Biological Evaluation of the Response Activities Contained in the Region 5 Regional Contingency Plan/ Inland Zone Contingency Plan for the Response to Spills of Oil in Fresh Water

Prepared for:

The United States Coast Guard

Ninth District

and

The United States Environmental Protection Agency

Region 5

Prepared by:

EnviroScience, Inc.

September 20, 2022

ACKNOWLEDGEMENTS

EnviroScience, Inc. prepared this document under contract with the U.S. Coast Guard (USCG). With close collaboration and support from the Endangered Species Act (ESA) Workgroup, EnviroScience prepared the contents, data analysis, presentation of findings, and mapping. The ESA Workgroup represents federal agency scientists and biologists from USCG, U.S. Environmental Protection Agency, U.S. Fish & Wildlife Service, National Oceanic and Atmospheric Administration, and Department of Interior.

Document links are provided where appropriate. For all web-based resources referenced in this BE, the current websites are listed in the endnotes at the end of this document; however, links are not maintained and may expire during this documents utility.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST ABBREVIATIONS AND ACRONYMS

ACP	Area Contingency Plan
AOC	Area of Concern
BA	Biological Assessment
BE	Biological Evaluation
BMP	Best Management Practices
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COTP	Captain of the Port
CWA	Clean Water Act
DOI	Department of Interior
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESI	Environmental Sensitivity Indices
FOSC	Federal On-Scene Coordinator
FR	Federal Register
FRP	Facility Response Plan
FWPCA	Federal Water Pollution Control Act
FY	Fiscal Year
GLERL	Great Lakes Environmental Research Lab
GRS	Geographic Response Strategy
MNDNR	Minnesota Department of Natural Resources
MNFI	Michigan Natural Features Inventory
MOA	Memorandum of Agreement
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEC	National Environmental Compliance
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
NRC	National Response Center
NRDA	Natural Resource Damage Assessment
NRT	National Response Team
NTSB	National Transportation Safety Board
ODNR	Ohio Department of Natural Resources
OPA 90	Oil Pollution Act of 1990
PAH	Polycyclic Aromatic Hydrocarbon
PCE	Primary Constituent Elements
RAM	Response Action Matrix
R5 RCP	Region 5 Contingency Plan
RCP	Regional Contingency Plan
RRT	Regional Response Team
SCAT	Shoreline Cleanup Assessment Technique
SMART	Special Monitoring of Applied Response Technologies
SORS	Spilled Oil Recovery System
SRM	Species Response Matrix

LIST ABBREVIATIONS AND ACRONYMS CONTINUED

SSC	Scientific Support Coordinator
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service
VRP	Vessel Response Plan
WIDNR	Wisconsin Department of Natural Resources

TABLE OF CHANGES FOR THE REGION 5 BE

Change Number	Section	Description of Change	Date	Initials
NA	Appendix G	Species removed from consideration during press period but may remain listed in Appendix G: Hall's Bullrush, Price's Potato Bean, Least Tern, and Kirtland's Warbler	9/2022	BW

EXECUTIVE SUMMARY

This biological evaluation (BE) assesses the potential for adverse effects on species and critical habitats protected under the Endangered Species Act (ESA) resulting from response actions used in the implementation of the Region 5 Regional Contingency Plan/Inland Zone Contingency Plan (R5 RCP) and subsidiary Coastal Zone Area Contingency Plans. This BE is considered a programmatic federal action that approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time. Lead federal action agencies, the U.S. Environmental Protection Agency (EPA) Region 5 and the U.S. Coast Guard (USCG) Ninth District, are directed by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and applicable laws to administer ACPs and oversee spill response within Region 5. The R5 RCP was developed to improve spill response effectiveness and provide consistency between spill response protocols and guidance published at local, state, and national levels.

The BE focuses on the potential effects of spill response actions carried out under the R5 RCP within the Action Area. The Region 5 Action Area is the inland and coastal zones of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, including tribal territories. The Action Area is divided into two operational areas, inland and coastal, which correspond to the areas in which EPA and USCG are responsible for providing On-Scene Coordinators. The effects evaluated are those associated with the specific spill response actions used to minimize the risks from the spilled material during an emergency response, and not the material itself. Within the context of this BE, the spilled material is considered part of the baseline condition.

The boundary of the Action Area focused on areas within Region 5 that are at higher risk for larger oil spills (>11,000 gallons), which correlates with high-volume transportation corridors such as hazardous liquid pipelines, major roads, high-capacity rail corridors (carrying unit trains of crude oil), and commercial shipping waterways, including the inland navigable waterways and shipping lanes within the Great Lakes; a 1-mi buffer was extended on both sides of the high-volume transportation corridors. Waters downstream of intersections with high-risk areas are included in the Action Area because a spill response will not cease at the extent of a 1-mi buffer; rather, the spill response actions will continue downstream as necessary to contain a spill.

A total of 90 species, including 10 proposed or designated critical habitats, were considered in this BE. The species list (current as of December 2021) was developed with input from the USFWS and includes ESA-listed species in Region 5 with distributions that overlap with the Action Area. The potential effects from implementation of the R5 RCP on ESA-listed species and proposed or designated critical habitats are evaluated in this BE in a step-wise process by first assessing the likelihood of exposure to spill response actions used within a defined environment and then analyzing the effects of those spill response actions on ESA-listed species and critical

habitat.

This BE addresses effects analysis for spill responses that occur within environments described based on a Response Action Matrix and habitat categories suggested by the National Response Team. There are seven primary environments defined for the Species Response Matrix (SRM): Shorelines; Ports, Canals, and Industrial Areas; Rivers and Streams; Bays and Estuaries; Ponds and Lakes; Wetlands; and Uplands. In addition to the environments defined for where spills occur, this BE also considers vulnerable habitats. Vulnerable habitats are those environments that harbor unique biota that are particularly sensitive to negative impacts that may result from spills.

For the purposes of this BE, vulnerable habitats were determined from the Regional Response Team 5 **Habitat Fact Sheets**[i] available from the Tools tab on the website.

The underlying assumption of this evaluation is that in the event of a spill, implementing an appropriate response action would provide greater protection for ESA-listed species and habitats than not responding to the spill. In the first step of the analysis, if there is low or no likelihood of exposure, then effects of the action are concluded to be discountable. If effects are not discountable, then the potential effects of a spill response on individuals will be analyzed in greater detail. That analysis includes the assumption that the responding agencies will implement the Best Management Practices (BMPs) and avoidance and conservation measures. In general, “No Effect” will be applied to species whose habitat does not overlap with the Action Area habitats or with areas within each environment where the activity is expected to occur in each environment. For example, the Iowa Pleistocene Snail does not occur in Rivers and Streams, and response activities occurring in Rivers and Streams would therefore have no effect on this species.

In addition to this BE supporting the federal coordination required under the ESA by the USCG and EPA, it also serves as a valuable tool for spill responders, in particular, OSCs and other stakeholders. It is expected that legislation changes and status listing of listed species and proposed and designated critical habitats will occur over time. Updates to this BE may be made periodically and are noted in the **Table of Changes**.

Section 1.0

1.0 INTRODUCTION

1.1 Purpose Statement

This biological evaluation (BE) assesses the potential for adverse effects on species and critical habitats protected under the Endangered Species Act (ESA) resulting from response actions used in the implementation of the Region 5 Regional Contingency Plan/Inland Zone Contingency Plan (R5 RCP) and subsidiary Coastal Zone Area Contingency Plans. Lead federal action agencies, the U.S. Environmental Protection Agency (EPA) Region 5 and the U.S. Coast Guard (USCG) Ninth District, are directed by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and applicable laws to administer ACPs and oversee spill response within Region 5.

The Region 5 Action Area is defined as the inland and coastal zones of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, including tribal territories. Per the R5 RCP:

"The Action Area has been divided into two operational areas, inland and coastal, which correspond to the areas in which EPA and USCG are responsible for providing On-Scene Coordinators. The coastal operational area consists of the open waters of the Great Lakes, including Lake St. Clair, the interconnecting rivers, major bays, ports, and harbors of the Region 5 States, and the land surface, land substrata, ground water, and ambient air proximal to those waters. The inland operational area includes all other land territories of the Action Area states, including each state's inland ponds, lakes, and rivers. Numerous Native American community reservations and treaty rights areas are also delineated within Region 5 (EPA and USCG, 2018)."

Overview Map of the Region 5 Action Area

Furthermore, the Action Area includes all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02). The federal action[1] under the scope of this BE are those oil spill response activities covered by the NCP, which are coordinated under Section 1321(d) of the Clean Water Act and Section 7(a)(1) of the ESA.

This BE provides the mechanism for the Action Agencies to coordinate with the U.S. Fish & Wildlife Service (USFWS) on spill response in the Action Area. This mechanism encompasses all actions warranted from spill response and includes potential effects of response tactics, including

[1] Per 50 CFR 402.02, the "Action" means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include but are not limited to: (a) actions intended to conserve listed species or their habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or (d) actions directly or indirectly causing modifications to the land, water, or air.

the means and methods used by responders in spill response. Spill response actions are described in **Section 2.0** and fall under two main categories: (1) Primary Response Actions and Supporting Interrelated or Interdependent Actions and (2) Secondary Response Activities. The BE describes listed species (collectively refers to ESA federally listed, petitioned, and candidate species) and designated critical habitats to be considered by responders and regional planners. The Action Agencies can use the information in this BE to develop best management practices and conservation measures to employ during spill responses to reduce or eliminate any harm to listed species significantly.

Formal consultation between the Action Agencies and USFWS is required if a spill response action "may affect" listed, proposed, and other species of concern or designated or proposed critical habitat. This BE is not part of an ESA Section 7 emergency consultation, but instead addresses a programmatic federal action that approves a framework for the development of future action(s) that are authorized, funded, or carried out at a later time. The regulatory definition for "framework programmatic action" further states that "any take of a listed species would not occur unless and until those future action(s) are authorized, funded, or carried out and subject to further Section 7 consultation. The Action Agencies should not solely rely on this document to proceed with response operations. The BE is intended to inform emergency consultations between the Action Agencies and USFWS by providing appropriate background information, questions for consideration when selecting and implementing spill response actions, a compendium of potential impacts of various response tactics, and potential vulnerabilities of species. Where this BE demonstrates response actions are "likely to adversely affect" a listed, proposed, or other species of concern or designated or proposed critical habitat, defining specific Best Management Practices (BMPs) and conservation measures is warranted.

1.2 Regulatory Framework

As required by the Clean Water Act of 1972, the NCP was revised to include a framework for responding to hazardous substance releases, as well as oil spills. Following the passage of Superfund legislation in 1980, the NCP was broadened to cover releases at hazardous waste sites requiring emergency removal actions. The current NCP was finalized in 1994 to reflect the oil spill provisions of the Oil Pollution Act of 1990 (OPA 90). The NCP establishes the National Response Team (NRT) and its roles and responsibilities in the National Response System. This system includes planning and coordinating responses, providing guidance to Regional Response Teams (RRT), coordinating a national preparedness planning and response program, and facilitating research to improve response activities.

The NRT is an organization of 15 federal departments and agencies responsible for coordinating emergency preparedness and response to oil and hazardous substance pollution incidents. Section 7(a)(1) of the ESA requires all federal agencies to use their authorities to conserve endangered and threatened species in consultation with USFWS. Other ESA sections relevant and applicable to this BE include the following:

- Section 7(a)(2) stipulates that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species that is determined by the Secretary of the Interior, after consultation as appropriate with affected states, to be critical.
- Section 7(a)(4) states that each federal agency shall coordinate with the Secretary of the

Interior on any agency action that is likely to jeopardize the continued existence of any species proposed to be listed under ESA Section 4 or result in the destruction or adverse modification of critical habitat proposed to be designated for such species. This paragraph does not require a limitation on the commitment of resources as described in subsection (d).

In 2001, USCG, EPA, Department of the Interior's (DOI) Office of Environmental Policy and Compliance, USFWS, and the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) developed and signed an inter-agency Memorandum of Agreement (MOA) regarding Oil Spill Planning and Response Activities under the NCP and ESA. The purpose of the MOA is to coordinate the requirements of both ESA Section 7(a)(1) and Section 7(a)(2) statutes. Federal agencies have responsibilities under both statutes, and the MOA outlines procedures to streamline the ESA compliance process before, during, and after a spill. The MOA is provided in **Appendix A**.

The NCP and the Code of Federal Regulations (40 CFR Part 300) outline the role of the NRT and RRTs. The NRT (through the MOA) provides the mechanism and rationale for establishing a workgroup as part of the pre-spill planning process (**Figure 1**). Workgroups comprise the Action Agencies and the other NRT agency members listed above. For this BE, the ESA Workgroup includes experts from USFWS, NOAA, DOI, and the Action Agencies (USCG and EPA). See **Appendix B** for a list of preparers and contacts.

If listed, proposed, or other species of concern, or designated or proposed critical habitat, are present in the planning area (spill area of occurrence), then implementing the planning process in **Figure 1** ensures that the Action Agencies will engage with subject matter experts. This planning process is considered informal consultation. Informal consultation is an optional process that includes all discussions, correspondence, etc., between USFWS and the federal agency or the designated non-federal representative prior to formal consultation if required. The BE herein references and uses the guidelines and procedures outlined in the MOA as well as those provided by NRT. This BE describes the current status of listed, proposed, and other species of concern and designated or proposed critical habitat that may be present in the proposed Action Area and meets the planning criteria defined in the MOA. Per the 2001 ESA MOA, the planning criteria are:

1. It is essential that the Area Committee engage USFWS and NMFS during the ACP planning process while developing or modifying the ACP and response strategies. This informal consultation can be used to determine the presence of listed species or critical habitat, and the effects of countermeasures, and to ensure that measures to reduce or avoid impacts to listed species and critical habitats during oil spill response activities are developed. By consulting on the anticipated effects prior to implementing response actions, decisions can be made rapidly during the spill, harm from response actions can be minimized, and implementation of response strategies specifically designed to protect listed species and critical habitat can be achieved.

2. The Area Committee Chair will request, in writing, that endangered species expertise and a species list be provided by the Services. The request should also describe the area and include a general description of the countermeasures being considered and the planning process to be used (e.g., a workgroup). In order to document the request for consultation and planning involvement, the request shall be sent to both NOAA and USFWS. For USFWS support, a request should be sent to the local USFWS field office(s), with a copy

to the USFWS Regional Response Coordinator (RRC) at the appropriate USFWS Regional Office(s) and the DOI RRT representative. It is the responsibility of the USFWS RRC, acting through the Ecological Services Assistant Regional Director, and the NOAA Scientific Support Coordinator (SSC) to act as a liaison between the respective Service and the Area Committee. USFWS will orally respond to the request within 30 days of receipt and provide a written response within 60 days. The response should include designation of a listed species expert to assist the Area Committee.

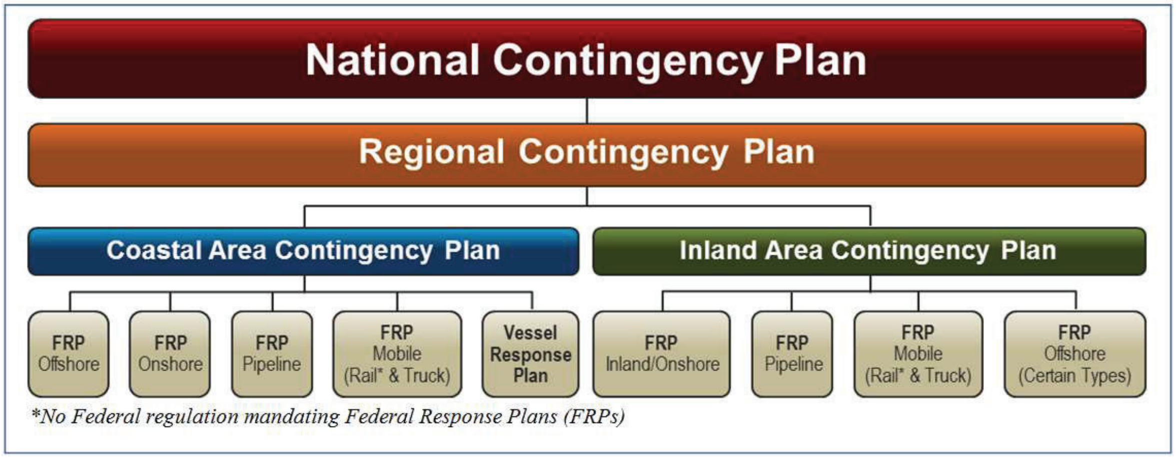
3. If listed species or critical habitat are present in the planning area being considered, the Area Committee should use a planning process that ensures engagement of Service experts. This process shall ensure that the appropriate participants jointly gather and analyze the information needed to complete the Planning Template in **Appendix C of the MOA**. This planning process constitutes informal consultation. The goals of this planning process are to identify the potential for oil spill response activities to adversely affect listed species and critical habitat and to identify for inclusion in the ACP information on sensitive areas, emergency response notification contacts, and any other information needed. Methods should be developed to minimize identified adverse effects and, where necessary, the plan should be modified accordingly. If specific sources of potential adverse effects are identified and removed, the Services will provide a concurrence letter and Section 7(a)(2) requirements will be deemed to have been met.

4. If, after the pre-spill planning process **Appendix C of the MOA** has been followed, it cannot be determined that adverse effects will not occur during a response action, the USCG or USEPA, as appropriate, will initiate formal consultation using the information gathered in **Appendix C of the MOA**; this information will be used by the Services to complete formal consultation. This will be a programmatic consultation that generally addresses oil spill response activities at issue in the plan area. At times when specific information is available about certain oil spill response methods and listed species and critical habitat, it may be possible to pre-approve particular activities that may be implemented in the event there is insufficient time to initiate emergency consultation before the need to take action.

5. All parties recognize that development and modification of the ACP is an ongoing process. Changes, including modifications to response actions or changes to the species list, should be addressed regularly through a dynamic planning process. The Services should contact the Area Committee or workgroup if they become aware of newly listed species that may be affected by planned response activities. The Area Committee should likewise notify the Services of changes to planned response activities. The Area Committee or workgroup should evaluate any changes and assess the need for additional consultation as needed.

1.2.1 Response Planning under the Region 5 RCP/ACP

The underlying authorities for spill response planning come from various acts, including the Federal Water Pollution Control Act (FWPCA) and the OPA 90, and are codified at 33 U.S.C. § 1321. This statute provides the president the authority to respond to a discharge or substantial threat of discharge of oil or a hazardous substance. It also lays out a framework of plans to prevent and respond to pollution threats, including establishing an NCP, ACPs, Vessel Response Plans (VRP), and Facility Response Plans (FRP). This multi-layer system encompasses national, regional, area, vessel, and facility-level participants.



The NCP provides overarching guidance for RCPs and ACPs concerning organizational structure and procedures for preparing for and responding to oil, hazardous substance, pollution, and contaminant discharges and releases. In accordance with the NCP, the lead agency provides the Federal On-Scene Coordinator (FOSC) to plan and implement response actions under the NCP. In the coastal zone, the NCP applies to discharges into or on the navigable waters of the United States, on the adjoining shorelines, and those that may affect natural resources belonging to, appertaining to, or under the exclusive management authority of the United States (see 40 CFR §300.5). Through Executive Order 12777, the president delegated to EPA responsibility for designating the response areas and appointing the committees for the inland zone as designated in the NCP. The Region 5 RCP/ACP has been developed in accordance with the NCP and takes into consideration relevant USCG ACPs.

1.2.2 Response Jurisdiction

Region 5 is divided into two operational areas, coastal and inland, which correspond to the areas where EPA and USCG are responsible for providing FOSCs. The coastal operational area consists of the open waters of the Great Lakes, including Lake St. Clair, the interconnecting rivers, major bays, ports, and harbors of the Region 5 States, and the land surface, land substrata, ground water, and ambient air proximal to those waters. The inland operational area consists of all other land territories of the Region 5 Action Area, including each state's inland lakes and rivers.

Two Coast Guard Districts share EPA Region 5. The Ninth Coast Guard District, headquartered in Cleveland, serves the Great Lakes drainage basin. The Eighth Coast Guard District, headquartered in New Orleans, serves the drainage basins of the upper Mississippi and the Ohio Rivers. The Eighth and Ninth Coast Guard District boundary is at River Mile 187.3 on the Illinois River. Within the Great Lakes coastal zone, the appropriate Captain of the Port (COTP) functions as the predesignated FOSC for all oil and hazardous substance releases (subject to redelegation of certain Comprehensive Environmental Response [CERCLA] response authorities). EPA performs the following types of response actions within the coastal zone: 1) remedial actions for releases originating from facilities, and 2) all response actions for releases originating from hazardous waste management facilities. EPA is the predesignated FOSC for the entire inland zone, including the inland river system within the Eighth Coast Guard District, for responding to all discharges of oil and hazardous substances. Per an MOA between EPA Region 5 and the

Eighth Coast Guard District, USCG has agreed to respond to spills from commercial vessels only within the inland zone portion of the Eighth District only. The R5 RCP details a complete list of jurisdictional responsibilities within Region 5.

Ordinarily, the USCG (the Eighth or Ninth Coast Guard District for this BE) will not provide the OSC for a release occurring in the inland zone. However, where a Marine Safety Officer responds in the inland zone to a marine casualty or other incident pursuant to USCG port safety and commercial vessel safety responsibilities, that officer will serve as the first FOSC, pending arrival of the predesignated EPA OSC. In this capacity, that officer will manage any cleanup actions performed by the responsible party and, if necessary, will initiate a federal removal. The US EPA Region 5 office may request that the Eighth/Ninth Coast Guard District provide the OSC for a release in the inland zone, regardless of source, because of the particular circumstances of the incident.

The NOAA provides scientific support for oil and chemical spills as directed by the NCP 40CFR 300.145. NOAA's Emergency Response Division has dedicated staff scientists able to provide oil spill trajectories, persistence models, environmental impact, and clean up recommendations. The SSC is an on-scene responder and a direct report to the FOSC. The SSC's primary role is to support the USCG and participate in EPA-led responses upon request.

1.2.3 Planning Areas

EPA R5 and the USCG integrate several response plans and sub-areas within Region 5. Area specific plans are obtainable from the RRT 5 website and a summary of active plans within R5 is provided in **Table 1**, which is organized by State.

There are five main types of spill response plans: Regional Contingency Plans (RCP), Area Contingency Plans (ACP) and subsidiary Geographic Response Strategies (GRS), Facility Response Plans (FRP), and Vessel Response Plans (VRP). The scope and context are detailed below.

Regional Contingency Plans (RCP) – RCPs provide the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The RCP provides a framework through which ACPs in that region will be consistent with each other, with the NCP, and with other federal emergency response plans. RCPs take the national concepts for planning and preparedness and narrow them to a specific geographical region for each federal region. The RCP also describes the mechanisms by which the RRT assists FOSCs before a response, through planning and training activities, and during a response, through organizational and coordination assistance.

Area Contingency Plans (ACP) – An ACP is a reference document prepared for the use of all agencies engaged in responding to environmental emergencies within a defined geographic area. ACPs align with the NCP and RCPs to ensure consistency of planning and preparedness at the local, regional, and national levels. The ACP contains specific oil and hazardous substance spill response, incident management, and all-hazards preparedness planning elements and is focused on a smaller geographic region within the area covered under the RCP. Sub-regional concerns may also be addressed by Sub- Area Plans, which are more limited in scope, but include many of the same elements as ACPs.

Geographic Response Strategies (GRS) – An ACP may also contain Sub-Area and GRSs, which may have more limited scope than the ACP itself. The ACP is the mechanism to ensure that all responders have access to essential area-specific information. The GRSs that fall within the RCP/ACP include geographic response plans, which contain spill response plans specific to coastal and inland zones of Region 5. The GRSs guide spill response and include tactical response plans tailored to a particular shore or waterway (e.g., the Mississippi River has several defined planning areas). They are considered part of the R5 RCP but are distributed and revised separately. Within the GRSs, sensitive resources are broadly defined to include human and cultural resources, as well as species and habitats of concern, not just ESA-listed resources.

Facility Response Plans (FRP) and Vessel Response Plans (VRP) – Under 33 U.S.C. 1321 (j)(5), marine transportation-related facilities and vessels are mandated to develop response plans. The statute applies to facilities (including pipelines), vessels over 400 gross tons, and tank vessels, as defined in 33 CFR § 155.1015, that could reasonably cause substantial harm to the environment by discharging oil into or on the navigable waters of the United States and adjoining shorelines. These facilities and vessels are required to maintain response plans specific to and consistent with the NCP (40 CFR § 300) and the applicable RCPs and ACPs. No federal regulation currently requires rail or trucking companies to develop response plans.

The R5 RCP and subordinate ACPs and GRSs contain administrative and technical guidance for the response community to follow during an emergency response to a spill. The plans establish procedures designed to minimize the imminent threat to human health or the environment from an uncontrolled release of oil or other hazardous substances. The FOSC will initiate Emergency Consultation under ESA Section 7 when there is a possibility that response action may affect endangered species. This BE will inform that Emergency Consultation.

This BE focuses on the potential effects of spill response actions under the R5 RCP and subordinate ACPs and GRSs within the proposed Action Area. Within the context of this BE, the spilled material is considered part of the baseline condition. Specifically excluded from this BE, however, is an evaluation of the effect of the spilled material itself on ESA-listed species or designated critical habitat.

1.3 Response and Spill Consultation History in Region 5

This section describes where spills have occurred in the past within the Action Area and the impacts of previous spills after the enactment of OPA 90. This section provides an overview of existing spill issues that may affect listed, proposed, or other species of concern, critical habitat, and vulnerable habitats within the Action Area.

1.3.1 History of Response Area – Incident & Impact of Previous Oil Spills in Action Area

The Great Lakes are a bi-national treasure, forming the largest freshwater system on Earth. This system greatly affects the way of life for tens of millions of people and all aspects of the region's natural environment, from weather and climate to wildlife and habitat. During the colonization of North America, many generations first explored, then exploited, the Great Lakes, which watermarked the development of the heartlands of the United States and Canada. The Great Lakes shorelines became magnets for population growth, anchoring major cities like Chicago, Detroit, Buffalo, Cleveland, Rochester, Milwaukee, Toronto, Windsor, Hamilton, and Burlington. Tens of millions of residents now rely upon the Great Lakes for their freshwater supply.

Over more than a century, the region developed massive trade, industrialization, and transportation infrastructure. Rapid, unchecked growth and lack of environmental awareness created large-scale Great Lakes pollution and contamination. After decades of pre-modern practices, this trend was eventually reversed, to a large extent, by concerned groups and key initiatives such as the Clean Water Act, the Federal Water Pollution Control Act, and the 1972 and 1978 Great Lakes Water Quality Agreements. Since the 1972 agreement, 43 Areas of Concern (AOC) were identified, 26 located within the United States, 12 located within Canada, and 5 shared by both countries. As a result of collective efforts, the Great Lakes have experienced an overall rejuvenation. An overview of oil pollution incidents by volume in the Ninth Coast Guard District from fiscal year (FY) 2006–2016 is provided below.

Because of widespread preventative measures, frequent exercises and drills, and strict enforcement, major and medium spills in the Great Lakes coastal zone occur infrequently. Ninety-nine percent of the response cases within the last 10 years have been spills of less than 1,000 gallons. This record of accomplishment is indicative of a system of preparedness and response that has successfully safeguarded Great Lakes waters from significant environmental damage wherever possible.

In the past 10 years, approximately 99% of oil and hazardous materials spills in the Action Area reside in the "minor" spill category defined by the NCP (less than 1,000 gallons of oil). Routine responses to these types of spills under the R5 RCP and freshwater ACPs often rely on natural dissipation or evaporation and require little to no mechanical or non-mechanical cleanup techniques.

Enbridge's Liquids System and the 1,900-mile Lakehead System (the U.S. portion). *Figure borrowed from NTSB report (NTSB, 2010)*

While large-scale incidents are rare, an example of one significant spill occurred on Sunday, July 25, 2010, when a segment of a 30-inch-diameter pipeline (Line 6B), owned and operated by Enbridge Incorporated, ruptured in a wetland in Marshall, Michigan. The rupture occurred during the last stages of a planned shutdown and was not discovered or addressed for over 17 hours. During the time-lapse, Enbridge twice pumped additional oil (81%

of the total release) into Line 6B during two startups; the total release was estimated to be 843,444 gallons of diluted bitumen (dilbit). The lighter components of the oil evaporated into the air, leaving the heavier components to weather and drift in the water column, eventually sinking to the river bottom. The oil saturated the surrounding wetlands and flowed into Talmadge Creek and the Kalamazoo River. Local residents self-evacuated from their houses, and the environment was negatively affected. Cleanup effort costs exceeded $767 million as of the National Transportation Safety Board report (NTSB, 2010). About 320 people reported symptoms consistent with crude oil exposure. Significant impacts to wildlife and vulnerable habitat were identified, and restoration activities are still underway. No fatalities were reported. Cleanup and most of the primary restoration took approximately four years.

Spill Response: An Example for Hine's Emerald Dragonfly and Designated Critical Habitat

The Lockport Illinois Buckeye Oil Spill occurred in Will County, Illinois in 2010. The crude oil flowed from an accidental pipeline leak into designated critical habitat for the endangered Hine's Emerald Dragonfly (*Somatochlora hineana*) (HED). Crude oil cleanup activities began in 2010 and cleanup and restoration activities are ongoing as of 2022. The proposed action for which USFWS consulted was the clean-up and restoration of the area impacted by the crude oil spill release. The clean-up and restoration were administered by an EPA Compliance Order. The 2015 Biological Assessment (BA) drafted for the spill proposed 27 action steps for the cleanup and restoration process as well as 18 measures to reduce or avoid impacts to listed species and habitat.

HED adults and larvae were observed in the affected area. The spill and subsequent response to the crude oil release incident likely directly affected HED individuals when occupied larval habitat was permanently destroyed and over two acres of designated critical habitat were impacted (Hey and Associates, 2015). Because of restoration efforts conducted on site, the Responsible Party's Draft BA stated that the there was "no net adverse modification to the Critical Habitat other than temporal loss of function during spill response operations" (Hey and Associates, 2015). However, USFWS determined that the spill permanently destroyed HED critical habitat and full restoration was therefore not possible. Some limited on-site restoration was conducted to satisfy requirements of Section 404 of the Clean Water Act (USFWS, pers. comm., 2022).

The HED case example provides an illustration of the importance of following the Planning Process described in **Section 1.2.1**. The proposed action steps were extensive and intended to follow the USFWS guidance of analyzing the overall proposed action to determine the adverse effects to HED and its designated critical habitat. A summary of the action steps is listed below and demonstrates primary response and interrelated/interdependent actions that can occur during a spill (**Section 2.0**). Descriptions of some of these steps have been updated or clarified from the text in Hey and Associates (2015) with input from USFWS. The USFWS Chicago Field Office retains additional details and specifics regarding this HED case example that may not be included in the list below.

1) During the initial or emergency response, crews used vacuum trucks, sorbent boom, wheel-skimmers, and other machinery to recover and remove as much crude oil from the environment as possible in an expeditious manner that minimized additional impacts to the ecosystem.

2) Visual surveys were completed to determine the maximum aerial extent of crude oil on the ground surface within a perimeter containment system (sorbent boom, hard/containment

boom, and certified weed free strawbales).

3) Site demarcation to isolate affected and vulnerable habitats within the action area was proposed but limited to the designated critical habitat without necessarily including all potential HED larval habitat. Most of the impacted area was critical habitat. No additional effort was made to demarcate potential HED larval habitat.

4) Crude oil was recovered using vacuum trucks and sorbents, followed by excavation of the top one (1) to two (2) feet of impacted soil. Excavation was deeper in some areas including pockets and fractures within the bedrock that likely served as conduits for groundwater flow that was essential to the hydrology of the HED larval habitat. This deep excavation is one of the main factors that led to permanent habitat destruction.

5) Placement, transportation, and sampling of excavated soil was proposed, but not done in coordination with the State and Federal Trustees.

6) Installation and monitoring of plastic drain tile with recovery stubs and sumps placed in strategic locations to remove residual crude oil that could not be removed via excavation.

7) To address remaining residual oil contamination attenuation, additional soil and bedrock borings were performed. This included countermeasures to address the surface and subsurface migration of crude oil, which included excavation and removal of oil impacted soil, construction of shallow intercept trenches/earthen barriers, and sorbent booms.

8) Evidence suggests increased natural attenuation of crude oil in areas of increased precipitation infiltration (Delin et al., 1998). In this example, storm water entering the site appeared to be influential in attenuating the remaining oil. To enhance the natural attenuation of the remaining crude oil, removal of the drain tile and sump system, re-grading with gravel, and construction of low rock rubble ditch checks to slow storm water flow to promote more infiltration was proposed. "An enhanced natural attenuation corrective action versus chemical injection or other remediation methods that remove and/or treat groundwater will limit the amount of disturbance to the area's hydrology and be more protective of the habitat for the HED (Hey and Associates, 2015)." The USFWS proposed excavating the railroad bed to prevent continuing releases of oil over time, but EPA did not choose to order this action. However, ongoing contamination was determined to be one of the factors that permanently destroyed HED larval habitat at the site.

9) The more heavily oiled areas of the wetland were excavated using tracked, extended reach excavators operating from untreated timber mats.

10) After the initial excavation was completed, a qualitative transect observation protocol approved by EPA was carried out. Further actions were necessary to reduce the amount of residual, mobile, black crude oil in the bottom sediments and a removal plan was proposed.

11) Clean up included "release" residual oil from the sediment and allow the oil to float to the surface by its own buoyancy where it could be collected or allowed to dissipate naturally. A water jet array was constructed to hydraulically agitate the bottom sediments and deployed in the eastern half of the excavated area using an aluminum jon boat. They were consistently able to float oil to the surface of the open water, with more oil production on days with warmer ambient temperatures. It is estimated that this procedure recovered

approximately 2000 gallons of crude oil using skimmers and vacuum trucks.

12) Quantitative sampling of the sediments and water in the action area to provide an understanding of the nature and extent of residual oil remaining in the soft sediments within the excavated and proximal open water areas after the hydraulic agitation operations. While significant oil had been removed from the affected action area with the techniques described above, sampling results showed that some residual oil remained in the sediments in the excavated area. The surface water sampling indicated that the water met ecological screening levels for benzene, toluene, ethylbenzene and xylene (BTEX), yet the bottom sediments did not meet screening levels for BTEX or polycyclic aromatic hydrocarbon (PAH) toxic unit protective levels at some sample locations.

13) Climatic conditions influenced how the action plan was executed. Drought conditions during the cleanup and remediation process allowed for areas of BTEX and PAH exceedance concentrations to be excavated in the dry instead of needing to be dredged. This excavation removed an additional 3400 tons of soil and dolomite. Upon removal of the shallow soils of the re-excavated area, black crude oil was observed in some fractures in the weathered dolomite. Excavators removed weathered dolomite with mobile black oil visible during this excavation. Visual observations were used to define the area of rock excavation based on visible oil in the weathered dolomite.

14) All rock and soil from this operation was hauled offsite. Additional soil/rock borings were completed to help define the geographic extent of oil in the weathered dolomite. Additional sampling was performed after the additional excavation was completed. Samples were collected by small crews using hand tools.

15) Approval was obtained for a dewatering system using water-filled bladder dams to coffer off the work area in areas where water was observed once the drought was over.

16) Confirmatory samples were then taken across the entire excavated area and extended to the decontamination station and dewatering containment cell locations. Sample points were on an expanded 75-foot grid that included all previous sample locations.

17) When residual crude oil levels were determined to be such that the risk to environmental receptors[2] was lower than the anticipated impacts from further recovery operations and the appropriate regulatory agencies had signed off, the area was proposed to be restored to emergent wetland similar to the pre-spill condition.

18) Unaffected soil from other locations within the site was used for backfilling once the dolomite had been placed. The donor soil areas were cleared of dense invasive brush vegetating the areas. All wood and chips from this operation were hauled offsite and disposed of in an appropriate manner.

19) Once these soil donor areas were cleared, excavation equipment accessed the area using mat roads constructed of composite or un-treated timber mats. Soil was loaded into small low ground pressure dump trucks and hauled to the restoration area for placement. Excavation depth of soil donor areas was limited to ensure sufficient topsoil remained to

[2] Environmental receptor is defined at 40 CFR §68.3 as "natural areas such as national or state parks, forests, or monuments; officially designated wildlife sanctuaries, preserves, refuges, or areas; and Federal wilderness areas" which could be exposed to an accidental release.

support appropriate revegetation at the donor site.

20) Engineered soil, purchased and imported to the site for backfill, was created to be as close in physical properties to the native onsite soil as possible.

21) Topography/bathymetry data collected was compared with topography data from during the initial response (prior to excavation but excluding areas with deep surface oil deposits) to determine soil needs. The volume of soil taken up by the root-wads of the shrubs and trees was included in the calculation.

22) A system of active dewatering (water-filled bladder dam) to enable placement of the backfill soils and minimize sedimentation downgradient was also included. Water was pumped out of the work area within the bladder dam area using pumps and discharged through an appropriate and approved filtration system and considered discharge downgradient to account for sensitive wetland areas.

23) Within each dewatered work area, backfill soil was placed in the site using tracked excavators working from mats, bare rock areas, or newly backfilled areas. Final grading included micro-topographic variation for a more robust and natural wetland restoration, and to minimize soil compaction.

24) Once the backfill soils were placed to match existing topography, vegetation restoration occurred. The intent was to restore the vegetation to the pre-spill condition with the exception of reestablishing woody species. Seeding and transplanting rooted plant material was described in a Restoration Plan. The implementation of the actions described in the Ecological Restoration Plan was the last phase of work under the Compliance Order.

25) Prescribed burning was proposed as an ecological management tool in and around the affected site but was not conducted.

26) Some invasive species control (e.g., use of herbicides) other than prescribed burns was deemed to be necessary to successfully complete and meet restoration goals and approved performance standards. Best management practices, including USFWS restrictions on herbicide use/application in or near larval HED habitat, were proposed to avoid and minimize collateral damage to non-target species. However, when the site was later determined to be incapable of being restored to HED habitat due to the contamination and clean up response activities, these measures were not considered essential to protect HED.

27) Monitoring of the site was to be initiated once vegetation had been planted. Monitoring included assessment of vegetation, hydrology, invertebrate communities, and HED habitat constituent elements. It is unknown at the time of preparation of this BE the status of monitoring on site.

There were 18 avoidance and minimization measures presented in the Lockport Spill BA designed to reduce or avoid impacts to HED and its designated critical habitat (Hey and Associates, 2015). The list below (paraphrased and excerpted from the 2015 BA) applies to the measures employed at the Lockport Site and could serve as examples of appropriate avoidance and minimization measures for other spills within R5 utilizing similar response strategies.

1) A containment system was constructed around the affected wetland that consisted of

sorbent boom, hard/containment boom, and straw bales. Certified weed-free/seed-free straw bales were used to avoid introduction of invasive species into the wetland. Weed-free/seed-free straw bales and sandbags were used along the access roads to reduce the flow of water into the contaminated area, reducing the total volume of water flowing through the site that could potentially become contaminated.

2) A series of water and sediment sampling points were established to aid in detection of any spread of any dissolved phase petroleum constituents. Additional sampling locations were added as needed to ensure adequate understanding of water quality in the draining pathways, although sampling was not always conducted during high water events when releases may have been occurring.

3) A survey of existing topography was conducted prior to excavation activities. This topographic information was used to help keep the oil contained and to avoid impacts to other habitats in the area, and to guide the ultimate restoration of the area. Topographic information was also specifically gathered in the area of the temporary dewatering containment cell to facilitate the restoration of that area.

4) During the early spill response and cleanup operations, intensive HED surveys (e.g.: larvae, or the host devil crayfish [crayfish burrows used by HED to overwinter]) were performed. The surveys were intended to inform further avoidance of impacts to this species and help in identifying opportunities to restore or enhance habitat on the site.

5) Upon evaluation of initial response activities and considering possible future impacts if heavily oiled vegetation and soil were left in place, excavation of selected wetland areas was chosen as the most effective cleanup tactic for the next phase of response to the spill. Vacuum trucks and skimmers, aided by physical herding and steam thawing (use of steam to keep open water areas thawed, and skimmers functional), were initially deployed to remove oil from the affected marsh area, and were very effective at removing a significant volume of the oil. Investigation revealed that in the areas of heavily oiled vegetation, the oil had penetrated into the soil profile approximately 6-10 inches. Thus, shallow excavation was the most prudent method to remove additional oil from the wetland system. The goal was to remove crude oil as efficiently as possible to reduce the likelihood that petroleum constituents could delay recovery or restoration within the visibly impacted areas or move beyond the visibly oiled area farther into the wetland system including HED habitat on the site. The approach used was to conduct shallow excavation with extended-reach excavators operating with a toothless bucket. This approach reduced any deeper disturbance of the native soil from bucket teeth and reduced the likelihood of pushing oil any deeper into the soil profile during this operation. The limits of the excavation were defined by using soil test pits to observe penetration of oil into the soil profile versus an unimpacted profile.

6) During excavation activities, the contaminated soil was placed directly into off-road low-ground pressure specialized dump trucks operated from untreated timber mats. The untreated timber mats were selected to reduce any compaction of the wetland soils from the dump trucks. Untreated timber mats were used to avoid any potential contamination of the wetland from treated timbers.

7) The containment dewatering cell was located and sized to avoid/reduce impacts to the

surrounding wetlands. The details of the cell design included several measures to ensure its integrity throughout dewatering operations.

8) Alternative locations were evaluated for the dewatering cell.

9) Logistics were also considered for the location of the cell. Specifically, the location chosen allowed the trucks used to haul the material offsite to remain on the gravel access road. This avoided further construction of additional mat roads or gravel access pads to bring larger trucks into the site. After the initial excavation was completed, the dewatering cell was dismantled so that the area could recover.

10) The objective of the next stage of the cleanup was to “release” residual oil from the sediment and allow the oil to float to the surface by its own buoyancy where it could be collected or allowed to dissipate naturally. This effort was aimed at removing as much residual crude oil as possible, while minimizing the impacts to the wetland from further excavation.

11) The quantitative sediment and water samples from the excavated area indicated that residual oil constituents remained that were in concentrations above protective thresholds. Climatic conditions during the cleanup operations presented an opportunity where the two areas of BTEX and PAH exceedance concentrations in the sediments were able to be excavated in the dry during drought conditions. This excavation removed an additional 3400 tons of soil and dolomite and did not require the construction of a dewatering cell.

12) Excavation of black crude oil that was observed in some fractures in the weathered dolomite was removed. All rock and soil from this operation was hauled offsite to an appropriate landfill. Additional soil/rock borings were completed with a sonic drill rig to help define the geographic extent of oil in the weathered dolomite. While this second excavation removed more of the native wetland soil and weathered bedrock causing additional impacts within the original excavated area, it represented the most effective and efficient way to remove remaining residual oil from the wetland ecosystem and prevent its migration into additional wetland areas.

13) Where oiled dolomite had been observed, the area was dewatered using pumps and a carbon filtration system. Any areas showing visible mobile black crude oil were further excavated. Discharge water samples confirmed that the carbon filtration system was functioning, and the discharge had non-detections of BTEX and PAHs.

14) Untreated timber mats and composite mats were used throughout all phases of the clean-up and restoration activities to minimize soil compaction and rutting from equipment and trucks. All vehicles and equipment were to remain on designated access or mat roads and work platforms, with the exception of the tracked sonic drill rig used for soil borings.

15) Backfill soils were utilized as backfill for restoration since they were more likely to be of the same physical and bio-chemical characteristics as the native soil removed from the site. It is not known at the time of writing this BE if backfill soils were unaffected soils from the site or purchased engineered soil.

16) A migratory bird hazing program was implemented to keep migratory birds from venturing into the clean-up area and risk exposure to any potentially remaining contaminants until cleanup activities were completed.

17) An oil water separator was used to recover oil that followed pipelines that crossed under railroad tracks and traversed the site. This reduced the risk of oil remaining in the railroad bed and along the pipelines from migrating into wetland habitat areas.

18) Monitoring wells and rock/soil borings provide data regarding all cleanup and restoration activities post remediation.

A Natural Resources Damage Assessment (NRDA) cooperative agreement between all parties (unnamed for this BE) was made in 2014 for the Lockport Site. The agreement provided the framework for a cooperative NRDA to facilitate resolution of any natural resource damage claims arising under the OPA. The agreement described how the parties would "undertake cooperative studies, determine and quantify injuries to natural resources, develop and implement restoration plans and pay for reasonable assessment costs" incurred by the USFWS, Illinois Department of Natural Resources, and the Illinois Environmental Protection Agency (collectively the Trustees).

Sections 1006 and 1012 of the OPA (and implementation of Natural Resource Damage Assessment (NRDA) regulations under CERCLA and the Clean Water Act (CWA), as amended), authorize natural resource trustees to determine injuries to natural resources resulting from releases of oil and hazardous substances, assess natural resource damages (including reasonable costs of assessing damages), present claims, recover damages, and develop and implement plans for the restoration, rehabilitation, replacement, or acquisition of the equivalent of the injured natural resources under their trusteeship.

The NRDA process is implemented concurrently with spill response efforts and may continue for years following an incident. The NRDA process may be completed cooperatively with Responsible Parties (RP), and consists of the following general phases:

- Pre-spill Planning Phase: Trustees, sub-area committee members, Potential Responsible Parties (PRP), and the public coordinate and initiate planning activities to ensure a cost-effective and coordinated assessment in the event of a discharge.
- Pre-assessment Phase: Trustees must formally decide to initiate this phase (Preassessment Determination) and must determine whether to proceed with a damage assessment (Damage Assessment Determination). The trustees identify potentially affected resources and may complete limited data collection and analysis during this phase.
- Damage Assessment Phase: Spill-related injuries to natural resources are determined and quantified, and damages are determined based on restoration and planning costs. The trustees may use compensation formulas, models, and/or conduct extensive biological and environmental sampling and detailed economic evaluations to make these assessments.
- Post-assessment Phase: A demand for total damages claimed by the trustees resulting from the discharge is presented to the responsible party. The demand identifies the discharge, the applicable trustees, the amount of damages, and a Report of Assessment describing the trustee restoration approach and its cost.
- Restoration Phase: Trustees implement projects sufficient to restore, replace, or acquire the equivalent of those natural resources lost or injured due to the release of oil or hazardous substances.

Despite the avoidance and minimization measures employed during cleanup, the Trustees determined that natural resources and services had been injured, and that response actions at the spill site did not fully address these injuries, and in fact caused additional injuries. Throughout the injury assessment and restoration planning process, the Trustees used available information, expert scientific judgment, information generated through response activities, and literature on the fate and effects of oil spills on natural resources and their services to arrive at the best estimate of the injuries. The Trustees concluded that the oil spill resulted in significant and long-lasting injury to a critical habitat for HED, and habitat for Blanding's turtle (*Emydoidea blandingii*) and migratory birds.

According to the Lockport Natural Resource Damage Restoration Overview Document, the Trustees evaluated potential restoration options based on the assessment of injuries to the HED and the habitat for Blanding's turtle and migratory birds (USFWS, ILDNR, and ILEPA, 2021). This includes identification of restoration techniques, locations for restoration projects, and evaluating the costs of restoration. In doing so, the Trustees considered the criteria outlined in the regulations (at 15 CFR § 990.54), including but not limited to, the cost to carry out the alternative, the likelihood of success of the alternative, the extent to which the alternative was expected to meet the Trustees' goals and objectives in returning injured natural resources and services to baseline and/or compensating for interim losses, and the extent to which the restoration alternative was expected to provide benefits to more than one natural resource and/or service. For the Lockport Oil Spill, there are four main types of restoration categories: (1) restoration of Blanding's turtle habitat; (2) restoration of migratory bird habitat; (3) HED captive rearing; and (4) restoration of HED habitat.

The Lockport Oil Spill, although it occurred over 10 years ago, is still undergoing regulatory review under the OPA and moving through the NRDA process. The federal and state Trustees for the NRDA settled with the parties responsible for the spill in 2021 for over $7M in damages for injuries to natural resources and for unauthorized impacts to wetlands. These funds are to be used for additional off-site restoration work. The avoidance and minimization measures used at the Lockport Site did not provide for complete protection of resources affected by the spill but did reduce some impacts. Coordinating spill response early in the planning process and identifying avoidance and minimization measures for the listed species and designated or proposed critical habitats within R5 for commonly used response actions can reduce impacts and permanent damage to habitats, but not necessarily eliminate them for significant spills in highly sensitive areas. Real-time coordination is key for maximizing the success of both cleanup and restoration at spill sites.

1.3.2 Oil and Substances Addressed in the R5 RCP

Oil production from the United States and Canadian Midwest has increased dramatically over the past few decades due to shale and oil sand substances emanating from regional deposits. Significant percentages of oil products are transported by truck, tank vessels, rail, and pipeline to or through the Great Lakes/Midwest region. Pipelines and rail cars are the primary modes for transportation of crude oil products. Rail shipments of crude oil products through the region, for example, have increased more than ten-fold over the past decade. These modes cross the Great Lakes or their tributaries and run alongside or nearby Great Lakes shorelines in several other areas. One example of an increase in transit from the St. Lawrence Seaway Management Corporation is that approximately 5 million (US) tons of "liquid bulk" transited the St. Lawrence Seaway in 2019 increasing from 3.3 million tons in 2012.

In general, the oil and hazardous substances under the umbrella of this BE include crude oil and other petroleum derivatives, including low sulfur fuels. It does not include natural gas products which fall under the authority of the Federal Energy Resource Commission, nor does it address all hazardous substances as defined by CERCLA[3]. Oil as defined by Section 311(a)(1) of the CWA includes "oil of any kind or in any form, including, but not limited to, petroleum, fuel oil (including low-sulfur [diesel] fuel), sludge, oil refuse, and oil mixed with wastes other than dredged spoil. Oil as defined by Section 1001 of the OPA means oil of any kind or in any form, including petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil, but does not include any substance which is specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. 9601) and which is subject to the provisions of that Act [42 U.S.C. 9601 et seq.].

1.3.3 Description of the Average Most Probable Discharge, Maximum Most Probable Discharge, and Worst-Case Discharge

Spills are classified by size and information is included in RCPs and sub-area ACPs to provide context or indicator of the type and scope of discharges that may occur in the region. For the scope of this R5 it is not practical to list the 500+ worst-case discharges that are listed; however, it is important to convey the context of how these relate for pre-spill planning processes described in **Section 1.2.1**. Discharges are classified into three categories.

- <u>Average most probable discharge</u> is a discharge of the lesser of 50 barrels or 1 percent of the volume of the worst-case discharge.
- <u>Maximum most probable discharge</u> means a discharge of the lesser of 1,200 barrels or 10 percent of the volume of a worst-case discharge.
- <u>Worst-case discharge</u> means in the case of an onshore facility and port, the largest foreseeable discharge in adverse weather conditions. An FRP must use the appropriate criteria to develop the worst-case discharge. These criteria are:
    - Where applicable, the loss of the entire capacity of all in-line and break out tank(s) needed for the continuous operation of the pipelines used for the purposes of handling or transporting oil, in bulk, to or from a vessel regardless of the presence of secondary containment.
    - The discharge from all piping carrying oil between the marine transfer manifold and the non-transportation-related portion of the facility. The discharge from each pipe is calculated as follows: The maximum time to discover the release from the pipe in hours, plus the maximum time to shut down flow from the pipe in hours (based on historic discharge data or the best estimate in the absence of historic discharge data for the facility) multiplied by the maximum flow rate expressed in barrels per

[3] *The term "hazardous substance" means (A) any substance designated pursuant to section 311(b)(2)(A) of the Federal Water Pollution Control Act [33 U.S.C. 1321(b)(2)(A)], (B) any element, compound, mixture, solution, or substance designated pursuant to section 9602 of this title, (C) any hazardous waste having the characteristics identified under or listed pursuant to section 3001 of the Solid Waste Disposal Act [42 U.S.C. 6921] (but not including any waste the regulation of which under the Solid Waste Disposal Act [42 U.S.C. 6901 et seq.] has been suspended by Act of Congress), (D) any toxic pollutant listed under section 307(a) of the Federal Water Pollution Control Act [33 U.S.C. 1317(a)], (E) any hazardous air pollutant listed under section 112 of the Clean Air Act [42 U.S.C. 7412], and (F) any imminently hazardous chemical substance or mixture with respect to which the Administrator has taken action pursuant to section 7 of the Toxic Substances Control Act [15 U.S.C. 2606]. The term does not include petroleum, including crude oil or any fraction thereof which is not otherwise specifically listed or designated as a hazardous substance under subparagraphs (A) through (F) of this paragraph, and the term does not include natural gas, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas).*

hour (based on the maximum relief valve setting or maximum system pressure when relief valves are not provided) plus the total line drainage volume expressed in barrels for the pipe between the marine manifold and the non-transportation-related portion of the facility.

- For a mobile facility it means the loss of the entire contents of the container in which the oil is stored or transported.

Worst-case discharges in R5 can be accessed on the RRT5 website. An example of four scenarios by transportation type of worst-case discharges as described in the Sector Lake Michigan Geographic Response Plan for the Southern Tip of Lake Michigan Port Area are listed below (USCG Sector Lake Michigan, 2022).

1. Tank vessel: various foreign flagged tank ships make trips to Burns Harbor, IN, the largest with a capacity of 149,000 US barrels (6,258,000 gals) of petroleum products. An allusion/sinking with a total loss of cargo near Burns Harbor could impact much of the southern tip of Lake Michigan including Indiana Dunes National Lakeshore and the shoreline of Gary, IN and parts of Chicago.
2. Facility: The BP facility in Whiting, IN has a capacity of 326,000 US barrels (13,692,000 gals). In accordance with their facility response plan, a worst-case discharge would result in a 24,271,800-gallon spill of Group II oil into the Lake George Barge Canal.
3. Pipeline: Amoco Oil Co (BP) has many pipelines running near Lake Michigan in IN and IL. A worst-case discharge would be complete line segment loss of 9,996 US barrels (420,000 gals) that could impact Lake Michigan.
4. Rail: Many trains pass near Lake Michigan with multiple tank cars carrying heavy oil with a capacity of 34,000 gals in each car. A derailment or accident involving these rail cars could result in a significant spill of heavy oil in a tributary or drainage ditch leading to Lake Michigan.

Similar scenarios are viewable in other, but not all, R5 sub-area ACPs and subsequent GRPs listed in **Table 1**.

1.3.4 Pre-spill and Other Consultations

One previous ESA consultation on spill response planning or tactics for Region 5 currently exists. In May 2010, EPA and USCG Region 5 co-chairs requested services consultation on using five solidifier products within booms, socks, or pillows in limited locations. In November 2010, USFWS provided a letter of concurrence to the Region 5 co-chairs indicating federally listed species, candidate species, and critical habitat were not likely to be adversely affected by the conditional preauthorization to use solidifier products within the RRT5 Action Area. The five solidifier products considered were ALSOCUP, Aqua N-CAP Polymer, CIAgent, WASTE-SET #3200, and WASTE-SET #3400. USFWS's analyses indicated that these solidifier products are acutely toxic at high concentrations, but only at levels above what would be encountered from the prescribed (contained) application.

The EPA consulted with USFWS on the 2010 Enbridge Line 6B spill response and the consultation for the Lockport spill described earlier in **Section 1.3.1** this document as well emergency consultations for spill responses and other issues (e.g. water quality standards). Additional context and information regarding other consultations that have occurred in Region 5 can be found by contacting the USCG and EPA Region 5 RRT5 Coordinators[ii]

Page Intentionally Left Blank

Section 2.0

2.0 POTENTIAL RESPONSE ACTIONS

The response actions applicable to this BE were identified from the Inland Response Tactics Manual (UMRBA, 2014) and the Response Action Matrix, May 2017, V. 5 (**Table 1**). Interagency members from USCG, EPA, and the DOI/USFWS participating on the NRT National Environmental Compliance (NEC) Subcommittee developed the Response Action Matrix to aid ESA Section 7 consultations. The Response Action Matrix describes the connection between the most common activities performed during spill operations and potential impacts on ESA-listed, proposed, or other species of concern and their habitats or designated and proposed critical habitat. It highlights response activities that may fall within the scope of the consultation.

The Response Action Matrix (RAM) summarizes potential impacts on listed, proposed, and other species of concern and any associated designated and proposed critical habitat potentially incurred by response actions (**Appendix C**). The RAM is specifically designed to be used during Step 2 (Action Agency modifies/reviews Response Action Matrix) of the ESA Pre-spill Planning Consultation Process (see **Section 1.2.1**). Response actions are intended to have a net benefit on the environment in all cases, given that a response will never occur without oil already being in the environment. In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response.

2.1 Coordination of Response Activities with the Endangered Species Act

Emergency consultation is an expedited consultation process that takes place during an emergency response (natural disaster or other calamity) (50 CFR 402.05). The USFWS and NMFS determined that oil spill response activities qualify as an emergency action. The consultation may be initiated informally. Once a spill has occurred, USFWS will be notified directly by EPA or USGC, or the DOI Regional Environmental Officer will notify USFWS of spill reports from National Response Center (NRC). During an oil spill event which may affect listed species and/or critical habitat, emergency consultations under the ESA are implemented (50 CFR 402.05) for oil spill response actions. Emergency consultation may be conducted informally through the procedures that follow the response process shown in **Figure 2**.

Once contact with USFWS is made, the FOSC provides initial information regarding spill response actions to USFWS within 24 hours of initiating emergency response activities. USFWS then acknowledges receipt of the notification and provides information to the FOSC on any species or habitats that may occur in the area and may be affected by the response activities, as well as recommended BMPs or other measures to avoid or minimize potential effects on those resources. USFWS should provide any proposed conservation measures to the FOSC no more than 24 hours after receiving the FOSC's formal notification to USFWS that a spill response has been initiated. The FOSC continues to coordinate with USFWS as appropriate throughout the emergency response action. USFWS may join the incident management team to advise the FOSC. Staff from USFWS may be assigned to the Environmental Unit of the Planning Section to provide on-site technical assistance to avoid and minimize impacts from the response action on listed species and critical habitats. Staff from USFWS may also be involved with the long-term cleanup phase to ensure that regulatory mandates are followed. Long-term response actions may include:

- Evaluation of cleanup/decontamination options;

- Implementation of cleanup alternatives; and
- Long-term monitoring or remediation of the impacted area, if necessary.

Several resources that can facilitate coordination of response activities and evaluate potential risks of an oil spill to species and habitats have been developed. These include:

- Habitat Fact Sheets and Species Fact Sheets to guide the selection of response tactics in R5. These are described in **Sections 3.2** and **4.0** of this BE and are available in their entirety on the RRT5 website.
- Prevention of the spread of aquatic nuisance species during spill response (Appendix IX of the R5 RCP[iii]).

The emergency status remains in effect until oil removal operations are completed and the case is closed in accordance with 40 CFR 300.320(b). The FOSC will continue to conduct emergency consultations, if needed, until the emergency is over, and the case is closed.

After the emergency is over, formal, or informal, consultation with USFWS is initiated by USCG, EPA, or both. At that time, USCG and/or EPA will provide to the USFWS a description of the emergency; a justification for the expedited consultation; and an evaluation of the response to and the impacts of the emergency on affected species and their habitats, including documentation of how USFWS recommendations were implemented, and the results of implementation in minimizing take (USFWS & NMFS, 1998). If the response actions may have affected listed species or critical habitats, but the effects were not likely to have been adverse, EPA and USCG will request concurrence from USFWS. Should response activities cause an adverse effect on a listed, proposed, or other species of concern or designated or proposed critical habitat, USCG and EPA will initiate a subsequent formal consultation process that will be conducted after the spill response is complete (see 50 CFR 402.05). USFWS evaluates the information provided and will either concur with a Not Likely to Adversely Affect determination or will prepare a post-response biological opinion (BO) if the emergency response was likely to have resulted in adverse effects to any listed species or critical habitat. The BO documents whether or not the impacts from the response action likely jeopardized the species or destroyed or adversely modified critical habitat.

Other Agency Involvement

NOAA provides scientific support for oil and chemical spills as directed by the National Contingency Plan 40 CFR 300.145. NOAA's Emergency Response Division has dedicated staff scientists able to provide oil spill trajectories, persistence models, environmental impact, and clean up recommendations. The scientific support coordinator (SSC) is an on-scene responder and a direct report to the FOSC. The SSC's primary role is to support the USCG but have participated in EPA-led responses upon request.

NOAA provides the SSC to the FOSC in USCG-led spill responses. The key spill-related NOAA programs in Region 5 include the Office of Response and Restoration, with staff in Cleveland, Ohio, and Ann Arbor, Michigan. The NOAA Great Lakes Environmental Research Laboratory (GLERL) is also located in Ann Arbor, Michigan, and researches lake currents and hydrodynamics. NOAA monitors current chemical contaminants, including polycyclic aromatic hydrocarbons, for the Great Lakes' nearshore and offshore areas through their National Mussel Watch Program. NOAA also has a trustee role in the Great Lakes region, managing sensitive areas, including estuarine research reserves and sanctuaries, and conducting damage assessments and restoration in the event of a significant release of oil or chemicals.

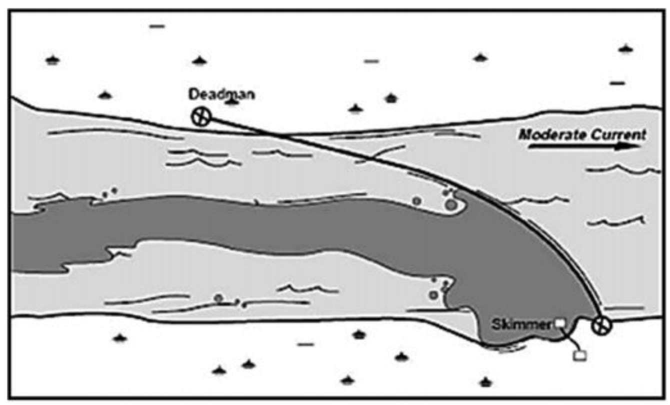
2.2 Primary Response Actions

The Inland Response Tactics Manual and RAM were used to describe the primary response and associated supporting actions identified below. This list is frequently reviewed and updated as needed. Responders and the Action Agencies should consult with the NRT and RRT at least annually to update the RAM as needed for this BE. The responses detailed in this BE are presented in **Table 2**. Additional resources that may help describe and define response actions:

- EPA website for Emergency Response
- For comprehensive descriptions and deployment considerations and limitations of primary response actions, please refer to the Inland Response Tactics Manual, available on the R5 RRT website[iv].

Deflection and Containment Activities

Deflection and containment activities include booming; dikes or berms; construction barriers, dams, pits, and trenches; and culvert blocking. Containment is deploying a boom to contain and concentrate the oil until it can be removed. Deflection is moving oil away from sensitive areas. Diversion is moving oil toward recovery sites that have slower flow, better access, etc. Exclusion is placing a boom to prevent oil from reaching sensitive areas.



Deflection/Diversionary (Single Boom)

Booming is specifically designed for pollution response and is a floating, physical barrier placed on the water to contain, divert, deflect, or exclude oil. Booms must be properly deployed and maintained (including removing accumulated debris) and re-adjusted to changing water flow directions, water levels, and wave conditions. Proper deployment involves using mooring systems (e.g., anchors, land lines) and skilled teams. A boom has four basic components: flotation, skirt, tension members, and ballast. Freeboard and draft are the portions of a boom's flotation and skirt above and below the waterline, respectively. Adsorbent booms, which are designed to be permeable to and absorb oil, are addressed under Sorbents below.

The interdependent/interrelated activities listed below are commonly used in conjunction with booming activities: Use of Vehicles, Use of Vessels, Use of Machinery, Access by Foot, Use of Staging Areas, Skimming, Sorbents, Decontamination, Demobilization, and Waste Handling and Storage.

To ensure that information sufficient in scope and detail is provided to USFWS for consultation, the Action Agencies will ensure that each of the following questions is considered when the response includes booming activities:

- What type of boom will be used?

- Will the boom be anchored, and if so, what does the anchoring system include?
- Where will the boom be anchored?
- How is the boom being used, i.e., for containment, deflection, or protection?
- How long to deploy and recover the boom?
- Where is oil-contaminated boom disposed of?
- What machinery (vessels, trucks, etc.) are used to recover boom?
- What size is the boom?
- Why might the boom fail?
  - There are five basic types of boom failure: entrainment, drainage, splash over, submergence, and planning (Exxon Mobil, 2014)
- Is there netting or skirting, and what is the size and material?
- How will equipment (e.g., vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

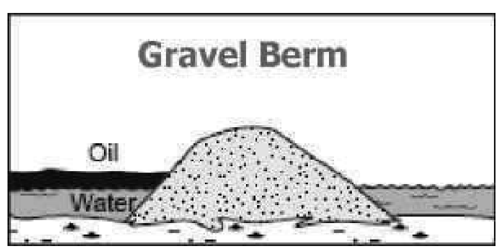
Direct and indirect effects of booming activities to listed, proposed, and other species of concern and habitat include wildlife disturbance by the presence of people and boom; crushing; destruction of benthic habitat and organisms by anchors or the anchor chain; entanglement in lines; exposure of perching birds, or mammals, or basking turtles to oiled boom; effects on wading and surface wildlife due to aggregation of oil; and risk of entanglement. Plants, small mammals, insects, wading birds, nesting birds, fish, mollusks, reptiles, and amphibians could all be affected by booming activities.

Habitats within the Action Area where booming is most likely to occur:

Shoreline	Ponds and Lakes
Ports, Canals, and Industrial Areas	Wetlands
Rivers and Streams	Uplands
Bays and Estuaries	

Vulnerable Habitats within the Action Area potentially affected by booming activities:

Bog	Rooted Floating Aquatics
Calcareous Fen	Shallow Marsh Vegetation
Deep Marsh Vegetation	Submersed Vegetation
Open Water	



Dikes or Berms are constructed to prevent wave action or currents from depositing oil onto back-shore areas (Exxon Mobil, 2014). Motor graders can build the dikes or berms if the beach, riparian zone, or upland area can sustain motor traffic. If the beach, riparian zone, or upland cannot sustain motor traffic well, front-end loaders or bulldozers are used (Exxon Mobil, 2014). The actions associated with building dikes or berms typically disturb the upper 2 ft of beach and shoreline sediments (Exxon Mobil, 2014).

The interdependent/interrelated activities listed below are commonly used in conjunction with dikes or berms: Use of Vehicles, Use of Machinery, and Access by Foot.

Considerations for consultation include:

- What types of equipment will be used to build the dikes or berms?
- What are the digging and building and access ramifications?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of dikes or berms to listed, proposed, and other species of concern species and habitat are associated with construction and deconstruction of dike/berm, and the presence of the dike/berm. Effects could include crushing, noise, habitat disturbance, and loss of access to essential resources (e.g., food, refuge, or nesting area). Small coastal land animals, coastal plants, birds that forage in or nest near shorelines and beaches, invertebrates, and fish would most likely be affected by habitat disturbance and loss of access to essential resources.

Habitats within the Action Area where dikes or berms would be used include:

Shorelines

Vulnerable habitats within the Action Area potentially affected by dikes or berms:

Beach and Sand Bar
Rooted Floating Aquatics
Mudflats

Construction Barriers, Dams, Pits, and Trenches are land-based tactics that contain spilled oil and limit the spreading of oil slicks when the oil threatens sensitive habitats and other barrier options (e.g., boom, skimmers, less invasive barriers, etc.) are not feasible (NOAA, 2010). A physical barrier (other than a boom) is placed across an area to prevent oil from passing. Barriers can consist of earthen berms, trenching, or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used (NOAA, 2010). These physical barriers are typically used with skimming or other recovery techniques (e.g., sorbents, vacuuming).

The interdependent/interrelated activities listed below are commonly used in conjunction with construction barriers, dams, pits, and trenches: Skimming, Waste Handling and Storage, Vacuuming (when applicable), and Access by Foot.

Considerations for consultation include:

- Are permits (e.g., a civil work permit) required for the construction of the dike, berm, or dam?
- Where will disposal of construction material take place?
- What tools, materials, equipment, and personnel are being used to construct the barriers or dams (soil, gravel, sand, dump truck, equipment operator, front-end loader, excavator, hand tools, and shovels)?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of construction barriers, dams, pits, and trench activities to listed, proposed, and other species of concern and habitat are associated with manual construction and deconstruction using heavy equipment, and placement of components (e.g., sandbags), and personnel activity associated with construction. Effects could include habitat disturbance or destruction (disturbance of soil and vegetation, compaction of soil); loss of aquatic organisms (if in streams, wetlands, or coastal areas); wildlife disturbance (noise, trampling); and restriction of wildlife access to resources (WindWard LLC, 2014). Obstruction to movement applies to both the listed, proposed, and other species of concern species themselves as well as predators and prey (which could lead to indirect effects to listed, proposed, and other species of concern species). Small coastal land animals, coastal plants, birds that forage in or nest near water, invertebrates (aquatic and terrestrial), fish, reptiles, and amphibians may be affected.

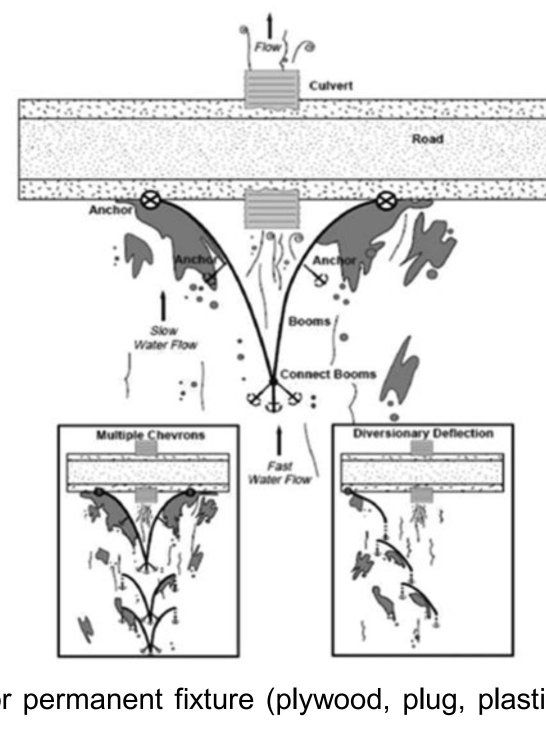
Habitats within the Action Area where construction barriers, dams, pits, and trenches are most likely to occur:

Rivers and Streams	Bays and Estuaries
Ponds and Lakes	Wetlands

Vulnerable habitats within the Action Area potentially affected by construction barriers, dams, pits, and trenches activities:

Beach and Sand Bar	Rooted Floating Aquatics
Deep Marsh Vegetation	Sedge Meadow
Floodplain Forest	Shallow Marsh Vegetation
Submersed Vegetation	Mudflats
Open Water	

Culvert Blocking involves placing a physical barrier across the culvert opening. A culvert is a drain or a pipe that allows water to flow under a road or railroad. Open culverts present a potential route for spilled oil to enter otherwise unaffected areas (WindWard LLC, 2014).



The interdependent/interrelated activities listed below are commonly used in conjunction with culvert blocking activities: Use of Machinery, Access Points and Staging Areas, New Access Points, and Access by Foot.

<u>Considerations for consultation include:</u>

- What are current water levels?
- Are there weather-related factors, such as variable flows and discharges due to precipitation/snowmelt?
- Will the culvert be blocked with a temporary or permanent fixture (plywood, plug, plastic sheeting, sandbags)?
- Will deflection booming be used to block the culvert?
    - Is there a particular size of culvert that is useful, or when should you move to make a

dam, for example?

- Is there a potential for water chemistry to change because of the culvert being blocked (indirect effects)?
- How will equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

The direct and indirect effects of culvert blocking activities on listed, proposed, and other species of concern species and habitat are associated with construction, barrier placement, and outlet replumbing. Effects could include wildlife habitat disturbance, alteration of stream hydrology, and obstruction to migration or general movement. Obstruction to movement applies to both the listed and proposed species and to other species of concern as well as predators and prey (which could lead to indirect effects to listed, proposed, and other species of concern). Species potentially affected include fish, insects, aquatic invertebrates (including freshwater mussels), plants, amphibians, reptiles, and small land animals.

Habitats within the Action Area where culvert blocking is most likely to occur:

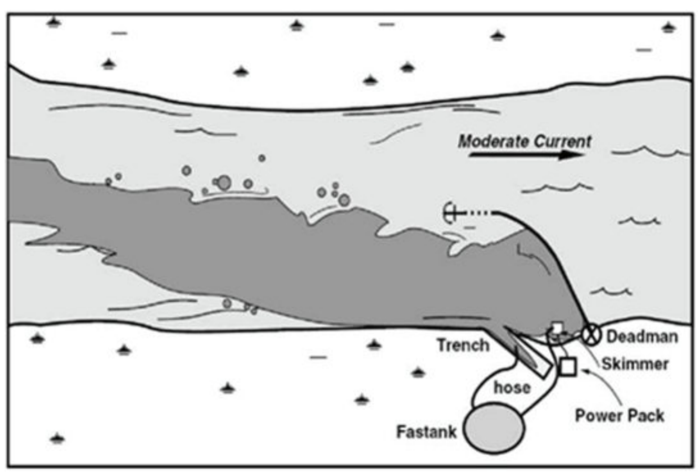
Rivers and Streams

Vulnerable habitats within the Action Area potentially affected by culvert blocking activities:

Beach and Sand Bar	Floodplain Forest
Mudflats	Open Water
Rooted Floating Aquatics	Submersed Vegetation

Recovery Activities

Recovery activities occur once an oil spill has been contained, and efforts to remove the oil from the water can begin. Three different types of equipment are commonly used to recover oil from the surface: skimming, vacuuming, and use of sorbents.



Skimming is performed with mechanical devices that physically remove the free or contained oil from the water's surface. Many different skimmers exist, but they can be grouped into four categories based on oil recovery principles (Exxon Mobil, 2014). The main types (with examples) are 1) weir (simple, self-leveling, integral screw auger, advancing, and boom/weir systems); 2) hydrodynamic (water jet, submersion plane/belt, and rotating vane); 3) oleophilic (drum, disc, rope mop, sorbent lifting belt, and brush); and 4) other (paddle belt, trawl/boom skimmers; Exxon Mobil, 2014). They are placed at the oil/water interface to recover, or skim, oil from the water's surface and may be operated independently from shore, be mounted on vessels, or be completely self-propelled (NOAA, 2010).

The interdependent/interrelated activities listed below are commonly used in conjunction with skimming activities: Booming, Dikes or Berms, Construction Barriers, Dams, Pits, and Trenches, Culvert Blocking, Vacuuming, Use of Vessels, Use of Vehicles, and Waste Handling and Storage.

Considerations for consultation include:

- What type of skimmer and ancillary support/storage capabilities are needed?
- Availability/size/quantity/mobility of storage devices for recovered oil?
- Does the discharged product present a hazard to people operating equipment?
- Access for support equipment (e.g., power, pumps, storage bladders, hydraulic power units, vessels)?
- How many vessels will be used during skimming (e.g., booming, towing)?
- What is the size of the vessels?
- What is the operational speed of the vessels?
- Traffic to and from skimming sites could cause harm.
- What type of skimmer is used (based on water depth and product type)?
- Where/how will skimmed oil be contained and disposed of?
- Is boom used for skimming operations?
- What are the operating requirements for the skimmer (e.g., duration, frequency)?
- Is it an area where boats normally transit?
- How will the skimmer be transported to the site (vessel, vehicle, foot)?
- How will equipment (e.g., vessels, pumps) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of skimming activities to listed, proposed, and other species of concern and habitat are associated with the operation of the skimmer, stationary and while in transit. Effects could include wildlife disturbance associated with noise and wildlife entrainment in the skimmer system. Species potentially affected include food resources (e.g., plankton), larval fish, invertebrates, juvenile turtles, birds, and plants smaller than 3 inches and at the water surface.

Habitats within the Action Area where skimming is most likely to occur:

Shoreline	Ports, Canals, and Industrial Areas
Bays and Estuaries	Rivers and Streams
Wetlands	Ponds and Lakes
Upland Areas	

Vulnerable habitats within the Action Area potentially affected by skimming activities:

Beach and Sand Bar	Shallow Marsh Vegetation
Deep Marsh Vegetation	Floodplain Forest
Mudflats	Open Water
Rooted Floating Aquatics	Sedge Meadow
Shallow Marsh Vegetation	Submersed Vegetation

Vacuuming entails a vacuum unit attached via a hose to a truck, mounted on vessels for water-based operations, or hand-carried to remote sites. These units are used to remove oil accumulations on the water in the absence of skimmers and to recover oil pooled against a shoreline, concentrated in trenches, trapped in vegetation, or pooled in natural depressions on all shoreline types (except where inaccessible). Vacuuming is unsafe for the recovery of gasoline. Primary equipment includes a vacuum unit with a 2–3 in. suction hose and skimming head. Supporting equipment may include boom, low-pressure water hoses, and leaf blowers/air movers. Vacuuming typically requires a barge, landing craft, or shoreline or road access for heavy equipment. The equipment can range from small, portable units that can fill 55-gallon drums to large supersuckers mounted to a truck or vessel that can generate enough suction to lift large rocks (NOAA, 2010). Depending on the thickness of the slick, a mixture of oil and water enters the collection chamber; positioning the intake end of the hose is critical to minimize the amount of water collected.

The interdependent/interrelated activities listed below are commonly used in conjunction with vacuuming activities: Booming, Construction Barriers, Dams, Pits, and Trenches, Culvert Blocking, Use of Vessels, Use of Vehicles, Use of Skimmers, and Access by Foot Traffic.

Considerations for consultation include:

- Where will the vacuuming take place (shore-based or in open water)?
- How will the vacuuming equipment be transported to the site?
- Will decanting take place (via permit)?
- What supporting equipment (boom, water hoses, leaf blowers, etc.) will be used?
- What type of vacuum and ancillary support/storage capabilities are needed (e.g., vac truck, other pumps, portable vacuum)?
- Availability/size/quantity/mobility of storage devices for recovered oil?
- What support equipment is needed?
- Where is the access for support equipment (e.g., power, storage bladders, vessels)?
- What is the size of the vessels?
- What is the operational speed of the vessel?
- Could traffic to and from vacuuming sites cause harm?
- Where/how will vacuumed oil be disposed of?
- Is boom utilized for vacuuming operations?
- What are the operating requirements for the vacuum (e.g., duration, frequency)?
- How will equipment (e.g., vessels, pumps) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

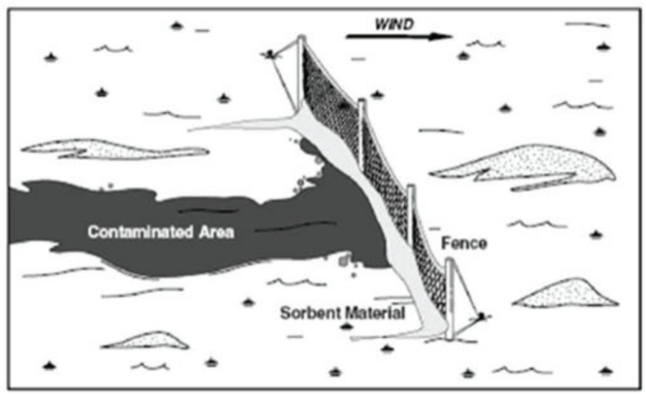
Direct and indirect effects of vacuuming activities to listed, proposed, and other species of concern species and habitat are associated with the operation of the vacuum. Effects could include entrainment, habitat, and wildlife disturbance (e.g., noise). Species potentially affected include entrainment of plankton, larval fish, small fish, juvenile turtles, invertebrates, plants, nesting/foraging birds, and small mammals.

Habitats within the Action Area where vacuuming is most likely to occur:

Shoreline
Rivers and Streams
Ponds and Lakes
Ports, Canals, and Industrial Areas
Bays and Estuaries

Vulnerable habitats within the Action Area potentially affected by vacuuming activities:

Beach and Sandbar
Floodplain Forest
Open Water
Sedge Meadow
Submersed Vegetation
Deep Marsh Vegetation
Mudflats
Rooted Floating Aquatics
Shallow Marsh Vegetation



Sorbents are used when oil is free-floating or stranded on shore or as a secondary treatment method after gross oil removal or in sensitive habitats where access is restricted. Sorbents can recover small amounts of oil through absorption (the penetration of oil into the sorbent material) and/or adsorption (the adherence of oil onto the surface of sorbent material). Most sorbents are both oleophilic (attract oil) and hydrophobic (repel water) to enhance recovery (Exxon Mobil, 2014). Sorbents are defined in the National Oil and Hazardous Substance Contingency Plan (40 CFR 300 series). Sorbents reviewed by EPA that meet the regulatory definition of a sorbent in Subpart J should have an official letter from EPA to be shared with the FOSC. Deployment/removal of sorbents is labor-intensive and typically done by hand by personnel in light motor vehicles or shallow watercraft. Most disposal involves placing the sorbents into a plastic bag. Sorbents may be reused (by extracting adsorbed liquids) and can help to suppress waves and prevent splash over.

Types of adsorbents include:

1. Type I, roll, film, sheet, pad, blanket, web: a material with length and width much greater than the thickness and has both linear form and strength sufficient to be handled either saturated or unsaturated.
2. Type II, loose: an unconsolidated particulate material without sufficient form and strength to be handled except with scoops and similar equipment.
3. Type III, enclosed: III(a) pillows—adsorbent material contained by an outer fabric or netting that has permeability to oil, but with small openings to substantially retain the sorbent material within the fabric or netting; or III(b) adsorbent booms—adsorbent material contained by an outer fabric or netting that has permeability or is permeable to oil but with small openings to substantially retain the sorbent material within the fabric or netting. The lengthwise dimension substantially exceeds other dimensions and with strength members

running parallel with length. Booms are also provided with connections for coupling adsorbent booms together.

4. Type IV, agglomeration unit: an assemblage of strands, open netting, or other physical forms giving an open structure that minimally impedes the intrusion into itself of high viscosity oils.

The interdependent/interrelated activities listed below are commonly used in conjunction with using sorbents and associated activities: Use of Vessels, Use of Vehicles, Booming, Disposal, Decontamination, and Access by Foot Traffic.

Considerations for consultation include:

- Is there enough oil product present to be absorbed?
- What kind of sorbent is applied, and how buoyant is it?
- How is it being tended (based on saturation)? How often?
- Have dispersants been applied?
- How will sorbents be disposed of?
- What is the minimum size/diameter of sorbent material used?
- Will placement or use of sorbent booms create concentrations of oil that could lead to additional exposure?
- Are sorbents being used as a first response tool?
- Where might oil-soaked sorbent materials be displaced if they break free during a storm or high-water event? What preparations will be made to ensure sorbent materials are secured if a storm or high-water event is predicted to occur?
- How will sorbents be installed, tended, and removed? How will responders ensure that crews avoid walking on oiled areas when installing, tending, and retrieving sorbents?
- How will equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?
- Sorbents should be removed from the environment after use.

Direct and indirect effects of using sorbents to listed, proposed, and other species of concern and habitat are associated with secondary ingestion or coating. Effects could include disturbance of habitat, high traffic or frequent trips to site, direct contact causing crushing or smothering, exposure from noise or personnel movement and material placement, entrainment, and habitat and wildlife disturbance. Species potentially affected include small land animals, birds, nesting/juvenile turtles on beaches, plants, and freshwater mussels.

Habitats within the Action Area where using sorbents is most likely to occur:

Shoreline
Rivers and Streams
Ponds and Lakes
Ports, Canals, and Industrial Areas
Bays and Estuaries

Vulnerable habitats within the Action Area potentially affected by sorbent use:

Beach and Sandbar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Removal/Cleanup Activities

Despite the best efforts of response teams to contain spilled oil, some of it may contaminate shorelines of lakes, banks of rivers and streams, and other ecologically sensitive habitats along the water's edge. Cleaning up shorelines following oil spills has become an essential part of oil spill response. Removal and cleanup activities include flooding, flushing, steam cleaning, sandblasting, mechanical sand cleaning and excavation, and manual oil removal and cleaning.

Flooding is the washing of oil stranded on land to the water's edge for collection via the use of a perforated header pipe or hose and ambient water pumped at low or high pressure. The oil is typically contained by booms and recovered via a skimmer or other equipment. Best used in heavily oiled areas when the oil is still fluid and only loosely adheres to the substrate or where oil has penetrated gravel sediments (NOAA, 2010).

The interdependent/interrelated activities listed below are commonly used in conjunction with flooding activities: Booming, Skimming, Sorbents, Flushing, Disposal, Decontamination, Waste Handling and Storage, Use of Vessels, Access by foot traffic, Use of Vehicles, and Staging.

<u>Considerations for consultation include:</u>

- On what type of substrate is it being used?
- What ancillary equipment is being used (i.e., pump, hoses, trucks)?
- What is being used to collect the freed oil?
- How many personnel are required at the site?
- How will the site be accessed (vehicle, shallow craft, barge)?
- How long will this method be utilized? Would length of time have a greater or lesser effect on certain species?
- What are the methods or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system [by fire hose or header pipe])?
- Are there concerns about introducing invasive species from the source of the water and impacts to local species?
- Will the use of flooding increase turbidity in the area?
- How will equipment (e.g., vessels, pumps) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of flooding activities on listed, proposed, and other species of concern species and habitat are associated with the operation of the water delivery system. Effects could include operations and remobilization (or refloating) of the oil to facilitate collection. Sediment loss, erosion of the shoreline and shallow-rooted vegetation, physical removal of organisms (by water pressure), smothering by sediments washed down the slope, and water temperature fluctuations could harm (or kill) organisms; noise could also affect listed, proposed, and other species of concern. Oiled sediment may be transported to nearshore and down coast areas, contaminating them and burying benthic organisms (NOAA, 2010). Species may also ingest transported oil and come into direct contact with transported oil.

Species potentially affected by flooding include invertebrates, nearshore aquatic organisms, aquatic vegetation, amphibians, plants, nesting/wading/foraging birds, mammals, turtles, and fish.

Habitats within the Action Area where flooding is most likely to occur:

Shoreline

Vulnerable habitats within the Action Area potentially affected by flooding activities:

Beach and Sand Bar
Mudflats
Rooted Floating Aquatics

Flushing removes fluid oil that has adhered to the substrate or artificial structures, pooled on the surface, or become trapped in vegetation via ambient water temperature sprayed at low pressures, usually from hand-held hoses. Typically recovered by skimmers, vacuum, or sorbents and used with a flooding system to prevent released oil from moving downstream (NOAA, 2010). Higher temperatures may be used to mobilize oil when appropriate for the area.

The interdependent/interrelated activities listed below are commonly used in conjunction with flushing activities: Booming, Skimming, Sorbents, Flushing, Disposal, Decontamination, Waste Handling and Storage, Use of Vessels, Use of Vehicles, Access by Foot Traffic, and Staging.

<u>Considerations for consultation include:</u>

- What is being used to collect the freed oil?
- What will the water temperature be?
- How many personnel are required at the site?
- How will the site be accessed (vehicle, shallow craft, barge)?
- <u>How long will this method be utilized? Would length of time have a greater or lesser effect on certain species?</u>
- On what type of substrate is it being used?
- What ancillary equipment is being used (i.e., pump, hoses, trucks)?
- What are the methods or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system [by fire hose or header pipe])?
- Are there concerns about introducing invasive species from the source of the water and impacts on local species?
- Will the use of flushing increase turbidity in the area?
- How will equipment (e.g., vessels, pumps) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of flushing include operations and remobilization (or refloating) of the oil to facilitate collection. If containment methods are not sufficient, oil and oiled sediments may be flushed into adjacent areas, which can cause sediment loss, erosion of the shoreline, and shallow-rooted vegetation. High-pressure flushing may drive the oil deeper into the substrate and physically displace benthic organisms (NOAA, 2010). Species may have direct contact with or ingest transported oil. Mobilized sediments may affect coastal and shoreline habitats and further oil adjacent areas (NOAA, 2010). Species affected include invertebrates, freshwater mussels, fish, nearshore aquatic organisms, submerged aquatic vegetation, amphibians, plants, fish, mammals, and birds.

Habitats within the Action Area where flushing is most likely to occur:

Shoreline	Ports, Canals, and Industrial Areas
Rivers and Streams	Ponds and Lakes

Vulnerable habitats within the Action Area potentially affected by flushing activities:

Beach and Sandbar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Steam Cleaning involves steam or extremely hot water (171° F to 212° F) sprayed with hand-held wands at high pressure (2,000 psi) to remove heavy residual oil from solid substrates or artificial structures (NOAA, 2010). Typically used when heavy oil residue must be removed for aesthetic reasons (NOAA, 2010). Higher temperatures and higher pressures may be used to mobilize oil where environmental conditions allow.

The interdependent/interrelated activities listed below are commonly used in conjunction with steam cleaning activities: Booming, Skimming, Sorbents, Flushing, Disposal, Decontamination, Waste Handling and Storage, Use of Vessels, Use of Vehicles, Access by Foot Traffic, and Staging.

<u>Considerations for consultation include:</u>

- What is used to collect the oil in conjunction with the steam cleaning operation?
- How will personnel access the area?
- How long will this method be utilized? Would length of time have a greater or lesser effect on certain species?
- How many personnel are involved? (There are typically two operators per unit.)
- On what type of substrate is it being used?
- What ancillary equipment is being used (i.e., pump, hoses, trucks)?
- Where is the hot water going?
- How will equipment (e.g., pumps) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of steam cleaning include spraying and remobilizing oil (or refloating) to facilitate collection. Species effects include direct contact with hot water/steam at high pressure, noise, and thermal effects. If containment methods are insufficient, oil and oiled sediments may be flushed into adjacent areas, and species may come into direct contact and ingest remobilized oil. Mobilized sediments may affect coastal and shoreline habitats/further oiling of adjacent areas (NOAA, 2010). Species affected include invertebrates, nearshore aquatic organisms, submerged aquatic vegetation, mammals, turtles, birds, fish, amphibians, and plants.

Habitats within the Action Area where steam cleaning is most likely to occur are hard solid surfaces associated with:

Shoreline	Ports, Canals, and Industrial Areas
Rivers and Streams	Ponds and Lakes

Vulnerable habitats within the Action Area potentially affected by steam cleaning activities:

Beach and Sand Bar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Sandblasting removes heavy residual oil from solid substrates or artificial structures via sand moving at high velocity. Sandblasting is used when heavy oil residue must be cleaned (typically for aesthetic reasons), and steam-cleaning is ineffective (NOAA, 2010).

The interdependent/interrelated activities listed below are commonly used in conjunction with sandblasting activities: Booming, Skimming, Sorbents, Flushing, Disposal, Decontamination, Waste Handling and Storage, Use of Vessels, Use of Vehicles, Staging, Access by Foot Traffic, and New Access Points.

<u>Considerations for consultation include:</u>

- Do operations involve a sand supply truck or front-end loader?
- What materials are used to cover the ground?
- On what type of substrate is it used?
- What ancillary equipment is used (i.e., pump, hoses, trucks)?
- Are you sure no other suitable methods are available?
- Are there issues of potential erosion, scouring, pushing oil deeper into crevices, etc.?
- How is sandblasted material collected/recovered?
- Will oil be flushed into adjacent areas?
- Do you anticipate using a medium other than sand? (Consult with USFWS if sandblasting is identified as a high-risk activity for any species in the SRM).
- How will equipment (e.g., pumps, heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?)

Direct and indirect effects of sandblasting are associated with operations and can include the destruction of organisms and habitat in sandblasting zone. Oil may be channeled to a recovery area downstream (NOAA, 2010). Species can also be affected by noise during sandblasting operations and consequences of contact and ingestion of remobilized oil. Species affected include plants, invertebrates, aquatic organisms, mammals, reptiles, and shorebirds.

Habitats within the Action Area where sandblasting is most likely to occur:

Shoreline	Ports, Canals, and Industrial Areas
Rivers and Streams	Ponds and Lake

Vulnerable habitats within the Action Area potentially affected by sandblasting activities:

Beach and Sand Bar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Mechanical (Non-Chemical) Sand/Sediment/Mudflat Cleaning (surface, <1 in.) uses different types of equipment to promote evaporation and weathering or collecting oiled material off of a beach or other shoreline or floodplain area. Most of this activity involves a tractor or similar vehicle to pull the equipment or conduct the activity.

Examples include:

1. Beach cleaner – Can be used on lightly oiled (tarballs or patties) sand or gravel beaches and is pulled by a tractor or self-propelled across a beach. Typically operates at 4 mph, taking a skim cut 6 ft wide (Exxon Mobil, 2014).
2. Lightly oiled sediment mixing-discer – Track-type tractor preferred with 8–12 ft wide discer. Tractor pulls discing equipment along an oiled area to promote evaporation and weathering by shoreline processes; typically used on lightly oiled, non-recreational sand and gravel beaches (Exxon Mobil, 2014).
3. Mechanical surface cleaner (elevating scraper) – Used to remove surface oil, tarballs, and patties on sand and gravel beaches. It causes disturbance of upper sediments <1 in. (Exxon Mobil, 2014).

The interdependent/interrelated activities listed below are commonly used in conjunction with mechanical (non-chemical) sand cleaning (surface, <1 in.): Use of Vehicles, Use of Vessels, Use of Machinery, Deterrence and Hazing, Waste Handling and Storage, Staging, and Mobilization/Demobilization of Personnel.

<u>Considerations for consultation include:</u>

- What is the degree of oiling?
- What equipment will be used?
- What is the substrate type?
- Is there access to the beach for heavy equipment, or can access be constructed?
- Is the oil in the form of tar balls?
- Can oil remain on the beach or in the area without causing problems?

- Will mixing the sediments expose subsurface organisms to undue hazards?
- Will wind-driven seiches in the Great Lakes and periodic water fluctuations from dam operations affect reworked sediments?
- Can rubber-tired or track vehicle equipment operate on the beach?
- If tilling/discing sediments, how deep will equipment penetrate?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of mechanical (non-chemical) sand cleaning (surface, <1 in.) are associated with working with sand/sediment. Species can be affected by habitat or wildlife disturbance or loss from noise, crushing, and the presence of people. Effects can also occur due to the distribution of the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to polycyclic aromatic hydrocarbons (PAHs) if contaminated sediments are moved deeper into the beach). Species affected include birds, mammals, reptiles and amphibians, beach invertebrates (insects), plants, snails, and crustaceans.

Habitats within the Action Area where mechanical (non-chemical) sand cleaning (surface, <1 in.) is most likely to occur are:

Shoreline

Vulnerable habitats within Action Area potentially affected by mechanical (non-chemical) sand cleaning (surface, <1 in.) activities:

Beach and Sand Bar	Mudflats
Rooted Floating Aquatics	

Mechanical (Non-chemical) Sand/Sediment/Mudflat Cleaning and Excavation (>1 in.) uses mechanical equipment to clean or remove sand/sediments that impact >1 in. deep (may go to 10 in.).

Examples include:

1. Heavily oiled sediment mixing-tractor/ripper – A tractor fitted with a ripper or tines operated up and down the beach so that sediments remain, and erosion is minimized to promote evaporation and weathering by shoreline processes.
2. Bulldozer – Pushes oiled substrate into the surf zone to accelerate natural cleaning while causing minimal erosion (Exxon Mobil, 2014).
3. Front-end loader or excavator – Removes oiled material directly off the beach, mudflat, or floodplain area and hauls it to a loading area.

The interdependent/interrelated activities listed below are commonly used in conjunction with mechanical (non-chemical) sand cleaning and excavation (>1 in.): Use of Vehicles, Use of Vessels, Use of Machinery, Deterrence and Hazing, Waste Handling and Storage, Staging, and Mobilization/Demobilization of Personnel.

Considerations for consultation include:

- What is the degree of oiling?
- What equipment will be used?
- What is the substrate type?
- Is there access for heavy equipment, or can access be constructed?
- Is the oil in the form of tar balls?
- Can oil remain on the beach or in the area without causing problems?
- Will mixing the sediments expose subsurface organisms to undue hazards?
- Will wind seiches and periodic water fluctuations affect reworked sediments?
- Can tracked equipment be used?
- What is the risk of sediment loss to water bodies?
- What is the risk of additional erosion due to substrate disturbance?
- How deep into sediment will cleaner or excavator operate?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of mechanical (non-chemical) sand cleaning and excavation (>1 in.) are associated with working with sand/sediment. Species can be affected by habitat or wildlife disturbance or loss from noise, crushing, and the presence of people. Effects can also occur due to the distribution of the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to PAHs if contaminated sediments are moved deeper into the beach). Species affected include birds, mammals, reptiles, amphibians, beach invertebrates (insects), plants, snails, and crustaceans.

Habitats within the Action Area where mechanical (non-chemical) sand cleaning and excavation (>1 in.) is most likely to occur are:

Shoreline

Vulnerable habitats within the Action Area potentially affected by mechanical (non-chemical) sand cleaning and excavation (>1 in.) activities:

Beach and Sand Bar	Mudflats
Rooted Floating Aquatics	Sedge Meadow

Manual Removal/Cleaning of Oil, Oiled Sediment, Debris, or Vegetation, includes removal by hand, shovels, rakes, etc. It could also involve trailers or wheelbarrows, debris boxes/bags, and ATVs with trailers. Typically used on mud, sand, gravel, and cobble when oiling is light, sporadic, or at or near the beach surface (stranded), or on beaches where there is little to no access for heavy equipment (Exxon Mobil, 2014) and may be used in oiled areas of floodplains as well.

The interdependent/interrelated activities listed below are commonly used in conjunction with manual removal/ cleaning of oil, oiled sediment, debris, or vegetation: Use of Vehicles, Use of Vessels, Use of Machinery, Deterrence and Hazing, Waste Handling and Storage Staging, Mobilization/Demobilization of Personnel, and Access by Foot Traffic.

<u>Considerations for consultation include:</u>

- Is the area concentrated on one area?
- What is the degree of oiling?
- What is the substrate type?
- What is oiled, and what cleaning methods will be used?
- Can oil remain without causing environmental problems?
- What equipment (non-mechanical) will be used to remove the oil/oiled material physically?
- How will the oiled material be collected/transported?
- How many workers will be needed?
- How will the site be accessed (i.e., foot traffic)?
- What logistical support will be necessary to support workers (e.g., facilities, utilities)?
- Will any additional ground cover be used for initially capturing oil?
- How will equipment (e.g., hand tools) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of manual removal/cleaning of oil, oiled sediment, debris, or vegetation are associated with removing oil/oiled material. Species can be affected by disturbance from people (noise, movement); trampling of small animals and vegetation; and penetration of oil deeper into sediments. Species affected include birds, mammals, beach invertebrates (insects), plants, reptiles, crustaceans, snails, and freshwater mussels.

Habitats within the Action Area where manual removal/cleaning of oil, oiled sediment, debris, or vegetation is most likely to occur are:

Shoreline	Ports, Canals, and Industrial Areas
Rivers and Streams	Bays and Estuaries
Ponds and Lakes	Wetlands
Upland Areas	

Vulnerable habitats within the Action Area potentially affected by manual removal/ cleaning of oil, oiled sediment, debris, or vegetation activities:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

Submerged Oil Activities

Non-floating oil can be used to describe oils that have become either submerged or sunken. Submerged oil includes spilled oil with neutral or near-neutral buoyancy below the water surface and in the water column. Sunken oil includes spilled oil that has negative buoyancy and sinks to the bottom of the water body. In some circumstances involving low current conditions, sunken oil in shallow waters may pool in depressions on the lake, river, or stream bed or be moved along by natural flow regimes or currents. Detection, recovery, and containment of submerged oil activities are described below.

Detection of Non-floating or Submerged Oil, examples of which include:

1. Sonar systems – side-scan sonar, multi-beam echo sounder, sub-bottom profiler, and 3D scanning sonar
2. Underwater visualization systems – cameras and video
3. Diver observations – with or without submersibles
4. Towed or stationary sorbents – examples include sorbents attached to chains that are dragged on the bottom—typically 1 ft swath—and sorbents suspended in the water column or cages
5. Laser fluorosensors – a unit that is towed close to the bottom
6. Visual observations by trained observers, including use of a pole to disturb sediments and observe released “globs” or sheens.
7. Bottom sampling – taking a sediment grab, core samplers, or wading-depth shovel pits
8. Water sampling in-situ analysis – fluorometers and mass spectrometers are towed in the water column (USCG, 2016)

The interdependent/interrelated activities listed below are commonly used in conjunction with the detection of non-floating or submerged oil: Use of Vessels, Use of Machinery/Supporting Equipment, and Access of Personnel via Foot Traffic.

Considerations for consultation include:

- What type of detection capability will be used?
- How deep is the water?
- What type of substrate is the bottom?
- What is the nature of the oil?
- Will dragging of sorbent material be used?
- Will sediment disturbance occur?
- How will equipment (e.g., vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of detecting non-floating or submerged oil are associated with using people and equipment in the water column to detect oil. Species can be affected by sediment disturbance and from strikes from equipment in the water. Species affected include freshwater mussels, fish, reptiles, amphibians, aquatic plants, and birds.

Habitats within the Action Area where detection of non-floating or submerged oil may occur:

Ports, Canals, and Industrial Areas
Rivers and Streams
Ponds and Lakes
Bays and Estuaries
Wetlands

Vulnerable habitats within the Action Area potentially affected by detection of non-floating or submerged oil activities:

Bog	Calcareous Fen
Deep Marsh Vegetation	Floodplain Forest
Mudflats	Open Water
Rooted Floating Aquatics	Sedge Meadow
Shallow Marsh Vegetation	Submersed Vegetation
Wet Meadow	

Recovery of Non-Floating or Submerged Oil will be unique to the type of event, location, and availability of equipment and logistical support due to a large range of densities and properties of non-floating oils. Non-floating oil recovery has been successful when low current speeds and wave conditions occur, the oil is pumpable, the water is relatively shallow, and the oil is concentrated in natural collection areas (RRT 10 Northwest Area Contingency Plan, 2016).

Recovery techniques include:

1. Suction dredge – Dredging using pumps to hydraulically remove and transport the oil.
2. Diver-directed pumping and vacuuming – Pumping capabilities refer to using a centrifugal or positive displacement pump at or below the water surface with a diver-directed suction hose. Vacuuming refers to a vacuum truck or unit above the water surface/on a barge that creates a vacuum, with a diver-directed hose attached.
3. Mechanical removal – Excavators, clamshell dredges, environmental dredge buckets, or other machinery used to grab, scoop, or pick up the sunken oil/oiled debris/oiled sediment.
4. Sorbent and V-SORS – Sorbents attached to chains that are dragged on the bottom to recover liquid oil.
5. Trawls and nets – Towed in the water column or on the bottom to recover viscous oil.
6. Manual removal – Physical removal of viscous oil using hand tools (by wading in shallow water or divers).
7. Agitation/refloat/poling – Agitation of oil on the bottom to get the oil to float to the surface for recovery (USCG, 2016).

<u>Considerations for consultation include:</u>

- What type of recovery equipment will be used?
- How deep is the water?
- What type of substrate is the bottom?
- How deep does the submerged oil penetrate?
- How will the oil/sediments be contained; what type of equipment will be used?
- What is the nature of the oil?
- Will divers be used to assess the progress?
- Will vacuuming be used?
- Will dredging via clamshell or a surface-suction device be used?
- Will dragging of sorbent material be conducted?
- Will sediment disturbance to remove oil occur?

- How will equipment (e.g., vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

The interdependent/interrelated activities listed below are commonly used in conjunction with recovery of non-floating or submerged oil: Use of Vessels, Use of Machinery, Creation of Staging Areas, Waste Handling and Storage, and Vacuuming.

Direct and indirect effects of recovery of non-floating or submerged oil are associated with working with the sediment. Species can be affected by the physical removal of substrate/habitat and disturbance of the water column. Species affected include freshwater mussels, snails, aquatic insects, submerged aquatic vegetation, fish, reptiles, amphibians, plants, and birds.

Habitats within the Action Area where recovery of non-floating or submerged oil may occur:

Ports, Canals, Industrial Areas	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	

Vulnerable habitats within Action Area potentially affected by recovery of non-floating or submerged oil activities:

Bog	Calcareous Fen
Deep Marsh Vegetation	Floodplain Forest
Mudflats	Open Water
Rooted Floating Aquatics	Sedge Meadow
Shallow Marsh Vegetation	Submersed Vegetation
Wet Meadow	

Containment of Non-Floating or Submerged Oil involves equipment and methods used to contain non-floating oil or reduce spreading on the bottom. Examples include: 1) Nets or curtains attached to the bottom or suspended from the surface; 2) Physical barriers such as artificial depressions (e.g., trenching); 3) Bottom boom; 4) Sheet piling; or 5) Sorbents in filter fences or cages (USCG, 2016).

The interdependent/interrelated activities listed below are commonly used in conjunction with containment of non-floating or submerged oil: Use of Vessels, Use of Machinery, Creation of Staging Areas, and Waste Handling and Storage.

<u>Considerations for consultation include:</u>

- What type of equipment will be used?
- How deep is the water?
- How deep does the submerged oil penetrate?
- What is the bottom substrate?
- What is the nature of the oil, i.e., will it refloat?
- Will divers be used to assess or aid in the process?
- Will sediment disturbance occur?
- How will containment/barrier structures be secured in place?

- How long will these structures be deployed?
- Will a bubble curtain be used to contain the oil?
- How will equipment (e.g., vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of containment of non-floating or submerged oil are associated with the containment of oily wastes below the surface. Species can be affected by habitat disturbance from the insertion of physical barriers or boom into the sediment, crushing and turbidity, restriction of movement, entanglement, and noise. Species affected include freshwater mussels, aquatic vegetation, fish, aquatic insects, amphibians, and reptiles.

Habitats within the Action Area where containment of non-floating or submerged oil may occur:

Ports, Canals, and Industrial Areas	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	

Vulnerable habitats within the Action Area potentially affected by containment of non-floating or submerged oil activities:

Bog	Calcareous Fen
Deep Marsh Vegetation	Floodplain Forest
Mudflats	Open Water
Rooted Floating Aquatics	Sedge Meadow
Shallow Marsh Vegetation	Submersed Vegetation
Wet Meadow	

Wildlife Protection Activities

When a spill occurs, wildlife responders minimize injuries to fish, wildlife, and sensitive environments. By working with the response agencies containing and cleaning up spills, wildlife responders can reduce the adverse effects an oil spill has on natural resources. Wildlife protection activities including deterrence, hazing, capture, and care of contaminated animals may themselves incur potential effects to sensitive species.

Deterrence or Hazing are techniques that can be used to move wildlife from locations in the predicted path of the spilled oil. These techniques are intentionally used to deter wildlife from entering into areas that have been previously oiled or depart an area that has been or could be oiled to prevent harm. Deterrence does not include unintentional behavioral responses resulting from vessels, vehicles, and aircraft in support of other response activities. Deterrence and hazing include techniques such as 1) noise deterrence, including pyrotechnics, shotgun, or pistol-launched projectiles, air horns, motorized equipment, propane cannons, and recorded bird alarm sounds; 2) scare devices, including deployment of reflective tape, helium-filled balloons, and scarecrows on oiled beaches; 3) herding wildlife using aircraft, boats, or other vehicles; and 4) hazing by human presence (Exxon Mobil, 2014).

The interdependent/interrelated activities listed below are commonly used in conjunction with Deterrence or Hazing: Use of Vessels, Use of Vehicles, Use of Aircraft, New Access Points, Access by Foot Traffic, and Staging.

<u>Considerations for consultation include:</u>

- What are the potential effects of human activity and disturbance on the habitat?

- Are any nesting or rookery sites nearby?
- Which devices will be used?
- How long/often will the devices be used and at what times of day/night/dusk/dawn?
- What animals are the target of the hazing?
- How will equipment (e.g., vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of deterrence or hazing are associated with the operation of the equipment to disturb the species so that they avoid the oiled area. Species can be affected by habitat disruption, noise, and human presence and activity. Species affected include birds, small land animals, and mobile aquatic organisms (e.g., fish).

Habitats within the Action Area where deterrence or hazing may occur:

Shoreline	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	Upland Areas
Ports, Canals, and Industrial Areas	

Vulnerable habitats within the Action Area potentially affected deterrence or hazing activities:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

Capture and Care of Contaminated Species or Recovery of Contaminated Carcasses that, during some spills, have become oiled or died due to oiling. Capture, care for, or recovery of the animal's carcass may need to be carried out by responders to help an animal's chances for survival or prevent other animals from further oil exposure. Capture and care for oiled wildlife can be hazardous and require specially trained personnel, equipment, and facilities (Exxon Mobil, 2014). The sooner oiled wildlife is captured and rehabilitated, the better their chance for survival (Exxon Mobil, 2014). Pre-emptive capture of unoiled animals protected by the ESA requires a separate permitting action (under ESA Section 10) and is therefore not in the scope of this matrix.

The interdependent/interrelated activities listed below are commonly used in conjunction with the capture and care of contaminated species or recovery of contaminated carcasses: Use of Vessels, Use of Vehicles, Use of Aircraft, New Access Points, Access by Foot Traffic, and Staging.

<u>Considerations for consultation include:</u>

- What did the carcasses result from?
- What federal agency supports coordination of the removal?
- Who provides assistance?
- Where should the carcasses be taken to?
- Is there a Wildlife Branch Director to help coordinate efforts?

- What species are being recovered?
- Are any permits necessary for the activities or the wildlife care facility?
- How will equipment (e.g., vessels) be disinfected to prevent for the spread of invasive species, particularly if activities or the equipment is being transported to or from a different watershed or wildlife care facility?

Direct and indirect effects of the capture and care of contaminated species or recovery of contaminated carcasses are associated with capture and care as directed by federal/state/territorial wildlife agencies and rescue centers. Species can be affected by stress, transport, physical harm, and the application of cleaning products. Species affected include birds, small land animals, reptiles, and amphibians.

Habitats within the Action Area where the capture and care of contaminated species or recovery of contaminated carcasses may occur:

Shoreline	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	Upland Areas
Ports, Canals, and Industrial Areas	

Vulnerable habitats within the Action Area potentially affected by the capture and care of contaminated species or recovery of contaminated carcasses:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

Locating, Tracking, and Support Activities

Support activities of primary responses to oil spills cannot be discounted from potential impacts to listed, proposed, and other species of concern. Several examples include site access by air, land, or vehicle; and setting up staging areas for cleanup activities, sampling, and foot traffic.

Aircraft Use (various types including fixed-wing and helicopters) during an oil spill to conduct overflights to track or monitor the location of the spill or transport responders to the site. Aircraft may also be used to evaluate the presence of wildlife, including flocks of waterfowl, in the spill trajectory. The Coast Guard's MH65 is frequently used, which has a max speed of 175 knots with two turbine engines. In some cases (i.e., when a spill is offshore), a longer-range aircraft may be used, such as the Coast Guard C-130H, which has a cruising speed of 374 mph, a wingspan of 132 ft, and has four turboprop engines. It can be used to drop pumps, etc., to a site.

The interdependent/interrelated activities listed below are commonly used in conjunction with aircraft use: Use of vehicles and use of vessels.

<u>Considerations for consultation include:</u>

- Which type of aircraft will be used (airplanes, helicopters, drones, balloons, etc.)?
- How often will overflights take place?

- Can other remote sensing operations be used in its place?
- Is the aircraft carrying hazardous materials or waste to or from the response site?
- Is it permitted to carry hazardous materials?
- At what altitude will the aircraft be flying?
- Is there a known flight path?
- Are flight path restrictions needed to avoid bald eagle nests and areas of high bird density like breeding colonies or seasonal roosts?
- Will the aircraft fly over sensitive habitat?
- Are there any existing restrictions in place?
- In an emergency response situation, it may be possible to use the permitting process through resource trustees to fly lower than would otherwise be allowed.
- Would you expect any air quality, water quality, or noise concerns above background?
- How will equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of aircraft use are associated with conducting flights over the impacted spill area. Species can be affected by disruption (noise) and bird strikes. Species affected include birds and land animals.

Habitats within the Action Area where aircraft use may occur:

Shoreline	Ports, Canals, and Industrial Areas
Coastal Zone	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	Upland Areas

Vulnerable habitats within the Action Area potentially affected by flyovers from aircraft use include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

Use of Vessels during an oil spill to locate, monitor, conduct operations, or transport people and equipment to the site. Vessel size typically depends on the water body environment and what is available from the Oil Spill Removal Organization or Coast Guard vessels in the area; however, the most used vessels during spill responses include 12 ft punt boats, 14 ft Jon boats, 32 ft support vessels, rigged hulled inflatable boats (approximately 5–11 ft), and approximately 21 ft workboats. In some cases (e.g., larger spills, deeper water), larger vessels may be used, such as a 46 ft fast response vessel, 200 ft oil spill response vessel (can travel 12 kts and has 4,000-barrel storage capacity), or 225 ft Sea Going Buoy Tender (13 ft draft, has Spilled Oil Recovery System onboard).

The interdependent/interrelated activities listed below are commonly used in conjunction with the use of vessels: Use of vehicles, Use of machinery, Booming, Skimming, Decontamination and Disinfection.

Considerations for consultation include:

- Which type of vessels will be used (autonomous vessels, airboats, etc.)?
- How often will the vessels transit the area, and at what speeds?
- How many vessels will be in the area?
- Where will fueling take place?
- Where will decontamination take place, if necessary?
- Where will vessels launch?
- Are these vessels carrying hazardous materials or waste to or from the response site?
- Are they permitted to carry hazardous materials?
- Are the vessels being operated in atypical locations?
- Would you expect any air quality, water quality, or noise concerns above background?
- How will vessels and related equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of use of vessels are associated with vessel operation. Species can be affected by disruption (noise) and vessel strikes. Species affected include birds, land animals, and fish.

Habitats within the Action Area where Use of Vessels may occur:

Ports, Canals, and Industrial Areas	Rivers and Streams
Bays and Estuaries	Ponds and Lakes
Wetlands	

Vulnerable habitats within the Action Area potentially affected by use of vessels include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

Use of Vehicles and equipment (with wheels or tracks) during oil spills to track spills, deploy equipment, and transport responders to the site (pickup trucks, ATVs, etc., are often used).

The interdependent/interrelated activities listed below are commonly used in conjunction with the use of vehicles: Decontamination.

Considerations for consultation include:

- What type of vehicle will be used (car, semi-tractor trailers, RVs, hovercraft, backhoe, bulldozer, ATV, off-road vehicles, etc.)?
- What type of substrates will the vehicle be working on?

- How many vehicles will be used?
- How will they be re-filled (with gasoline, etc.)?
- How will the vehicle be decontaminated if necessary?
- How will vehicles access sites?
- Are these vehicles carrying hazardous materials or waste to or from the response site?
- Are they permitted to carry hazardous materials?
- Are vehicles being operated in atypical locations?
- Would you expect any air quality, water quality, or noise concerns above background?
- How will vehicles and related equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of the use of vehicles are associated with operation. Species can be affected by disruption (noise, lights), vehicle strikes, and crushing/compaction. Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans, and gastropods.

Habitats within the Action Area where the use of vehicles may occur:

Shorelines
Rivers and Streams
Ponds and Lakes
Ports, Canals, and Industrial Areas
Bays and Estuaries
Uplands

Vulnerable habitats within the Action Area potentially affected by the use of vehicles include:

Beach and Sand Bar
Floodplain Forest
Open Water
Sedge Meadow
Submersed Vegetation
Deep Marsh Vegetation
Mudflats
Rooted Floating Aquatics
Shallow Marsh Vegetation

Use of Machinery/Supporting Equipment to support oil spill response activities (e.g., generators, pumps, 2–3 in. hoses, hydraulic power packs, lighting). For example, a CCN-150 is a submersible offloading pump with a max capacity with seawater of 3,500 gallons per minute at 98 ft, weighs 187 lb, and is designed to fit into a 12.5 in. diameter opening. USCG supplies a Deutz Hydraulic Power Unit used to drive hydraulic pumps (creates suction) and can develop 3,500 psi at 45-55 gallons per minute hydraulic flow. It weighs 1,735 lb (USCG, 2006).

The interdependent/interrelated activities listed below are commonly used in conjunction with the use of machinery/supporting equipment: Decontamination.

<u>Considerations for consultation include:</u>

- What type of substrates will the machinery be working on?
- How many will be used?
- How will they be re-filled (with gasoline, etc.)?
- How will the machinery be decontaminated if necessary?
- How will machinery access sites? What route(s) will vehicles and equipment use to access sites?

- Would you expect any air quality, water quality, or noise concerns above background?
- How will machinery and supporting equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of machinery/supporting equipment use are associated with deployment and the presence of machinery in atypical locations. Species can be affected by disruption (noise, lights) and soil compaction. Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans, and gastropods.

Habitats within the Action Area where the use of machinery/supporting equipment may occur:

Shorelines
Rivers and Streams
Ponds and Lakes
Ports, Canals, and Industrial Areas
Bays and Estuaries
Uplands

Vulnerable habitats within Action Area potentially affected by Use of Machinery/Supporting Equipment include:

Beach and Sand Bar
Floodplain Forest
Open Water
Sedge Meadow
Submersed Vegetation
Deep Marsh Vegetation
Mudflats
Rooted Floating Aquatics
Shallow Marsh Vegetation

Creation/Use of New Access Points by responders to create new access points to get people, equipment, vessels, and vehicles to a site to monitor, contain, or recover oil. This activity can range from putting a piece of wood down (4 x 6 in.) to creating a new road for vehicle access.

The interdependent/interrelated activities listed below are commonly used in conjunction with the creation/use of new access points: Use of Machinery and Use of Vehicles.

<u>Considerations for consultation include:</u>

- What is the access point being created for (people, machine, or vessel)?
- Are other options available to access the location?
- Can the location be accessed through a less sensitive area?
- What kind of equipment and materials will be needed to create the new access point?
- What will happen to the access point after the response concludes ("demobilization" of access point)?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of the creation/use of new access points are associated with constructing and using new access points. Species can be affected by disruption, habitat disturbance or destruction, and soil compaction. Species affected include small land animals, insects, plants, amphibians, reptiles, crustaceans, gastropods, and nesting/foraging birds.

Habitats within the Action Area where the creation/use of new access points may occur:

Shorelines
Bays and Estuaries
Wetlands
Ports, Canals, and Industrial Areas
Rivers and Streams
Ponds and Lakes
Upland Areas

Vulnerable habitats within the Action Area potentially affected by the creation/use of new access points include:

Beach and Sand Bar
Calcareous Fen
Floodplain Forest
Open Water
Sedge Meadow
Submersed Vegetation
Bog
Deep Marsh Vegetation
Mudflats
Rooted Floating Aquatics
Shallow Marsh Vegetation

Creation/Use of Staging Areas (Land-based) by responders to create new staging areas or convert certain existing areas into an area to store, set up, and transport people and equipment needed to conduct the oil spill response. This activity can range from using an existing parking lot to bringing in trailers/constructing a semi-permanent building.

The interdependent/interrelated activities listed below are commonly used in conjunction with the creation/use of staging areas: Use of Vehicles, Use of Vessels, New Access Points, Use of Machinery, and Use of Aircraft.

<u>Considerations for consultation include:</u>

- How many personnel and what type of resources will be found at the staging area?
- When will the staging area be accessed?
- Will the staging area require lights?
- How/what kind of equipment will be used to access the staging area and routing of equipment in and out of the staging area?
- Are responders using existing areas or creating a new staging area in an undeveloped area?
- Is flooring being created for responders to walk on/store equipment (i.e., pallets, boards, or carpet)?
- How long will the equipment be stored on-site?
- Will oil or hazardous materials be stored on-site (in frac tanks or other types of containers)?
- How will equipment (e.g., heavy machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of the creation/use of staging areas are associated with the construction and use of new staging areas. Species can be affected by habitat disturbance or destruction and wildlife disturbance. Species affected include small land animals, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, and gastropods.

Habitats within the Action Area where the creation/use of staging areas may occur:

Shorelines
Bays and Estuaries
Ports, Canals, and Industrial Areas
Rivers and Streams

Upland Areas	Ponds and Lakes

Vulnerable habitats within Action Area potentially affected by the creation/use of staging areas include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Natural Attenuation relies on natural processes (including biodegradation, dispersion, dilution, sorption, evaporation, etc.) to achieve site-specific remedial objectives within a reasonable time frame compared to those offered by other response activities (EPA, 1999). For example, no attempt is made to remove stranded oil or minimize impacts to the environment. As the National Research Council states, "For areas in which a spill is logistically inaccessible for reasons of remoteness (e.g., the Arctic), stormy weather, or lack of equipment and manpower, natural attenuation might be the only option available" (2013). The decision to use natural attenuation may take place for cases in which: 1) oil is not accessible; 2) when oiling has occurred on high-energy beaches or shorelines where wave action will remove a majority of the oil in a short period; 3) when there is a human health or worker safety issue (e.g., fast-moving water, rocky coastline, high-energy environment); or 4) when it is determined (e.g., through a Net Environmental Benefit Analysis) that responding to the oil may do more harm than good.

The interdependent/interrelated activities listed below are commonly used in conjunction with Natural Attenuation: Use of Vessels (for tracking and surveillance), Use of Vehicles (for tracking and surveillance), Sample Collection, Access of Personnel by Foot Traffic, and Deterrence and Hazing.

<u>Considerations for consultation include:</u>

- Will effects manifest at the ecosystem level, resulting in significant changes in ecosystem structure and function?
- Are important ecological resources or human activities/resources threatened?
- Will stranded oil remobilize?
- How will equipment (e.g., vessels used for tracking/monitoring) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

The Natural Attenuation option will most likely need to be addressed during the USFWS coordination phase of spill response consultation. Species effects are variable and incident specific. It is unlikely that specific species and habitats would be determined before a response unless specific sites are already identified for "natural attenuation" in the ACP. During a response, this option will be discussed and identified within the Environmental Unit.

Habitats within the Action Area where natural attenuation may occur:

Shorelines	Bays and Estuaries
Rivers and Streams	Wetlands

Ponds and Lakes	Upland Areas
Ports, Canals, and Industrial Areas	

Vulnerable habitats within the Action Area potentially affected by natural attenuation include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Deployment of Sampling/Monitoring Location Buoys applies to small buoys, not navigation aids. Tracking buoys can be used to study current patterns. This information can be useful in predicting the trajectory of an oil spill. Several designs are used, such as radio- and satellite-tracking units (Exxon Mobil, 2014). Drift (unanchored) buoys and static buoys may be used to track and surveil spilled product or mark the boundaries of environmentally sensitive areas or specially designated on-water zones potentially in the path of the spilled product. They are used to mark anchors or hazardous areas. For example, the Orion Tracking Buoy has a 9.8 in. diameter and 6 in. height, a split globe with an outer ring, weighs 4 lb, and tracks spills via a single coplanar stripline transmission (free-floating) line (Fingas, 2011).

The interdependent/interrelated activities listed below are commonly used in conjunction with the deployment of sampling/monitoring location buoys: Use of Vessels, Use of Aircraft, New Access Points, and Staging.

<u>Considerations for consultation include:</u>

- Are they static or drifting buoys?
- What will the buoys look like (how big, are they lighted, etc.)?
- How long will they remain at the deployment location?
- How will they be deployed?
- Will they be anchored?
- How will they be used?
- Will drift buoys be recovered?
- Are they large enough for birds to perch on?
- Are buoys grounded (i.e., at high/low tide)?
- Is there any rope or chain drag that could impact the benthic habitats?
- How is grounding avoided (particularly for environmentally sensitive areas)?
- What are the anchoring mechanism and the habitat that is being anchored into?
- How will equipment (e.g., buoys, vessels) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed used for anchoring?

Direct and indirect effects of the deployment of sampling/monitoring location buoys are associated with deployment/anchoring/presence of the buoys (including recovery) and light (or sounds) emitting from the buoy. Species can be affected by disturbance from the buoys signal (light, sound) and direct contact with chain or chain scour. Species affected include waterfowl, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, mollusks, and fish.

Habitats within the Action Area where the deployment of sampling/monitoring location buoys may occur:

Ports, Canals, and Industrial Areas	Rivers and Streams
Bays and Estuaries	Ponds and Lakes

Vulnerable habitats within the Action Area potentially affected by the deployment of sampling/monitoring location buoys include:

Beach and Sand Bar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Locating, Sampling, and Monitoring: Air, Land, Water (includes Shoreline Cleanup Assessment Technique – SCAT). During spills, responders collect samples of the spilled product and clean water (as a background) to determine or confirm the spill source. Typically, at least three samples are collected at the leading edge, the center of the spill, and clean water. Grab sampling involves lowering the sample jar into the water and skimming the oil layer or globules from the water surface into the jar. Sheen net sampling involves slowly dragging a sheen net through an oil sheen and using its natural affinity to collect the oil (then placing it in the jar). Oil samples are sent to the USCG Marine Safety Laboratory for analysis via established procedures. Shoreline Cleanup and Assessment Technique (SCAT) is a systematic approach to surveying an area during an oil spill response (begins early in the response and continues to ensure cleanup endpoints are met). During SCAT assessment, a team of people (including representatives from federal agencies [USCG, NOAA], the state, the responsible party, and other applicable stakeholders) walks the impacted area to verify shoreline oiling, cleanup effectiveness, and final evaluations (NOAA SCAT, 2016). Special Monitoring of Applied Response Technologies (SMART) is a cooperatively designed monitoring program for in situ burning and dispersants that rely on small, highly mobile teams that collect real-time data using portable, rugged instruments. Data are provided to the Incident/Unified Command to address the effectiveness of the response (NOAA Office of Response and Restoration, 2016). Additional information regarding SMART protocol can be found on NOAA's Office of Response and Restoration website for Oil and Chemical Spills and following the Response Tools link.

The interdependent/interrelated activities listed below are commonly used in conjunction with locating, sampling, and monitoring: Use of Vessels, Use of Vehicles, Use of Aircraft, New Access Points, Access of Personnel by Foot Traffic, and Staging.

<u>Considerations for consultation include:</u>

- What type of sampling will be conducted (grab sampling, sheen net sampling)?
- How will sampling be conducted (via foot, vessel, aircraft)?
- Where will sampling take place?
- What other equipment will be used during the sampling?

- How often will sampling take place? Is there a sampling plan?
- Is your sample methodology destructive (e.g., will it impact sediment, species, etc.)?
- What is the sampling duration (e.g., will the sampling device be left in the environment for continuous sampling or monitoring)?
- If sampling and monitoring will be long term, will noise be a factor?
- What kind of noise or other types of disturbance may the monitoring and sampling equipment produce?
- How will equipment (e.g., vessels, sampling equipment) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of locating, sampling, and monitoring are associated with sampling; all other activities are interrelated and covered in other activities. Species can be affected by physical contact or containment in the collection device. Species affected include any that are targeted for sampling and monitoring.

Habitats within the Action Area where locating, sampling, and monitoring may occur:

Shorelines	Rivers and Streams
Bays and Estuaries	Ponds and Lakes
Wetlands	Upland Areas
Ports, Canals, and Industrial Areas	

Vulnerable habitats within the Action Area potentially affected by locating, sampling, and monitoring include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Access by Foot Traffic involves deploying personnel to the oil spill site to conduct visual observations, track oil, and conduct cleanup operations.

The interdependent/interrelated activities listed below are commonly used in conjunction with access by foot traffic: Use of Vessels, Use of Vehicles, Use of Machinery, Use of Aircraft, and Staging.

<u>Considerations for consultation include:</u>

- How many personnel are necessary to complete the job?
- How much area will be affected by responders traveling to the incident site?
- Where will they operate out of (a facility or temporary structure)?
- How will people get to the site (aircraft, vehicle, vessel)?
- How will equipment (e.g., vessels used to access the site) be disinfected to prevent the

spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of access by foot traffic are associated with site access. Species can be affected by habitat disturbance (e.g., soil compaction, erosion from foot traffic, noise, presence of people) and direct contact. Species affected include plants, amphibians, reptiles, small land mammals, nesting birds, insects, and gastropods.

Habitats within the Action Area where access by foot traffic may occur:

Shorelines	Ports, Canals, and Industrial Areas
Wetlands	Upland Areas

Vulnerable habitats within the Action Area potentially affected by the access by foot traffic include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Rooted Floating Aquatics	Sedge Meadow
Shallow Marsh Vegetation	Submersed Vegetation
Wet Meadow	

2.3 Secondary Response Activities

Secondary response activities occur because of a primary or support activity and are primarily associated with waste management activities.

Waste Management Activities

Waste management activities include handling, storage on water and land, decanting, and decontamination.

Waste Handling is the movement of collected oil or contaminated waste (soil, sediment, debris) during a spill response. In large spills, as much waste can be generated as the amount of oil spilled (Exxon Mobil, 2014). Non-oily wastes (e.g., sewage, domestic waste) that are generated during cleanup operations can be disposed of at local wastewater treatment plants and municipal landfills; oiled and hazardous wastes disposal can be disposed of via industrial landfilling, landfarming, open burning, portable incineration, commercial incineration, waste to energy facilities, reprocessing, reclaiming/recycling and further information regarding these options can be found in Exxon Mobil (2014).

The interdependent/interrelated activities listed below are commonly used in conjunction with waste handling: Use of Vessels, Use of Vehicles, Use of Machinery, Deterrence and Hazing, Mobilization/Demobilization of Personnel, Booming, and Staging.

<u>Considerations for consultation include:</u>

- What is the size and location of the spill?
- Are there local or regional regulatory requirements that impact where waste handling takes place?
- What equipment will be needed to handle the waste?
- Is the waste a listed hazardous waste or does it exhibit characteristics of hazardous waste?

- How will it be labeled?
- Are operations being carried out according to the waste management plan?
- Will odor or vapors be released into the atmosphere?
- Could any chemical reactions take place with the wastes?
- Are permits needed?
- What regulations apply?
- How will waste be transported to storage?
- How will waste be transported off-site?
- What utilities and logistical support are needed at the response site (electricity, water, response equipment)?
- How will recovered oil be handled?
- Is there a potential for secondary releases or a need for secondary containment; if so, how will they be addressed?
- Is the waste being handled near a sensitive area?
- How will equipment be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of waste handling are associated with collecting and moving waste. Species can be affected by the accidental release of oil or oiled materials in a previously unaffected area (water or land). Species affected include all threatened and endangered species in waste handling areas. Potential impacts are likely already covered by the waste-generating activity.

Habitats within the Action Area where Waste Handling may occur:

Shorelines
Coastal Zone
Rivers and Streams
Ponds and Lakes
Ports, Canals, Industrial Areas
Bays and Estuaries
Wetlands
Upland Areas

Vulnerable habitats within the Action Area potentially affected by waste handling include:

Beach and Sand Bar
Calcareous Fen
Floodplain Forest
Open Water
Sedge Meadow
Submersed Vegetation
Bog
Deep Marsh Vegetation
Mudflats
Rooted Floating Aquatics
Shallow Marsh Vegetation

Temporary Storage (Land-based) includes numerous options for storing wastes and debris associated with oil spills. Appropriate storage equipment and methods are based on the type and volume of material to be stored (Exxon Mobil, 2014). Descriptions of storage options (such as 55-gallon drums, containers, barges, and trucks) and estimated timeframes for their use can be found in Exxon Mobil, 2014, p. 14-6. Examples of more commonly used temporary storage devices (in larger spills, used on land) is a 30 cubic yard dumpster with open top or sealed top (22 ft long, 8 ft wide, 6 ft high) and a frac tank used to store waste liquids (holds 21,000 gallons), which is made of steel, has a 516 in. by 96 in. by 141 in. footprint, and weighs 26,000 lb empty.

The interdependent/interrelated activities listed below are commonly used in conjunction with Land-based Temporary Storage: Use of Vessels, Use of Machinery, Booming, Staging, and Decanting.

Considerations for consultation include:

- What is the duration of storage (days, weeks, months)?
- What storage options are available? How will the oil or hazardous material be stored (dumpsters, tanks, barges, etc.)?
- What is the storage capacity?
- What material is being stored?
- How will recovered oil be handled and stored?
- Is the stored waste a listed hazardous waste or does it exhibit characteristics of hazardous waste?
- Will odor or vapors be released into the atmosphere?
- Could any chemical reactions take place with the wastes?
- Are permits needed?
- What regulations apply?
- How will waste be transported to storage?
- Will security be provided to prevent unauthorized dumping?
- What utilities and logistical support are needed at the response site (electricity, water, response equipment)?
- Is there a potential for a secondary release?
- How will equipment (e.g., storage containers) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?
- The Oil Spill Response Field Manual (Exxon Mobil, 2014) lists 25 types of storage and the estimated timeframe (days, weeks, months) for use to consider.

Direct and indirect effects of land-based temporary storage are associated with establishing temporary storage and containment of oily wastes. Species can be affected by secondary spillage from container failure or overfill (on water), compaction/crushing from setting up of storage containers (or applicable storage method), direct exposure (if open-top or uncovered), and exposure to off-gassing (VOCs like BTEX, and other associated oil vapors). Species affected include small land mammals, birds, insects, reptiles, and amphibians.

Habitats within the Action Area where land-based temporary storage may occur:

Shorelines Shorelines of Rivers and Streams, Bays and Estuaries, Ponds and Lakes	Upland Areas

Vulnerable habitats within the Action Area potentially affected by land-based temporary storage include:

Beach and Sand Bar
Mudflats
Rooted Floating Aquatics

Temporary Storage (Water-based) includes numerous storage devices for waste and debris associated with oil spills; selection may depend on the type and amount of oil spilled and availability at the time of the spill. When oil recovery and transfer are conducted on-water, there are two options: 1) towable on-water storage especially tank barges designed to take on fluids. (Note: When barges contain less than 250 barrels of storage volume, they are considered equipment and do not require a USCG inspection or tankerman's document.) Deck barges may also be used with a tote or tank on top. Other types of towable on-water storage include inflatable bladders and tanks (also called dracones), typically made of rubber and flexible, but designed to store flammable or combustible liquids and be towed at slow rates. Additionally, there are inflatable, towable barges with open-top storage that can provide some freeboard and protection from seas (USCG, 2011). Tank vessels are an option for larger spills and when lightering may be necessary. Drawbacks may include a high freeboard, deep draft, and lack of availability - depending on the vessel size. The other type of onboard system is deck tanks. Use of these onboard systems may require extreme caution due to altering vessel stability (USCG, 2011). An example of an inflatable barge, used offshore (not common), is the Canflex FCB-250 Sea Slug, which is found on Coast Guard buoy tenders with the Spilled Oil Recovery System (SORS). This inflatable barge is 66 ft in length, 9.2 ft in diameter, 6.7 ft draft, 2,870 lb, and has a capacity of 26,400 gallons.

The interdependent/interrelated activities listed below are commonly used in conjunction with water-based temporary storage**:** Use of Vessels, Use of Vehicles, Use of Machinery, Deterrence and Hazing, Booming, Staging, Dikes and Berms, and Decanting.

<u>Considerations for consultation include:</u>

- What is the duration of storage (days, weeks, months)?
- What storage options are available/how will the oil or hazardous material be handled or transferred (tanks, barges, etc.)?
- What is the storage capacity?
- What material is being stored?
- Is the waste being stored a listed hazardous waste or does it exhibit characteristics of hazardous waste?
- Will odor or vapors be released into the atmosphere?
- Could any chemical reactions take place with the wastes?
- Are permits needed?
- Is there a potential for a secondary release?
- What regulations apply?
- Will security be provided to prevent unauthorized dumping?
- What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)?
- How will equipment (e.g., storage containers) be disinfected to prevent the spread of

invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of Water-based Temporary Storage are associated with the containment of oily wastes. Species can be affected by secondary spillage from container failure or overfill (on water); crushing substrate and turbidity from anchoring or spudding down of the temporary storage vessel/barge; direct exposure (if open-top or uncovered), and exposure to off-gassing (VOCs like BTEX, and other associated oil vapors). Species affected include birds, aquatic plants (submerged/rooted), insects, and benthic organisms.

Habitats within the Action Area where water-based temporary storage may occur:

Shorelines	Ports/Canals
Rivers and Streams	Ponds and Lakes

Vulnerable habitats within Action Area potentially affected by water-based temporary storage include:

Beach and Sand Bar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	

Decanting is the process of removing or discharging recovered water from temporary storage devices (i.e., portable tanks, internal tanks, collection wells, or other storage containers) to maximize the use of available storage capacity for recovered oil. This process is typically done during large spills in open water when large volumes of water are recovered along with the oil during the mechanical recovery process. Mechanical recovery is often restricted by factors such as the skimming system's oil/water recovery rate and the amount of tank space available on the recovery unit. Additionally, the longer the oil remains in the water, the more it can emulsify (form a highly mixed oil/water liquid or mousse), necessitating more storage space. Decanting is addressed in the NRT’s guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE.

Decontamination removes oil from personnel, vessels, and equipment as necessary during oil spill responses. Throughout the response, personnel decontamination is required; decontamination units can be fabricated on-site or via commercial modular units (Exxon Mobile, 2014). Vessels may accumulate oil on their hulls and at the waterline and should not be brought into uncontaminated areas without being cleaned; therefore, hulls may be manually washed from a low-freeboard pontoon float inside a protected area (Exxon Mobil, 2014). Equipment decontamination will be necessary before equipment is moved to uncontaminated areas (i.e., boom, skimmers, etc.). If the cleaning station location does not have direct access to shore facilities, a barge may need to be procured to provide supplies, communications, shelter, and sanitary facilities (Exxon Mobil, 2014).

The interdependent/interrelated activities listed below are commonly used in conjunction with decontamination: Use of Vehicles, Use of Vessels, Use of Machinery, New Access Points, Access of Personnel by Foot Traffic, Staging, Waste Handling, and Temporary Storage.

Considerations for consultation include:

- Where will the decontamination procedures occur?
- Is there an established infrastructure for environmental decontamination?
- What will be decontaminated?
- Will support equipment need to be brought in?
- Are there options for avoiding designated or proposed critical habitat or other areas that contain resources for listed or proposed species or species of concern?
- Is there potential for water contamination and terrestrial contamination?
- What will be used to decontaminate the people/equipment?
- How will equipment (e.g., vessels, machinery) be disinfected to prevent the spread of invasive species, particularly if the equipment is being transported to or from a different watershed?

Direct and indirect effects of decontamination are associated with the setup and use of the decontamination area and breach of containment/runoff. Species can be affected by disturbance, substrate compaction, oil remobilizing into previously uncontaminated water/land, compromised water quality, chemical cleaning agents, and direct exposure and ingestion of potentially oil-contaminated water. Species affected include small land mammals, birds, insects, amphibians, plants, and reptiles.

Habitats within the Action Area where decontamination may occur:

Shorelines	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	Upland Areas
Ports, Canals, and Industrial Areas	

Vulnerable habitats within the Action Area potentially affected by decontamination include:

Beach and Sand Bar	Bog
Calcareous Fen	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed Vegetation	Wet Meadow

2.3.1 Use of Non-Mechanical Countermeasures

Dispersants (chemical countermeasures) for oil spills are not a pre-authorized response action within the Great Lakes region. Dispersants will not be used as a primary or secondary countermeasure within the R5 RCP. No non-mechanical countermeasures have been pre-approved for use in the Great Lakes. Any proposal for such countermeasures would require incident-specific RRT 5 approval and input from USFWS to ensure that effects on species are considered during the selection of a response action. Potential types of countermeasures include shoreline cleaning agents, herding agents, and solidifiers.

2.4 Response Actions Specific to the Action Area and Not Included in the RAM

Disinfection This is distinct from "decontamination" as disinfection needs to occur before vessels are launched to prevent the spread of invasive species and may involve steam cleaning or the use of chemical disinfectants. Aquatic invasive species are waterborne, non-native organisms, including plants, animals, and pathogens, that can threaten ecosystems into which they spread or are introduced. Aquatic invasive species can compete with native species for food and habitat, prey on native species and kill them through disease processes, disrupt ecosystem stability, impact water quality, impact commercial and recreational activities, affect property values, and cost millions of dollars in prevention and control. The long-term impacts of invasive species on an ecosystem can easily exceed those of an oil spill.

Aquatic invasive species may be introduced via vessels and water wetted equipment that are from waters outside of the region, as well as vessels that have been used in more local, but separate, waterways. For example, viral hemorrhagic septicemia is a fish virus that is present in the Great Lakes but is not yet present in most inland lakes. The movement of vessels and water wetted equipment between infected waters and uninfected waters may spread the virus.

Disinfection needs to be considered for heavy equipment, vehicles, and equipment brought to the response from other areas, especially outside the immediate watershed, not just vessels. Many of the considerations and effects will be similar to those for decontamination, but without oil as part of the process.

For disinfection procedures, methods, and considerations please refer to Appendix IX of the Inland Response Tactics Manual[iv].

Phytoremediation Naturally occurring microorganisms use oxygen to convert hydrocarbons into water and carbon dioxide. This process usually occurs at the water interface and is limited by oxygen and nutrient availability and by the exposed surface area of the oil. If these factors can be increased, the rate of biodegradation can be accelerated. Use of phytoremediation in R5 has not been employed to date; however, may be considered on a case-by-case basis.

Air Sparging Air sparging can be used to reduce concentrations of volatile organic compounds in water, which can appear in the event of an ethanol spill. The injection of clean air into the contaminated water enables a phase transfer of hydrocarbons from a dissolved state to a vapor phase. Sparging adds dissolved oxygen to the water, lessening the effect of the breakdown of compounds that may otherwise lead to hypoxic conditions. It has also been shown to be an effective remedy for soil contaminated by leaking underground storage tanks. The air sparging system can be built with parts commonly found at home centers or hardware stores. Eight coiled soaker hoses are mounted on a chain link gate with zip ties. The hoses are fitted to two four-way brass manifolds, which are in turn connected to a two-way brass manifold. This manifold is fitted to the hose of an air pump. The gate is lowered into the contaminated water. Air pumped through the sparging system aerates a small area of water for as long as it runs.

Deployment Considerations and Limitations

- Products such as ethanol biodegrade quickly in water, locally reducing the levels of dissolved oxygen and putting aquatic biota at risk.
- In larger volumes, blended ethanol and gasoline can separate in water. Responders

should be aware if the released product is blended and prepare for gasoline containment, as well as employing air sparging to prevent hypoxic conditions. Ethanol will mix with the water while gasoline floats.

Effects analyses for disinfection, phytoremediation, and air sparging response activities are to be determined at the time of preparing this BE. Effects to species and designated critical habitats are to be reviewed and determined in future BE modifications warranted by regulatory review and federal listing changes. Updated analyses will be noted in the **Table of Changes**.

2.5 Conservation Measures and Best Management Practices

Conservation measures and BMPs are non-negotiable. According to EPA 40 CFR 122.2:

"Best management practices ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage."

Additionally, according to the endangered species conservation handbook (USFWS & NMFS, 1998):

"Conservation measures - are actions to benefit or promote the recovery of listed species that are included by the Federal agency as an integral part of the proposed action. These actions will be taken by the Federal agency or applicant, and serve to minimize or compensate for, project effects on the species under review. These may include actions taken prior to the initiation of consultation, or actions which the Federal agency or applicant have committed to complete in a biological assessment or similar document."

Therefore, the BMPs and conservation measures in this BE are considered collectively as conditions of response actions that aim to eliminate or reduce incidence of contamination to waters of the United States and/or aim to improve survivability or reduce detrimental impact to listed species. General BMPs are described below. Additional BMPs may be required at the regional or local levels and should be coordinated during spill response per the ESA MOA (**Appendix A**). Similarly, additional BMPs may be developed as part of informal consultation between the action agencies and USFWS during the development of ACPs. **The BMPs provided here are not all inclusive of those that may be employed and necessitated by response activities when a spill occurs**.

More detailed and prescriptive BMPs may be developed as part of the pre-spill planning process (Informal Consultation/ACP Planning Process; Appendix A) and will consider the response action and affected species and habitats. The BMPs provided in this BE are to be employed during spill response regardless of whether the FOSC initiates formal or informal consultation, and regardless of whether or not the spill response is considered to be likely to result in adverse effects to any listed species or critical habitat.

2.5.1 Existing Best Management Practices Documented in Contingency Plans

During area planning and any pre-spill consultations, EPA and the USCG may work with USFWS to develop area-specific BMPs or conservation measures; incorporating them into the response practices helps minimize the need for formal consultation. Existing BMPs that are standard for spill response actions the EPA and USCG FOSCs will generally and part of spill response planning as provided by the USFWS[v] include:

- An endangered species protection, effects, and habitat monitoring plan for the Action Area in place will provide information on the possible presence and impacts of ESA listed, proposed, and other species of concern or designated or proposed critical habitats. The need for wildlife hazing for a specific response activity will be assessed and implemented if necessary.
- Buffer zones for potentially affected wildlife or their habitat will be established and implemented (i.e., avian nesting areas, fish spawning areas, etc.) with the concurrence of USFWS. Buffer zones will be defined by the Environmental Unit in coordination with USFWS during spill response planning.
- Spill Response Plans prepared at the regional or sub-area level and Environmental Sensitivity Indices (ESIs) in the Action Area will have pre-identified staging areas for personnel and equipment that will avoid and minimize disturbance to threatened or endangered wildlife and their habitats. Local USFWS field offices will be consulted to obtain current geo-referenced information for listed species and proposed or designated critical habitat within the area of interest.
- Before installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), construction/deconstruction/removal plans are in place and are scheduled and implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats, including any designated or proposed critical habitat.

During a response, the Environmental Unit may complete a Resources at Risk Summary form (**ICS Form 232-OS; Appendix D**). The Resources at Risk Summary form provides information about listed species, sensitive sites in the incident area, and other resources at risk. The form also identifies incident-specific priorities and issues, including the need to use BMPs.

2.5.2 Conservation Measures and BMPs Agreed to as Part of this Consultation

USCG and EPA agree to implement the BMPs listed in **Section 2.2.1**, along with any species-specific BMPs to be followed when a specific species is thought to be present in the spill response area (**Appendix H**). In addition, activity-specific BMPs have been identified for some, but not all activities listed in the RAM. At a minimum, USCG and EPA agree to implement the following activity-specific BMPs or conservation measures identified below where listed species occurrences or proposed or designated critical habitats overlap with the spill response area of interest.

Deflection and Containment Activities

The standard BMPs and conservation measures listed in **Section 5.2.1** apply to all activities (<u>Booming</u>; <u>Dikes or Berms</u>; <u>Construction of Barriers</u>, <u>Dams, Pits, and Trenches</u>; and <u>Culvert Blocking</u>).

Recovery Activities

The standard BMPs and conservation measures listed in **Section 2.2.1** apply to all activities. In addition, those listed below are activity specific.

For <u>Skimming</u> in open water operations: Vessels will avoid transit through submerged aquatic vegetation. Where applicable, vessels will exclude larger water column species through use of restricted size intakes for skimming.

For Vacuuming in open water operations: Vessels will avoid transit through submerged aquatic vegetation. In non-open water operations, responders will closely monitor vegetated areas and develop a site-specific list of procedures and restrictions to minimize damage to vegetation.

Use of Sorbent materials: Responders will monitor, maintain, and replace sorbents at regular intervals as necessary to avoid material breaking down. Particulate sorbent material will not be placed in open water (i.e., coconut husk, peat, etc.).

Removal and Cleanup Activities

The standard BMPs and conservation measures listed in **Section 2.2.1** apply to all activities. In addition, those listed below are activities specific to Flooding, Flushing, Steam Cleaning, and Sandblasting:

- Responders will monitor and maintain booms and oil collection methods at the application sites to prevent transport of oil and oiled sediments away from application site.
- Responders will employ careful use of the response equipment (i.e., hose, pressure wand) to prevent overuse.
- If at all possible, these techniques will not be used in sensitive areas such as soft substrates, aquatic vegetation, and spawning areas. If unavoidable, special restrictions will be established by the Environmental Unit in coordination with responders for areas where foot traffic and equipment operation may cause compaction or other damage.
- For Flooding applications – Responders will only use low pressure and ambient water temperatures where benthic organisms and vegetation are located to minimize stress or displacement.
- For Sandblasting operations – Responders will coordinate with the Environmental Unit to plan for and implement careful recovery and collection of oiled sand.

The following activities are not permitted within mussel beds (or vegetated habitats without incident-specific emergency consultation with USFWS: Mechanical Sand Cleaning (surface, <1 inch), Mechanical Sand Cleaning (>1 inch) and/or Excavation, Removal of Non-floating or Submerged Oil, and/or Manual Removal.

Wildlife Protection Activities

Actions must be conducted by authorized permitted personnel in the Wildlife Operations branch with USFWS oversight. Actions must be consistent with an existing Fish and Wildlife and Sensitive Environments Plan or Wildlife Response Plan if in place for the planning area or the EPA or USCG must ensure that one of these is created for the incident. Any such plan must meet the objectives set forth in 40 CFR 300.210 c(4i)(iiF).

Locating, Tracking, and Support Activities

All aircraft/vessel/vehicle traffic will be minimized as much as possible – particularly in environmentally sensitive areas identified in the Resources at Risk Summary form (**Appendix D**).

Existing shore-based access/vehicular traffic routes and existing infrastructure or boat ramps will be utilized to the greatest extent possible.

Creation of new access points, roads, ramps, or aircraft landing areas in order to deploy a response activity during a spill will need to be addressed under emergency consultation procedures.

Deterrence and hazing may be considered for Natural Attenuation.

For Deployment of Buoys; Locating, Sampling and Monitoring; and Access of Personnel by Foot Traffic, Responders will consult with the Environmental Unit or natural resource protection managers to determine if any additional restrictions or additional safety precautions are required in the proposed action area or if emergency consultation is necessary.

Waste Management Activities

Considerations for Waste Handling and Temporary Storage:

- Waste accumulation and storage locations will be pre-identified by responders in coordination with the Environmental Unit in a way that minimizes or eliminates potential for disturbance to threatened or endangered wildlife and their habitats.
- For waste accumulation and storage locations, responders will ensure that the following criteria will be in place: spill prevention, control, and countermeasures plans; storm water pollution prevention plans; severe weather contingency plans; ample storage for segregation of wastes; and an emergency response plan for waste accumulation/storage locations.
- To the maximum extent practicable, responders will conduct waste handling and staging operations in semi-developed or developed areas in order to minimize impact and to minimize the potential of new contamination in clean areas.

Decontamination BMPs and conservation measures:

- Responders will monitor wildlife and will take appropriate action to prevent harm (where not possible contact wildlife operations professionals, Environmental Unit, and SSC).
- Responders will remove oil as soon as possible to prevent contamination of non-oiled areas, insofar as is practical.
- Decontamination sites will be established by responders in non-sensitive or protected areas without listed species, for example: on a parking lot or at a boat ramp.

3.0 ACTION AREA

The Action Area includes all areas that may be affected directly or indirectly by actions warranted from spill response, including potential effects and impacts of response tactics, as well as the means and methods used by responders in spill response (defined in **Sections 2.1.2**, **2.1.3**, and **2.1.4**). The inland and coastal zones of Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin, including tribal territories within the boundaries of those states, fall under the purview of this BE. Mapping is provided to facilitate analyses of the likely effects of spill response, actions on listed, proposed, and other species of concern and designated or proposed critical habitats that overlap with those habitats in the Action Area. The goal is to ensure that FOSCs, regional responders, and planners appropriately account for significant sensitivities of the species and critical habitats. Action Agencies and responders should also refer to the R5 RCP/ACP for response jurisdictions applicable to this BE.

The R5 RCP specifically details the 8th and 9th USGC District's response jurisdiction boundaries. These operational areas include the Great Lakes coastal zone and their connecting channels. In general, unless otherwise stated, these areas encompass lakes, harbors, and marinas, and include adjoining wetlands, inlets, channels, and shorelines either in their entirety or up to a specific geographic feature that serves as the boundary. The seven primary environments addressed may be found within and throughout these jurisdiction boundaries the Action Area delineated in **Figures 3 through 8**.

Region 5 states are shown in **Figures 3 through 8**. These maps display petroleum pipelines (red line), major roads (brown line), railroads (dashed black line), commercial navigable waterways (blue line) and rivers and streams (light blue line), as well as lakes and ponds (blue area) within each state. While the R5 RCP/ACP covers the states in their entirety, in order to provide a reasonable focus for this BE, the Action Area is defined as areas within Region 5 that have a higher risk of oil spills greater than 11,000 gallons (the approximate amount carried by one large tanker truck). The Action Area is therefore demarcated by yellow (inland corridor) and pink (coastal) boundaries.

The Action Area boundaries that were assigned to mapping components and overlaid with species and critical habitat data are areas with a higher risk of oil spills >11,000 gallons. Within the inland zone, a discharge must be reported to the EPA Regional Administrator when there is a discharge of more than 1,000 gallons of oil in a single discharge to navigable waters or adjoining shorelines or more than 42 gallons of oil in each of two discharges to navigable waters or adjoining shorelines occurring within any 12-month period. Per the NCP, oil spills in Region 5 are classified as:

- Minor: < 1,000 gallons
- Medium: 1,000–10,000 gallons
- Major: > 10,000 gallons

Areas considered at high risk for oil spills were delineated within the Action Area. Interactive mapping is available on the RRT5 website. Other resources used were EPA's Inland Sensitivity Atlas, US Energy Information Administration's GIS data portal, US Department of Transportation's National Pipeline Mapping System, Department of Homeland Security's Homeland Infrastructure Foundation-Level Open Data platform, and Esri's USA roads layer, which contains data from the US Census Bureau's 2014 TIGER database.

The Action Area high-risk boundary includes high-volume transportation corridors such as hazardous liquid pipelines, major roads, high-capacity rail corridors (carrying unit trains of crude oil), and commercial shipping waterways, including the inland navigable waterways and shipping lanes within the Great Lakes[4]. Specifically, corridors included in mapping and for application of the BE are:

- Major Roads – Major roads are a high-risk transportation corridor due to carrying tanker trucks transporting oil.
- Crude Oil Pipelines – Major crude oil pipelines in the R5 states.
- Crude Oil Rail Terminals – Rail terminals handling the loading and unloading of crude oil in the R5 states.
- Navigable Waterways – Navigable waters of the United States are those subject to the ebb and flow of the tide and are presently used, or have been used, or may be susceptible for use to transport interstate or foreign commerce. Navigable Waterways in R5 fall under the jurisdiction of USCG concerning spill response and are defined in the R5 RCP/ACP.
- Petroleum Pipelines – Major petroleum product pipelines in the R5 states, which include pipelines that carry refined petroleum products - gasoline, jet fuel, home heating oil and diesel fuel. These petroleum pipelines vary in size from relatively small 8 to 12 inches in diameter to lines up to 42 inches. These pipelines deliver petroleum products to large fuel terminals with storage tanks to be loaded into tanker trucks.
- Petroleum Refineries – All operable petroleum refineries located in the R5 states.
- Petroleum Product Terminals – All operable bulk petroleum product terminals in the R5 states (terminals with bulk shell storage [the gross storage capacity of a tank for each respective Product] capacity of 50,000 barrels or more, and/or ability to receive volumes from tanker, barge, or pipeline).
- Port Facilities – Commercial United States port facilities at the principal coastal, Great Lakes, and inland ports.
- Railroads – Class 1 freight and other railroads in the R5 states.

A 1-mi buffer has been extended on both sides of the high-volume transportation corridors (e.g., pipelines, major roads), and railways carrying unit trains (**Figures 3 through 8**, yellow area) and 1-mi inland along the coast (**Figures 3 through 8**, pink area). Waters downstream of intersections with high-risk areas are included in the Action Area because a spill response will not cease at the extent of a 1-mi buffer; rather, the spill response actions will continue downstream as necessary to contain a spill. The buffers are intended to include staging areas used during a response action and associated ingress/egress. The buffers will provide a range of staging areas and access options to reduce potential impacts on designated or proposed critical habitat during a response. Mapping components, corridor layers, and spatial information was obtained through the RRT5 website interactive mapping tools and ESRI ArcMap available data.

3.1 Description of Environments within the Action Area

Because the authority to respond to spilled oil is granted to the EPA and USCG by the CWA, oil spill response actions in terrestrial habitats may only be coordinated by federal agencies so long

[4] U.S. Major Roads represents interstate highways, freeways, U.S. and state highways, major streets and roads, primary, secondary, and local roads, access ramps, ferry crossings, and other major thoroughfares within the United States. Unit trains are freight train composed of rail cars carrying a single type of commodity that are all bound for the same destination.

as there is a nexus to water (including staging areas and access points). Otherwise, state agencies have the responsibility to respond to terrestrial oil spills. Terrestrial habitats in R5 include forests and upland areas and do not include riparian habitats along streams or other water bodies.

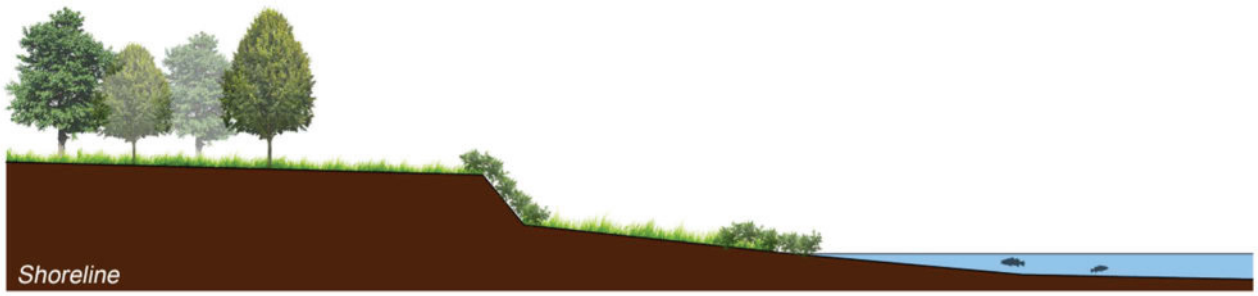
This BE addresses effects analysis for spill responses that occur within pre-defined habitat types. The environments (or general habitat types) described below are based on the RAM and habitat categories suggested by the NRT. There are seven primary environments defined for the Species Response Matrix (SRM): Shorelines; Ports, Canals, and Industrial Areas; Rivers and Streams; Bays and Estuaries; Ponds and Lakes; Wetlands; and Uplands.

Representative Overview of the Primary Environment Categories

One additional environment is pre-identified in the NRT-suggested RAM and SRM: Coastal Zone. The Coastal Zone, as defined for the purpose of the NCP (33 CFR 153.103), refers to "all United States waters subject to the tide, United States waters of the Great Lakes, specified ports and harbors on inland rivers, waters of the contiguous zone, other waters of the high seas subject to the NCP, and the land surface or land substrata, ground waters, and ambient air proximal to those waters." The ESA Workgroup determined the Coastal Zone environment could be excluded from the R5 BE context because: 1) R5 does not encompass a marine environment, harbor any marine NMFS listed species, nor does it include any essential fish habitat, 2) no listed species or proposed or designated critical habitat was solely listed as occurring with the Great Lakes Coastal Zone habitat, and 3) listed species and proposed and designated critical habitat identified in this BE are addressed under responses occurring in other environments, and to include Coastal Zone would be redundant. The term Coastal Zone used elsewhere in this BE delineates an area of federal responsibility for response action and should not be confused with the NRT RAM prescribed environment.

In addition to the primary environments listed for the SRM and identified in the RAM, vulnerable habitats within R5 have been considered for effects by response activities to listed species and proposed or designated critical habitat. Vulnerable habitats that may occur concurrently with these seven primary environments are listed for each environment and are described in more detail in **Section 3.2**.

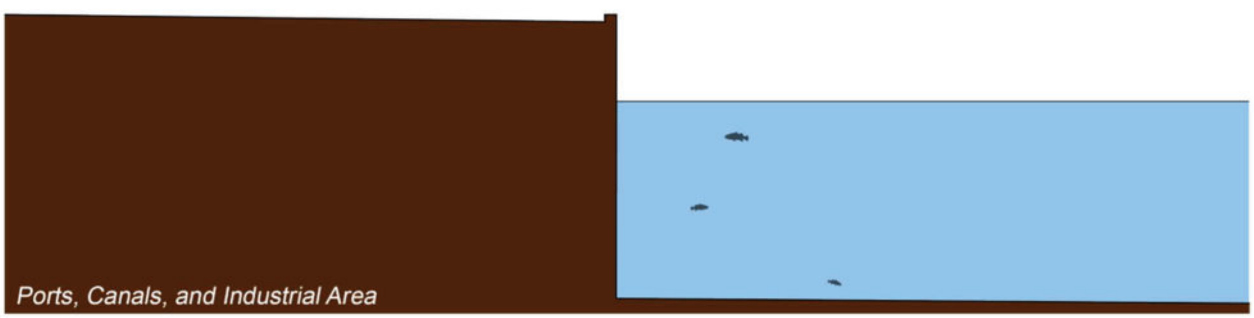
Shoreline (Beach/Land)



Shorelines are locations where aquatic and terrestrial habitats meet in freshwater environments. The physical and biological characteristics of shorelines in R5 are highly variable. Shorelines support a variety of different organisms, serving important functions for mammals and birds. The response actions employed in freshwater shoreline habitats are selected with consideration for the type of shoreline substrate, exposure to wave energy, biological productivity or sensitivity, and the ease of cleanup for a given shoreline type. The freshwater shoreline is defined as the area extending from the wetted channel or lake edge and excludes riparian habitat. Shoreline habitats are strongly influenced by adjacent landforms and water bodies and are used by both terrestrial and aquatic species.

Vulnerable and Sensitive Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, and Sedge Meadow.

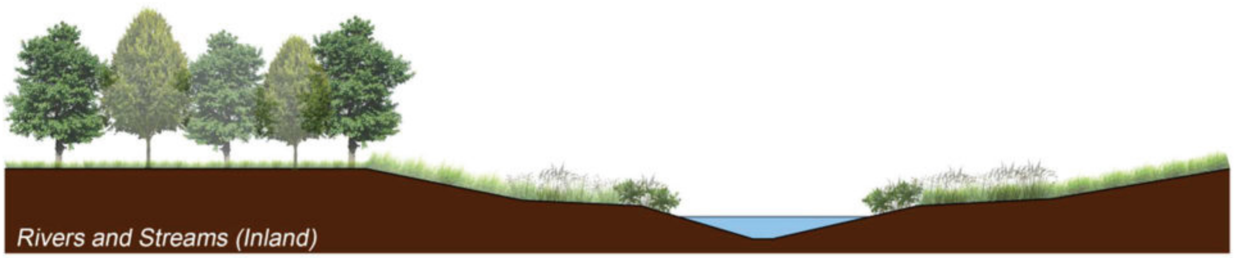
Ports, Canals, and Industrial Areas



Ports and canals primarily occur along the Great Lakes and Navigable Waterways (e.g., Ohio River, Upper Mississippi River) within R5. Industrial areas are most often correlated with population centers within the Action Area. Ports are usually built near natural harbors, but they can also be located up rivers or lakes hundreds of miles. Ports are land facilities consisting of docks or berths where vessels moor, equipment, and personnel load and unload vessels, connections to land transportation (such as highways, railways, and pipelines), and cargo storage areas. A canal is an artificial waterway that allows boats and ships to pass from one body of water to another. There are two types of canals: waterways and aqueducts. Waterways are the navigable parts of a body of water that can connect two or more waterbodies or even form networks within a city. Aqueducts are used exclusively to transport water for drinking, agriculture, and hydroelectric power. Natural harbors, typically in bays, estuaries, and river mouths, occur where land and water converge. Harbors include entrance channels, interior channels (to allow movement to anchoring areas or turning basins), and support facilities for refueling and repairing vessels.

Vulnerable and Sensitive Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, and Submersed Vegetation.

Rivers and Streams (Inland)



Rivers and streams are aquatic systems characterized by flowing water. The river/stream habitat includes the stream itself as a source of food, as well as adjacent lands such as stream banks, natural levees, and floodplains directly associated with the stream. Vegetation adjacent to streams can include grasses and forbs, scrub/shrub, or forests. This habitat supports species that depend on the stream for feeding and reproduction. Region 5 has a complex system of river and stream habitats, which are essential to fish species, as well as birds, reptiles, mammals, and amphibians. In addition to being a source of drinking water for larger animals, river and stream habitats provide forage habitat for fish, birds, and mammals and breeding/spawning, rearing, migration, refuge, or forage habitat for aquatic species and amphibians. Important considerations for spill response in riverine and lacustrine habitats include the influence of flowing water on oil collection. For example, booms need to be positioned and anchored such that they are not dragged by a flowing river or rapidly overtopped by spilled material. Also, they should be positioned to maintain migration corridors, if possible. Lastly, they should be anchored and positioned to minimize the suspension of sediment, which would reduce water quality.

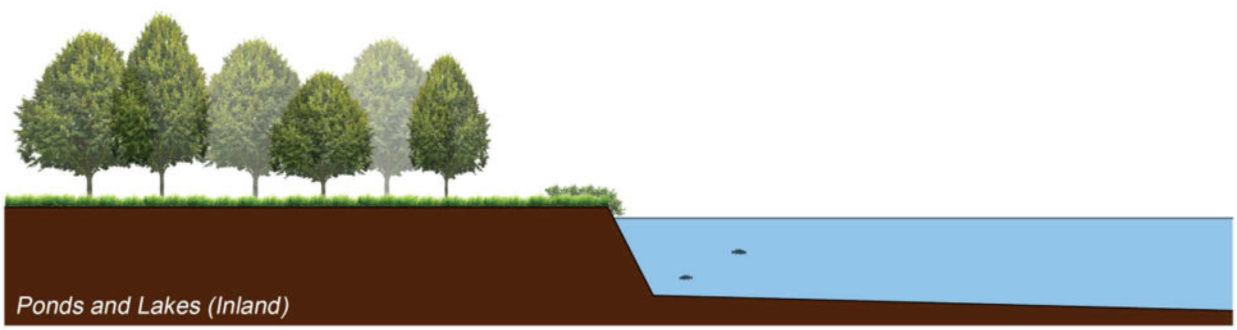
Vulnerable and Sensitive Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest.

Bays and Estuaries

Bays and estuaries of a river or stream or other body of water are areas having an unimpaired connection with the open areas of the Great Lakes. Bays are areas created by the convergence of the land and Lake Erie (e.g., Maumee Bay near Toledo, Ohio). Similarly, freshwater estuaries are semi-enclosed areas of the Great Lakes in which the waters become mixed with waters from rivers or streams. Although these freshwater estuaries do not contain saltwater, they are unique combinations of river and lake water, which are chemically distinct. Freshwater estuaries are storm-driven. In freshwater estuaries, the composition of the water is often regulated by storm surges and subsequent seiches (vertical oscillations, or sloshing, of lake water). While the Great Lakes do exhibit tides, they are extremely small. Most changes in the water level are due to seiches, which can result in exchanges of water between the river and the lake. As an example, Old Woman Creek is a freshwater estuary located on the south-central shore of Lake Erie in Ohio. Tidal changes in water level only average about 3 cm. As a storm-driven estuary system, during periods of low water flow from the creek, a barrier sand beach will often close the mouth of the estuary, isolating it from Lake Erie. Strong seiche events in Saginaw Bay of Lake Huron can result in a reversal of flow in the Saginaw River up to approximately 20 miles from the confluence with the bay and a rise in water levels in the lower Saginaw River of at least 1 m.

Vulnerable and Sensitive Habitats: Beach and Sand Bar, Rooted Floating Aquatics, Open Water, and Sedge Meadow.

Ponds and Lakes (Inland)



Lake habitat includes large open water aquatic systems (a surface area greater than 10 hectares [24.7 acres]) characterized by standing water. It includes deep water and shallow areas as well as lakeshores and immediately surrounding areas directly associated with or affected by the lake. Lake margin substrates include sandy beaches, rocky shores, mudflats, and distinct banks. Vegetation surrounding lakes may be grasses and forbs, shrub/scrub, or forests. Lake habitats support species that depend on the lake for food or reproduction. Ponds are small aquatic systems (surface area of 10 hectares or less) characterized by standing water. Pond habitats can include deep water and shallow areas, although they are generally shallow compared to lakes. The habitat also includes pond margins and immediately surrounding areas directly associated with or affected by the pond. Vegetation surrounding ponds may be grasslands, shrub/scrub, or forests. In general, ponds support a different suite of terrestrial species than lakes because of their smaller surface area and the smaller size and lower diversity of prey. Terrestrial wildlife species for ponds depend on the pond for food or reproduction (e.g., amphibians).

Vulnerable and Sensitive Habitats: Beach and Sand Bar, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Open Water, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation.

Wetlands

Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the land's surface. The term wetland refers to several types of habitats, all of which are seasonally or permanently inundated. Wetlands are also often definable by their unique vegetation communities adapted to living in fully submerged soils for at least a portion of the year. Plants associated with wetlands are adapted to permanently or seasonally saturated conditions.

Vulnerable and Sensitive Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow.

Upland Areas

Upland areas are all other areas where the ground is elevated above the lowlands along rivers or between hills. Any area that does not qualify as a shoreline per the definition above, wetland, river or stream, or not inundated by standing water at any part of the year is considered an upland area.

3.2 Vulnerable and Sensitive Habitats within the Action Area

An assumption of this BE is that in the event of a spill, implementing an appropriate response action would provide greater protection for listed species and habitats than not responding to the spill. While this consultation is restricted to species and proposed or designated critical habitats, vulnerable and sensitive habitats that are known to occur within Region 5 were also considered relative to spill response actions. These vulnerable and sensitive habitats are unique in that they provide unique ecosystem services[5], are considered rare, and several are correlated with habitats occupied by listed and rare species.

Vulnerable habitats were identified from the RRT5 Habitat Fact Sheets[vi], which include a general description of the habitat, information about the habitat's sensitivity to oil spills and response

[5] Ecosystem services are defined as the gains acquired by humankind from surroundings ecosystems) and the benefits people obtain from ecosystems; four categories of ecosystem services include supporting, provisioning, regulating and cultural (Millennium Ecosystem Assessment, 2006. By 2010, there had evolved various working definitions and descriptions of ecosystem services (Ojea et al., 2010). Supporting services was replaced by "habitat services" and "ecosystem functions", defined as "a subset of the interactions between ecosystem structure and processes that underpin the capacity of an ecosystem to provide goods and services (TEEB, 2010)."

methods, a list of response methods sorted by level of impact, and sources of additional information. The vulnerable and sensitive habitats described in the Habitat Fact Sheets are somewhat similar to the primary environments provided in the RAM; however, specific aspects of response activities are noted for vulnerable habitats and should fall within the scope of this consultation. Species may use one or more of the habitat types described above during their lifespan. Some species may be affected to varying degrees depending on the species life stage at the time of spill response occurrence and the level and type of response used within their respective habitats.

The vulnerable habitats described below are potentially affected by the response actions defined in Section 2.0 and are identified by the RRT 5 with varying degrees of sensitivity to response actions (**Table 3**). Response activities that might be used in each vulnerable and sensitive habitat are rated by level of impact (least impact, some impact, and most impact) below. Responses are not all inclusive but refer to those defined in the Inland Response Tactics Manual (UMRBA, 2014).

Beach and Sand Bar Beaches are areas infrequently flooded with non-vegetated sand or gravel. Beaches typically include sand spoil banks, beaches, and other sandy areas that are upland. This general class may have small inclusions of grasses or forbs (less than 10%), trees (less than 10%), or shrubs (less than 25%).

Sand Bars are areas temporarily flooded and exposed with non-vegetated sand flats. They are typically found in or near the main channel and are often associated with wing dams, shorelines, and islands. Sand bars may become exposed due to low water levels. This general class may have small incursions of grasses or forbs (less than 10%) or shrubs (less than 25%) but usually does not support plant life. Beaches and sandbars are also ideal nesting and foraging habitats for various shorebirds, including the recently delisted (2021) interior population of Least Tern (*Sternula antillarum*) and the threatened Piping Plover (*Charadrius melodus*), including the endangered Great Lakes population and the threatened Northern Great Plains population. These areas are also popular recreation sites, and exposure to oil may have significant socioeconomic impacts.

Least Impact	Some Impact	Most Impact
Sorbents/Solidifiers Low-Pressure Ambient Flushing Hand Tool/Oil Removal Cleaning	Vacuum Light Equipment Oil Removal	Sediment Removal Heavy Equipment Removal

Bog A bog is a distinctive type of freshwater wetland that accumulates peat derived from sphagnum moss. Wet conditions and low oxygen levels contribute to the slow decay of organic material, resulting in layers of peat that can be meters deep. Due to a lack of inflows and outflows, and impermeability of the peat layer, most bogs receive nearly all of their water from the surface rather than groundwater. Punctuated by the occasional spruce (*Picea*) and tamarack (*Larix*), they are nutrient-poor because of the acid-forming peat deposits. Despite these limiting factors, bogs are composed of unique plant communities. These may include carnivorous plants such as the sundew (*Drosera*) and pitcher plant (*Sarracenia*), ericaceous shrubs, and sedges (*Carex*), making bogs important sites of biodiversity.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low Pressure, Ambient-Water Flushing In-Situ Burning Collection by Direct Suction Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Peat/Sediment Removal

<u>Calcareous Fen</u> Calcareous fens are one of the rarest habitat types in the United States. They typically form on or near slight slopes from upwelling groundwater trapped by a layer of peat. Like bogs, fens are characterized by a peat substrate but are fed by a supply of cold, oxygen-deprived groundwater rich in calcium and magnesium bicarbonates. As they occur on sites of cold-water seepage, active springs and trout streams are often associated with fens.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low Pressure, Ambient-Water Flushing In-Situ Burning Collection by Direct Suction Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Peat/Sediment Removal

<u>Deep Marsh Annuals</u> The deep marsh annuals habitat includes portions of lakes, ponds, marshes, or backwaters that are more than 10% vegetated with wild rice (*Zizania*). While this habitat is dominated by wild rice, it may have inclusions of submersed, non-rooted-floating aquatics, rooted-floating aquatics, or emergent vegetation. Deep marsh annuals are typically found in flooded semi-permanent areas and have water depths between 0.25 and 2 m with silt or mucky bottom. During normal water conditions, there is little flow, though there can be wind-generated currents and stronger flows at inlets and outlets. During flood conditions, these habitats can be connected to rivers or streams, have strong currents, and have the potential to carry large amounts of debris.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Sediment Removal

<u>Deep Marsh Perennials</u> The deep marsh perennials habitat includes portions of lakes, ponds, marshes, or backwaters that are semi-permanently flooded and more than 10% vegetated with persistent emergent vegetation dominated by pickerelweed (*Pontederia*), arrowhead (*Sagittaria*), cattail (*Typha*), or bur-reed (*Sparganium*). Invasive species include hybrid cattail (*T. latifolia*), distinguished by its intermediate features between the parental common and narrow leaf cattails. This habitat may have incursions of submersed, nonrooted-floating aquatics, rooted-floating aquatics, or other emergent vegetation and is typically found growing in water up to 1 m deep. Little flow occurs during normal water conditions, though wind-generated currents and stronger flows at inlets and outlets often happen. During flood conditions, these habitats can be connected to rivers or streams, have strong currents, and have the potential to carry large amounts of debris.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Sorbents/Sorbent Boom, Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning, Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Sediment Removal

Deep Marsh Shrub The deep marsh shrub habitat is found in or around lakes, ponds, backwaters, or shorelines that are more than 25% vegetated with semi-permanently flooded shrubby vegetation. Common vegetation types include buttonbush (*Cephalanthus*) and swamp loosestrife (*Decodon*). This general class may have inclusions of submersed, nonrooted-floating aquatics, rooted-floating aquatics, or emergent vegetation. This habitat is common in southern aquatic systems.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Natural Attenuation Sorbents Flooding Low-Pressure, Ambient-Water Flushing Solidifiers	In-Situ Burning Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil RemovalSediment Removal

Floodplain Forest Floodplain forest represents areas on islands, near the shoreline, or around lakes, ponds, and backwaters more than 10% vegetated with seasonally flooded forests. These forests are predominantly silver maple (*Acer*) but also include elm (*Ulmus*), cottonwood (*Populus*), black willow (*Salix*), and river birch (*Betula*). Sedges (*Carex*), grasses (*Cinna, Elymus, Leersia*), and Lianas such as Virginia creeper, wild grape, and poison ivy are common understory plants. This general class typically grows at or near the water table, where it becomes inundated from spring flooding and high-water events.

Least Impact	Some Impact	Most Impact
Natural Attenuation Sorbents/Solidifiers Flooding Low-Pressure, Ambient-Water Flushing	Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil Removal

Mudflats Most common in tidal environments, mudflats also occupy marginal areas of backwaters, estuaries, lakes, ponds, or shorelines prone to seasonal flooding and subsequently exposed to non-vegetated mud. Though typically barren, incursions of emergent vegetation, forbs, grasses, or sedges of less than 10% cover may be present. Water may be present depending on season or weather patterns.

Least Impact	Some Impact	Most Impact
Sorbents Low-Pressure, Ambient-Water Flushing Hand Tool Oil Removal/Cleaning	Vacuum Light Equipment Oil Removal	Heavy Equipment Oil Removal Sediment Removal

Open Water The open water habitat includes main river channels and portions of lakes, ponds, and backwaters that remain permanently flooded all year and appear less than 10% vegetated. Open water also includes more than 10% of areas vegetated with duckweed (*Lemna, Spirodela,* and *Wolffia*) and other nonrooted-floating aquatics. Because duckweed is free-floating, it can relocate day-to-day depending on current and wind direction. Therefore, any area of otherwise open water containing dense duckweed is classified as Open Water (rather than being placed into any vegetation-specific habitat classes). These habitats are subject to varying currents and wave action.

Least Impact	Some Impact	Most Impact
Sorbents Low-Pressure, Ambient-Water Flushing Hand Tool Oil Removal/Cleaning	Vacuum Light Equipment Oil Removal	Heavy Equipment Oil Removal Sediment Removal

Rooted Floating Aquatics Rooted-floating aquatics represent portions of lakes, ponds, marshes, backwaters, or channel borders greater than 10% vegetated with water lilies (*Nymphaea* and *Nuphar*) or American Lotus (*Nelumbo*). This general class is dominated by rooted-floating aquatics but may have inclusions of submersed, nonrooted-floating aquatics or emergent vegetation. These aquatics are typically found growing between water depths of 0.25 and 2 m. This general class remains permanently flooded all year.

Least Impact	Some Impact	Most Impact
Containment Booming Sorbents/Sorbent Booming Debris/Vegetation Removal Natural Attenuation	Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers In-Situ Burning	Sediment Removal

Sedge Meadow The sedge meadow habitat includes lowland areas around lakes, ponds, backwaters, and along seasonally flooded shorelines. Similar to wet meadows, these habitats are close to 100% vegetated with perennial grasses and forbs. The distinction is that over 20% of the vegetation consists of sedges (*Cyperaceae*). Most of the species present are from the genus *Carex*, true sedges characterized by three-ranked leaves and triangular stems, with grasses and rushes interspersed. Forbs are also present but may grow poorly under competition with the sedges. Though the peat and muck soils remain saturated most of the year, there is little standing water present (except after flooding or precipitation events). Sedge meadow habitat is rare and limited in occurrence in the Upper Mississippi River system.

Least Impact	Some Impact	Most Impact
Flooding Collection by Direct Suction Low-Pressure, Ambient-Water Flushing In-Situ Burning	Natural Attenuation Phytoremediation Debris/Vegetation Removal	Light Equipment Oil Removal Sorbents Hand Tool Oil Removal/Cleaning Nutrient Enrichment Sediment Removal

<u>Shallow Marsh Annuals</u> The shallow marsh annuals habitat includes portions of lakes, ponds, backwaters, mudflats, or shorelines that are seasonally flooded and more than 10% vegetated with annual (non-persistent) emergent vegetation. Common vegetation types include wild millet (*Echinochloa*), smartweed/pinkweed (*Polygonum*), spike-rush (*Eleocharis*), nutsedge/red-root flatsedge (*Cyperus*), and beggarticks (*Bidens*). This habitat may have incursions of submersed, nonrooted-floating aquatics or persistent emergent vegetation. Shallow marsh annuals are typically found in seasonally flooded areas and have soils saturated or inundated by water up to 0.2 m deep. There is little flow during normal water conditions, though there can be wind-generated currents and stronger flows at inlets and outlets. These habitats can be connected to rivers or streams during flood conditions, with strong currents and possibly large amounts of debris.

Least Impact	Some Impact	Most Impact
Low-Pressure, Ambient-Water Flushing Flooding Exclusion or Deflection Booming Sorbents/Sorbent Boom In-Situ Burning Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Sediment Removal

<u>Shallow Marsh Perennials</u> The shallow marsh perennials' habitat includes portions of lakes, ponds, backwaters, or shorelines that are seasonally flooded and more than 10% vegetated with persistent emergent vegetation. This habitat denotes the transition zone between deep marsh perennials and wet meadows. Common plant species are common cattail (*Typha*), perennial smartweeds (*Polygonum*), giant reed (*Phragmites*), and bulrush (*Schoenoplectus*). Invasives include purple loosestrife. This habitat may have inclusions of submersed, nonrooted-floating aquatics or other emergent vegetation. Shallow Marsh Perennials are typically found growing on soils saturated or inundated by water up to 0.2 m deep. There is little flow during normal water conditions, though there can be wind-generated currents and stronger flows at inlets and outlets. These habitats can be connected to rivers or streams during flood conditions, with strong currents and possibly large amounts of debris.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Debris/Vegetation Removal	Natural Attenuation Phytoremediation	Light Equipment Oil Removal Sediment Removal

Shallow Marsh Shrub The shallow marsh shrub habitat represents areas near the shoreline or around lakes, ponds, and backwaters more than 25% vegetated with seasonally flooded shrubby vegetation. Shallow marsh shrub typically grows with mixed emergent grasses and forbs. This general class tends to be drier than wet meadow shrubs. Willows (*Salix*) are the predominant shrub type. Other indicator species are dogwood (*Corbus*), false indigo (*Amorpha*), and swamp privet (*Forestiera*). Shallow marsh shrubs are typically found growing in soils that are saturated or inundated with little water.

Least Impact	Some Impact	Most Impact
Exclusion or Deflection Booming Natural Attenuation Sorbents Flooding Low-Pressure, Ambient-Water Flushing Solidifiers	In-Situ Burning Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil Removal Sediment Removal

Submersed Vegetation The submersed vegetation habitat comprises lakes, ponds, channel borders, or backwaters that appear more than 10% of vegetation fully underwater. Common vegetation types include wild celery (*Vallisneria*), coontail (*Ceratophyllum*), and invasive curly pondweed (*Potamogeton*). While this habitat is dominated by submersed vegetation, it may have inclusions of nonrooted-floating aquatics, rooted-floating aquatics, or emergent vegetation. Submersed vegetation is generally found in areas flooded year-round that have water depths between 0.5 and 2 m. Submersed vegetation occurring at depths greater than 2 m may be classified as open water.

Least Impact	Some Impact	Most Impact
Containment Booming Sorbents/Sorbent Boom Debris/Vegetation Removal Natural Attenuation	In-Situ Burning Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers	Sediment Removal

Wet Meadow Wet meadow habitat includes lowland areas close to 100% vegetated with perennial grasses and forbs. Vegetation is typically darker or greener than surrounding areas. Common vegetation types include reed canary grass (*Phalaris*), bluejoint grass (*Calamagrostis*), cordgrass (*Spartina alterniflora*), and goldenrod (*Solidago*). This habitat may have small incursions of woody vegetation, sedges, or emergent vegetation, such as smartweed or the invasive purple loosestrife. Wet meadow typically occurs on saturated soils and is often considered the transition zone between aquatic communities and uplands. Wet meadows are common along the shores of shallow lakes, stream margins, and the edges of marshes and can occur in areas of restricted drainage. Though the soils remain saturated most of the year, there is little standing water present (except after flooding or precipitation events).

Least Impact	Some Impact	Most Impact
Flooding Collection by Direct Suction Low-Pressure, Ambient-Water Flushing In-Situ Burning	Natural Attenuation Phytoremediation Debris/Vegetation Removal	Light Equipment Oil Removal Hand Tool Oil Removal/Cleaning Sorbents Sediment Removal

4.0 STATUS OF SPECIES AND CRITICAL HABITATS IN ACTION AREA

The 90 species addressed in this BE are briefly described in the following pages (**Table 4**). Detailed descriptions of each species are provided in **Appendix E**. Species identified as occurring within the Action Area were determined from the USFWS IPaC tool and the USFWS 5-Year National Listing Workplan (January 2021) for petitioned and proposed species. Because the listing status and distribution of these species may change over time, IPaC will also be used to produce a current species list for each incident location as spills occur. Species with ranges within the Region 5 states but whose habitat requirements do not intersect with the Action Area parameters were not included in this BE:

- A freshwater Mussel, Green Floater (*Lasmigona subviridis*), species listed for Ohio in the cited references; however, USFWS Ohio Field Office indicated it does not occur in Ohio.
- An insect, Virginia Stone (*Acroneuria kosztarabi*), species listed for Ohio in the cited references; however, USFWS Ohio Field Office indicated it does not occur in Ohio.
- An insect, Western Bumble Bee (*Bombus occidentalis*), species listed for Minnesota in the cited references; however, USFWS Minnesota Field Office indicated it does not likely occur in Minnesota.

4.1 Critical Habitat within the Action Area

Designated critical habitat for several species overlaps the Action Area and may be affected by spill response activities. There is designated critical habitat for:

- Short's Bladderpod (Endangered) – Indiana (**Figure 9**)
- Rabbitsfoot (Threatened) – Illinois, Indiana, Ohio (**Figure 10**)
- Round Hickorynut (Proposed Threatened) – Indiana, Michigan, Ohio (mapping not available)
- Dakota Skipper (Threatened) – Minnesota (**Figure 11**)
- Hine's Emerald Dragonfly (Endangered) – Illinois, Michigan, Wisconsin (**Figure 12**)
- Poweshiek Skipperling (Endangered) – Michigan, Minnesota, Wisconsin (**Figure 13**)
- Topeka Shiner (Endangered) – Minnesota (**Figure 14**)
- Canada Lynx (Threatened) – Minnesota (**Figure 15**)
- Indiana Bat (Endangered) – Indiana, Illinois, Michigan, Ohio (**Figure 16**)
- Piping Plover, Great Lakes Population and Northern Great Plains Breeding Population (Endangered) – Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin (**Figure 17**)

Additionally, there is proposed critical habitat for several species that fall under the scope of this BE. Four listed mussel species as well as one bird (Rufa Red Knot) are included on the USFWS National Listing Workplan (2021) for potential development of a critical habitat rule. The Rayed Bean, Snuffbox, Sheepnose and Spectaclecase were listed as endangered in 2012, but critical habitat was not designated at the time of listing. USFWS will review these species and propose to designate critical habitat if critical habitat is prudent and determinable. The review and proposed critical habitat designation is planned for 2025. The proposed critical habitat rule for Rufa Red Knot was planned for 2021; the proposed critical habitat for Rufa Red Knot occurs outside of the Action Area of this BE (120 units in Massachusetts, New York, New Jersey, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas). One proposed endangered mussel (Longsolid) also has proposed designated critical habitat, but it also is outside of the Action Area of this BE (12 units in

Pennsylvania, West Virginia, Kentucky, Tennessee, and Alabama).

Critical Habitat information for the species listed above that occur within the Action Area is described below.

Short's Bladderpod (Designated Critical Habitat) Primary constituent elements (PCEs) are those specific elements of the physical or biological features that provide for a species' life-history processes and are essential to the conservation of the species. Within the Action Area, USFWS designated approximately 373 hectares (ha) (925.5 acres (ac)) of critical habitat for Short's Bladderpod, with several units in Posey County, Indiana. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Plants**).

The PCEs for Short's Bladderpod are:

1. Bedrock formations and outcrops of calcareous limestone, sometimes with interbedded shale or siltstone, in close proximity to the mainstem or tributaries of the Kentucky and Cumberland rivers. These outcrop sites or areas of suitable bedrock geology should be located on steeply sloped hillsides or bluffs, typically on south- to west-facing aspects.
2. Shallow or rocky, well-drained soils formed from the weathering of underlying calcareous bedrock formations, which are undisturbed or subjected to minimal disturbance, so as to retain habitat for ground-nesting pollinators and potential for maintenance of a soil seed bank.
3. Forest communities with low levels of canopy closure or openings in the canopy to provide adequate sunlight for individual and population growth. Invasive, nonnative plants must be absent or present in sufficiently low numbers not to inhibit growth or reproduction of Short's Bladderpod.

Rabbitsfoot (Designated Critical Habitat) Thirty-one critical habitat units have been designated for Rabbitsfoot, encompassing approximately 2,300 river kilometers in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee (80 FR 24692). Critical habitat was designated based on five PCEs: geomorphically stable river channels, hydrologic flow regime necessary to maintain benthic habitats for Rabbitsfoot and its host fish, suitable water and sediment quality, occurrence of natural fish assemblages, and low abundance of competitive or predaceous species (80 FR 24692). Critical habitat units within USCG Region 5 include segments of the Ohio River (Illinois), Tippecanoe River (Indiana), Walhonding River (Ohio), Little Darby Creek (Ohio), North Fork Vermilion River and Middle Branch North Fork Vermilion River (Illinois), and Fish Creek (Ohio; 80 FR 24692). (see **Appendix E: Snails and Clams**) The five PCE's for Rabbitsfoot are detailed below.

1. Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae).
2. A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability,

spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats.

3. Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages.
4. The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the Rabbitsfoot. Suitable fish hosts for Rabbitsfoot may include, but are not limited to, Blacktail Shiner (*Cyprinella venusta*), Cardinal Shiner (*Luxilus cardinalis*), Red Shiner (*C. lutrensis*), Spotfin Shiner (*C. spiloptera*), Bluntface Shiner (*C. camura*), Rainbow Darter (*Etheostoma caeruleum*), Rosyface Shiner (*Notropis rubellus*), Striped Shiner (*L. chrysocephalus*), and Emerald Shiner (*N. atherinoides*).
5. Competitive or predaceous invasive (nonnative) species in quantities low enough to have minimal effect on survival of freshwater mussels.

<u>Round Hickorynut (Proposed Critical Habitat)</u> Proposed critical habitat for Round Hickory Nut includes a total of 921 river mi (1,482 km) in 14 units as occupied critical habitat for the Round Hickorynut. Within the Action Area, only two of the 14 units overlap with the Action Area in this BE: The Grand River in Ohio and Tippecanoe River in Indiana (see **Appendix E: Plants**). Physical or biological features essential to the conservation of the Round Hickorynut consist of:

1. Adequate flows, or a hydrologic flow regime (magnitude, timing, frequency, duration, rate of change, and overall seasonality of discharge over time), necessary to maintain benthic habitats where the species are found and to maintain stream connectivity, specifically providing for the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat and food availability, maintenance of spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats. Adequate flows ensure delivery of oxygen, enable reproduction, deliver food to filter-feeding mussels, and reduce contaminants and fine sediments from interstitial spaces. Stream velocity is not static over time, and variations may be attributed to seasonal changes (with higher flows in winter/spring and lower flows in summer/fall), extreme weather events (e.g., drought or floods), or anthropogenic influence (e.g., flow regulation via impoundments).
2. Suitable substrates and connected instream habitats, characterized by geomorphically stable stream channels and banks (i.e., channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish (such as, stable riffle-run-pool habitats that provide flow refuges consisting of predominantly silt-free, stable sand, gravel, and cobble substrates).
3. Water and sediment quality necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages, including (but not limited to): dissolved oxygen (generally above 2 to 3 parts per million (ppm)), salinity (generally below 2 to 4 ppm), and temperature (generally below 86 °Fahrenheit (°F) (30 °Celsius (°C)). Additionally, water and sediment should be low in ammonia (generally below 0.5 ppm total ammonia-nitrogen) and heavy metal concentrations and lack excessive total suspended solids and other pollutants.

4. The presence and abundance of fish hosts necessary for recruitment of the Round Hickorynut (*i.e.,* Eastern Sand Darter [*Ammocrypta pellucida]*, Emerald Darter [*Etheostoma baileyi]*, Greenside Darter [*E. blennioides*], Iowa Darter [*E. exile]*, Fantail Darter [*E. flabellare]*, Cumberland Darter [*E. susanae]*, Spangled Darter [*E. obama]*, Variegate Darter [*E. variatum]*, Blackside Darter [*Percina maculata]*, Frecklebelly Darter [*P. stictogaster]*, and Banded Sculpin [*Cottus carolinae]*).

<u>Dakota Skipper (Designated Critical Habitat)</u> Designated critical habitat for the Dakota Skipper within the Action Area is within Chippewa, Clay, Kittson, Lincoln, Murray, Norman, Pipestone, Polk, Pope, and Swift Counties, Minnesota. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Insects**). The PCE's for Dakota Skipper are:

1. Wet-mesic tallgrass or mixed-grass remnant untilled prairie that occurs on near-shore glacial lake soil deposits or high-quality dry-mesic remnant untilled prairie on rolling terrain consisting of gravelly glacial moraine soil deposits, containing:
    a. A predominance of native grasses and native flowering forbs;
    b. Glacial soils that provide the soil surface or near surface (between soil surface and 2-cm depth) micro-climate conditions conducive to Dakota skipper larval survival and native prairie vegetation;
    c. If present, trees or large shrub cover of less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies; and
    d. If present, nonnative invasive plant species occurring in less than 5 percent of area.
2. Native grasses and native flowering forbs for larval and adult food and shelter, specifically:
    a. At least one of the following native grasses to provide larval food and shelter sources during Dakota skipper larval stages: Prairie Dropseed (*Sporobolus heterolepis*) or Little Bluestem (*Schizachyrium scoparium*); and
    b. One or more of the following forbs in bloom to provide nectar and water sources during the Dakota skipper flight period: Purple Coneflower (*Echinacea angustifolia*), Bluebell Bellflower (*Campanula rotundifolia*), White Prairie Clover (*Dalea candida*), Upright Prairie Coneflower (*Ratibida columnifera*), Fleabane (*Erigeron spp.*), Blanketflower (*Gaillardia spp.),* Black-eyed Susan (*Rudbeckia hirta*), Yellow Sundrops (*Calylophus serrulatus*), Prairie Milkvetch (*Astragalus adsurgens*), or Common Gaillardia (*Gaillardia aristata*).
3. Dispersal grassland habitat that is within 1 km (0.6 mi) of native high-quality remnant prairie (as defined in Primary Constituent Element 1) that connects high-quality wet-mesic to dry tallgrass prairies or moist meadow habitats. Dispersal grassland habitat consists of undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

<u>Hine's Emerald Dragonfly (Designated Critical Habitat)</u> Critical habitat units within the Action Area for HED are located in Cook, DuPage, and Will Counties in Illinois; Alpena, Mackinac, and Presque Isle Counties in Michigan; and Door and Ozaukee Counties in Wisconsin. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Insects**). The PCE's for HED are:

1. For egg deposition and larval growth and development:
    a. Organic soils (histosols, or with organic surface horizon) overlying calcareous substrate (predominantly dolomite and limestone bedrock);
    b. Calcareous water from intermittent seeps and springs and associated shallow, small, slow flowing streamlet channels, rivulets, and/or sheet flow within fens;
    c. Emergent herbaceous and woody vegetation for emergence facilitation and refugia;
    d. Occupied burrows maintained by crayfish for refugia; and
    e. Prey base of aquatic macroinvertebrates, including mayflies, aquatic isopods, caddisflies, midge larvae, and aquatic worms.
2. For adult foraging; reproduction; dispersal; and refugia necessary for roosting, resting, escape from male harassment, and predator avoidance (especially during the vulnerable teneral stage):
    a. Natural plant communities near the breeding/larval habitat which may include fen, marsh, sedge meadow, dolomite prairie, and the fringe (up to 328 ft (100m)) of bordering shrubby and forested areas with open corridors for movement and dispersal; and
    b. Prey base of small, flying insect species (e.g., dipterans).

<u>Poweshiek Skipperling (Designated Critical Habitat)</u> Critical habitat units within the Action Area for the Poweshiek Skipperling occur in Hillsdale, Jackson, Lenawee, Livingston, Oakland, and Washtenaw Counties, Michigan; Chippewa, Clay, Cottonwood, Douglas, Kittson, Lac qui Parle, Lincoln, Lyon, Mahnomen, Murray, Norman, Pipestone, Polk, Pope, Swift, and Wilkin Counties, Minnesota; and Green Lake and Waukesha Counties, Wisconsin. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Insects**). The PCE's for Poweshiek Skipperling are:

1. Wet-mesic to dry tallgrass remnant untilled prairies or remnant moist meadows containing:
    a. A predominance of native grasses and native flowering forbs;
    b. Undisturbed (untilled) glacial soil types including, but not limited to, loam, sandy loam, loamy sand, gravel, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek Skipperling larval survival and native prairie vegetation;
    c. If present, depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire;
    d. If present, trees or large shrub cover less than 5 percent of area in dry prairies and less than 25 percent in wet-mesic prairies and prairie fens; and
    e. If present, nonnative invasive plant species occurring in less than 5 percent of the area.
2. Prairie fen habitats containing:
    a. A predominance of native grasses and native flowering forbs;
    b. Undisturbed (untilled) glacial soil types including, but not limited to, organic soils (peat), or marl that provide the edaphic features conducive to Poweshiek Skipperling larval survival and native prairie vegetation;
    c. Depressional wetlands or low wet areas, within or adjacent to prairies that provide shelter from high summer temperatures and fire;
    d. Hydraulic features necessary to maintain prairie fen groundwater flow and prairie

fen plant communities;

e. If present, trees or large shrub cover less than 25 percent of the unit; and
f. If present, nonnative invasive plant species occurring in less than 5 percent of area.

3. Native grasses and native flowering forbs for larval and adult food and shelter, specifically;
   a. At least one of the following native grasses available to provide larval food and shelter sources during Poweshiek Skipperling larval stages: Prairie Dropseed (*Sporobolus heterolepis*), Little Bluestem (*Schizachyrium scoparium*), Sideoats Grama (*Bouteloua curtipendula*), or Mat Muhly (*Muhlenbergia richardsonis*); and
   b. At least one of the following forbs in bloom to provide nectar and water sources during the Poweshiek Skipperling flight period: Purple Coneflower (*Echinacea angustifolia*), Black-eyed Susan (*Rudbeckia hirta*), Smooth Ox-eye (*Heliopsis helianthoides*), Stiff Tickseed (*Coreopsis palmata*), Palespike Lobelia (*Lobelia spicata*), Sticky Tofieldia (*Triantha glutinosa*), or Shrubby Cinquefoil (*Dasiphora fruticosa ssp. floribunda*).
4. Dispersal grassland habitat that is within 1 km (0.6 mi) of native high-quality remnant prairie (as defined in PCE 1) that connects high quality wet-mesic to dry tallgrass prairies, moist meadows, or prairie fen habitats. Dispersal grassland habitat consists of the following physical characteristics appropriate for supporting Poweshiek Skipperling dispersal: Undeveloped open areas dominated by perennial grassland with limited or no barriers to dispersal including tree or shrub cover less than 25 percent of the area and no row crops such as corn, beans, potatoes, or sunflowers.

<u>Topeka Shiner (Designated Critical Habitat)</u> Designated critical habitat for Topeka Shiner within the Action Area occurs in Minnesota. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Fish**). The PCE's for Topeka Shiner are:

1. Streams most often with permanent flow, but that can become intermittent during dry periods;
2. Side-channel pools and oxbows either seasonally connected to a stream or maintained by groundwater inputs, at a surface elevation equal to or lower than the bankfull discharge stream elevation. The bankfull discharge is the flow at which water begins leaving the channel and flowing into the floodplain; this level is generally attained every 1 to 2 years. Bankfull discharge, while a function of the size of the stream, is a fairly constant feature related to the formation, maintenance, and dimensions of the stream channel;
3. Streams and side-channel pools with water quality necessary for unimpaired behavior, growth, and viability of all life stages. The water quality components can vary seasonally and include—temperature (1 to 30°C), total suspended solids (0 to 2000 ppm), conductivity (100 to 800 mhos), dissolved oxygen (4 ppm or greater), pH (7.0 to 9.0), and other chemical characteristics;
4. Living and spawning areas for adult Topeka Shiner with pools or runs with water velocities less than 0.5 meters/second (approx. 20 inches/second) and depths ranging from 0.1 to 2.0 meters (approximately 4 to 80 inches);
5. Living areas for juvenile Topeka Shiners with water velocities less than 0.5 meters/second (approx. 20 inches/second) with depths less than 0.25 meters (approx. 10 inches) and moderate amounts of instream aquatic cover, such as woody debris, overhanging

terrestrial vegetation, and aquatic plants;

6. Sand, gravel, cobble, and silt substrates with amounts of fine sediment and substrate embeddedness that allows for nest building and maintenance of nests and eggs by native *Lepomis* sunfishes (Green Sunfish, Orangespotted Sunfish, Longear Sunfish) and Topeka Shiner as necessary for reproduction, unimpaired behavior, growth, and viability of all life stages;
7. An adequate terrestrial, semiaquatic, and aquatic invertebrate food base that allows for unimpaired growth, reproduction, and survival of all life stages;
8. A hydrologic regime capable of forming, maintaining, or restoring the flow periodicity, channel morphology, fish community composition, off-channel habitats, and habitat components described in the other primary constituent elements; and
9. Few or no nonnative predatory or nonnative competitive species present.

<u>Canada Lynx (Designated Critical Habitat)</u> Critical habitat for the Canada Lynx in the Action Area is in northeastern Minnesota. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Mammals**). The PCE's for Canada Lynx are boreal forest landscapes supporting a mosaic of differing successional forest stages and containing:

1. Presence of snowshoe hares and their preferred habitat conditions, which include dense understories of young trees, shrubs or overhanging boughs that protrude above the snow, and mature multistoried stands with conifer boughs touching the snow surface;
2. Winter conditions that provide and maintain deep fluffy snow for extended periods of time;
3. Sites for denning that have abundant coarse woody debris, such as downed trees and root wads; and
4. Matrix habitat (e.g., hardwood forest, dry forest, non-forest, or other habitat types that do not support snowshoe hares) that occurs between patches of boreal forest in close juxtaposition (at the scale of a lynx home range) such that lynx are likely to travel through such habitat while accessing patches of boreal forest within a home range.

<u>Indiana Bat (Designated Critical Habitat)</u> Critical habitat for the Indiana Bat include existing mines and caves in Illinois and Indiana. Additional designated critical habitat units are defined outside of the Action Area of this BE (see **Appendix E: Mammals**). No PCEs were identified in the initial critical habitat rule; however, USFWS has since identified the following "important conservation features" of the cave systems designated as critical habitat:

1. The mine or cave's physical structure, configuration, and all openings that create and regulate suitable microclimates for hibernating bats within.
2. The associated karst hydrology and stream recharge area/watershed.
3. The amount and condition of surrounding forested habitat that is used by the bats during the pre-hibernation swarming period each fall and post-hibernation staging each spring.

<u>Piping Plover – Great Lakes population (Designated Critical Habitat)</u> Within the Action area, designated critical habitat includes shorelines in Minnesota, Wisconsin, Michigan, Illinois, Indiana, and Ohio. The PCEs required to sustain the Great Lakes breeding population of the piping plover are found on Great Lakes islands and mainland shorelines that support open, sparsely vegetated sandy habitats, such as sand spits or sand beaches, that are associated with wide, unforested systems of dunes and inter-dune wetlands (see **Appendix E: Birds**). The

PCEs for Piping Plover, Great Lakes Population are:

1. In order for habitat to be physically and biologically suitable for piping plovers, it must have a total shoreline length of at least 0.2 km (0.12 mi) of gently sloping, sparsely vegetated (less than 50 percent herbaceous and low woody cover) sand beach with a total beach area of at least 2 hectares (ha) (5 acres (ac)).
2. Appropriately sized sites must also have areas of at least 50 meters (m) (164 feet (ft)) in length where (1) the beach width is more than 7 m (23 ft), (2) there is protective cover for nests and chicks, and (3) the distance to the treeline (from the normal high water line to where the forest begins) is more than 50 m (164 ft). Beach width is defined as the distance from the normal high water line to the foredune (a low barrier dune ridge immediately inland from the beach) edge, or to the sand/vegetation boundary in areas where the foredune is absent. The beach width may be narrower than 7 m (23 ft) if appropriate sand and cobble areas of at least 7 m (23 ft) exist between the dune and the treeline.
3. Protective cover for nests and chicks consists of small patches of herbaceous vegetation, cobble (stones larger than 1 cm (0.4 inches (in)) diameter), gravel (stones smaller than 1 cm (0.4 in) diameter), or debris such as driftwood, wrack, root masses, or dead shrubs. These areas must have a low level of disturbance from human activities and from domestic animals. As the nesting season progresses, the level of disturbance tolerated by piping plovers increases. A lower level of disturbance is required at the beginning of the nesting period during nest site selection, egg laying, and incubation. Beach activities that may be associated with a high level of disturbance include, but are not limited to, walking pets off leash, loud noise, driving all-terrain vehicles (ATVs), or activities that significantly increase the level of people using the beach. The level of disturbance is relative to the proximity to the nest, intensity, and frequency of these and other similar activities.
4. The dynamic ecological processes that create and maintain piping plover habitat are also important primary constituent elements. These geologically dynamic lakeside regions are controlled by processes of erosion, accretion, plant succession, and lake-level fluctuations. The integrity of the habitat depends upon regular sediment transport processes, as well as episodic, high-magnitude storm events. By their nature, Great Lakes shorelines are in a constant state of change; habitat features may disappear or be created nearby. The critical habitat boundaries reflect these natural processes and the dynamic character of Great Lakes shorelines.

If a spill is suspected to have occurred within or adjacent to Critical Habitats, consultation with USFWS is an integral and necessary part of the Response Plan described in **Section 2.1.1**.

4.2 Plants

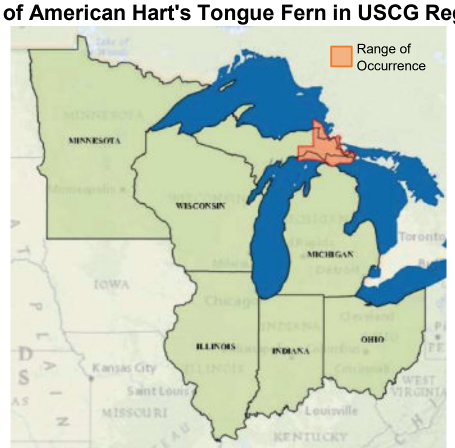
American Hart's Tongue Fern	Status	Threatened (1989)	54 FR 29726
Scientific Name	*Asplenium scolopendrium* L. var. *americanum*	**Critical Habitat**	N/A

Photo: U.S. Forest Service

Appearance: The American Hart's Tongue Fern has long, flat, entire (not serrated) fronds that are 20 to 40 cm long. The frond apex is abruptly pointed to sometimes rounded, and the tip is never rooting. Sporangia are arranged in distinct elongated clusters (sori) with an elongated indusium. Plants are perennial with rhizomes with evergreen fronds. American Hart's Tongue Fern is an epiphytic fern, growing in small cracks in larger dolomitic limestone (limestone high in magnesium) boulders no more than a foot above the moist soil within moist deciduous forest understories.

Life History: American Hart's Tongue Fern reproduces only via spores. Spores require cool, moist calcareous environments with abundant bryophytes (mosses, liverworts, hornworts) for seedling establishment. Seedlings have underdeveloped rhizomes and utilize the moisture associated with bryophyte beds to obtain resources. As seedlings mature and rhizomes grow larger, they outcompete and replace bryophytes. Winter snow cover is necessary for the long-term survival of a population by maintaining soil moisture and decreasing adverse effects from frost. Evergreen fronds remain green and functional throughout the winter. New fronds are produced at the start of each growing season and remain functional for two growing seasons. These fronds typically emerge in mid-June in Michigan. Spores are produced on 10-year-old fronds from May through August and require moist habitat for fertilization and protection from desiccation.

Range of American Hart's Tongue Fern in USCG Region 5



Current Threats:

- Quarrying activities
- Tree removal
- Development
- Potential trampling
- Climate change

Distribution/Habitat: Habitat in Michigan and New York is within the Niagara escarpment on shaded, moist boulders and ledges. This epipetric fern requires Silurian limestone, a substrate of high magnesium content. The Niagara escarpment was formed approximately 450 million years ago by corals inhabiting a vast and tropical inland sea and slowly was transformed into a dolomitic limestone. The distribution of American Hart's Tongue Fern is limited and discrete. It is found in two counties within the eastern Upper Peninsula of Michigan: Chippewa and Mackinac Counties (about 12 occurrences). A few isolated, tiny colonies were also found in Alabama (on another karst feature: cave entrances) and in central New York, which harbors 90% of the United States population. In contrast, this fern is locally abundant on the Bruce Peninsula of Ontario, Canada, again on the Niagara escarpment.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
		X			

Additional References:

Michigan Flora Online (2021) *Asplenium scolopendrium*
USFWS (1993) *American Hart's Tongue recovery plan*
USFWS (2021) *American Hart's Tongue Fern (Asplenium scolopendrium var. americanum) species profile*
USFS (2021) *Plant of the week: American Hart's Tongue Fern (Asplenium scolopendrium L. var. americanum)*

Decurrent False Aster	**Status**	**Threatened (1988)**	53 FR 45858

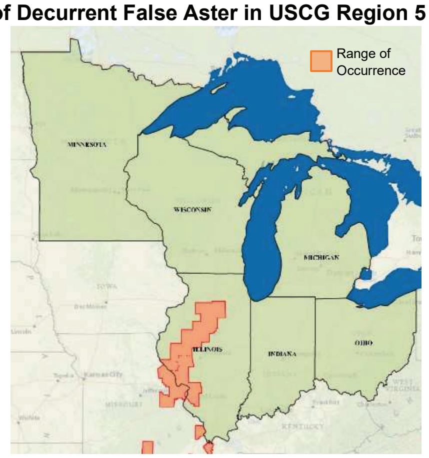
Scientific Name	*Boltonia decurrens*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: This herbaceous perennial plant becomes 3 to 7 ft tall, forming either a solitary or a cluster of central stems that branch occasionally to abundantly. Spreading to drooping alternate leaves occurs along the entire length of these stems at regular intervals, becoming gradually smaller in size as they ascend. The basal margins of these leaves extend downward 1 to 3 in. along their stems, forming pairs of wings up to 0.75 in. across. The central stems terminate in large panicles of flowerheads (up to 2 ft long and 2 ft across) that are more or less dome-shaped. Each daisy-like flowerhead is 0.75 to 1 in. across, consisting of 40-60 ray florets that surround a dense head of 180+ disk florets. The petaloid rays of these flowerheads are linear-oblong in shape and white (rarely lavender or light purple).

Life History: Decurrent False Aster reproduces both vegetatively by producing basal shoots and sexually by producing seeds. The typical blooming period begins late summer into autumn, lasting about 1-2 months. Mature achenes (seeds) are about 1.5 to 2.5 mm in length. Achenes are obovoid, somewhat flattened, and slightly winged along their margins, allowing them to be blown about by the wind or float on water. The root system is shallow and fibrous.

Range of Decurrent False Aster in USCG Region 5



Current Threats:

- Excessive silt deposition
- Habitat destruction
- Herbicides

Distribution/Habitat: The distribution of Decurrent False Aster includes the alluvial floodplain areas along the Illinois and Mississippi Rivers. It relies on periodic flooding to scour away other plants that compete for the same habitat. In Illinois, between 14 and 20 counties support populations of Decurrent False Aster, and in Missouri, between 4 and 9 counties report populations along the Mississippi River. However, far fewer counties likely support successful populations. Additionally, known populations are likely not self-sustaining.

Primary Habitat in Action Area/RAM: Streams and River, Wetlands

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Wet Meadow.

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

Illinois Wildflowers (2021) *Decurrent False Aster (Boltonia decurrens)*
USDA (2021) *Boltonia decurrens plant profile*
USFWS (1990) *Decurrent False Aster recovery plan*
USFWS (2012) *Decurrent False Aster (Boltonia decurrens) 5-year review*
USFWS (2021) *Decurrent False Aster (Boltonia decurrens) species profile*

Dwarf Lake Iris	**Status**	**Threatened (1988)**	53 FR 37972

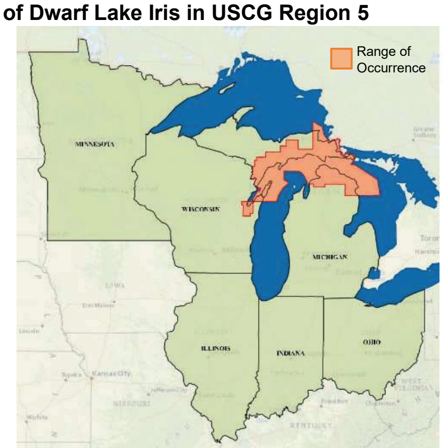
Scientific Name	*Iris lacustris*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: These plants are shorter in stature than most irises at less than 15 cm, with leaves 1 - 2 cm wide. Flowers 5 to 6 cm wide and are sky blue to deep blue to violet in color. Spreading sepals have a white signal bordered by a deep purple color. Inflorescences typically contain one flower, although rarely two flowers can be observed. Leaves are stiff and upright, arising from narrow creeping rhizomes with an enlarged terminus with fibrous roots. These slender rhizomes distinguish Dwarf Lake Iris from small individual and juvenile plants of the widespread common blue flag (*Iris versicolor*).

Life History: The blooming period occurs from early May through early June. Fruiting occurs from late June through late July. Seeds are dark brown in color.

Range of Dwarf Lake Iris in USCG Region 5



Current Threats:

- Lakeshore development
- Habitat disturbance/destruction
- Changes in hydrology
- Invasive species

Distribution/Habitat: The Dwarf Lake Iris can be found in slightly acidic, shallow, moist, sandy, or rocky soils in sun-dappled, forested openings near the lakeshore where cool air flows off the lake, creating this species-specific microclimate. The dwarf lake iris is typically found near the shorelines of Lake Michigan and Lake Huron in Michigan and Lake Michigan in Wisconsin, but there are a few known inland populations found in Michigan’s upper peninsula. The majority of dwarf lake iris populations occur in Michigan with approximately 80 known populations found in 9 counties. The coastal range occurs from the Stonington Peninsula (Delta County) to Drummond Island (Chippewa County) and south to Wilderness State Park (Emmet County), Beaver Island (Charlevoix County), and Alpena (Alpena County) with the inland populations identified in Delta and Menominee counties.

Primary Habitat in Action Area/RAM: Shoreline (beach/land) and Uplands

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X			X

Additional References:

MNFI (2004) *Iris lacustris, Dwarf Lake Iris*
USFS (2021) *Our native irises: dwarf woodland irises*
USFWS (2019) *Dwarf Lake Iris fact sheet*
USFWS (2021) *Dwarf Lake Iris (Iris lacustris) species profile*
WIDNR (2021) *Dwarf Lake Iris (Iris lacustris)*

Eastern Prairie Fringed Orchid	Status	Threatened (1989)	54 FR 39857

Scientific Name	*Platanthera leucophaea*	Critical Habitat	N/A

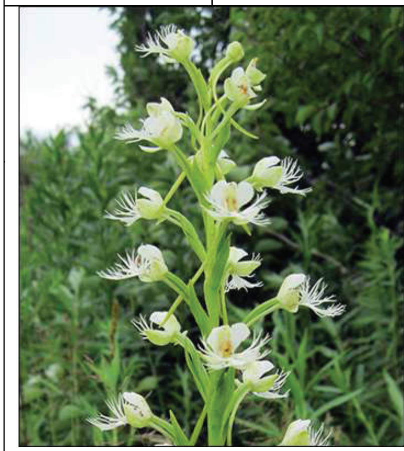
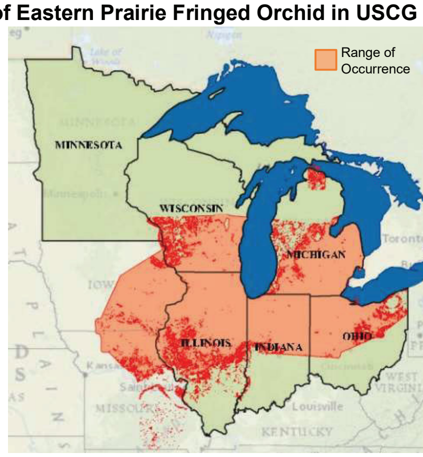


Photo: U.S. Fish & Wildlife Service

Appearance: This plant is 8 to 40 in. tall and has an upright leafy stem with a flower cluster (inflorescence). The 3- to 8-in. lance-shaped leaves sheath the stem. Each plant has one single flower spike composed of 5 to 40 white flowers. Each flower has a three-part fringed lip less than 1 in. long and a nectar spur (tube-like structure) about 1 to 2 in. long.

Life History: Flowering occurs from late June to early July, lasting from 7 to 10 days. Flower clusters emerge and are not much taller than surrounding grasses and sedges. A symbiotic relationship between the seed and soil fungi, called mycorrhizae, is necessary for seedlings to become established. These fungi help the seeds assimilate nutrients into the soil.

Range of Eastern Prairie Fringed Orchid in USCG Region 5



Current Threats:

- Wetland drainage
- Wetland conversion/development
- Habitat succession
- Non-native species
- Over-collection

Distribution/Habitat: Eastern Prairie Fringed Orchid can be found in a wide variety of habitats, from wet to mesic prairie or wetland communities, including, but not limited to, sedge meadows, bogs, fens, marshes, and marsh edges. It requires full sun for optimal growth with little to no woody encroachment or canopy coverage. The Eastern Prairie Fringed Orchid formerly occurred from eastern Iowa, Missouri, and Oklahoma eastward across southern Wisconsin, northern and central Illinois, southern Michigan, northern Indiana, and Ohio, and northwestern Pennsylvania to western New York and adjacent southern Ontario. Disjunct populations also occurred in New Jersey, Virginia, and Maine. Current populations are known to occur in Arkansas, Illinois, Indiana, Iowa, Maine, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Virginia, West Virginia, and Wisconsin.

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow.

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

USFWS (2019) *Eastern Prairie Fringed Orchid (Platanthera leucophaea)*
USFWS (2020) *5-year review: Eastern Prairie Fringed Orchid (Platanthera leucophaea)*
USFWS (2021) *Eastern Prairie Fringed Orchid (Platanthera leucophaea) species profile*

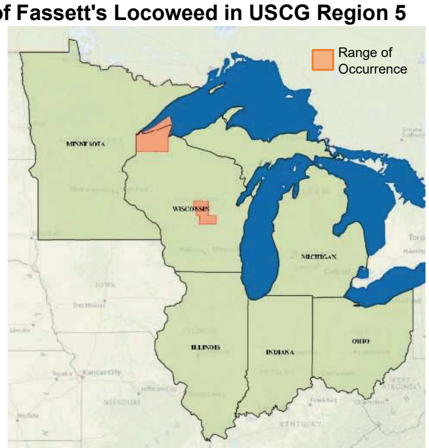
Fassett's Locoweed	**Status**	**Threatened (1988)**	53 FR 37970
Scientific Name	*Oxytropis campestris* var. *chartacea*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Fassett's Locoweed is a 4- to 12-in. tall perennial herb of the pea family. It appears silvery-gray in color because of the white, silky hairs that cover most of the plant. The flowers are pea-like, 0.5 to 0.75 in. long, and rose-pink to violet. An individual plant produces 1 to 20 stems, and each stem can have 10 to 20 flowers. The flowers produce numerous pale yellow pods that contain small black seeds. On a mature plant, the leaves, which grow from a common base, are 3 to 8 in. long and are made up of 18 to 30 leaflets, each about an inch or less in length.

Life History: Fassett's Locoweed plants live for several years, reappearing each spring from underground perennial tap roots. The species reproduces entirely by seed. Flowers bloom from mid-May through mid-June. Both small and large bees have been observed visiting flowers, but the pollinator is not definitively known. While uppermost flowers are still in bloom, legume pods have begun to develop in the lower part of the plant. Seed dispersal from mature seed pods begins by mid-July. Fassett's Locoweed depends on the open habitat provided during low lake levels and a large seed bank of dormant seeds in the soil for long-term population maintenance.

Range of Fassett's Locoweed in USCG Region 5



Current Threats:

- Lakeshore development
- Low water levels
- Herbicides and pesticides
- Cattle grazing
- Agricultural irrigation

Distribution/Habitat: Fassett's Locoweed grows on gentle, sand-gravel shoreline slopes around shallow lakes fed by groundwater seepage. These landlocked lakes are subject to frequent, large fluctuations of water levels. Fassett's Locoweed is found along the lakes and open shoreline and, to a lesser extent, on higher ground under the partial shade of adjacent vegetation. Nearly all lakes with historical populations are less than 15 ha (37 ac) in size and occur at approximately 350 m in elevation, which suggests the distribution of Fassett's Locoweed may be related to the glacial history of Wisconsin.

Primary Habitat in Action Area/RAM: Shoreline (beach/land), ponds and lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Beach and Sand Bar, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Open Water, Rooted Floating Aquatics, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
					X

Additional References:

USFWS (1991) *Fassett's Locoweed recovery plan*
USFWS (2003) *Fassett's Locoweed (Oxytropis campestris var. chartacea) fact sheet*
USFWS (2021) *Fassett's Locoweed (Oxytropis campestris var. chartacea) species profile*

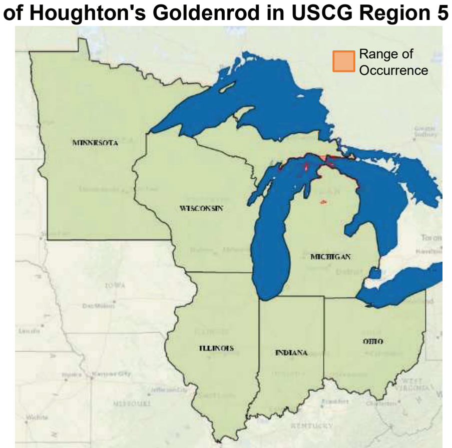
Houghton's Goldenrod	**Status**	**Threatened (1988)**	53 FR 27134
Scientific Name	*Solidago houghtonii*	**Critical Habitat**	N/A


Photo: Michigan Natural Features Inventory

Appearance: Houghton's Goldenrod is a perennial herbaceous member of the Asteraceae family. They are frequently tufted or clumped and can grow up to 75 cm tall. Rhizomes are commonly produced from the caudex (thickened, branching, fibrous-rooted base). Stems are smooth and slender and sometimes reddish in color. Basal leaves are 20 cm long and 20 mm wide and slightly clasp at the base. The flat-topped inflorescence consists of relatively few (2 to 18) showy, large flower heads.

Life History: Flowering occurs from August to early September but can begin as early as late July. Houghton's Goldenrod is insect-pollinated. Fruiting and seed dispersal begins in August and lasts through November. Seeds remain viable within the seed bank for no more than one year.

Range of Houghton's Goldenrod in USCG Region 5



Current Threats:

- Residential development
- Beach retaining wall construction
- Excessive foot and off-road vehicle traffic
- Marina construction
- Road construction
- Sand mining
- Changes in hydrology
- Invasive species

Distribution/Habitat: Houghton's Goldenrod is generally restricted to narrow bands of open, calcareous, lakeshore habitat requiring the natural dynamics of the Great Lakes system to maintain a suitable environment. Houghton's Goldenrod is primarily endemic to the Upper Great Lakes region, occurring on the northern shores of Lakes Michigan and Huron in Michigan and Ontario. Inland Houghton’s goldenrod populations were known to occur in Crawford and Kalkaska Counties but following genetic analysis have now been identified as a new species, *Solidago vossii*. Additionally, a disjunct population occurs in Genesee County in the Bergen Swamp Nature Preserve in New York. The Environmental Conservation Online System (ECOS) also lists Monroe County, New York.

Primary Habitat in Action Area/RAM: Shoreline (beach/land)

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X			

Additional References:
USFWS (1997) *Recovery plan for Houghton's Goldenrod (Solidago houghtonii)*
USFWS (2021*) Houghton's Goldenrod (Solidago houghtonii) species profile*

Lakeside Daisy	**Status**	**Threatened (1988)**	53 FR 23742

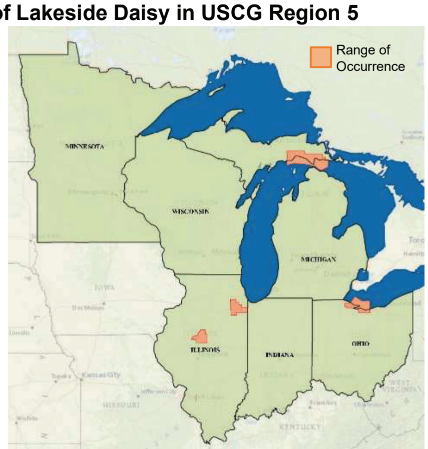
Scientific Name	*Hymenoxys herbacea*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: Lakeside Daisy is an herbaceous spring-blooming perennial with a short, thick taproot and stout branching caudex. Basal rosette leaves are entire and range 0.6 to 16.7 cm long and are 0.35 to 1.3 cm wide. Stems are short and stout, with whiteish hairs reaching a maximum height between 8.4 to 40 cm and support a solitary inflorescence flower head. Both disc and ray florets are bright yellow and produce five-angled, hairy achenes.

Life History: Inflorescence buds typically form in the fall and overwinter at the base of the rosette. Flowering occurs from late April to early June. Pollinators include bumble bees, small carpenter bees, and halictid bees. Achenes develop quickly and are wind-dispersed three to four weeks following fertilization (late May to early July).

Range of Lakeside Daisy in USCG Region 5



Current Threats:

- Habitat destruction
- Natural succession
- Trampling and soil compaction
- Over-collection

Distribution/Habitat: Lakeside Daisy historically occurred in dry prairies, on outcrops of dolomite or limestone bedrock, or on sand and gravel terraces of major river valleys. Nearly all original habitat has been destroyed, and only in Ohio has the variety recolonized abandoned quarry habitat where nearly 98% of the essential habitat is in private ownership. A naturally occurring population of Lakeside Daisy is known from the Marblehead Peninsula in Ohio, where there is now a state park: Lakeside Daisy State Park (ODNR, 2021). Additional Ohio populations have been established on Kelleys Island and at Castalia Quarry Metropark (both in Erie County). Two populations are known in Michigan, with an additional reserve population established and an introduced population established at an abandoned quarry. Lakeside Daisy was historically recorded in Tazewell and Will Counties in Illinois and populations have been re-established at three sites in these counties. In addition, new populations have been introduced into Cook and DuPage Counties, Illinois (USFWS, 2021a).

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
X		X		X	

Additional References:

MNFI (2021) *Tetraneuris herbacea (Lakeside Daisy)*
ODNR (2021) *Lakeside Daisy (Tetraneuris herbacea)*
USFWS (1990) *Recovery plan for the Lakeside Daisy (Hymenoxys acaulis* var. *glabra)*
USFWS (2021) *Lakeside Daisy (Tetraneuris herbacea) 5-year review*
USFWS (2021*) Lakeside Daisy (Hymenoxys herbacea) species profile*

Leafy Prairie-Clover	**Status**	**Endangered (1991)**	56 FR 19953

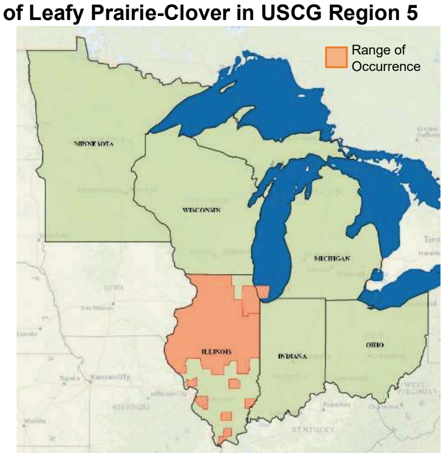
Scientific Name	*Dalea foliosa*	**Critical Habitat**	N/A


Photo: U.S. Forest Service

Appearance: Leafy Prairie-Clover is a member of the legume family (Fabaceae). One to several stems 20 cm to 80 cm long arise from a hardened root crown. Alternate leaves are compound, oddly pinnate, and are primarily distinguished from other members of the genus based on leaflet number, which ranges from 9 to 31 but typically is between 20 to 27 leaflets. Flowering heads are between 0.4 and 8.9 cm long and 0.6 to 1.0 cm wide on short peduncles, 0 to 2 mm long. Florets are lavender-purple in color with a calyx with five petals and five strongly exerted anthers with orange pollen.

Life History: Leafy Prairie-Clover is a short-lived herbaceous perennial that has no capacity for vegetative spread. In March, new ramets (stems) begin to grow from buds on the root crown just below the soil surface. By July, these ramets are 40 to 65 cm tall. Nonflowering plants have from 1 to 4 ramets, and flowering plants have from 1 to 20 ramets. A single ramet will develop one or more inflorescence buds in late June. Flowering begins in late July, peaks in mid-August, and can continue until late August. The number of flowers per inflorescence varies from 40 to 495. Bumble bees, small bees, and syrphid flies have been observed visiting flowers. Leafy Prairie-Clover seeds ripen by early October and disperse from the erect dead ramets from late fall to early spring. Potential dispersal vectors include wind, gravity, birds, and small mammals. Dormant seeds are capable of forming a persistent seed bank.

Range of Leafy Prairie-Clover in USCG Region 5



Current Threats:

- Residential and commercial development
- Road construction
- Herbicide use
- Severe drought events
- Herbivory
- Succession to woody habitat

Distribution/Habitat: The species occurs in thin-soiled (less than 45 cm [18 in.] deep) mesic and wet-mesic dolomite prairie, limestone cedar glades, and limestone barrens. It can persist in successional plant communities following disturbance or woody succession but will decline in advanced stages of woody succession. The natural communities supporting Leafy Prairie-Clover must be maintained by periodic burning. This plant is found in prairie remnants along the Des Plains River in Illinois in thin soils over limestone substrate. Historically, five sites from four counties (Kane, Kankakee, La Salle, and Will) were known in Illinois, with unconfirmed records in Boone, Ogle, and Winnebago Counties. The species was thought to be extirpated from Illinois until a large population was discovered west of the Des Plaines River in 1974 in what is now the Lockport Prairie Nature Preserve. Tennessee likely had the most extensive and widespread pre-settlement *Dalea foliosa* populations. The recovery plan lists 33 occurrences in seven counties.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:
USFWS (1996) *Leafy Prairie-Clover Recovery Plan*
USFWS (1997) *Leafy Prairie-Clover (Dalea foliosa) fact sheet*
USFWS (2015) *Leafy Prairie-Clover (Dalea foliosa) 5-year review*
USFWS (2021) *Leafy Prairie-Clover (Dalea foliosa) species profile*

Leedy's Roseroot	**Status**	**Threatened (1992)**	57 FR 14649

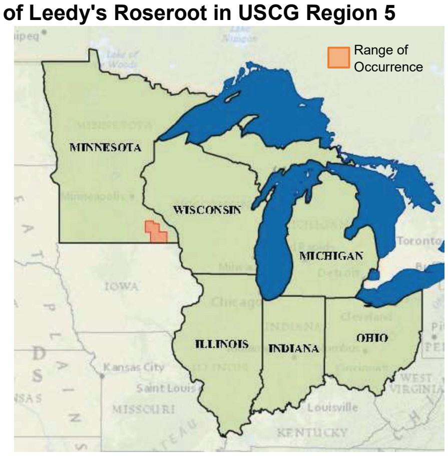
Scientific Name	*Rhodiola integrifolia* ssp. *leedyi*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Leedy's Roseroot is a perennial member of the stonecrop (orpine) family, which has waxy leaves that enable them to tolerate periods of water stress. Leedy's Roseroot has a relatively elongate, leafy stem. The closely-packed leaves arise directly from the main stem and are smooth, with irregularly toothed to toothless edges. Although they are a succulent, they can appear quite limp in dry weather. Male and female flowers are borne on separate plants. The small four- to five-petaled flowers are arranged in dense heads at the end of the leafy stem. They vary in color from dark red to occasional yellow or oranges.

Life History: Flowering occurs in early June with bees and syrphus flies as primary pollinators. Seeds are winged and wind-dispersed. Occasionally, seeds will germinate in their follicles and produce seedlings on the parent plant.

Range of Leedy's Roseroot in USCG Region 5



Current Threats:

- Increased human activities
- Groundwater contamination
- Changes in groundwater hydrology

Distribution/Habitat: The Minnesota populations of *R. integrifolia* ssp. *leedyi* are found on shallow ledges on north-facing dolomite cliffs up to 30 m (98 ft) in height. Plants are restricted to crevices in maderate cliffs, a very specialized habitat of specific strata where groundwater seeps through the rock and is cooled by air coming from underground air passages in karst topography. This results in a constantly wet, dripping condition, an unusual product of a long geologic history. Historically four populations from two counties were identified in Minnesota and included: Bear Creek Cliff and Deer Creek Cliff in Fillmore County and Simpson Cliff and Whitewater Wildlife Management Area in Olmsted County. Three populations in two counties were identified in New York and included: Glenora Cliff and Gelnora Falls in Yates County and Watkins Glen in Schuyler County.

Leedy's Roseroot is a cliffside wildflower found today in only seven locations in three states. Four populations are found in Fillmore and Olmsted Counties, Minnesota. Two are in upstate New York, a large population on the shores of Seneca Lake and a single plant at Watkins Glen. In South Dakota, the subspecies occurs on Black Hills National Forest on a cliff at approximately 7,000 ft above sea level (Custer and Pennington Counties).

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:
MNDNR (2021) *Rhodiola integrifolia ssp. leedyi (Leedy's Roseroot)*
USFWS (1993) *Leedy's Roseroot (Rhodiola integrifolia ssp. leedyi) fact sheet*
USFWS (1998) *Sedum integrifolium ssp. leedyi (Leedy's Roseroot) recovery plan*
USFWS (2015) *Leedy's Roseroot (Rhodiola integrifolia ssp. leedyi) 5-year review*
USFWS (2021) *Leedy's Roseroot (Rhodiola integrifolia ssp. leedyi) species profile*

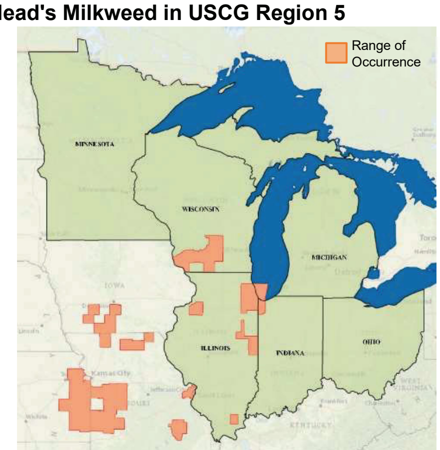
Mead's Milkweed	**Status**	**Threatened (1988)**	53 FR 33992
Scientific Name *Asclepias meadii*		**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Mead's Milkweed has a single slender, unbranched stalk, 20-40 cm high, without hairs but with a whitish waxy covering. The hairless leaves are opposite, broadly ovate, 2 to 3 in. (5 to 7.5 cm) long, ⅜ to 2 in. (1 to 5 cm) wide, with a whitish waxy covering. A solitary umbel at the top of the stalk has 6 to 15 greenish ivory/cream-colored flowers, which appear in late May and early June.

Life History: Mead's Milkweed is a long-lived perennial rhizomatous herb that may persist indefinitely or until destroyed by chance impacts from animals or pathogens. Mead's Milkweed persists in the stable habitat of late-successional prairie. This species has low reproductive rates. It usually begins its seasonal growth in mid to late April. Flowering occurs in late May in the south through early to mid-June in the north. Severe drought can cause loss of flowers or wilting and dying back of an entire plant. Pollinators include small bumble bees and miner bees. Young green fruit pods appear by late June and reach their maximum length of 4 to 8 cm by late August or early September. As these pods mature, they darken, and the hairy seeds borne within are mature by mid-October. Seeds are wind-dispersed.

Range of Mead's Milkweed in USCG Region 5



Current Threats:

- Habitat destruction
- Agricultural activities
- Development and urbanization
- Recreational use of sites
- Hay mowing

Distribution/Habitat: The primary habitat of Mead's Milkweed is mesic to dry mesic, upland tallgrass prairie, characterized by vegetation adapted for drought and fire. Mead's Milkweed populations are generally restricted to full sun in late-successional or virgin grassland; however, plants may also persist vegetatively in partial shade, such as in edges of glades or barrens that are being encroached upon by woody vegetation. Mead's Milkweed has also been found on glades or barrens.

The historical range includes Illinois, Indiana, Iowa, Kansas, Missouri, and Wisconsin. In 2003 Mead's Milkweed was known from 171 sites in 34 counties in eastern Kansas, Missouri, south-central Iowa, and southern Illinois. The majority of counties with extant populations were clustered within a 125 square mile area of eastern Kansas and southwest Missouri. Outside this area, populations are widely dispersed across 11 counties of northern Missouri, southeast Missouri, southwest Iowa, and southern Illinois. Mead's Milkweed has 330 known extant populations in Illinois, Indiana, Iowa, Kansas, and Missouri, with the majority occurring in Kansas and Missouri. No extant populations were identified in Wisconsin.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X				X

Additional References:

USFWS (2003) *Mead's Milkweed (Asclepias meadii) recovery plan*
USFWS (2013) *Mead's Milkweed (Asclepias meadii) 5-year review*
USFWS (2021) *Mead's Milkweed (Asclepias meadii) species profile*

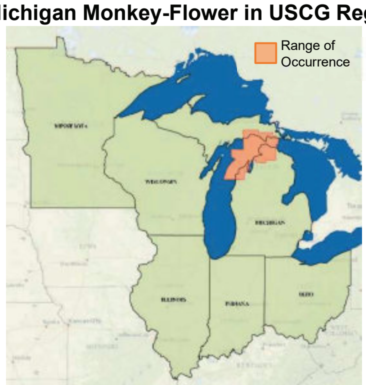
Michigan Monkey-Flower	**Status**	**Endangered (1990)**	55 FR 25596
Scientific Name	*Mimulus michiganensis*	**Critical Habitat**	N/A


Photo: Michigan Wildflowers

Appearance: The stems, which range to about 40 cm (15.7 in.) or more in length, are lax and reclining at their base, rooting freely at lower leaf nodes to produce numerous additional shoots via stolons. Propagation in this manner often results in the production of clones of up to several hundred stems or more. The broadly ovate to roundish, opposite leaves are inconspicuous to coarsely sharp-toothed and have leafstalks that are usually shorter than the blades. Upward the leaves become somewhat reduced and shorter stalked. Bright yellow, snapdragon-like, tubular flowers are produced from the upper leaf axils, borne on slender pedicels that may be longer than the leaves. The two-lipped flowers range from 16 to 27 mm (0.6 to 1.1 in.) in length and have an irregularly red-spotted lower lip and tube. The three-lobed, heavily-bearded lower lip forms a wide landing platform for insect pollinators. Fruit, which is seldom produced, consists of an oblong, pointed capsule, 8 to 10 mm long, containing numerous oval seeds with longitudinal striations.

Life History: Michigan Monkey-Flower is a member of the Scrophulariaceae (snapdragon family) and is an endemic variety of a widespread and diverse complex of yellow monkey-flowers. Michigan Monkey-Flower is an aquatic to semi-aquatic perennial plant characterized by its mat-forming, clonal growth habit. Flowering occurs primarily from approximately mid-June to August, occasionally extending into October. It flowers most abundantly when growing in full sunlight, although it appears to persist as mostly sterile colonies when growing under heavy tree canopy cover.

Range of Michigan Monkey-Flower in USCG Region 5



Current Threats:

- Habitat destruction and modification
- Human development
- Hydrologic disruptions
- Overcollection
- Competition from invasive species

Distribution/Habitat: Michigan Monkey-Flower is restricted to cold, alkaline spring seepages and streams, usually associated with northern white cedar (*Thuja occidentalis*) swamps occurring along current or post-glacial Great Lakes shorelines. It frequently occurs in northern white cedar swamps formed in drainages found at the base of relatively steep morainic slopes and bluffs. Historically, Michigan Monkey-Flower was known from only 15 extant occurrences and is distributed principally within Michigan's Mackinac Straits region in Charlevoix, Cheboygan, Emmet, and Mackinac Counties, with outlying localities to the south in Benzie and Leelanau Counties. The 5-year review in 2011 identified three additional occurrences for a total of 19, and four new occurrences were discovered after the 2011 status review.

Primary Habitat in Action Area/RAM: Streams and Rivers, Wetlands

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X			

Additional References:

USFWS (1997) *Michigan Monkey-Flower (Mimulus glabratus var. michiganensis) recovery plan*
USFWS (2011) *Michigan Monkey-Flower (Mimulus michiganensis) 5-year review*
USFWS (2018) *Michigan Monkey-Flower (Erythranthe michiganensis) 5-year review*
USFWS (2021) *Michigan Monkey-Flower (Mimulus michiganensis) species profile*

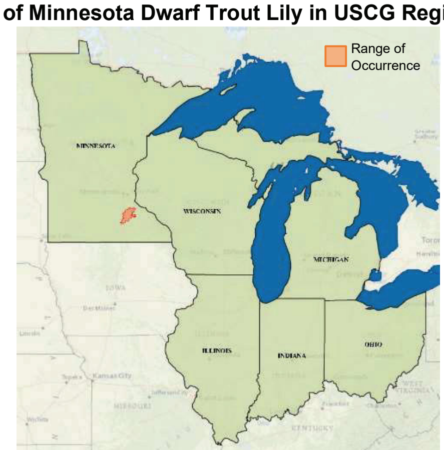
Minnesota Dwarf Trout Lily	**Status**	**Endangered (1986)**	51 FR 10521
Scientific Name	*Erythronium propullans*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Minnesota Dwarf Trout Lily is a herbaceous, spring-blooming, perennial member of the lily family (Liliaceae). Leaves are slightly mottled and are paired in flowering plants but single in vegetative plants. The blooming plant is readily identified by the very small size of its flowers. Flowers of the Dwarf Trout Lily are about the size of a dime or less, pale pink, with a variable number of perianth parts ("petals"). Most members of the lily family have six "petals," but Dwarf Trout Lilies may have four, five, or six petals.

Life History: The Minnesota Dwarf Trout Lily is a spring ephemeral, flowering from late April to mid-May. The annual formation of new bulbs sustains Below-ground perennial bulbs. Vegetative production of a new individual is accomplished by forming a new bulb at the tip of a runner that arises from the underground stem of flowering plants. This process can result in a new plant being produced at distances as great as 3.5 cm from the parent plant. Flowers are available for pollination for 6 to 7 hours per day and are principally visited by the small Carlinville Miner Bee (*Andrena carlini*). Other species of bees, flies, and beetles infrequently visit the Minnesota Dwarf Trout Lily. The Minnesota Dwarf Trout Lily does not readily self-pollinate and typically only produces seeds when cross-pollinated with the White Trout Lily (*E. albidum*). Sexual reproduction is possible but is a likely rare, periodic event.

Range of Minnesota Dwarf Trout Lily in USCG Region 5



Current Threats:

- Grazing
- Increased flooding and erosion
- Invasive species control
- Woody shrub succession
- Non-native species

Distribution/Habitat: The Minnesota Dwarf Trout Lily occurs mostly on the lower parts of wooded north-facing slopes 15 to 27 m high and adjacent floodplains. Sites are associated either with streams or abandoned stream channels. This species appears to grow best in habitats with a surface layer of rich, black, well-aerated soil. The Minnesota Dwarf Trout Lily is a forest wildflower found in Rice and Goodhue Counties, Minnesota. Because it is known only from this small area, the Dwarf Trout Lily is considered a Minnesota "endemic"—i.e., a species that grows in Minnesota and nowhere else on earth. Historically, the Minnesota Dwarf Trout Lily occurred in colonies that range in size from one or two scattered plants to more than 500 individuals. Plants mainly occur at elevations between 960 and 1,000 ft above sea level.

Primary Habitat in Action Area/RAM: Streams and Rivers, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:

USFWS (1987) *Erythronium propullans recovery plan*
USFWS (2011) *Minnesota Dwarf Trout Lily (Erythronium propullans) 5-year review*
USFWS (2021*) Minnesota Dwarf Trout Lily (Erythronium propullans) species profile*

Northern Wild Monkshood	**Status**	**Threatened (1978)**	43 FR 17910

Scientific Name	*Aconitum noveboracense*	**Critical Habitat**	N/A

Photo: Ohio Department of Natural Resources

Appearance: Northern Wild Monkshood is a perennial herb arising from short tuberous roots with basal cauline leaves that are palmately cleft or dissected with usually blue to whiteish flowers borne in a terminal raceme or panicle. The flowers are about 1 in. in length, and a single stem may have many flowers. Stems range from about 1 to 4 ft in length. The leaves are broad with coarse, toothed lobes.

Life History: Northern Wild Monkshood is a perennial and reproduces from both seed and small tubers. The flowers bloom between June and September and are pollinated when bumble bees pry open the blossom to collect nectar and pollen. Fruiting occurs in August through late September in Wisconsin and late October in Ohio.

Range of Northern Wild Monkshood in USCG Region 5

Current Threats:

- Dam and reservoir construction
- Road construction and maintenance
- Logging
- Quarrying
- Grazing
- Recreational foot traffic
- Urban and residential development
- Overcollection

Distribution/Habitat: Northern Wild Monkshood is typically found on shaded to partially shaded cliffs, algific talus slopes, or on cool, streamside sites. These areas have cool soil conditions, cold air drainage, or cold groundwater flowage. On algific talus slopes, these conditions are caused by the outflow of cool air and water from ice contained in underground fissures. These fissures are connected to sinkholes and are a conduit for the air flows. In New York, Northern Wild Monkshood can also be found in semi-shaded seepage springs at high elevation headwaters in the stream-side crevices downstream.

Historical ranges spanned northeastern Iowa and southwestern Wisconsin to northeastern Ohio and the Catskill Mountains of New York. In 1983 Northern Wild Monkshood was restricted to 20 extant sites in three distinct regions: in and adjacent to the unglaciated (Wisconsin epoch) portion of Iowa (Allamakee. Clayton, Dubuque, Jackson, and Delaware Counties) and Wisconsin (Grant, Richland, Sauk, and Vernon Counties), the northeastern Ohio glaciated area (Summit and Portage Counties), and the glaciated area of the Catskill Mountains of New York (Chenango and Ulster County).

Primary Habitat in Action Area/RAM: Streams and Rivers, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	X

Additional References:

ODNR (2021) *Northern Monkshood*
USFWS (1983) *Northern Monkshood recovery plan*
USFWS (2007) *Northern Wild Monkshood (Aconitum noveboracense) fact sheet*
USFWS (2021*) Northern Wild Monkshood (Aconitum noveboracense) species profile*
WIDNR (2021) *Northern Monkshood (Aconitum noveboracense)*

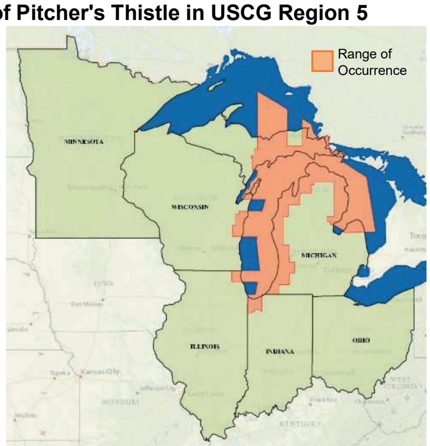
Pitcher's Thistle	Status	Threatened (1988)	53 FR 27137
Scientific Name *Cirsium pitcheri*		**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: Pitcher's Thistle is a monocarpic (flowers and sets seed only once), perennial, herbaceous plant, generally flowering after a 5- to 8-year juvenile stage. The stems and leaves of juveniles and adults are woolly-white, and the leaves are deeply pinnatifid with the lobes less than 1 cm wide and up to 4 cm long. Minute spines are concentrated along the edge of the leaf at its base, with a few spines between the lobes of the distal leaf margins. The flowering stems are up to 1 m tall and have several to a dozen widely scattered leaves. Individuals typically have a single branching flowering stem with terminal and axillary flowering heads of cream or pinkish color. Juveniles and adults have a taproot that may reach 2 m in length.

Life History: Seed dormancy is broken by cold, moist stratification, with seed germination occurring in May and June. Age of reproduction ranges from 5 to 8 years and appears to be correlated with habitat. Pitcher's Thistle blooms from May to September, with the date of peak anthesis occurring later with increasing latitude (mid-July at Sleeping Bear Dunes). Smaller axillary flowering head buds located below the flowering inflorescence may bloom late in the season or if distal heads are damaged or removed. The primary pollinators are bees. Primary seed dispersal is through individual seeds blowing from the inflorescence head or by the whole plant and heads falling to the ground at the end of the flowering season.

Range of Pitcher's Thistle in USCG Region 5



Current Threats:

- Habitat destruction
- Alteration of dune geomorphic processes
- Shoreline stabilization projects
- Non-native species

Distribution/Habitat: Pitcher's Thistle is endemic to the beaches and grassland dunes of Lakes Michigan, Superior, and Huron. It is found most frequently in the near-shore plant communities, although it occurs in all non-forested areas of Great Lakes dune systems. Pitcher's Thistle colonizes patches of open, windblown areas of the landscape and gradually declines locally as vegetation and ground litter density increases through plant succession. The majority of known sites of Pitcher's Thistle occur along the shores of Lake Michigan. The species ranges from the north shore of Lake Superior south to Indiana, and formerly occurred in northern Illinois, where it has been experimentally reintroduced. The distribution of the species extends along the Lake Michigan shoreline in Wisconsin. In the east, it ranges through northern Lake Huron to the Manitoulin Island archipelago and southern Georgian Bay in Ontario. Pitcher's Thistle extends as far south as Lambton County, Ontario, Canada, on Lake Huron, as indicated by pre-1964 collections for two localities.

Primary Habitat in Action Area/RAM: Shoreline (beach/land), Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X			X

Additional References:
MNFI (2021) *Cirsium pitcheri (Pitcher's Thistle)*
USFWS (2002) *Pitcher's Thistle (Cirsium pitcheri) recovery plan*
USFWS (2010) *Pitcher's Thistle (Cirsium pitcheri) 5-year review*
USFWS (2018) *5-year review: Pitcher's Thistle (Cirsium pitcheri)*
USFWS (2021) *Pitcher's Thistle (Cirsium pitcheri) species profile*

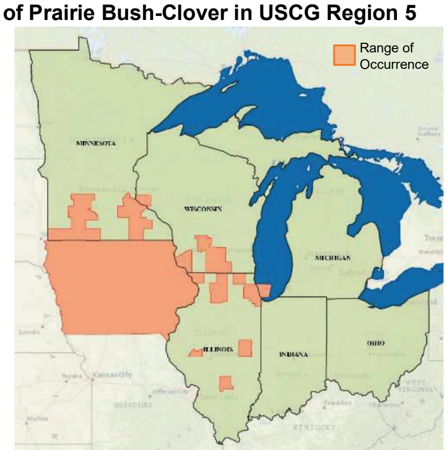
Prairie Bush-Clover	Status	Threatened (1987)	52 FR 781
Scientific Name	*Lespedeza leptostachya*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Also known as slender-leaved bush clover, it has a clover-like leaf composed of three leaflets about 1 in. long and a ¼ in. wide. Flowering plants are generally between 9 and 18 in. tall, with the flowers loosely arranged on an open spike. The pale pink or cream-colored flowers bloom in mid-July. The entire plant has a grayish-silver sheen. The showy pink flowers of Prairie Bush-Clover are less often seen than the silvery-green pods because of the plant's short blooming season and its ability to produce pods directly from flowers that never open.

Life History: Prairie Bush-Clover is a perennial species. Plants reach maturity in approximately five years or more, and mature plants have been observed to flower repeatedly over four seasons. It is estimated that individual plants frequently live 10 years or more. Established plants typically send up a single stem from each root, though they may occasionally produce 2 or 3 stems. Flowering begins in mid-July and continues into early September. Two flower types are produced: chasmogamous (potentially outcrossing) and cleistogamous (obligately self-pollinating). Both flower types can be produced on a single plant, or a plant may bear all cleistogamous flowers. Pollinators are unknown. Each plant produces as many as 560 pods, with an average of 235 pods per plant. Seed production begins in late August through early October. Seed production is much lower compared to pod production. It is possible seeds persist in the seed bank for a few years, and seed germination typically begins in May and continues through July.

Range of Prairie Bush-Clover in USCG Region 5



Current Threats:

- Habitat loss and degradation
- Row crop conversion
- Livestock grazing
- Herbicide application
- Residential development
- Herbivory
- Successional change

Distribution/Habitat: Prairie Bush-Clover is endemic to midwestern prairies. Habitats are usually north-facing slopes of 10-15°, with fine silty loam, fine sandy loam, or clay loam. Specifically, the Des Moines River basin and the Little Sioux basin seem to be the "core" area for this species and are the location of 9 of the 13 Iowa populations and 9 of the 12 Minnesota populations. Additionally, Prairie Bush-Clover has been identified on the margins of bedrock outcrops, specifically in Cottonwood and Morton Counties, Minnesota. Historical records include 27 counties in Illinois, Iowa, Minnesota, and Illinois. The history of subsequent collections and sightings of the species suggests that the Prairie Bush-Clover has always been found more often in Iowa than in the other three states. In 1988 Prairie Bush-Clover was known from 36 sites in 24 counties in northern Illinois, Iowa, southern and western Wisconsin, and southern Minnesota.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
X			X		X

Additional References:

MNDNR (2021) *Lespedeza leptostachya (Prairie Bush Clover)*
USFWS (1988) *Lespedeza leptostachya recovery plan*
USFWS (2021*) Prairie Bush-Clover (Lespedeza leptostachya) species profile*

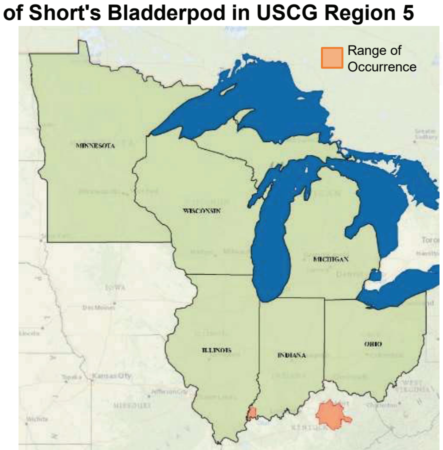
Short's Bladderpod	**Status**	**Endangered (2014)**	79 FR 44712
Scientific Name	*Physaria globosa*	**Critical Habitat**	79 FR 50989

Photo: U.S. Fish & Wildlife Service

Appearance: Short's Bladderpod is an upright biennial or perennial (lives for 2 years or longer) with several stems, some branched at the base, reaching heights up to 50 cm (20 in.) and which are leafy to the base of the inflorescence. The basal leaves, borne on short petioles (stalks), are 2.5 to 5 cm (1 to 2 in.) in length and 0.5 to 1.5 cm (0.2 to 0.6 in.) wide, obovate or oblanceolate in shape, with a smooth or slightly wavy margin, and gray-green in color due to a layer of dense hairs. Numerous flowers are borne on a raceme (elongate, spike-shaped inflorescence). The yellow flowers are composed of four spoon-shaped petals, 0.4 to 0.7 cm (0.16 to 0.28 in.) long, with a nectary at the base of each petal. The fruit is globose in shape and lightly beset with stellate (star-shaped) hairs, becoming smooth with time, and typically contains one to four seeds, less often five.

Life History: Short's Bladderpod is a biennial or perennial that typically flowers and produces seeds during March through June. Observed pollinators include mining bees (*Andrena* sp.), two species of dipterans (*Nemotelus bruesii*, *Toxomerus geminatus*) and four species of hymenopterans (bees; *Lasioglossum illinoense*, *L. versatus*, *Halictus ligatus*, *Augochlorella striata*). The timing of seed germination is not currently known, but potentially seeds could germinate in the fall and form rosettes over winter, germinate in spring when conditions become favorable, or exhibit either phenology depending upon the dormancy status of individual seeds and variation in seasonal climatic conditions.

Range of Short's Bladderpod in USCG Region 5



Current Threats:

- Habitat degradation
- Transportation right-of-way maintenance/construction
- Flooding and erosion
- Forest succession
- Invasive species

Distribution/Habitat: Short's Bladderpod typically grows on steep, rocky, wooded slopes and talus areas. It also occurs along tops, bases, and ledges of bluffs and infrequently on sites with little topographic relief. The species usually is found in these habitats on the south- to west-facing slopes near rivers or streams, and most populations are closely associated with calcareous outcrops. The most vigorous and stable occurrences are found in sites with a relatively open overstory canopy. Historically, Short's Bladderpod is known from 55 occurrences verified and tracked in NHP databases. As of 2016, there were 10 extant occurrences in Kentucky, 20 in Tennessee, and 1 in Posey County, Indiana, for a total of 31 extant occurrences range-wide.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
	X				

Additional References:

USFWS (2017) *Draft recovery plan for Short's Bladderpod (Physaria globosa)*
USFWS (2017) *Recovery implementation strategy for Short's Bladderpod (Physaria globosa)*
USFWS (2017) *Species status assessment: Short's Bladderpod (Physaria globosa)*
USFWS (2021) *Short's Bladderpod (Physaria globosa) species profile*

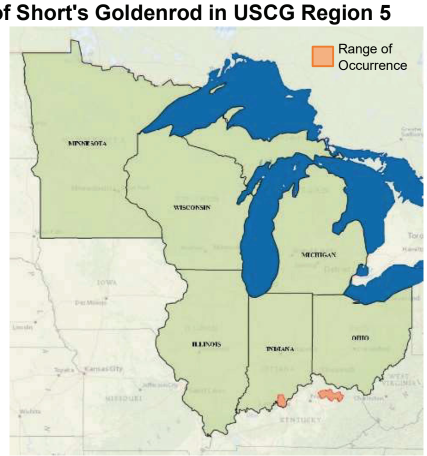
Short's Goldenrod	**Status**	**Endangered (1985)**	50 FR 36085
Scientific Name	*Solidago shortii*	**Critical Habitat**	N/A

Photo: North Carolina State University

Appearance: Short's Goldenrod is a perennial herb with one to several erect or ascending stems 0.5 to 1.3 m tall, arising from a creeping rhizome. Stems are terete in cross section, slightly ribbed, and minutely scabrid-puberulent at least above the middle. Leaves are alternate, crowded, 5 to 10 cm long, and 0.6 to 1.5 cm wide. The inflorescence is terminal and ranges from racemose to paniculate with divergent, secund branches. Heads are 10-14 flowered on puberulent stalks, usually 5 mm or less in length. Ray florets number four to eight and are 2.5 to 3.0 mm long. The corollas are elliptic-linear, with bright yellow ligules about 2 mm long. The disc florets are also bright yellow with a short tube, funnelform throat, and five linear spreading lobes roughly equaling the throat length. The white pappus is capillary and about 2 mm long. Achenes are cuneate-cylindric, about 2 mm long, and pale brown with appressed, silky pubescence.

Life History: Little is known about the reproductive status of Short's Goldenrod. Short's Goldenrod produces flowers from mid-August to early November. Specific pollinators are unknown, but sweat bees (likely Halictidae) and the common black blister beetle (*Epicauta pennsylvanica*) have been observed in large numbers, likely feeding on the flowers. Achenes (fruits) mature several weeks after the flowers wither. Short's Goldenrod seeds are wind-dispersed, but there is no evidence to suggest this species expands its range by this method.

Range of Short's Goldenrod in USCG Region 5



Current Threats:

- Habitat disturbance
- Construction activities
- Agricultural practices
- Highway maintenance
- Power line maintenance
- Invasive species
- Natural succession

Distribution/Habitat: Short's Goldenrod is a species of full sun or partial shade and occurs in a variety of dry, mostly open habitats. These habitats include limestone cedar glades, open eroded areas, edges of dry, open oak-hickory woods, cedar thickets, pastures, old fields, power line rights-of-way, and rock ledges along highway rights-of-way. The Blue Licks population was first discovered in 1939 and has remained extant until the present. The second area of historical distribution was at the Falls of the Ohio, Jefferson County, Kentucky. An Indiana occurrence was discovered in 2001 along the Blue River in Harrison County and appeared to be stable. Approximately 139 clumps of Short's Goldenrod were counted in 2001 when the occurrence was first discovered. Additional counts in 2005 revealed 191 clumps.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
	X				

Additional References:

USFWS (1988) *Short's Goldenrod recovery plan*
USFWS (2007) *Short's Goldenrod (Solidago shortii) 5-year review*
USFWS (2017) *Short's Goldenrod (Solidago shortii) 5-year review*
USFWS (2021) *Short's Goldenrod (Solidago shortii) species profile*

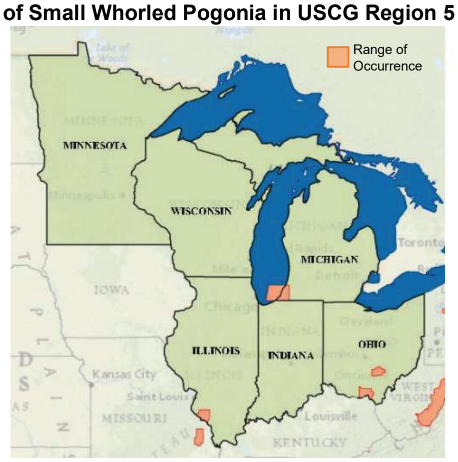
Small Whorled Pogonia	**Status**	**Endangered (1982)** **Threatened (1994)**	47 FR 39827 59 FR 50852
Scientific Name	*Isotria medeoloides*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: An individual Small Whorled Pogonia is usually single-stemmed, although occasionally a plant produces two or more stems in a cluster. The stem ranges from 6 to 35 cm tall in a flowering plant and is similar in color, with the same degree of glaucousness, as white seedless grapes; the elliptic to elliptic-obovate leaves are also a pale milky-green or grayish-green. The flower is yellowish-green with a greenish-white lip. The sepals vary from linear-oblanceolate to narrowly spatula-like in shape and spread outward when in full flower. The lateral petals are oblanceolate to oblong-elliptic and point forward above the lip. The sepals are approximately 1.5 to 2.5 cm long and equal in length to the lateral petals or up to 1.5 times as long.

Life History: In the northern part of its range, flowering buds emerge from the leaf litter in May and flower in June. Farther south (e.g., Virginia), such plants typically emerge in April, with flowering beginning in very late April to mid-May. An individual plant may stay in flower from 4 days to nearly 2 weeks. Small Whorled Pogonia is scentless, apparently lacks nectar, and is primarily self-pollinating. As soon as pollination occurs, the ovary begins to plumpen. The fruit capsule does not fully ripen until fall and may not dehisce until late fall. Many plants form a visible over-wintering vegetative bud at the base of the stem in August or September.

Range of Small Whorled Pogonia in USCG Region 5



Current Threats:

- Road construction
- Residential development
- Herbivory
- Illegal collection

Distribution/Habitat: The Small Whorled Pogonia occurs on upland sites in mixed-deciduous or mixed-deciduous/coniferous forests that are generally in second- or third-growth successional stages. At the time of listing, records for the species were known from 48 counties in 16 states and Canada. However, only 17 sites (throughout 10 states and Ontario, Canada) were known to be extant, and these sites contained a total of fewer than 500 plants. Subsequent searches have resulted in the discovery of several new sites: the 1991 census totaled approximately 2,600 stems at 86 sites in 15 states and Canada. States in which the Small Whorled Pogonia is known or believed to occur include Connecticut, Delaware, Georgia, Illinois, Maine, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, and West Virginia.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X		X		X	

Additional References:

MNFI (2021) *Isotria medeoloides (Small Whorled Pogonia)*
USFWS (1992) *Small Whorled Pogonia (Isotria medeoloides) recovery plan, first revision*
USFWS (2008) *Small Whorled Pogonia 5-year review*
USFWS (2021*) Small Whorled Pogonia (Isotria medeoloides) species profile*

Tennessee Pondweed	**Status**	**Under Review**	76 FR 59836

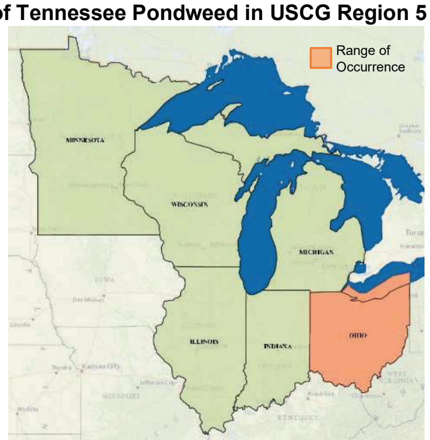
Scientific Name	*Potamogeton tennesseensis*	**Critical Habitat**	N/A

Photo: University of Tennessee - Knoxville

Appearance: Tennessee Pondweed is a perennial herbaceous aquatic plant. It has rhizomes with cauline stems terete, without spots, 10 to 35cm. Leaves are both submersed and floating or floating absent and are more or less spirally arranged. Submersed leaves sessile with stipules persistent and inconspicuous that are light brown to dark green, ligulate, 0.5 to 1.5 cm. Floating leaves are borne on petioles that are continuous in color to apex and are 2.5 to 6 cm long. Leaf blades are greenish-brown adaxially, lance-oblong, 2 to 4 cm long, and 5 to 13 mm at the base with 9 to 23 veins. Inflorescences are greenish in color, unbranched, emersed, and 10 to 22 mm wide. Fruits are sessile, greenish-brown, quadrate-orbicular, slightly compressed, abaxially keeled, laterally ridged, and 2 to 3 mm long with an erect beak present.

Life History: Flowering mid-spring to fall.

Range of Tennessee Pondweed in USCG Region 5



Current Threats:

- Agricultural runoff
- Pollutants
- Dams and water diversions
- Resource extraction activities
- Land-use conversion
- Habitat fragmentation

Distribution/Habitat: Tennessee Pondweed is known to occur in Kentucky, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia in slow- to fast-moving streams and rivers.

Primary Habitat in Action Area/RAM: Rivers and Streams

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References:
Flora of North American (2021) *Potamogeton tennesseensis*
NatureServe (2021) *Potamogeton tennesseensis (Tennessee Pondweed)*
ODNR (2020) *Rare native Ohio plants 2020-21 status list*
USDA (2021) *Plant profile for Potamogeton tennesseensis (Tennessee Pondweed)*

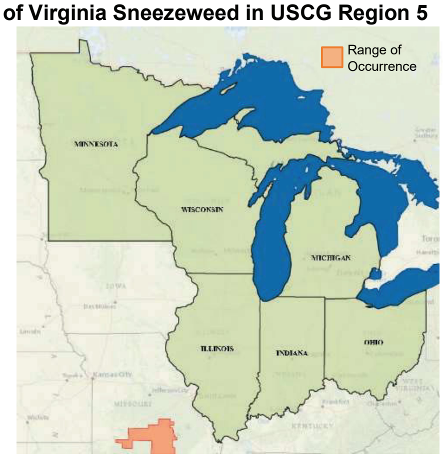
Virginia Sneezeweed	**Status**	**Threatened (1998)**	63 FR 59239
Scientific Name	*Helenium virginicum*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Virginia Sneezeweed is a 1 dm high herb with a stem simple below the inflorescence, branched above, and winged (0.3 to 2.5 mm wide) throughout the decurrent leaf bases. Basal leaves are clustered in a rosette. The relatively few, mostly untoothed, stem leaves are progressively reduced up the stem. Rosette leaves, the lower stem, and some lower stem leaves are coarsely hairy. The inflorescence, loosely cymose, consists of 2 to 20 heads, each 2.5 to 3 cm wide. The central flower disk is nearly ball-shaped. Ray flowers are golden yellow, wedge-shaped and three-toothed, and disk corollas are yellow, turning purplish at the base with age. The fruit is an achene with hairs on its nerves. The pappus, consisting of 6 to 7 awn-tipped white scales that crown the achene, is 1.5 mm long. The achene readily loses its corolla, resulting in a silvery appearance due to the long pappus scales.

Life History: A fibrous-rooted perennial herb, Virginia Sneezeweed blooms from early July through October, with a peak in late July to early August. Seed dispersal occurs in late fall, and dormancy is broken gradually, with most germination delayed until the next growing season after water has drawn down. Virginia Sneezeweed appears as a basal rosette in the first year and then in its second year usually bolts, producing a single flowering stem. Nothing is known about the pollinators of Virginia Sneezeweed; however, casual observations of insect visitors suggest that it is not a single pollinator.

Range of Virginia Sneezeweed in USCG Region 5



Current Threats:

- Hydrologic changes
- Ditching or pond deepening
- Groundwater withdrawal
- ATV/vehicle use
- Invasive species
- Climate change

Distribution/Habitat: Virginia Sneezeweed is limited to the seasonal wetlands commonly referred to as sinkhole ponds. Ponds supporting Virginia Sneezeweed vary in size, basin depth and shape, and length of hydroperiod. While many of the wetlands appear pond-like, consisting of more or less circular water-filled depressions with concentric vegetation zones, others within shallow basins are more meadow-like in physiognomy with little well-defined vegetation zonation. First found in Augusta County, Virginia, in 1935, the range of Virginia Sneezeweed was expanded to Rockingham County, Virginia, in 1967. As of 2000, 30 populations have been documented in Virginia. States in which Virginia Sneezeweed is known or believed to occur include Indiana (one county), Missouri (eight counties), and Virginia (four counties).

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
	X				

Additional References:

USFWS (2000) *Virginia Sneezeweed (Helenium virginicum) recovery plan*
USFWS (2020) *Virginia Sneezeweed (Helenium virginicum 5-year review*
USFWS (2021) *Virginia Sneezeweed (Helenium virginicum) species profile*

Virginia Spiraea	**Status**	**Threatened (1990)**	55 FR 24241

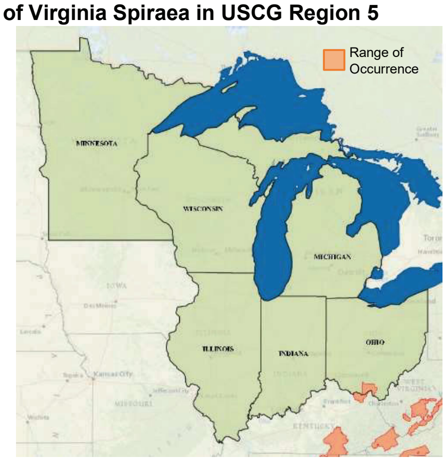
Scientific Name	*Spiraea virginiana*	**Critical Habitat**	N/A


Photo: Ohio Department of Natural Resources

Appearance: Virginia Spiraea is a perennial shrub that has a modular growth form. The species is clonal, with a root system and vegetative characteristics that allow it to thrive under appropriate disturbance regimes. Virginia Spiraea is a large shrub 1 to 3 m tall with profuse branching. Leaves are entire to completely serrate, ovate to lanceolate in shape and are 3 to 15 cm long and 2 to 5 cm wide. Flowers are yellow/greenish to pale white and are approximately 5 to 22 cm wide.

Life History: Sexual reproduction is rare and suggests poor genetic variability. Reproduction is primarily from vegetative propagules. Range-wide, fewer than 30 different genotypes are currently known. Flowering occurs from late May through late July. Flowering in the first year is rare or sparse until an individual is established. The species' flowers are visited by a host of insects, most commonly beetles. Most flowers abort without producing follicles, particularly if the water supply is inadequate, but follicles are sporadically produced in most populations. Seeds, however, seem to be rarely produced. The seeds are tiny (> 2 mm long x ca 0.5 mm wide) and could be dispersed by wind or water. The follicles begin to dehisce in late August to September and continue through late winter. The follicles are at the end of a long, flexible stem that would "shake out" the small seed due to wind or high water.

Range of Virginia Spiraea in USCG Region 5



Current Threats:

- Impoundments
- Insect pests
- Invasive species
- Human activity

Distribution/Habitat: Virginia Spiraea is found along the banks of high gradient sections of second and third-order streams or on meander scrolls and point bars, natural levees, and other braided features of lower reaches (often near the stream mouth). They are also found in disturbed rights-of-way. States in which Virginia Sneezeweed is known or believed to occur include Georgia, Kentucky, North Carolina, Ohio, Tennessee, Virginia, and West Virginia. The species was historically reported from Pennsylvania but no longer occurs in that state. All localities are within the southern Blue Ridge or the Appalachian (Cumberland) plateau physiographic provinces on the headwaters, or just over the divide, of streams that flow to the Ohio drainage basin. This distribution is probably relictual from a more widespread distribution during late-glacial time.

Primary Habitat in Action Area/RAM: Rivers and Streams, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References:

ODNR (2021) *Virginia Spiraea*
USFWS (1992) *Virginia Spiraea (Spiraea virginiana Britton) recovery plan*
USFWS (2021) *Virginia Spiraea (Spiraea virginiana)*
USFWS (2021) *Virginia Spiraea (Spiraea virginiana) species profile*
USFWS (2021) *Virginia Spiraea (Spiraea virginiana Britton) 5-year review*

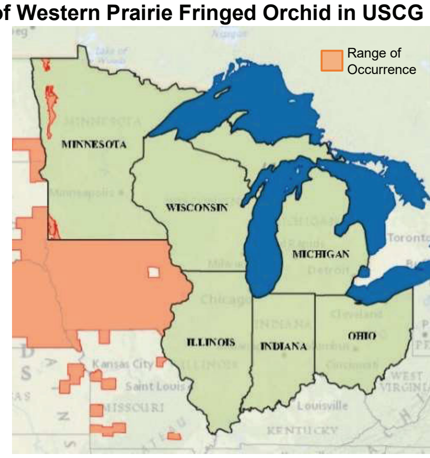
Western Prairie Fringed Orchid	Status	Threatened (1989)	54 FR 39857
Scientific Name	*Platanthera praeclara*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: Western Prairie Fringed Orchid is a smooth, erect, perennial herb that grows to 1.2 m (4 ft) tall. Plants have two to five fairly thick, elongate, hairless leaves each. The open, spikelike flowering stalk bears up to 24 showy, 2.5 cm (1 in.) wide, white flowers. The lower petal of each flower is deeply three-lobed and fringed, hence the common name. The seedpods, which contain many tiny seeds, are about 2.5 cm (1 in.) long and tapered on both ends.

Life History: Plants bloom from mid-June in the southern portion of the range to late July in the northern portion. Individual flowers last up to 10 days, and inflorescence produces flowers for up to 3 weeks. Pollination is required for seed production in the Western Prairie Fringed Orchid. The white flowers lack nectar guides, bear long nectariferous spurs, and are fragrant at night, a suite of features typical of sphingophyllous (sphinx moth-pollinated) plants. Seeds mature on the plant and are released in early fall, the capsules opening at the onset of dormancy. A single capsule may produce thousands of seeds. Seeds are wind-dispersed and may also be adapted for dissemination through the soil profile by water. The continued growth of the seedling in natural conditions requires association with a compatible soil-inhabiting mycorrhizal fungus.

Range of Western Prairie Fringed Orchid in USCG Region 5



Current Threats:

- Cropland conversion
- Overgrazing
- Intensive mowing
- Drainage of water sources
- Woody succession
- Herbicides and pesticides
- Overcollection

Distribution/Habitat: The plant's preferred habitat is unplowed, calcareous prairies and sedge meadows; plants have also been observed in successional communities such as borrow pits, old fields, and roadside ditches. The majority of the sites occur in full sunlight on moist calcareous till or sandy soils. Historically, Western Prairie Fringed Orchid was distributed throughout much of the western Central Lowlands and eastern Great Plains physiographic provinces of the Central United States and Interior Plains in extreme south-central Canada. Historical observations or collections are known from 81 counties in 8 states. Comparison of the historical and extant ranges shows the species has been lost from South Dakota and Oklahoma, with significant reductions in counties of occurrence in Iowa, southeastern Kansas, Missouri, and eastern Nebraska. States in which Western Prairie Fringed Orchid is known or believed to occur include Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:

MNDNR (2021) *Platanthera praeclara (Western Prairie Fringed Orchid)*
USFWS (1996) *Platanthera praeclara (Western Prairie Fringed Orchid) recovery plan*
USFWS (2009) *Western Prairie Fringed Orchid (Platanthera praeclara) 5-year review*
USFWS (2021) *Western Prairie Fringed Orchid (Platanthera praeclara) species profile*

4.3 Snails

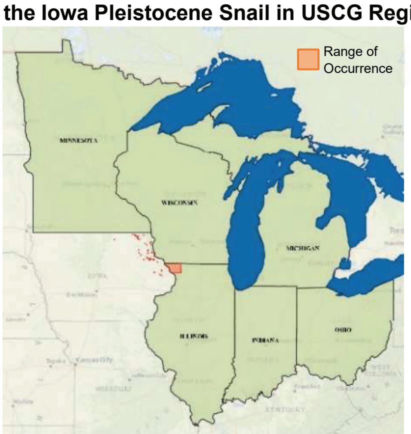
Iowa Pleistocene Snail	Status	Endangered (1978)	43 FR 28932
Scientific Name	*Discus macclintocki*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Iowa Pleistocene Snail is a small terrestrial snail with an adult width of 6 to 8 mm. The shell is moderately high-spired, almost dome-shaped, and tightly coiled; adults typically have six whorls. Ribs are relatively fine and confined to the upper half of each whorl. The shell color is either brown or greenish-white. The species has a moderate-sized umbilicus and lacks a parietal callus.

Life History: The Iowa Pleistocene Snail occurs only in small areas on algific talus slopes. Abundance on occupied slopes may range from 50 up to 205,000 individuals per colony or slope, and high spatial and temporal variation in population size has been noted in some locations. Individuals are typically active during the warmer months and hibernate through the winter. The Iowa Pleistocene Snail feeds primarily on decaying birch and maple leaves in the forest floor litter but may also feed on dogwood and willow leaves. The species matures during its third year and lays clutches of up to six eggs multiple times per year under logs or bark or just beneath the soil surface. Individuals are hermaphroditic and may be able to self-fertilize. The average lifespan is less than 7 years. Predators include the short-tailed shrew (*Blarina brevicauda*) and predatory beetles.

Range of the Iowa Pleistocene Snail in USCG Region 5



Current Threats:

- Human disturbance
- Natural calamities
- Climate change

Distribution/Habitat: The Iowa Pleistocene Snail occurs exclusively on algific talus slopes. These slopes are developed over the entrances to small fissures and caves. Air flows through fractured bedrock, over frozen groundwater, and out-vents on steep slopes to create a cool, moist microclimate. The ground temperature rarely exceeds 10°C (50°F) or falls below -10°C (14°F), and average humidity often exceeds 60%. This habitat is only known to occur in the Driftless Area that overlaps Illinois, Iowa, Minnesota, and Wisconsin. It is known from fossil records that the Iowa Pleistocene Snail was distributed throughout the Midwest during the Pleistocene era (400,000 years ago). Its historical range included parts of southern Iowa and adjacent Nebraska, northern Missouri, west and central Illinois, Indiana, and Ohio. As the glaciers receded, the snail survived in small pockets of suitable habitat on algific talus slopes. The Iowa Pleistocene Snail is currently only known to occur in the Driftless Area in portions of Clayton, Clinton, Delaware, Dubuque, Fayette, and Jackson Counties, Iowa; and Jo Daviess County, Illinois. The original recovery plan identified 19 known Iowa Pleistocene Snail locations within this range. With additional studies conducted since the recovery plan was issued, the number of known locations has increased to 38 sites on 31 geographically isolated algific talus slopes.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

USFWS (1984) *National recovery plan for Iowa Pleistocene Snail (Discus macclintocki)*
USFWS (2009) *Iowa Pleistocene Snail (Discus macclintocki) 5-year review*
USFWS (2013) *Iowa Pleistocene Snail (Discus macclintocki) 5-year review*

4.4 Clams (Freshwater Mussels)

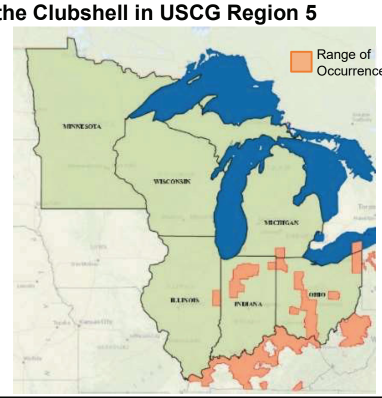
Clubshell	**Status**	**Endangered (1993)**	58 FR 5638
Scientific Name	*Pleurobema clava*	**Critical Habitat**	N/A

Photo: Indiana Dept. of Natural Resources

Appearance: The Clubshell is a small mussel, averaging 1 to 1.5 in. in length, though it may reach lengths up to about 3 in. The shell is triangular, elongate, and relatively thick. The umbos are low and projected far forward. Beak sculpture, if visible, consists of a few weak ridges on the umbo. The periostracum is yellow to light brown, with broken green rays present near the umbo. The periostracum may be dark brown or black on older individuals, and the green rays may be obscured. Pseudocardinal teeth are small but well developed, and lateral teeth are long and slightly arched. The beak cavity is shallow to moderately deep, and the nacre is white, becoming iridescent posteriorly.

Life History: The Clubshell is tachytictic (short-term brooder), with gravid individuals found in May through July. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Although some mussel species have particular displays or behaviors to attract host fish, female Clubshells do not have any known mechanisms to lure fish. Therefore, several studies have been conducted to identify suitable host fish for Clubshell. Clubshell glochidia have successfully transformed on a variety of cyprinid fish species (minnows and shiners) in the lab. Several centrarchid and percid fish species have also been tested but yielded no transformation.

Range of the Clubshell in USCG Region 5



Current Threats:

- Siltation
- Impoundment
- In-stream sand/gravel mining
- Pollutants
- Water quality degradation
- Resource extraction activities
- Invasive species

Distribution/Habitat: The Clubshell is frequently described as a small-stream species, although historical records suggest it occurred in larger rivers as well. The Clubshell is generally found in clean, coarse sand and gravel runs, often just downstream of a riffle, and individuals typically burrow completely beneath the substrate. The Clubshell is primarily an upper Ohio River system species. The species was historically widespread and was reported from Ohio River tributary streams in Kentucky, Illinois, Indiana, and Ohio, as well as from more isolated systems in Michigan, Pennsylvania, and West Virginia. Historical records of Clubshell exist for nearly 100 streams in the Lake Erie, Tennessee, Cumberland, and Ohio River basins. However, at the time of listing, Clubshell was thought to be extant in only 12 streams. Recent reviews of the species distribution suggest that its distribution remains similar; Clubshell appears to be restricted to 13 populations in the Ohio River and Lake Erie basins, and portions of 21 streams support, or might still support, the species.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
Freshwater Mussel Host Database (2017)
USFWS (1994) *Clubshell (Pleurobema clava) and Northern Riffleshell (Epioblasma torulosa rangiana) recovery plan*
USFWS (2019) *Clubshell (Pleurobema clava) 5-year review*

Fanshell	**Status**	**Endangered (1990)**	55 FR 25591

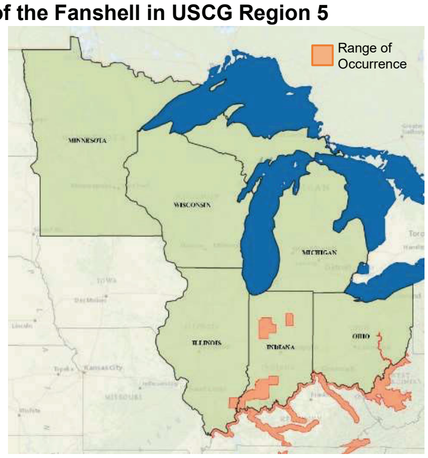
Scientific Name	*Cyprogenia stegaria*	**Critical Habitat**	N/A


Photo: Indiana Dept. of Natural Resources

Appearance: The Fanshell is a medium-sized mussel, reaching approximately 3 in. in length. The shell has a circular outline and is solid and moderately inflated. Growth lines on the shell appear as distinct elevated ridges. Numerous pustules are present on the shell surface, usually concentrated in the center of the shell but sometimes covering the entire shell surface. The periostracum is typically yellow or light green with dark green mottled rays. The pseudocardinal teeth are relatively large and serrated, and the lateral teeth are heavy, short, and straight to slightly curved. The beak cavity is shallow to moderately deep. The nacre is usually silvery-white and iridescent posteriorly.

Life History: The life history of the Fanshell is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Gravid females have been observed from late October to late May in Tennessee. Glochidia are released in spiral conglutinates; the worm-like shape mimics fish food items and presumably aids in attracting host fish. Ten host fish, including various darter species, sculpin, and logperch, have been identified as suitable hosts for Fanshell glochidia.

Range of the Fanshell in USCG Region 5



Current Threats:

- Impoundments
- Water quality degradation
- Instream activities
- Resource extraction activities
- Development and urbanization
- Invasive species

Distribution/Habitat: The Fanshell typically inhabits medium to large rivers with gravel substrate. It was historically widely distributed in the Ohio, Wabash, Cumberland, and Tennessee Rivers and their larger tributaries in Pennsylvania, Ohio, West Virginia, Illinois, Indiana, Kentucky, Tennessee, Alabama, and Virginia. However, the recovery plan indicated that reproducing populations were only believed to occur in three rivers: the Clinch River (Tennessee and Virginia), the Green River (Kentucky), and the Licking River (Kentucky). Remnant populations were thought to persist in the Muskingum River (Ohio), Walhonding River (Ohio), Wabash River (Illinois and Indiana), East Fork White River (Indiana), Tippecanoe River (Indiana), Kanawha River (West Virginia), Tygarts Creek (Kentucky), Barren River (Kentucky), Cumberland River (Tennessee), and Tennessee River (Tennessee). A recent review of Fanshell distributional data suggests that the species' distribution has not changed substantially since the recovery plan was completed. Fanshell populations in some locations, including the Tennessee River, Ohio River (Greenup Pool), Kanawha River, and Muskingum River, have been augmented with translocated adult Fanshell mussels over the past 10 years.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X			X	

Additional References:
Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1991) *Fanshell (Cyprogenia stegaria (=C. irrorata)) recovery plan*
USFWS (2019) *Fanshell (Cyprogenia stegaria) 5-year review*

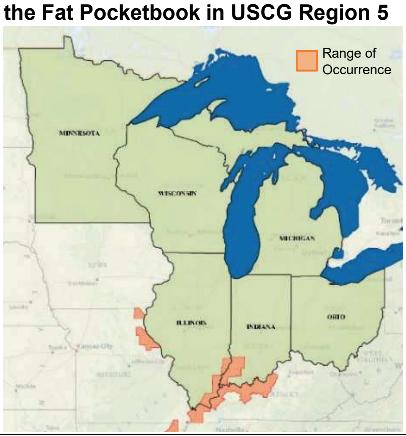
Fat Pocketbook	**Status**	**Endangered (1976)**	41 FR 24062
Scientific Name	*Potamilus capax*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The shell of Fat Pocketbook is relatively large, thin (in young individuals) to moderately thick (in adults), and highly inflated. The beaks are very inflated, elevated above the hinge line, and curved inward. Beak sculpture consists of a few faint ridges, generally only visible in young shells. Young individuals may also have a small posterior wing on the shell. The shell surface is smooth, and the periostracum is yellow, tan, or olive, rayless, and usually very shiny. The pseudocardinal teeth are thin and compressed, and the lateral teeth are thin and curved. The hinge line is distinctly S-shaped. The beak cavity is deep. The nacre is bluish-white, sometimes tinged with pink or salmon.

Life History: The life history of the Fat Pocketbook is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Like other mussels in the lampsiline subfamily, Fat Pocketbook is likely bradytictic (a long-term brooder), and gravid females have been observed from June to October. Of nearly 30 fish species tested, Freshwater Drum (*Aplodinotus grunniens*) remains the only known suitable host for Fat Pocketbook glochidia.

Range of the Fat Pocketbook in USCG Region 5



Current Threats:

- Impoundment
- Channelization
- Dredging/channel maintenance
- Hydropower development
- Pollution

Distribution/Habitat: The Fat Pocketbook typically occurs in large rivers and occupies slow-flowing areas with mud, sand, or fine gravel substrate. The Fat Pocketbook was historically widely distributed in the Mississippi River drainage from the confluence of the Minnesota and St. Croix Rivers downstream to the White River system. The species was documented in Minnesota, Wisconsin, Iowa, Illinois, Indiana, Missouri, Kentucky, and Arkansas. Most historical records for this species are from the upper Mississippi River (above St. Louis), the Wabash River in Indiana, and the St. Francis River in Arkansas. When listed, only the St. Francis River and White River populations of Fat Pocketbook were believed to be extant and viable. More recently, the range of Fat Pocketbook in the St. Francis and Ohio River drainages has increased over the historically documented extent. While the species appears to remain extirpated from the upper Mississippi River, it has expanded its range into the lower Mississippi River. Since 1985, Fat Pocketbook has been reported from 33 streams in the St. Francis River, Ohio River, and Mississippi River basins, including the Ohio and lower Mississippi River mainstems. Recruitment has been documented in several streams.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X				

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1989) *A recovery plan for the Fat Pocketbook pearly mussel Potamilus capax (Green 1832)*
USFWS (1997) *Fat Pocketbook (Potamilus capax) fact sheet*
USFWS (2012) *Fat Pocketbook pearly mussel (Potamilus capax) 5-year review*
USFWS (2019) *Fat Pocketbook pearly mussel (Potamilus capax) 5-year review*

Higgins Eye Pearlymussel	**Status**	**Endangered (1976)**	41 FR 24062

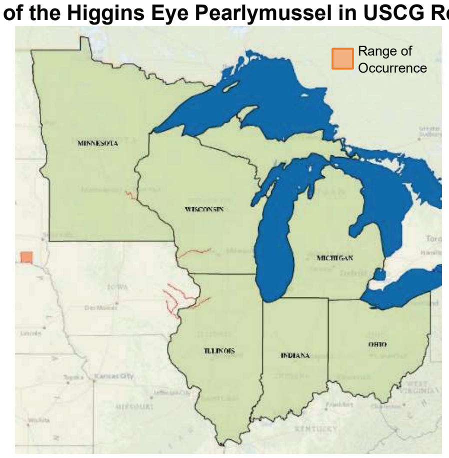
Scientific Name	*Lampsilis higginsii*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The shell of Higgins Eye Pearlymussel is rounded or oval, solid, and moderately inflated. The species is sexually dimorphic; the posterior end of the shell is bluntly pointed in males and truncated in females. The beaks are turned forward and elevated above the hinge line, and the beak sculpture, if visible, consists of a few double-looped ridges. The shell is smooth and yellowish-green to brown, sometimes with green rays. The pseudocardinal teeth are thick and triangular, and the lateral teeth are thick and straight to moderately curved. The nacre is white, potentially tinged with pink near the beak cavity, and iridescent posteriorly.

Life History: The Higgins Eye Pearlymussel is bradytictic (long-term brooder). Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Fish species identified as suitable hosts for Higgins Eye Pearlymussel include Sauger (*Sander canadensis*), Walleye (*Sander vitreus*), Freshwater Drum (*Aplodinotus grunniens*), Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Yellow Perch (*Perca flavescens*), and Black Crappie (*Pomoxis nigromaculatus*).

Range of the Higgins Eye Pearlymussel in USCG Region 5



Current Threats:

- Zebra Mussels
- Impoundments
- Dredging
- In-stream development
- Water quality degradation

Distribution/Habitat: Higgins Eye Pearlymussel has generally been characterized as a large river species. It has been found in a variety of substrate types but typically does not occur where the substrate is composed of hard clay, flocculent silt, organic material, bedrock or concrete, or unstable shifting sand. Historically, the range of Higgins Eye Pearlymussel included the Mississippi River mainstem from just north of St. Louis, Missouri, to just South of St. Paul, Minnesota, and tributaries in Illinois, Iowa, Wisconsin, and Minnesota. However, its current range is limited to approximately 50% of the historical range; species observations since 1980 have been limited to the Mississippi River upstream of Lock and Dam 19, the St. Croix River, the Wisconsin River, and the lower Rock River. USFWS and partner agencies have undertaken efforts to reintroduce Higgins Eye Pearlymussel into portions of its historical range, including several Mississippi River navigation pools, the lower Rock River, and the Iowa, Cedar, and Wapsipinicon Rivers.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X			X		X

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2004) *Higgins Eye Pearlymussel (Lampsilis higginsii) recovery plan: first revision*
USFWS (2008) *Higgins Eye (Lampsilis higginsii) Essential Habitat Areas: 2008 review and addition of new EHAs*
USFWS (2012) *Higgins Eye Pearlymussel (Lampsilis higginsii) fact sheet*
USFWS (2020) *Higgins Eye (Pearlymussel) (Lampsilis higginsii) 5-year review*

Longsolid	**Status**	**Proposed Threatened**	85 FR 61384

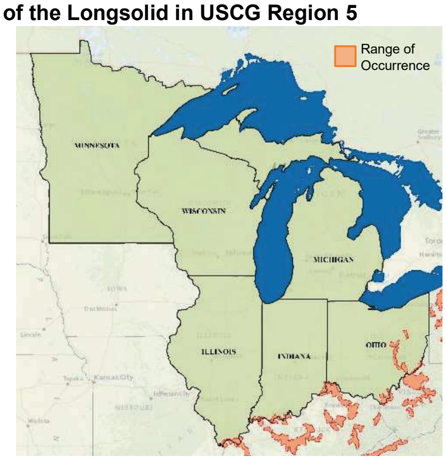
Scientific Name	*Fusconaia subrotunda*	**Critical Habitat**	N/A

Photo: Illinois Natural History Survey

Appearance: The Longsolid is a medium-sized, thick-shelled mussel. The shell is oval or elliptical, becoming more elongate with age and moderately inflated, though there is variability in the inflation depending on population and location. The beaks are low and directed forward. The shell is smooth, and the periostracum is light brown, becoming darker brown or black in adults. Fine broken green rays are present on the umbo. The pseudocardinal teeth are large and well developed, and the lateral teeth are large and straight. The beak cavity is wide, compressed, and deep. The nacre is white, iridescent posteriorly.

Life History: The life history of the Longsolid is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Longsolid is a short-term brooder and is typically gravid from May to July. Longsolid glochidia are released in packets called conglutinates, which drift in the water column and are targeted by sight-feeding fish, facilitating attachment of glochidia to the fish host. Host fish species for Longsolid are unknown, but based on other species of *Fusconaia*, likely hosts are minnows of the family Cyprinidae as well as potentially sculpins of the family Cottidae.

Range of the Longsolid in USCG Region 5



Current Threats:

- Development and urbanization
- Dredging and channelization
- Impoundments
- Contaminants
- Resource extraction activities
- Invasive species
- Inherent factors

Distribution/Habitat: The Longsolid occurs in small to large rivers in substrates ranging from sand and gravel to coarse gravel and cobble. The species has been associated with slower, deeper microhabitats, suggesting it has a greater tolerance for pool and run habitats. The Longsolid was historically known from 162 populations in the Great Lakes, Ohio River, Cumberland River, and Tennessee River basins in Alabama, Georgia, Illinois, Indiana, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. However, many populations have since been extirpated, and the Longsolid is currently only known from 60 populations in Alabama, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The species is considered extirpated from Georgia, Illinois, and Indiana; and the entire Great Lakes basin.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X			X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2018) *Draft species status assessment report for the Longsolid mussel (Fusconaia subrotunda), version 1.X3*

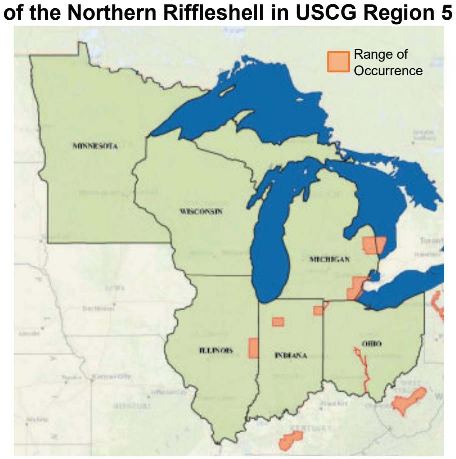
Northern Riffleshell	**Status**	**Endangered (1993)**	58 FR 5638
Scientific Name	*Epioblasma torulosa rangiana*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Northern Riffleshell is a small mussel with an elongate, moderately thick shell. Individuals are sexually dimorphic. Male shells are bluntly pointed posteriorly, with a distinct sulcus and indented posterior-ventral margin. The area anterior to the sulcus is raised and may have weak undulations or tubercules. Female shells are rounded and greatly expanded posteriorly. The periostracum may extend past the shell margins in the expanded area and is frequently thin and easily broken. In both sexes, the umbos are low and slightly turned forward. Beak sculpture consists of a series of double loops, usually eroded except in the youngest specimens. The periostracum is yellow, light brown, or green, with fine green rays. The nacre is white, iridescent posteriorly.

Life History: The life history of the Northern Riffleshell is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Northern Riffleshells are long-term brooders (bradytictic). Gravid females move to the substrate surface and gape widely, displaying a white mantle "pad" to attract host fish. When a host fish approaches, the female mussel captures the host fish between the valves of the shell, trapping the fish while the mussel expels glochidia onto the fish's gills and other tissues. Suitable host fish for Northern Riffleshells include several darter and sculpin species.

Range of the Northern Riffleshell in USCG Region 5



Current Threats:

- Siltation
- Impoundment
- In-stream sand/gravel mining
- Development and urbanization
- Pollutants
- Water quality degradation
- Coal, oil, and natural gas extraction
- Invasive species

Distribution/Habitat: The Northern Riffleshell occurs in medium to large rivers, occupying packed sand and gravel substrate in riffles and runs. The Northern Riffleshell is primarily an upper Ohio River system species, though it has also been documented in Great Lakes drainages. Historical records are known from approximately 50 streams in the Lake Erie, Lake St. Clair, and Ohio River basins. Recent data suggests that Northern Riffleshells are limited to four successfully recruiting populations in the Ohio and Great Lakes basins. Northern Riffleshells have been moved from the Allegheny River to several streams in the species' historical range to augment existing populations or reintroduce the species to increase redundancy and species recovery. Reintroduction locations include streams in Illinois, Indiana, Ohio, Kentucky, New York, Pennsylvania, and West Virginia.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1994) *Clubshell (Pleurobema clava) and Northern Riffleshell (Epioblasma torulosa rangiana) recovery plan*
USFWS (2009) *Northern Riffleshell (Epioblasma torulosa rangiana) 5-year review*
USFWS (2019) *Northern Riffleshell (Epioblasma torulosa rangiana) 5-year review*

Orangefoot Pimpleback	**Status**	**Endangered (1976)**	41 FR 24062

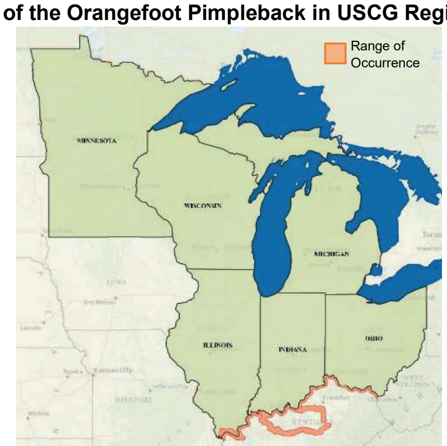
Scientific Name	*Plethobasus cooperianus*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The shell of Orange Pimpleback is thick, heavy, moderately inflated, and nearly circular in outline. The umbos are directed forward and only slightly elevated above the hinge line. The posterior two-thirds to three-fourths of the shell is covered with numerous pustules or tubercles. The periostracum is light brown in younger individuals, becoming chestnut or dark brown in older individuals. Faint greenish rays may be present on young specimens. The pseudocardinal teeth are well developed, and the lateral teeth are short and straight or slightly curved. The beak cavity is deep and compressed. The nacre is white and is often tinged with pink or salmon near the beak cavity. Notably, the foot of live mussels is orange.

Life History: The life history of the Orangefoot Pimpleback is thought to be similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The host fish for the Orangefoot Pimpleback is still unknown.

Range of the Orangefoot Pimpleback in USCG Region 5



Current Threats:

- Water quality degradation
- Impoundments
- Instream activities (dredging, navigation, fleeting)
- Invasive species
- Low recruitment

Distribution/Habitat: The Orangefoot Pimpleback occurs in medium to large rivers in sand and gravel substrate. The species has reportedly been collected in both deep water and shallower riffle and shoal areas. The Orangefoot Pimpleback historically occurred in Ohio or Interior Basin streams, with known records from the Ohio River, Kanawha River, Wabash River, Rough River, Tennessee River, Duck River, French Broad River, Holston River, Clinch River, and Cumberland River. However, at the time of listing, the species was only known to occur in the Tennessee, Cumberland, and lower Ohio Rivers. Since listing, the species' range has decreased even more, with only two known extant populations: one in the Tennessee River downstream of Pickwick Landing Dam, and one in the lower Tennessee River below Kentucky Lake Lock & Dam and the lower Ohio River downstream of the mouth of the Tennessee River. The lower Tennessee River is considered part of the lower Ohio River population due to the proximity and connection of the two rivers. It is unknown whether the Orangefoot Pimpleback persists in the Cumberland River.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1984) *Orange-Footed Pearly Mussel recovery plan*
USFWS (2018) *Orangefoot Pimpleback (Plethobasus cooperianus) 5-year review*

Pink Mucket	**Status**	**Endangered (1976)**	41 FR 24062
Scientific Name	*Lampsilis abrupta*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The shell of Pink Mucket is moderately large, round to elliptical, heavy, and inflated. The species is sexually dimorphic; the posterior end of the shell is bluntly pointed in males and truncated in females. The beaks are turned forward and elevated above the hinge line, and the beak sculpture consists of a series of double-looped ridges, often only visible in young shells. The periostracum is yellow to greenish-brown and may have faint green rays. The pseudocardinal teeth are thick and triangular, and the lateral teeth are short, heavy, and slightly curved. The beak cavity is deep. The nacre may be white, pink, or salmon, becoming iridescent posteriorly.

Life History: The life history of the Pink Mucket is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Pink Mucket is a long-term brooder (bradytictic). Females become gravid in August and brood glochidia over the winter before releasing the glochidia the following summer. The edge of the mantle is modified to resemble a small fish, presumably luring potential host fish to the female mussel. Suitable host fish identified in laboratory studies include: Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Spotted Bass (*Micropterus puctulatus*), Walleye (*Sander vitreus*), White Crappie (*Pomoxis annularis*), and Sauger (*Sander canadensis*)

Range of the Pink Mucket in USCG Region 5

Current Threats:

- Impoundment
- Sedimentation
- Pollutants
- Resource extraction activities
- Invasive species
- Climate change

Distribution/Habitat: The Pink Mucket occurs in medium to large rivers in habitat ranging from silt to boulders, rubble, gravel, and sand with moderate to swift current. It is an Ohioan or Interior Basin species, occurring in the lower Mississippi and Ohio Rivers and their larger tributaries. Pink Mucket was historically widespread throughout this range. The recovery plan listed records from 25 streams, but recent sampling efforts and a more thorough search of historical data indicate that the species was known from nearly 50 streams. At the time of listing, Pink Mucket was considered extant in 16 streams. Recent data indicates that extant populations of Pink Mucket occur in 29 streams in the upper Mississippi River, Missouri River, Ohio River, Cumberland River, Tennessee River, lower Mississippi River, White River, and Red River drainages in Alabama, Arkansas, Illinois, Kentucky, Louisiana, Missouri, Ohio, Tennessee, and West Virginia.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X				X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1985) *Recovery plan for the pink mucket pearly mussel Lampsilis orbiculata (Hildreth, 1828)*
USFWS (2018) *Pink mucket (Lampsilis abrupta) 5-year review*

Purple Cat's Paw Pearlymussel	**Status**	**Endangered (1990)**	55 FR 28209

Scientific Name	*Epioblasma obliquata obliquata*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Purple Cat's Paw Pearlymussel shell is small and subquadrate to oval in shape. The species is sexually dimorphic. Males are larger than females, the posterior end of the shell is bluntly pointed, and a wide sulcus or depression is present between the posterior ridges. The female shell is truncated, ribbed, and notched at the posterior end, and the posterior-ventral portion of the shell is inflated with fine grooves radiating from the umbo to the margin of the shell. The umbos are even with the hinge line and directed forward. The periostracum is yellow, yellowish-green, or brown with numerous fine, wavy green rays. The nacre is purplish to deep purple.

Life History: The life history of the Purple Cat's Paw Pearlymussel is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Rock Bass (*Amploplites rupestris*), Mottled Sculpin (*Cottus bairdii*), Stonecat (*Noturus flavus*), Blackside Darter (*Percina maculata*), and Logperch (*Percina caprodes*) have been identified as suitable hosts for Purple Cat's Paw Pearlymussel.

Range of the Purple Cat's Paw Pearlymussel in USCG Region 5

Current Threats:

- Impoundment
- Water quality degradation
- Invasive species
- Climate change
- Small population size

Distribution/Habitat: The Purple Cat's Paw Pearlymussel has been characterized as a large river species. It has been reported in boulder and sand substrates in moderate to swift current. The Purple Cat's Paw Pearlymussel was historically distributed in the Ohio, Cumberland, and Tennessee River systems in Ohio, Illinois, Indiana, Kentucky, Tennessee, and Alabama. However, at the time of listing, only two known populations remained: one in the Green River, Kentucky, and one in the Cumberland River, Tennessee. A new reproducing population of Purple Cat's Paw Pearlymussel was identified in Killbuck Creek, Ohio, in the 1990s, but later survey efforts in 2006–2009 suggested the population had drastically declined. Despite the decline, the Killbuck Creek population persists. In addition, Purple Cat's Paw Pearlymussel individuals were reintroduced into the Ohio River, Walhonding River, Green River, Licking River, and Duck River in 2017, although natural reproduction has not yet been documented in these populations. The species is presumed extirpated from the Cumberland River.

Primary Habitat in Action Area/RAM: Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Sedge Meadow, and Shallow Marsh Vegetation (Annuals, Perennials, Shrub)

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1992) *Purple Cat's Paw Pearlymussel recovery plan*
USFWS (2010) *Purple Cat's Paw Pearlymussel (Epioblasma obliquata obliquata) 5-year review*
USFWS (2020) *Purple Cat's Paw Pearlymussel (Epioblasma obliquata obliquata) 5-year review*

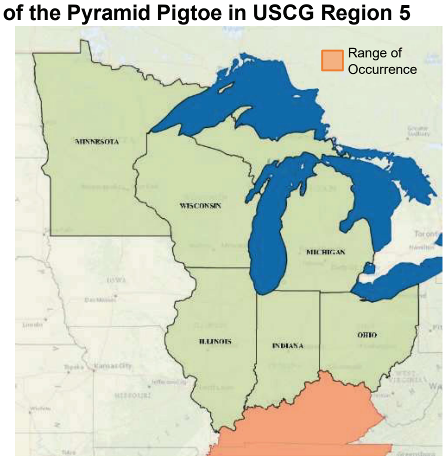
Pyramid (Pink) Pigtoe	**Status**	**Under Review**	76 FR 59836
Scientific Name	*Pleurobema rubrum*	**Critical Habitat**	N/A

Photo: Illinois Natural History Survey

Appearance: The shell of the Pyramid Pigtoe is triangular and elongate, thick, and moderately inflated. The anterior margin of the shell is rounded, and the posterior end is bluntly pointed. The beaks are high and project anteriorly to the rest of the shell. A prominent but shallow sulcus runs from the beak toward the ventral margin. The periostracum is brown or chestnut, often with a satiny appearance, and may have faint green rays on the beaks. The pseudocardinal teeth are well developed, and the lateral teeth are heavy and straight to slightly curved. The beak cavity is deep. The nacre may be pink, rose-colored, or white.

Life History: The life history of the Pyramid Pigtoe is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Like other mussels in the genus *Pleurobema*, the Pyramid Pigtoe is thought to be a short-term brooder (tachytictic). Females may release glochidia in conglutinates. Host fish for the Pyramid Pigtoe include Spotfin Shiner (*Cyprinella spiloptera*), Streamline Chub (*Erimystax dissimilis*), Scarlet Shiner (*Lythrurus fasciolaris*), and Silver Shiner (*Notropis photogenis*).

Range of the Pyramid Pigtoe in USCG Region 5



Current Threats:

- Impoundment
- Siltation
- Pollution
- Invasive species

Distribution/Habitat: The Pyramid Pigtoe occurs in medium to large rivers in riffles and shoals with moderate to swift current. Historically, the species was distributed throughout the Mississippi, Wabash, Tennessee, and Ohio River systems and was reported from Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Nebraska, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia. It is now presumed extirpated in Iowa, Illinois, and Indiana, and possibly extirpated from Pennsylvania, West Virginia, and Virginia. The best extant populations appear to be in a few sections of the Green River drainage in Kentucky and in the Little Missouri, Ouachita, White, St. Francis, and Saline Rivers in Arkansas.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References

CBD (2010) *Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act*
Culp et al. (2009) *Fish hosts and conglutinates of the Pyramid Pigtoe (Pleurobema rubrum)*
Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
NatureServe (2021) *NatureServe Explorer – Pleurobema rubrum*
Roe (2002) *Conservation assessment for the Pyramid Pigtoe (Pleurobema rubrum)*

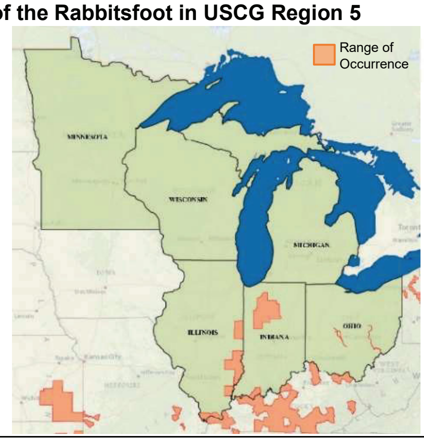
Rabbitsfoot	**Status**	**Threatened (2013)**	78 FR 57076
Scientific Name	*Quadrula cylindrica cylindrica*	**Critical Habitat**	80 FR 24692

Photo: U.S. Fish & Wildlife Service

Appearance: The shell is elongate and rectangular, and the posterior end is truncated or squared. The beaks are low and only slightly elevated above the hinge line. Beak sculpture consists of two rows of knobs or ridges that continue down the surface of the shell. Shell sculpture consists of a few large, rounded, low tubercles on the posterior slope and smaller pustules or tubercles on the anterior portion of the shell. The periostracum is greenish or yellowish-brown and is typically marked with dark green or black chevrons or triangles. The pseudocardinal teeth are serrated and well developed and the lateral teeth are very long and straight. The beak cavity is deep. The nacre is white, sometimes tinged with gray or green in the beak cavity, and iridescent posteriorly.

Life History: The life history of the Rabbitsfoot is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Rabbitsfoot is a short-term brooder (tachytictic), with females brooding between May and late August. Females display a mantle lure, consisting of an orange excurrent aperture encircled by white mantle tissue, and release glochidia in conglutinates when a host fish approaches or touches the excurrent aperture. Rabbitsfoot primarily utilizes cyprinid fish as hosts, with successful transformation of glochidia observed on various shiner species.

Range of the Rabbitsfoot in USCG Region 5



Current Threats:

- Impoundment
- Siltation
- Chemical contaminants
- Population fragmentation
- Invasive species
- Climate change

Distribution/Habitat: Suitable habitat for the Rabbitsfoot occurs in small- to medium-sized streams and some larger rivers, primarily in mixed sand and gravel substrate. At the time of listing, Rabbitsfoot had been documented from nearly 140 rivers and streams in Alabama, Arkansas, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. However, only 51 of the historically known populations were considered extant at the time of listing, and the species was believed to be extirpated in Georgia and West Virginia. Additional Rabbitsfoot occurrences were documented in several streams after the species was listed. The Rabbitsfoot is currently considered extant in 63 rivers and streams in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee; it is still considered extirpated from Georgia and West Virginia.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X			X	

Additional References

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2020) *Rabbitsfoot (Quadrula cylindrica cylindrica) 5-year review*
USFWS (2021) *Rabbitsfoot (Quadrula cylindrica cylindrica) species profile*

Rayed Bean	Status	Endangered (2012)	77 FR 8632

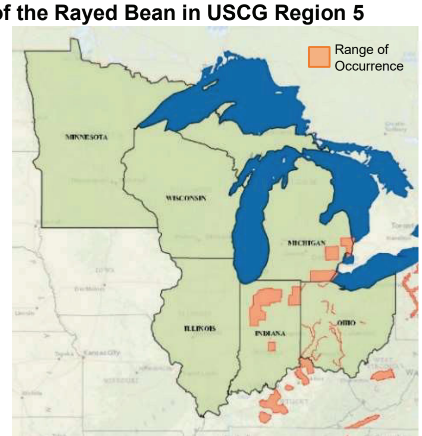
Scientific Name	*Villosa fabalis*	Critical Habitat	N/A

Photo: G. Thomas Watters, Ohio State University

Appearance: The Rayed Bean is a small mussel, usually less than 1.5 in (3.8 cm) in length. The shell outline is elongate or ovate in males and elliptical in females, and moderately inflated in both sexes, but more so in females. The valves are thick and solid. The beaks are slightly elevated above the hinge line, with sculptures consisting of double loops with some nodules. The shell surface is smooth, and the periostracum is green, yellowish-green, or brown in color, with numerous, wavy, dark-green rays of various widths (sometimes obscure in older, blackened specimens). The pseudocardinal teeth are triangular and relatively heavy, and the lateral teeth are short and heavy. The nacre is silvery white or bluish and iridescent posteriorly.

Life History: The life history of the Rayed Bean is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Rayed Bean is a long-term brooder (bradytictic), with gravid females found in May through October. The only verified host fish for Rayed Bean are Tippecanoe Darter (*Etheostoma tippecanoe*) and Spotted Darter (*Etheostoma maculatum*). Other darter and sculpin species may also be suitable host fish for Rayed Bean but have not been verified.

Range of the Rayed Bean in USCG Region 5



Current Threats:

- Impoundment
- Dredging and channelization
- Chemical contaminants
- Resource extraction activities
- Sedimentation
- Invasive species
- Climate change

Distribution/Habitat: The Rayed Bean is generally known from smaller headwater creeks but has been documented in larger rivers and one lake. It is typically found in or near shoal or riffle areas in sand and gravel substrate. The Rayed Bean was historically distributed in at least 115 streams, lakes, and some human-made canals in the Great Lakes (29 populations), Ohio River (74 populations), and Tennessee River (12 populations) systems in 10 states (Illinois, Indiana, Kentucky, Michigan, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia) and Ontario, Canada. When listed in 2012, the species was known to be extant in only 31 streams and 1 lake in 7 states (Indiana, Michigan, New York, Ohio, Pennsylvania, Tennessee, and West Virginia) and Ontario, Canada. Three new extant populations have been discovered since the species was listed, two in New York and one in Michigan. Thirteen populations of Rayed Bean are currently known from the Lower Great Lakes sub-basin, 21 populations are known from the Ohio River system, and only one population is extant in the Tennessee River system; this population was reintroduced in 2008.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
	X	X		X	

Additional References

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2018) *Rayed bean (Villosa fabalis) 5-year review*
USFWS (2021) *Rayed bean (Villosa fabalis) species profile*

Rough Pigtoe	**Status**	**Endangered (1976)**	41 FR 24062

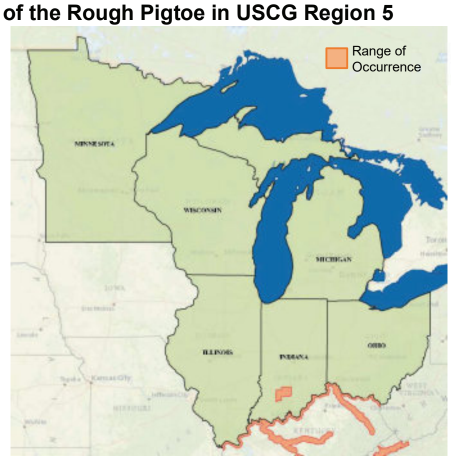
Scientific Name	*Pleurobema plenum*	**Critical Habitat**	N/A

Photo: Illinois Natural History Survey

Appearance: The shell of the Rough Pigtoe is subtriangular, moderately thick, and inflated. The shell has a prominent posterior ridge, and most older specimens have a slight sulcus. The umbos are inflated, elevated above the hinge line, and turned forward. Beak sculpture consists of a few elevated ridges. The periostracum is textured with a cloth-like or satin-like appearance and ranges from yellowish-brown in young individuals to reddish or dark brown in adults. Some shells may have faint green rays visible near the beaks. The pseudocardinal teeth are solid, heavy, and thick, and the lateral teeth are short and straight. The beak cavity is deep and compressed. The nacre is usually white but may be pink or orange.

Life History: Specific life history details of the Rough Pigtoe are unknown but are likely similar to other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Gravid females have been observed in late spring or early summer, suggesting Rough Pigtoe is a short-term brooder (tachytictic). The host fish(es) for Rough Pigtoe are unknown.

Range of the Rough Pigtoe in USCG Region 5



Current Threats:

- Siltation
- Impoundments
- Pollutants
- Instream activities (dredging, construction, etc.)
- Resource extraction activities
- Development and urbanization
- Invasive species

Distribution/Habitat: The Rough Pigtoe occurs in medium to large rivers in sand and gravel substrates. The Rough Pigtoe was historically widespread, with records from 15 streams in the Ohio River basin in Alabama, Indiana, Kentucky, Pennsylvania, Tennessee, and Virginia. At the time of listing, Rough Pigtoe was only known to occur in the Tennessee River, Cumberland River, Clinch River, Green River, and Barren River in Alabama, Kentucky, and Tennessee. The species' distribution appears to have remained relatively unchanged since listing. A single Rough Pigtoe individual was collected live in the East Fork White River, Indiana, in 1992. Although Rough Pigtoe has not been observed in the East Fork White River since 1992, the species may persist in this river system as well.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
	X				

Additional References

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1984) *Rough Pigtoe pearly mussel (Pleurobema plenum) recovery plan*
USFWS (2014) *Rough Pigtoe (Pleurobema plenum) 5-year review*
USFWS (2021) *Rough Pigtoe (Pleurobema plenum) species profile*

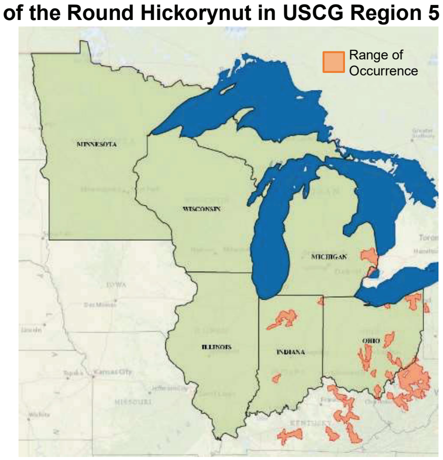
Round Hickorynut	**Status**	**Proposed Threatened**	85 FR 61384
Scientific Name	*Obovaria subrotunda*	**Critical Habitat**	N/A

Photo: Environment Canada

Appearance: The Round Hickorynut is a small to medium-sized mussel that may reach a length of 3 in. (7.6 cm) but is usually less than 2.4 in. (6.0 cm). The shell is round or circular, thick, and moderately inflated. The beaks are low and centrally located, and beak sculpture consists of a few indistinct concentric ridges, usually only visible in young individuals. The periostracum is greenish-olive to dark or chestnut brown, sometimes blackish in older individuals, and may have a yellowish band dorsally. The pseudocardinal teeth are moderately small and serrated, and the lateral teeth are fairly short and slightly curved. The beak cavity is moderately deep and wide. The nacre is silvery-white, iridescent posteriorly.

Life History: The life history of the Round Hickorynut is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Round Hickorynut releases glochidia in conglutinates, which are targeted by sight-feeding darters and burst when bitten by the fish, facilitating attachment of the glochidia to the gills and fins of the fish. Several host fish species have been documented for the Round Hickorynut, but the dominant host fish appear to be darters of the genera *Ammocrypta*, *Etheostoma*, and *Percina*.

Range of the Round Hickorynut in USCG Region 5



Current Threats:

- Development and urbanization
- Dredging and channelization
- Impoundments
- Contaminants
- Resource extraction activities
- Invasive species
- Inherent factors

Distribution/Habitat: The Round Hickorynut generally inhabits medium-sized streams and is found in sand and gravel in riffle, run, and pool habitats in streams and rivers, but also may be found in sandy mud. The Round Hickorynut is wide-ranging, with records from the Lower Mississippi, Tennessee, Cumberland, Ohio River, and Great Lakes basins. The species is historically known from 297 populations in 12 states, including Alabama, Georgia, Illinois, Indiana, Kentucky, Michigan, Mississippi, New York, Ohio, Pennsylvania, Tennessee, and West Virginia. Results of surveys conducted since 2000 indicate the currently occupied range of the Round Hickorynut in the United States includes 65 rivers and streams. The species is still extant in each drainage basin listed above, though only two populations represent the Cumberland basin, and only one population represents the Lower Mississippi basin. Many historically known populations are considered extirpated, and the species is considered extirpated from Georgia, Illinois, and New York.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2019) *Species status assessment report for the Round Hickorynut mussel (Obovaria subrotunda), version 1.0*

Salamander Mussel	**Status**	**Under Review**	76 FR 59835
Scientific Name	*Simpsonaias ambigua*	**Critical Habitat**	N/A

Photo: Illinois Natural History Survey

Appearance: The shell of the Salamander Mussel is small, thin, and elliptical or oval. The anterior and posterior ends are rounded, and the dorsal and ventral margins are parallel. Beaks are raised slightly above the hinge line and directed anteriorly. Beak sculpture consists of several double-looped bars. The periostracum is smooth, yellowish-tan to dark brown, and lacks rays. One small, thin pseudocardinal tooth is present in each valve, and lateral teeth are indistinct or absent. The beak cavity is shallow. The nacre is bluish-white and iridescent posteriorly.

Life History: The life history of the Salamander Mussel is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. However, the Salamander Mussel is the only North American unionid known to parasitize a non-fish host; glochidia of this species are only known to use the Mudpuppy (*Necturus maculosus*) as a host. The Salamander Mussel is believed to be a long-term brooder (bradytictic). Gravid females have been collected in April, and Mudpuppies infested with glochidia have been observed in mid-October.

Range of the Salamander Mussel in USCG Region 5

Current Threats:

- Impoundment
- Siltation
- Pollution
- Invasive species

Distribution/Habitat: The Salamander Mussel is found in medium to large rivers. It is a habitat specialist, typically occurring under flat rocks or ledges of rock walls, though it has also been reported from mud and gravel bars. The Salamander Mussel is known from the Lake St. Clair, Lake Huron, and Lake Erie drainages and the Ohio River, Cumberland River, and upper Mississippi River basins. It is considered imperiled or highly imperiled in Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, West Virginia, Wisconsin, and Ontario, Canada. The Salamander Mussel is presumed extirpated or possibly extirpated from Iowa, New York, and Tennessee. In many of these states, extant populations are only known from one or two rivers.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References

Carman (2002) *Special animal abstract for Simpsonaias ambigua (Salamander Mussel)*
CBD (2010) *Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act*
Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
MNDNR (2021) *Simpsonaias ambigua species profile*
Roe (2003) *Conservation assessment for the Salamander Mussel (Simpsonaias ambigua)*
WIDNR (2021) *Salamander Mussel (Simpsonaias ambigua) species profile*

Scaleshell	**Status**	**Endangered (2001)**	66 FR 51322

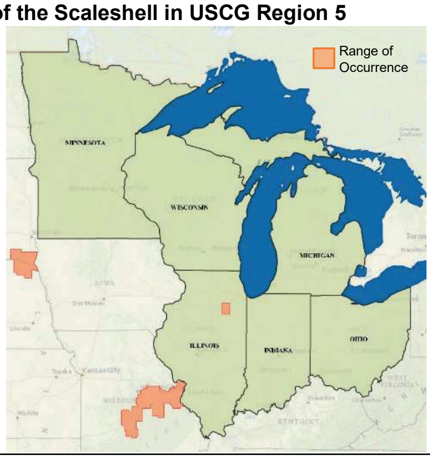
Scientific Name	*Leptodea leptodon*	**Critical Habitat**	N/A

Photo: M.C. Barnhart

Appearance: The Scaleshell is a medium-sized mussel that may reach a length of 10 to 12 cm. The shell is elongate, very thin, compressed, and rhomboidal. Individuals are sexually dimorphic. The posterior end of the shell is bluntly pointed in males. In females, the periostracum forms a broad, ruffled extension of the posterior end of the shell. The beaks are small, low, and nearly even with the hinge line. Beak sculpture, if visible, consists of four or five double-looped ridges. The periostracum is smooth, yellowish-green or brown, with numerous faint green rays. The pseudocardinal teeth are reduced to a small, thickened ridge, and the lateral teeth are moderately long and fine. The beak cavity is very shallow. The nacre is pinkish white or light purple and highly iridescent.

Life History: Life history of the Scaleshell is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Scaleshell is a long-term brooder (bradytictic); in Missouri, observations of gravid females suggest females begin brooding in early August and release glochidia the following June. The Scaleshell appears to utilize the Freshwater Drum (*Aplodinotus grunniens*) exclusively as a host for its larvae.

Range of the Scaleshell in USCG Region 5



Current Threats:

- Water quality degradation
- Sedimentation
- Sand and gravel mining/dredging
- Impoundments
- Invasive species

Distribution/Habitat: The Scaleshell occurs in medium to large rivers and is primarily found in stable riffles and runs with slow to moderate current velocity. Historically, the Scaleshell occurred in 56 rivers in 13 states within the Mississippi River drainage but was considered rare throughout this range. At the time of listing, the Scaleshell was considered extirpated in Iowa, Minnesota, Wisconsin, and all states east of the Mississippi River and considered extant in only 14 streams in Missouri, Arkansas, and Oklahoma. Since 2011, the species has been reported from several additional streams within its historical range, including the Illinois River, from which the Scaleshell had been considered extirpated. Currently, the Meramec, Bourbeuse, and Gasconade Rivers are considered the stronghold populations for the species. Records from other streams over the last 25 years consist of only a few sporadic live individuals.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References
Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2010) *Scaleshell mussel recovery plan (Leptodea leptodon)*
USFWS (2011) *Scaleshell mussel (Leptodea leptodon) 5-year review*
USFWS (2021) *5-year review: the Scaleshell mussel (Leptodea leptodon)*

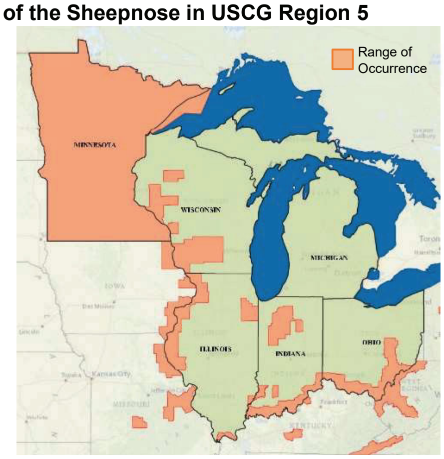
Sheepnose	**Status**	**Endangered (2012)**	77 FR 14914
Scientific Name	*Plethobasus cyphyus*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The shell of Sheepnose is ovate, somewhat elongated, moderately inflated, and thick. The anterior end is rounded, and the posterior end is bluntly pointed. The beaks are elevated and placed near the anterior margin. Beak sculpture consists of a few concentric ridges, usually only visible in juvenile individuals. The shell is smooth except for a row of broad knobs or tubercles running from the beaks to the ventral margin. The periostracum is rayless, yellow or light brown in juveniles, becoming chestnut to dark brown in adults. The pseudocardinal teeth are triangular and roughened, and the lateral teeth are long, heavy, and slightly curved. The beak cavity is shallow to moderately deep. The nacre is white, occasionally tinged with pink or salmon.

Life History: The life history of the Sheepnose is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Sheepnose are thought to be short-term brooders, with gravid females observed from May through early August in Wisconsin. Sheepnose glochidia are released in conglutinates, which resemble small pink worms, and glochidia infest the host fish when the fish attempts to eat the conglutinates. Laboratory studies have identified roughly 30 suitable host fish for Sheepnose, most of which are cyprinids (minnows and topminnows). Sauger has also been identified as a natural host for Sheepnose.

Range of the Sheepnose in USCG Region 5



Current Threats:

- Impoundments
- Sedimentation
- Dredging and channelization
- Resource extraction activities
- Chemical contaminants
- Invasive species

Distribution/Habitat: The Sheepnose is a larger-stream species occurring primarily in shallow shoal habitats with moderate to swift currents over coarse sand in gravel, although Sheepnose in larger rivers may occur in deeper water. Records indicate Sheepnose historically occurred in at least 76 streams in 14 states, including Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Extant populations of Sheepnose are known from 25 streams in all 14 states of historical occurrence, primarily in the Upper Mississippi and Ohio Rivers and their tributaries.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X		X	X	X

Additional References

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2020) *Sheepnose (Plethobasus cyphyus) 5-year review*

Snuffbox	**Status**	**Endangered (2012)**	77 FR 8632

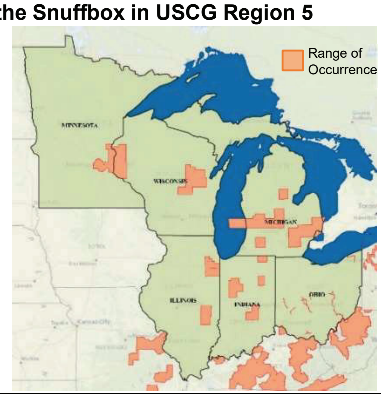
Scientific Name	*Epioblasma triquetra*	**Critical Habitat**	N/A

Photo: G. Thomas Watters, Ohio State University

Appearance: Snuffbox shell shape is somewhat triangular (females), oblong, or ovate (males), with the valves solid, thick, and very inflated. The anterior end of the shell is rounded, and the posterior end is truncated, highly so in females. The posterior ridge and slope in females are covered with fine ridges and grooves, and the posteroventral shell edge is finely toothed. The beaks are swollen, turned forward and inward, and extended above the hinge line. The periostracum is generally smooth and yellowish or yellowish-green in young individuals, becoming darker with age. Green, squarish, triangular, or chevron-shaped marks cover the dorsal portion of the shell but become poorly delineated stripes with age. The beak cavity is wide and deep. The nacre is white, often with a silvery luster and a gray-blue or gray-green tinge in the beak cavity.

Life History: The life history of the Snuffbox is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Female Snuffbox mussels display their mantle to attract host fish, and when a host fish approaches, they will often close their valves on the fish's head or snout, trapping the fish and ensuring that glochidia are released into the fish's gills. Juvenile Snuffbox have successfully transformed on Logperch *(Percina caprodes)* and several other species (primarily darters and sculpins) in laboratory tests.

Range of the Snuffbox in USCG Region 5



Current Threats:

- Impoundment
- Dredging and channelization
- Chemical contaminants
- Resource extraction activities
- Sedimentation
- Invasive species
- Climate change

Distribution/Habitat: The Snuffbox occurs in small- to medium-sized creeks, larger rivers, and lakes. It is found in riffles and shoals with swift current and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders. The Snuffbox historically occurred in 210 streams and lakes in 18 states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin) and Ontario, Canada. The Snuffbox is currently considered to be extant in 82 streams in 14 states (Alabama, Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin) and Ontario, Canada. Populations in the Grand River (Michigan), Ausable River (Ontario), Sydenham River (Ontario), Bourbeuse River (Missouri), French Creek (Pennsylvania), Clinch River (Tennessee and Virginia), and Paint Rock River (Alabama) have been categorized as stronghold populations.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Sedge Meadow, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References
Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2012) *Snuffbox (Epioblasma triquetra) fact sheet*
USFWS (2019) *Snuffbox (Epioblasma triquetra) 5-year review*
USFWS (2021) *Snuffbox (Epioblasma triquetra) species profile*

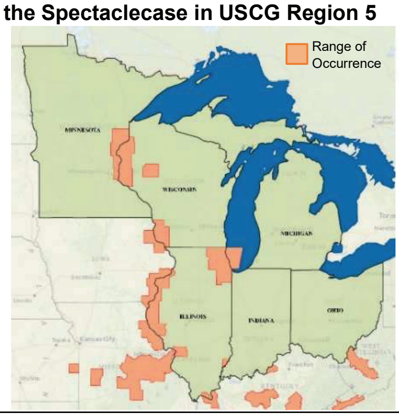
Spectaclecase	**Status**	**Endangered (2012)**	77 FR 14914
Scientific Name	*Cumberlandia monodonta*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: The Spectaclecase is a large mussel that reaches at least 23.5 cm in length. The shape of the shell is greatly elongated, sometimes arcuate (curved), and moderately inflated, with the valves being solid and moderately thick, especially in older individuals. The beaks are only slightly elevated above the hinge line. The periostracum is somewhat smooth, rayless, and light yellow, greenish-tan, or brown in young specimens, becoming rough and dark brown to black in old shells. The shell's posterior commonly will crack when dried. The single pseudocardinal tooth is simple and peg-like in the right valve, fitting into a depression in the left. The lateral teeth are straight and single in the right valve and double in the left valve, but they become fused with age into an indistinct raised hinge line. The nacre is white, mostly iridescent in young specimens but becoming iridescent posteriorly in older shells.

Life History: The life history of the Spectaclecase is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Spectaclecase is thought to release glochidia from early April to late May in the Meramec and Gasconade Rivers in Missouri, and has been reported as producing two broods, one in spring or early summer and the other in the fall, in the Meramec River. Mooneye (*Hiodon tergisus*) and Goldeye (*Hiodon alosoides*) have been identified as suitable host fish for Spectaclecase glochidia.

Range of the Spectaclecase in USCG Region 5



Current Threats:

- Impoundments
- Sedimentation
- Dredging and channelization
- Resource extraction activities
- Chemical contaminants
- Invasive species

Distribution/Habitat: The Spectaclecase is a large river species most often found between large rocks but has also been found in mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with a slow to swift current. Spectaclecase mussels are often found aggregated under slab boulders or bedrock shelves, protected from the current. The Spectaclecase historically occurred in at least 44 streams in the Mississippi, Ohio, and Missouri River basins, and its distribution comprised portions of 14 states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, Ohio, Tennessee, Virginia, West Virginia, and Wisconsin). The species is now known from only 20 of the 44 historical streams in the Mississippi, Ohio, and lower Missouri River basins and is considered extirpated from Indiana, Kansas, and Ohio. The only remaining populations considered relatively strong are in the Meramec and Gasconade Rivers in Missouri and the St. Croix River in Minnesota and Wisconsin.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
X			X		X

Additional References

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (2014) *Recovery outline for the Spectaclecase mussel (Cumberlandia monodonta)*
USFWS (2019) *Spectaclecase (Cumberlandia monodonta) 5-year review*

White Cat's Paw Pearly Mussel	Status	Endangered (1976)	41 FR 24062

Scientific Name	*Epioblasma obliquata perobliqua*	Critical Habitat	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The White Cat's Paw Pearly Mussel shell is small and subquadrate to oval in shape. The species is sexually dimorphic. Males are larger than females, the posterior end of the shell is bluntly pointed, and a wide sulcus or depression is present between the posterior ridges. The female shell is truncated, ribbed, and notched at the posterior end, with a narrow, slightly swollen postventral expansion bearing a comb-like row of small, sharp denticles on its margin. The umbos are moderately high, and the beak sculpture is double-looped. The periostracum is yellow, yellowish-green, or brown with numerous fine green rays. The pseudocardinal teeth are small and triangular, and the lateral teeth are moderately thick. The nacre is white.

Life History: The life history of the White Cat's Paw Pearly Mussel is presumably similar to that of other unionid mussel species, though specific life history details are not well known due to the scarcity of individuals. Females brood glochidia (larvae) in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Host fish for the White Cat's Paw Pearly Mussel are unknown. However, host fish for the closely related Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) include Rock Bass (*Amploplites rupestris*), Mottled Sculpin (*Cottus bairdii*), Stonecat (*Noturus flavus*), Blackside Darter (*Percina maculata*), and Logperch (*Percina caprodes*). Likely, the host fish for White Cat's Paw Pearly Mussel are also darter or sculpin species.

Range of the White Cat's Paw Pearly Mussel in USCG Region 5

Current Threats:

- Channelization and substrate disturbance
- Siltation
- Pollutants
- Climate change

Distribution/Habitat: The White Cat's Paw Pearly Mussel has been reported most frequently from riffle-run reaches of small to moderately large rivers. Historically, the species occurred in the Wabash, White, Tippecanoe, Maumee, and St. Joseph Rivers in Indiana; and the Maumee and St. Joseph Rivers and Fish Creek in Ohio. It may also have occurred in the Ohio River, though the museum record is questionable. However, since 1970, the White Cat's Paw Pearly Mussel has only been collected from Fish Creek in Ohio. It is currently known to exist in only a 3-mi portion of Fish Creek, and the last observation of a live individual was in 1999.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
	X			X	

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1990) *White Cat's Paw Pearly Mussel recovery plan*
USFWS (2013) *White Cat's Paw Pearly Mussel (Epioblasma obliquata perobliqua) 5-year review*
USFWS (2021) *5-year review: White Cat's Paw Pearly Mussel (Epioblasma obliquata perobliqua)*

Winged Mapleleaf	**Status**	**Endangered (1991)**	56 FR 28345
Scientific Name *Quadrula fragosa*		**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Winged Mapleleaf shell is quadrate or square, thick, and moderately inflated. The beaks are prominent and elevated above the hinge line. Beak sculpture consists of two rows of raised bumps or nodules. The sculpturing continues on the lateral surface of the shell as two prominent tuberculated ridges, separated by a sulcus, extending to the ventral margin of the shell. The shell has a prominent wing present posterior to the beak, with radiating rows of pustules or ridges. The periostracum ranges from tan or greenish in juveniles to chestnut or dark brown in adults, often with a few wide, broken green rays. The pseudocardinal teeth are large and serrated, and the lateral teeth are long and straight. The beak cavity is deep and compressed. The nacre is white, becoming iridescent posteriorly.

Life History: The life history of Winged Mapleleaf is similar to other unionid mussels. Females brood larvae, known as glochidia, in their gills. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Brooding females emerge at the substrate surface. For a few days during the brooding period, the posterior mantle around the excurrent aperture of brooding females becomes greatly expanded with swelling and development of black-ridged crenulations overlaying the mantle. Females brood glochidia in this "mantle magazine" and gape widely. The prominent display allows host fish to trigger the rapid release of glochidia. Channel Catfish (*Ictalurus punctatus*) and Blue Catfish (*Ictalurus furcatus*) are the only known suitable host fish for Winged Mapleleaf.

Range of the Winged Mapleleaf in USCG Region 5

Current Threats:

- Land-use changes
- River channel modifications
- Chemical contaminants
- Inherent factors

Distribution/Habitat: Winged Mapleleaf has been characterized as a large-stream species and has been reported from various substrate types, including mud, sand, and gravel. The species appears to inhabit dense and diverse mussel beds consistently. Historically, the Winged Mapleleaf was reported from 34 rivers in 12 states (Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Missouri, Nebraska, Ohio, Oklahoma, Tennessee, and Wisconsin). Most records are from tributaries of the Mississippi River or the Mississippi River itself. However, a few records exist for the Ohio River mainstem and tributaries (e.g., the Wabash and Tennessee Rivers). At the time of listing, the only confirmed remaining population was in the St. Croix River between Minnesota and Wisconsin. Since listing, several new populations were identified. Extant populations of Winged Mapleleaf are now known to occur in the St. Croix River (Minnesota, Wisconsin), Bourbeuse River (Missouri), Ouachita River (Arkansas), Saline River (Arkansas), and Little River (Arkansas, Oklahoma).

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		X

Additional References:

Cummings and Mayer (1992) *Field guide to freshwater mussels of the Midwest*
USFWS (1997) *Winged Mapleleaf mussel (Quadrula fragosa) recovery plan*
USFWS (2015) *Winged Mapleleaf (Quadrula fragosa) 5-year review*

4.5 Crustaceans

Illinois Cave Amphipod	Status	Endangered (1998)	63 FR 46900
Scientific Name	*Gammarus acherondytes*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: The Illinois cave amphipod is a small freshwater crustacean that has been found in cave streams in Monroe and St. Clair Counties in southwestern Illinois. Sexually mature males measure up to 20 mm (0.8 in.) long; sexually mature females are 12 to 16 mm (0.5 to 0.63 in.) long. They are usually light gray-blue, and their eyes are small, sub-reniform, and degenerate, with the pigment drawn away from the facets in an irregular black mass. The first antenna is long and slender, more than half the length of the body. The second antenna is about three-fourths as long as the first antenna.

Life History: The Illinois Cave Amphipod lives in the "dark zone" of cave streams. Like other amphipods, this species needs cold water and does not tolerate a wide range of water temperatures. They are sensitive to touch and avoid light. Little is known of the life history of the Illinois Cave Amphipod. In *Gammarus minus*, pairs may remain in amplexus for around two weeks prior to fertilization, but the duration of amplexus probably varies between cave and spring populations of this species. Eggs of *Gammarus minus* are released into the female's brood pouch, and young are released about a month later. For at least some Gammaridae, the incubation period varies with temperature.

Range of the Illinois Cave Amphipod in USCG Region 5

Current Threats:

- Urban sprawl
- Water pollution
- Cave use/species exploitation

Distribution/Habitat: The Illinois Cave Amphipod has never been widely distributed. It is endemic to the Illinois Sinkhole Plain in Monroe and St. Clair Counties in southwestern Illinois. Historically, the Illinois Cave Amphipod was known from six cave systems, all within a 10-mi radius of Waterloo, Illinois. These caves are each fed by separate watersheds, with no known connection among them. Therefore, scientists believe it is unlikely that the amphipod could be distributed to other cave systems via streams. Currently, the Illinois Cave Amphipod is found in only three of the original six cave sites. These caves are all in Monroe County, Illinois. Entrances to two caves are owned by the Illinois Department of Natural Resources, allowing public use of one of the sites. Three entrances to the third cave, which is privately owned, are dedicated Nature Preserves and are protected.

Primary Habitat in Action Area/RAM: Rivers and Streams

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References

USFWS (1998) *Illinois Cave Amphipod (Gammarus acherondytes) fact sheet*
USFWS (2002) *Illinois Cave Amphipod (Gammarus acherondytes) recovery plan*

4.6 Insects

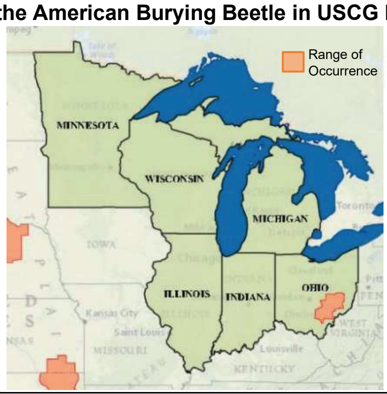
American Burying Beetle	**Status**	**Endangered (1989)** **Threatened (2020)**	54 FR 29652 85 FR 65241
Scientific Name	*Nicrophorus americanus*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The American Burying Beetle is the largest silphid (carrion beetle) in North America. The beetles are black with orange-red markings. Their hardened elytra (wing coverings) are smooth, shiny black, and each elytron has two scallop-shaped orange-red markings. The most diagnostic feature of the American Burying Beetle is the large orange-red marking on the raised portion of the pronotum. The American Burying Beetle also has orange-red frons (the upper, anterior part of the head), and a single orange-red marking on the clypeus, which can be viewed/considered as the lower "face" located just above the mandibles. Antennae are large, with notable orange club-shaped tips for chemoreception.

Life History: The American Burying Beetle is a nocturnal species that lives for only about one year. American Burying Beetles are active from late spring through early fall. New adult beetles or offspring (called tenerals) usually emerge in summer, overwinter (hibernate) as adults, and comprise the breeding population the following summer. Adults and larvae depend on dead animals (carrion) for food, moisture, and reproduction. Male burying beetles often locate carcasses first and then attract a mate. Beetles often fight over the carcass. The victors bury the carcass, the pair mates, and the female lays her eggs in an adjacent tunnel. Brood size usually ranges from one to 30 young, but 12 to 15 is the average size.

Range of the American Burying Beetle in USCG Region 5



Current Threats:

- Habitat loss and alteration
- Increased competition for prey
- Decreased prey abundance
- Population isolation
- Disease/pathogens
- Pesticides
- Agricultural and grazing practices
- Invasive species

Distribution/Habitat: The American Burying Beetle is considered a generalist in terms of the vegetation types where it is found, as it has been successfully live-trapped in a wide range of habitats, including wet meadows, partially forested loess canyons, oak-hickory forests, shrubland and grasslands, lightly grazed pasture, riparian zones, coniferous forest, and deciduous forests with an open understory. The American Burying Beetle occurs in various habitat types in portions of nine states: Arkansas, Kansas, Massachusetts, Missouri (recently reintroduced, experimental population), Nebraska, Oklahoma, Rhode Island, Texas, and South Dakota, based on the last 15 years of records. Reintroduction efforts are also underway in Ohio, but the survival of reintroduced beetles into the next year (successful overwintering) has not yet been documented. An American Burying Beetle reported in Michigan in 2017 is being investigated to determine if the area supports its populations. Surveys in 2018 and 2019 failed to verify the report. Currently, there is not enough information on the Michigan report to confirm or assess their status in this area.

Primary Habitat in Action Area/RAM: Wetlands, Upland Areas

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X		X	

Additional References:
MNFI (2021) *Nicrophorus americanus (American Burying Beetle)*
USFWS (1991) *American Burying Beetle (Nicrophorus americanus) recovery plan*
USFWS (1997) *American Burying Beetle fact sheet*
USFWS (2008) *American Burying Beetle (Nicrophorus americanus) 5-year review*
USFWS (2019) *Species status assessment report for the American Burying Beetle Nicrophorus americanus*
USFWS (2021) *American Burying Beetle (Nicrophorus americanus) species profile*

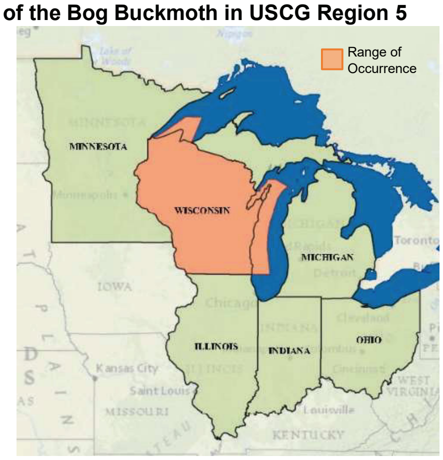
Bog Buckmoth	**Status**	**Not Listed**	59 FR 58982
Scientific Name	*Hemileuca sp.*	**Critical Habitat**	N/A

Photo: New York Natural Heritage Program

Appearance: Adult Bog Buckmoths are large, black moths with translucent wings containing white bands and eyespots. Males have red tufts on the apical segments of the abdomen and bipectinate antennae, while females have simple antennae and lack the red tuft. Wingspan has been reported to be 6.5 cm, and males have forewings of 26 to 32 mm in length, while females have a 32 to 36 mm long forewing. Larvae are dark, with rusty-orange, branched spines dorsally and a reddish-brown head capsule and prolegs. The spines are urticating and can cause a welt if handled.

Life History: Females lay their eggs after mating in the fall, with the eggs left to overwinter. Young hatch from April-June and develop into larvae from May to July. Larvae pupate within peat, and diurnal adults emerge from mid-September through mid-October, with peak flight around September 26–28. Life expectancy averaged 3.7 days, with a maximum of 9 days for adult females and 12 days for males. Females usually mate with the first male to reach them and then oviposit eggs on the same day. Females oviposit their eggs in clumps on shrubs and rings around stems on a variety of plants. Early instar larvae have been observed feeding on the foliage of the closest plant until the preferred host plant, *Menyanthes trifoliata,* emerges.

Range of the Bog Buckmoth in USCG Region 5



Current Threats:

- Invasive plant species
- Hydrological changes
- Succession
- Climate change
- Parasites and predation
- Inherent factors
- Pesticides

Distribution/Habitat: Bog Buckmoths are found on the northeastern margin of the *H. maia* complex distribution, with known populations in central New York and eastern Ontario. In New York, this species occupies six wetlands, all within Oswego County. This species inhabits minerotrophic fens. The Midwestern Fen Buckmoth (*Hemileuca nevadensis* ssp. 3) has been reported from Douglas, Jackson, Juneau, Marathon, Marquette, Milwaukee, Portage, Waukesha, and Wood Counties, Wisconsin.

Primary Habitat in Action Area/RAM: Wetlands

***Associated Vulnerable Habitats*:** Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
					X

Additional References:

DECNY (2014) *Bogbean Buckmoth species status assessment*
Environment Canada (2015) *Recovery strategy for the Bogbean Buckmoth (Hemileuca sp.) in Canada*
NYNHP (2021) *Online conservation guide for Hemileuca sp.*
USFWS (2020) *Bog Buckmoth peer review plan*
WIDNR (2021) *Midwestern Fen Buckmoth (Hemileuca nevadensis ssp. 3)*

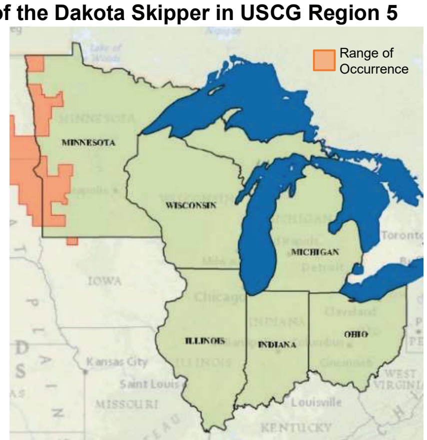
Dakota Skipper	**Status**	**Threatened (2014)**	79 FR 63671
Scientific Name	*Hesperia dacotae*	**Critical Habitat**	80 FR 59247


Photo: Minnesota Zoo

Appearance: The Dakota Skipper is a small to medium-sized butterfly with a wingspan of 2.4 to 3.2 cm (0.9 to 1.3 in.) and hooked antennae. The dorsal surface of adult male wings ranges in color from tawny-orange to brown and has a prominent mark on the forewing; the ventral surface is dusty yellow-orange. The dorsal surface of adult females is darker brown with diffused tawny orange spots and a few diffused white spots restricted to the margin of the forewing; the ventral surfaces are dusty gray-brown with a faint white spotband across the middle of the wing. Dakota Skipper pupae are reddish-brown, and the larvae are light brown with a black collar and dark brown head, with early instars being described as green with dark head and collar.

Life History: Dakota Skippers are univoltine (having a single flight per year), with an adult flight period that may occur from the middle of June through the end of July. Females lay eggs on the underside of leaves. Eggs take about 10 days to hatch into larvae (caterpillar). After hatching, larvae build shelters at or below the ground surface and emerge at night to feed on grass leaves. This practice continues until fall, when larvae become dormant. In the spring, larvae resume feeding and undergo two additional molts before they pupate. Pupation takes about 10 days and usually happens in June. Adult males emerge from pupae about 5 days before females, and the adults live for 3 weeks, at most.

Range of the Dakota Skipper in USCG Region 5



Current Threats:

- Conversion of native prairie for agriculture/urbanization
- Ecological succession
- Invasive species
- Pesticides and herbicides
- Flooding
- Land management regimes (grazing, haying, fire)

Distribution/Habitat: Historically, the species occurred throughout the vast grasslands of the north-central United States and south-central Canada, extending from Illinois to Saskatchewan. The Dakota Skipper has disappeared south and east of Minnesota and has become increasingly rare and local in its remaining range. In pre-agricultural Minnesota, the Dakota Skipper probably occurred in about 40 counties where prairie predominated (Prairie Parkland Province) to at least the eastern limit of Des Moines Lobe calcareous glacial tills in Waseca and Freeborn Counties. As recently as the early 2000s, this butterfly still occurred in 11 of these 18 counties, with site complexes in four of them that supported good populations. However, extensive surveys beginning in 2012 and continuing every year since have found only one Dakota Skipper population remaining in Minnesota in one of the four major site complexes. In addition, intensive surveys at this site in 2014, 2015, and 2016 suggest that the total number of adults in each annual generation here has been in the low hundreds at most, compared with thousands of adults per year in the mid-1980s.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:

MNDNR (2018) *Hesperia dacotae (Dakota Skipper)*
USFWS (2018) *Species status assessment report for the Dakota Skipper (Hesperia dacotae)*
USFWS (2019) *Dakota Skipper (Hesperia dacotae) fact sheet*
USFWS (2019) *Recovery plan for the Dakota Skipper (Hesperia dacotae)*

Frosted Elfin Butterfly

Status: Not Listed

Scientific Name: *Callophrys irus*

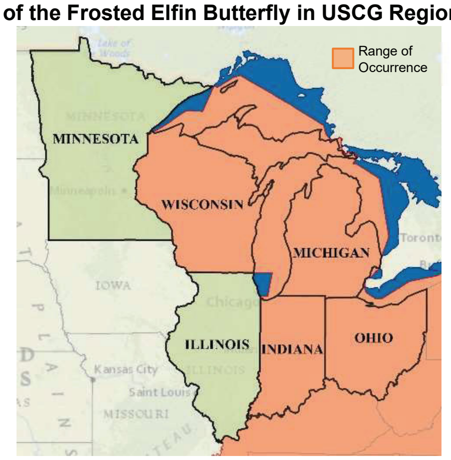
Critical Habitat: N/A


Photo: New York Natural Heritage Program

Appearance: While all elfins are small butterflies, the Frosted Elfin is larger than most with a 22 to 36 mm (0.87 to 1.42 in.) wingspan and short tails projecting from the hindwings. The upper side of the wings is uniformly dark gray-brown in color. The underside of the wings is also largely gray-brown but variegated, with a dusting of pale scales on the outer margin of the hindwing, with a dark spot and an irregular dark line. In most locations, the larvae (caterpillars) are pale greenish-white, with a pale lateral line and oblique dashes along the sides, and covered in short whitish hairs. However, in Oklahoma, larvae are yellow.

Life History: This species is univoltine (single adult flight period), and adults are diurnal. The single flight period lasts approximately 4 to 8 weeks, generally from late April through mid-June in the northern parts of the range, with the peak flight usually occurring in mid-May. Adult males actively defend wild lupine patches against other males to gain exclusive access to females for breeding. After mating, adult females visit multiple host plants where they deposit a single egg. The duration of the egg and larval stages varies with temperature, but eggs generally hatch into larvae within 2 weeks of spring adult emergence. Larvae pupate in mid to late spring in Florida and by late July in Massachusetts and remain in pupal diapause until the following spring. Larvae pupate at the plant base, at the soil surface, in the duff, and below the leaf litter.

Range of the Frosted Elfin Butterfly in USCG Region 5



Current Threats:

- Inherent factors
- Habitat loss and degradation
- Insecticides

Distribution/Habitat: Frosted Elfins are found within oak-pine barrens, oak savannas, prairie and dry oak woodlands, and similar anthropogenic habitats such as powerline cuts, railways, old sand/gravel pits, and airports. Frosted Elfins are closely associated with their host plants. Adults, especially indigo feeders, are virtually never seen more than 20 m (65.6 ft) from stands of the food plant. The distribution of the Frosted Elfin once extended from southern Ontario and the northeastern United States, south to Florida, and west to Texas and Wisconsin. The Frosted Elfin continues to have a wide range (25 states) in North America. However, the species is likely extirpated from Ontario, Canada, and the District of Columbia, Georgia, Illinois, and Vermont due to loss of host plants as a result of incompatible vegetation management, loss of populations and habitat from catastrophic fire, and residential development.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	X

Additional References:

USFWS (2018) *Species status assessment report for the Frosted Elfin (Callophrys irus)*
USFWS (2019) *Frosted Elfin*

Hine's Emerald Dragonfly	**Status**	**Endangered (1995)**	60 FR 5267

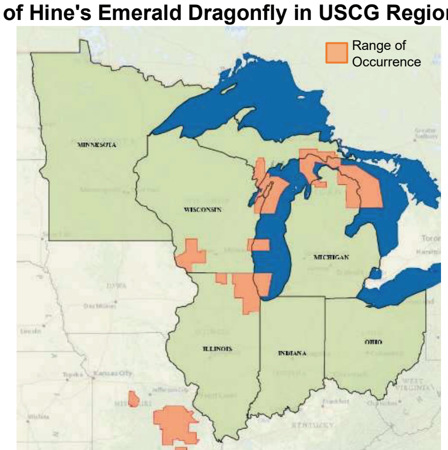
Scientific Name	*Somatochlora hineana*	**Critical Habitat**	72 FR 51102, 75 FR 21394

Photo: U.S. Fish & Wildlife Service

Appearance: Hine's Emerald Dragonfly has brilliant green eyes like many other members of its family. However, it is distinguished from all other species of *Somatochlora* by its dark metallic green thorax with two distinct creamy-yellow lateral lines and distinctively shaped male terminal appendages and female ovipositor. Adults have a body length of 60 to 65 mm (2.3 to 2.5 in.) and a wingspan of 90 to 95 mm (3.5 to 3.7 in.). The wings are clear and may have an amber hue towards the base of the hind wings. The larva (nymph, naiad) is approximately 25 mm in length and is light to dark brown when mature. The body is densely clothed with coarse setae (hair).

Life History: A Hine's Emerald Dragonfly female will most likely lay more than 500 eggs during her life. After an egg is hatched, the larvae may spend 2 to 4 years in small streamlets, foraging and molting as they grow. Upon completion of larval development, the larvae begin to emerge as adults. The Hine's Emerald Dragonfly's known flight season lasts until early October in Illinois and late August in Wisconsin. Fully adult Hine's Emerald Dragonflies can live at least 14 days and may live 4 to 6 weeks. As with most dragonflies, adult Hine's Emerald Dragonflies feed, establish territories, mate, and oviposit (lay eggs). Most dragonfly adults are general predators through their entire life cycle, feeding primarily on insects they can capture while flying.

Range of Hine's Emerald Dragonfly in USCG Region 5



Current Threats:

- Habitat destruction/alteration
- Contaminants
- Environmental extremes
- Transpiration
- Demographic and genetic stochasticity
- Disease or predation
- Overcollection

Distribution/Habitat: Hine's Emerald Dragonfly lives in wetlands dominated by grass (graminoid) or grass-like plants and fed primarily by water from a mineral source or fens. Historically, the Hine's Emerald Dragonfly was found in Alabama, Indiana, and Ohio and probably has been extirpated in those states. Today the dragonfly can only be found in Illinois, Michigan, Missouri, and Wisconsin, which includes 13 sites in Illinois, 22 sites in Wisconsin, and 18 sites in Minnesota.

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X		X			X

Additional References:
Illinois State Museum (2012) *Hine's Emerald Dragonfly*
USFWS (2001) *Hine's Emerald Dragonfly (Somatochlora hineana) recovery plan*
USFWS (2006) *Hine's Emerald Dragonfly (Somatochlora hineana) fact sheet*
USFWS (2013) *Hine's Emerald Dragonfly (Somatochlora hineana) 5-year review*
USFWS (2019) *5-year review: Hine's Emerald Dragonfly (Somatochlora hineana)*

Hungerford's Crawling Water Beetle	**Status**	**Endangered (1994)**	59 FR 10580
Scientific Name	*Brychius hungerfordi*	**Critical Habitat**	N/A


Photo: Michigan Natural Features Inventory

Appearance: Adult Hungerford's Crawling Water Beetles (HCWB) are small and torpedo-shaped, with an average body length of 3.8 to 4.3 mm (0.15 to 0.17 in.). They are yellowish-brown in color with irregular dark markings and longitudinal stripes on the elytra. Each of them comprises a series of fine, closely spaced, and darkly pigmented indentations. Males are characterized by thickened tarsal segments of the front legs with small tufts of hair on the first three segments. HCWB larvae are light yellowish-brown with cylindrical bodies that taper to a hooked tail. They are stiff-bodied and possess short legs with five segments and a single tarsal hook.

Life History: Like all beetle species, HCWB undergoes complete metamorphosis with a life cycle that consists of four distinct stages. In general, the period of egg-laying for haliplids extends from May through July, although this may extend later in the summer in HCWB, and another generation may emerge in the fall for some species. Haliplid larvae pass through three instars and are herbivorous. When mature, larvae leave the water in search of a place in damp soil to pupate. Like other haliplids, they likely overwinter in the larval stage in position for spring pupation. The pupal stage is the only one spent in a terrestrial setting. This stage lasts two to three weeks, during which time the transformation to adult takes place. It requires several days before the adult beetle is ready to leave the pupal chamber and reenter the water.

Range of Hungerford's Crawling Water Beetle in USCG Region 5

Current Threats:

- Stream modification
- Fish management
- Degradation of water quality
- Geographic isolation

Distribution/Habitat: HCWB inhabits relatively cool (15 to 25°C), fast flowing (1st, 2nd, 3rd order) alkaline streams with sand and gravel substrates, often occurring in reaches with an open to partially open canopy just below beaver dams or similar human-made structures. Adults prefer gravel and cobble riffles while larvae occupy areas with slower current and dense growth of microalgae, especially Chara. Specifically, they occur in riffles in floodplain forest, northern shrub thicket, northern wet meadow and rich conifer swamp habitats. There are 13 streams range-wide (Michigan and Canada) with known populations of HCWB. In Michigan, HCWB is known to occur in the East Branch of Maple River and Carp Lake River in Emmet County; East Branch of Black River, Van Hetton Creek (also known as Van Hellon and Van Helen Creek), and Stuart Creek in Montmorency County; Canada Creek in Montmorency and Presque Isle Counties; Mullet Creek in Cheboygan County; North Branch of Boyne River in Charlevoix County; Middle Branch of Big Creek in Oscoda County; and Portage Creek in Kalkaska County. In Ontario, Canada, HCWB is known to occur in the North Saugeen River, Rankin River, and Saugeen River.

Primary Habitat in Action Area/RAM: Streams and Rivers

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
		X			

Additional References:

MNFI (2021) *Brychius hungerfordi (Hungerford's Crawling Water Beetle)*
Strand & Spangler (1994) *The natural-history, distribution, and larval description of Brychius hungerfordi Spangler (Coleoptera, Haliplidae).*
USFWS (2006) *Hungerford's Crawling Water Beetle (Brychius hungerfordi) recovery plan*
USFWS (2009) *Hungerford's Crawling Water Beetle (Brychius hungerfordi) 5-year review*
USFWS (2012) *Hungerford's Crawling Water Beetle (Brychius hungerfordi) 5-year review*
USFWS (2021) *Hungerford's Crawling Water Beetle (Brychius hungerfordi) 5-year review*

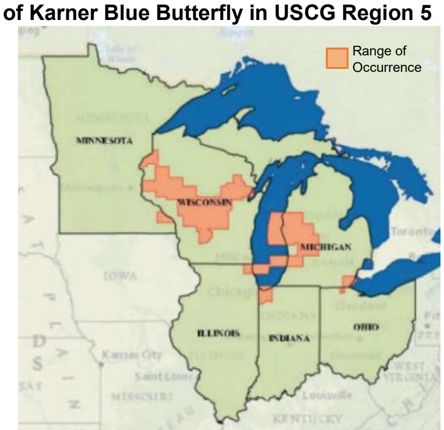
Karner Blue Butterfly	**Status**	**Endangered (1992)**	57 FR 59236
Scientific Name	*Lycaeides melissa samuelis*	**Critical Habitat**	N/A

Photo: The Nature Conservancy

Appearance: Karner Blue Butterflies are small with a wingspan of about 2.5 cm. The upper (dorsal) side of the male wing is violet-blue with a black margin and white fringed edge. The female upper side ranges from dull violet to bright purplish-blue near the body and central portions of the wings. The remainder of the wing is a light or dark gray-brown, with marginal orange crescents typically restricted to the hind wing. Near the margins of the underside of both wings are orange crescents and metallic spots. Larvae are a pea-green color, pubescent and dorsally flattened, with a brown-black to black head capsule. Pupae are bright green and smooth, changing to a light tan with hints of purple shortly before emergence when the adult cuticle separates from the cuticle of the pupal case.

Life History: The Karner Blue Butterfly is bivoltine, which means that it completes two generations per year. In typical years, first brood larvae (caterpillars) hatch from overwintered eggs in mid to late April. Larvae pass through four instars (developmental stages), between which the relatively soft larval exoskeleton is shed. Next, mature larvae enter a wandering phase, after which the pre-pupal larvae attach themselves to various substrates with a silk thread. First flight adults begin emerging in late May, with the flight extending through late June. Adults are believed to live an average of four to five days but can live as long as two to three weeks. First-flight adult females lay their eggs primarily on lupine plants.

Range of Karner Blue Butterfly in USCG Region 5



Current Threats:

- Loss and alteration of native habitat
- Land management (e.g., pesticide use, mowing)
- Overcollection
- Disease or predation
- Stochastic events
- Invasion and hybridization with other species

Distribution/Habitat: Of the eight states with Karner Blue Butterflies at the time of listing in 1992 (Illinois, New Hampshire, New York, Indiana, Ohio, Michigan, Wisconsin, and Minnesota), Karner Blue Butterflies are likely no longer present in Illinois, Minnesota, and Indiana. Wisconsin and Michigan have the largest number of local populations with the greatest numbers of individuals; New York has one large population. The historical northern, eastern, and western limits of the butterfly correspond roughly with the distributional limits of lupine. In all three regions, the present distribution of the butterfly has contracted away from these limits, with extirpations of populations occurring in all three geographic directions. The northernmost population of the Karner Blue occurs in the Superior Outwash Recovery Unit in Wisconsin, the westernmost population in the Paleozoic Plateau Recovery Unit in Minnesota, and the easternmost population in the Merrimac/Nashua River System Recovery Unit in New Hampshire.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:
MIDNR (2009) *Michigan Karner Blue Butterfly habitat conservation plan*
USFWS (2003) *Final recovery plan for the Karner Blue Butterfly (Lycaeides melissa samuelis)*
USFWS (2012) *Karner Blue Butterfly (Lycaeides melissa samuelis) 5-year review*
USFWS (2019) *Karner Blue Butterfly (Lycaeides melissa samuelis) 5-year review*
WIDNR (2009) *Wisconsin statewide Karner Blue Butterfly habitat conservation plan*

Linda's Roadside Skipper	Status	Under Review	76 FR 59836

Scientific Name	*Amblyscirtes linda*	Critical Habitat	N/A

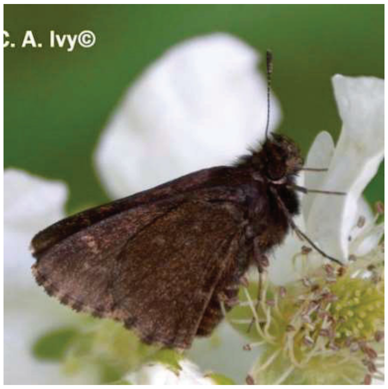


Photo: C.A. Ivy via butterfliesandmoths.org

Appearance: Upper side primaries are dark brown with some fulvous overscaling toward the base and inner margin; the number of subapical spots vary, from three well-defined to no spots at all. Secondaries are dark brown, with the basal and discal areas of the wings overscaled with fulvous scales and hairs. Underside primaries are grayish-brown, lighter than above. Secondaries are ground color dark brown, evenly suffused with grayish-white scales; an irregular curved discal band of five or six grayish-white spots, two above the cell and a faintly lighter area near the base. Fringes of both wings checkered. Colors are as follows: body is brown above; body is grayish-white beneath; palpi is grayish-white; antennae are dark brown, ringed with gray; club is black above; and club is grayish-white beneath.

Life History: It is debated whether there are three broods from mid-April to early September or only two in late April to early May and late June to early July. Perhaps the third brood is partial. The egg and pupal stages are brief, and most of the year is spent as larvae on the foodplant, perhaps among the litter over winter. Hibernation probably takes place as a late instar larva, possibly pupa. Larval diet is likely restricted to the grass Indian Woodoats (*Chasmanthium latifolia)*. The feeding habits of adults are not well documented except that they do visit flowers and mud puddles.

Range of Linda's Roadside Skipper in USCG Region 5

Current Threats:

- Habitat loss and fragmentation
- Development
- Forestry activities (e.g., logging, prescribed fire)
- Natural disturbances (e.g., floods)

Distribution/Habitat: This species is endemic to a small area of the lower Midwest centered in and near the Ozarks. It is found in the southern two-thirds of Missouri and immediately adjacent parts of Illinois, Kentucky, Tennessee, Arkansas, and Oklahoma. In addition, it is known from Shawnee National Forest in Illinois. Other unprotected occurrences may have good viability but have not been assessed.

Primary Habitat in Action Area/RAM: Streams and Rivers, Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

Freeman (1943) *Two new species of Amblyscirtes from Texas and Arkansas (Lepidoptera, Rhopalocera: Hesperiidae)*
NatureServe (2021) *NatureServe Explorer – Amblyscirtes linda*

Mitchell's Satyr Butterfly	**Status**	**Endangered (1991)**	56 FR 28825 57 FR 21564

Scientific Name	*Neonympha mitchellii mitchellii*	**Critical Habitat**	N/A

Photo: Michigan State University

Appearance: Male forewing length ranges between 1.6 to 1.8 cm (0.6 to 0.7 in.), females between 1.8 to 2.1 cm (0.7 to 0.8 in.). Although the dorsal (upper) wings are essentially unmarked and dark warm-brown in color, the ventral (lower) wing pattern may show through the thinly scaled dorsal wing surfaces. The ventral wing ground color is also dark warm-brown. Two conspicuous pattern elements characterize the ventral wing surfaces. The first is a linear series of four to five sub-marginal ocelli (eye-spots) on both the forewings and hindwings. The second is a pair of orange lines which encircle the ocelli rows on both wings.

Life History: The Mitchell's Satyr Butterfly exists for 95% of its life cycle as a caterpillar or larva. Larvae hatch from eggs after 7 to 11 days in July. The butterfly overwinters as a fourth instar larva on the leaves of the tussock sedge. In the spring, the larvae continue eating and growing. In late May to late June, the larvae form a chrysalis about 40 cm (5 to 68 cm) or 15 in. (2 to 27 in.) from the plant base. The chrysalis persists for 10 to 15 days. Adult butterflies emerge from mid-June to late July. Adults are short-lived, do not usually feed, and exist primarily to mate, disperse, and lay eggs. Eggs are most often laid on forbs and short-statured wildflowers.

Range of Mitchell's Satyr Butterfly in USCG Region 5

Current Threats:

- Habitat loss and degradation
- Pesticides
- Pollutants
- Butterfly collectors
- Hydrology alteration
- Inbreeding depression

Distribution/Habitat: In Michigan and Indiana, the Mitchell's Satyr Butterfly is found exclusively in fens and open parts of rich tamarack swamps. Mitchell's Satyr Butterflies are not found in all fens and are not distributed throughout an inhabited fen. These butterflies typically occur near woody vegetation (usually within 3 m) within a fen. In more open fens, Mitchell's Satyr Butterflyies occur along the shrubby edge of the fen. There are nine populations in Michigan (six viable), a decline from 16 since the previous 5-year review. There is one population in Indiana that is not considered viable and recently acquired by the local government. They are considered extirpated in Ohio. Populations in Virginia (11) are confined to one county, despite wide-ranging surveys. Mississippi has 15 populations across five counties. Alabama has populations in the Oakmulgee Ranger District of the Talladega National Forest, ranging across six counties.

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
	X	X		X	

Additional References
MNFI (2021) *Neonympha mitchellii mitchellii (Mitchell's Satyr)*
USFWS (1998) *Recovery plan for Mitchell's Satyr Butterfly (Neonympha mitchellii mitchellii French)*
USFWS (2014) *Mitchell's Satyr Butterfly (Neonympha mitchellii mitchellii) 5-year review*
USFWS (2021) *Mitchell's Satyr Butterfly (Neonympha mitchellii mitchellii) 5-year review*
USFWS (2021) *Mitchell's Satyr Butterfly fact sheet*

Monarch Butterfly	**Status**	**Candidate (2020)**	85 FR 81813

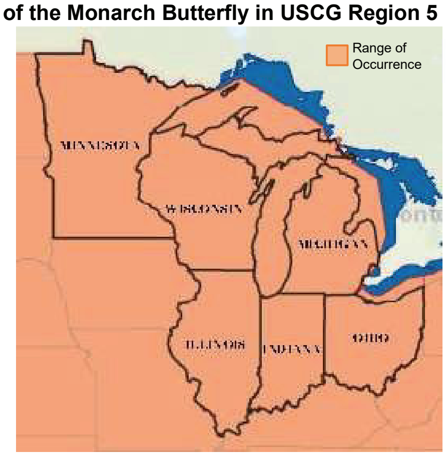
Scientific Name	*Danaus plexippus*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: Adult Monarch Butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots present on the upper and lower sides of the forewings and hindwings. Adult Monarchs are sexually dimorphic, with males having narrower wing venation and scent patches. The bright coloring of a Monarch is aposematic, as it serves as a warning to predators that eating them can be toxic. A newly-hatched Monarch larva is pale green or grayish-white, shiny, and almost translucent. It has no stripes or other markings. The head looks black, with lighter spots around the antennae and below the mouthparts, and it may be wider than the body. A pair of dark triangular patches between the head and front tentacles contain setae or hairs. The body is covered with sparse setae. Older first instar larvae have dark stripes on a greenish background.

Life History: During the breeding season, Monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.), and larvae emerge after 2 to 5 days. Larvae develop through five larval instars (intervals between molts) over 9 to 18 days. The larva then pupates into a chrysalis before eclosing 6 to 14 days later as an adult butterfly. There are multiple generations of Monarchs produced during the breeding season. Most adult butterflies live approximately 2 to 5 weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live 6 to 9 months. The Monarch life cycle varies by geographic location. In many regions where Monarchs are present, Monarchs breed year-round. Individual Monarchs in temperate climates undergo long-distance migration, taking Monarchs distances of over 3,000 km and last for over two months.

Range of the Monarch Butterfly in USCG Region 5



Current Threats:

- Habitat loss
- Agricultural conversion
- Urban development
- Herbicides and insecticides
- Logging/thinning
- Drought
- Climate change

Distribution/Habitat: In eastern North America, Monarchs travel north in the spring, from Mexico to Canada, over two to three successive generations, breeding along the way. Individual Monarchs disperse as far north as they can physiologically tolerate based on climatic conditions and available vegetation; the most specific predictors of the northern distribution of individual Monarchs are monthly mean temperature and precipitation. The Monarch occurs in North, Central, and South America; Australia; New Zealand; islands of the Pacific and Caribbean; and elsewhere. Monarch Butterflies are known or believed to occur in every U.S. state except Alaska.

Primary Habitat in Action Area/RAM: Streams and Rivers, Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References

USFWS (2020) *Monarch (Danaus plexippus) species status assessment report, version 2.1*
USFWS (2021) *Monarch Butterfly (Danaus plexippus) species profile*

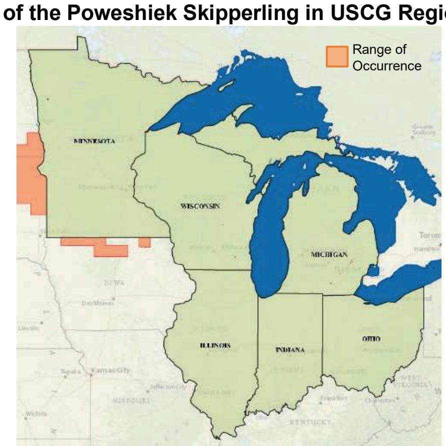
Poweshiek Skipperling	**Status**	**Endangered (2014)**	79 FR 63671
Scientific Name *Oarisma poweshiek*		**Critical Habitat**	80 FR 59247

Photo: U.S. Fish & Wildlife Service

Appearance: The Poweshiek Skipperling is a small butterfly, more delicate looking than most "grass" skippers (subfamily Hesperiinae). The forewing length (base to apex) is 1.4 to 1.6 cm (0.55 to 0.63 in.) in both sexes. Antennae are short and relatively stout and have blunt-tipped clubs. The upper surface of the wings is a uniform dark brown with a purplish gloss in fresh individuals, except for a splash of glossy orange along the leading edge of each forewing. The undersurface of the hind wings have a pale, finely pinstriped look created by white veins on a hoary gray-brown ground color. The caterpillar is pale green with a dark green dorsal band outlined by cream lines.

Life History: The Poweshiek Skipperling has a single annual generation. In a typical year, most adults fly between the end of June and the middle of July. Eggs hatch in about 10 days, and the partly grown larvae overwinter and complete development the following spring. Prairie grasses, especially prairie dropseed (*Sporobolus heterolepis*) and little bluestem (*Schizachyrium scoparium* var. *scoparium*), are probably the most important larval hosts. Unlike most skippers, Poweshiek larvae do not construct shelters but rest head down on grass blades or stems when not feeding. Larvae overwinter in a similar position on stems. Males seek mating opportunities through meandering search flights above and among the tops of grasses. Females probably mate soon after they become capable of flight.

Range of the Poweshiek Skipperling in USCG Region 5



Current Threats:

- Habitat conversion
- Grazing
- Haying
- Controlled burning
- Succession
- Exotic species
- Habitat fragmentation

Distribution/Habitat: Habitats utilized by the Poweshiek Skipperling in Minnesota include wet to dry native prairie but not sand prairie. The habitat in Michigan is a type of open wetland known as prairie fen. These are plant communities on peaty soils saturated by upwelling calcareous groundwater; wetland-obligate sedges dominate, but several grasses characteristic of prairie communities are present as well. In the United States, there are historical records for the Poweshiek Skipperling from eight states (Illinois, Indiana, Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin) and one Canadian province (Manitoba). The only confirmed records for Illinois and Indiana are very old, and it is presumed extirpated in both of those states. Poweshiek Skipperlings have been recently extant (since 2000) in each of the other states. Currently, in the United States, the species is known to or is believed to occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin.

Primary Habitat in Action Area/RAM: Wetlands, Upland Areas

***Associated Vulnerable Habitats*:** Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X	X		X

Additional References

COSEWIC (2013) *COSEWIC assessment and status report on the Poweshiek Skipperling Oarisma poweshiek in Canada*
MNDNR (2018) *Oarisma poweshiek (Poweshiek Skipperling)*
Selby (2010) *Status assessment update (2010): Poweshiek Skipperling (Oarisma poweshiek (Parker)*
USFWS (2019) *Poweshiek Skipperling (Oarisma poweshiek) 5-year review*

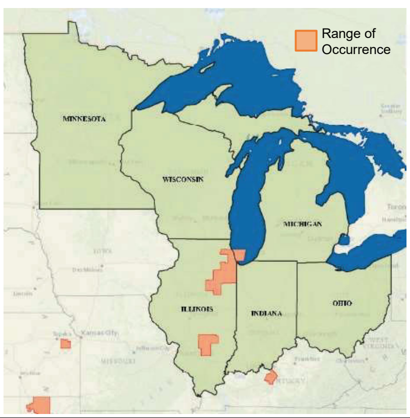
Rattlesnake-Master Borer Moth	**Status**	**Not Listed**	85 FR 44478
Scientific Name	*Papaipema eryngii*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: The adult Rattlesnake-Master Borer Moth (RMBM) measures 3.5 to 4.8 cm (1.4 to 1.9 in.) in wingspan. Both sexes are purple-brown with small, scattered yellow and white spots. Flight-worn moths appear lighter in color after darker scales have fallen away after a few nights of flying and crawling through vegetation, although the large white spots typically remain distinctive. RMBM larvae appear similar to other *Papaipema* larvae but retain longitudinal white and purplish-striped markings until the last instar when the purple fades, and the larvae become mostly dull yellowish-white with scattered, raised, dark-brown spots.

Life History: RMBM has a single flight per year (univoltine), with adults emerging from mid-September to early October. The adult flight period and breeding period is approximately 10 days of peak flight, with the greatest concentration of adults noted the last week of September. Adult moths live 10 to 14 days. Mating occurs during the flight period after which females lay eggs increases or folds on dead, dying, or green leaves of rattlesnake-master (*Eryngium yuccifolium*), where the eggs overwinter. Rattlesnake-master is the only food source for the larvae, which are internal plant feeders, boring into stems and root of the host plant. Pupation appears to take place either inside the feeding chamber in the root or the soil next to the root and lasts 3 to 4 weeks.

Range of the Rattlesnake-Master Borer Moth in USCG Region 5



Current Threats:

- Habitat loss or fragmentation
- Grazing/mowing
- Succession
- Fire

Distribution/Habitat: RMBMs are obligate residents of undisturbed prairie, barrens, savanna, and woodland openings that contain rattlesnake-master, the sole larval food plant. RMBM was thought not to occur outside of a true prairie or prairie remnant; however, populations in Missouri and Arkansas were found in roadsides, savannahs, glades, and woodland openings with moist, well-drained soils. The historically occupied range and species condition of RMBM are unknown. The species was described in 1917, and only occasional collection records exist until the 1990s. At the time of the original 12-month finding in 2013, 16 known extant populations had been discovered since 1993. Additional surveys between 2013 and 2018 brought the total number of extant populations to 55. With more than a 98% decline of prairie landscapes across the United States, it may be assumed that the currently occupied range is less than the historically occupied range. Currently, RMBM is thought to occur in Arkansas, Illinois, Kansas, Kentucky, North Carolina, and Oklahoma.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References

Mankowski et al. (2013) *Final recovery planning outline with listing status review triggers for the Illinois endangered Eryngium Stem Borer (Papaipema eryngii)*
USFWS (2020) *Species status assessment report for the Rattlesnake-Master Borer Moth (Papaipema eryngii)*
USFWS (2021) *Rattlesnake-Master Borer Moth (Papaipema eryngii) species profile*

Regal Fritillary	**Status**	**Under Review**	85 FR 44478
Scientific Name *Speyeria idalia*		**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: The Regal Fritillary is a large, brushfooted butterfly with a wingspan of 67 to 105 mm. The upper side of the forewing is bright red-orange with black markings. On females, the forewing is edged with a black marginal band with a postmedian row of white spots. The upper side of the hindwing is black with a postmedian row of white spots. There is also a submarginal row of spots that is orange on males and white on females. The underside of the forewing is orange with a marginal band of white spots and a black fringe. The hindwing is dark greenish-brown with elongate white spots. Larvae can be ochre-yellow to orangish, yellow on the rear with yellow lines and black spots. Pupae are light mottled brown tinged with pink, with small black spots on the wings and thorax, short dorsal cones, and yellow transverse bands on the abdomen.

Life History: The Regal Fritillary's single flight period takes place between mid-June and mid-September. Females emerge 1 to 2 weeks after the males and generally mate upon emergence. However, they do not lay eggs until at least 3 weeks after mating. The extended period between mating and oviposition during the heat of the summer and the overwintering of larvae allow the caterpillars to emerge in the spring when violet hostplants are young. Once the caterpillars hatch, they enter diapause immediately and overwinter unfed. After becoming active in the spring, they eat the leaves of young violets. The pupal stage lasts 2.5 to 4 weeks. June is typically the beginning of adult male emergence.

Range of the Regal Fritillary in USCG Region 5

Current Threats:

- Grassland conversion
- Prescribed burning and wildfires
- Grazing
- Exotic species
- Pesticides
- Overutilization/overcollection
- Environmental factors

Distribution/Habitat: Regal Fritillary butterflies live in tall-grass prairie and other open and sunny locations such as damp meadows, marshes, wet fields, and mountain pastures. Its historical range extended from Nova Scotia, south to northern Georgia, west to the Dakotas, and eastward to the Atlantic coast. The Regal Fritillary is currently restricted to tall-grass prairie remnants. Its core range is in Kansas, Missouri, and Nebraska. Regals are historical or extirpated in all six New England states, New York, New Jersey, Maryland, Delaware, probably West Virginia, Ohio, probably Indiana, and Michigan. By the late 1990s, a large population in central Pennsylvania (still extant in 2006) and another in Virginia were the only actually located extant occurrences east of the Illinois-Indiana border region. The Regal Fritillary is rapidly declining in the prairie states of Illinois, Iowa, and Wisconsin.

Primary Habitat in Action Area/RAM: Wetlands, Upland Areas

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References

ILDNR (2021) *Regal Fritillary*
MNDNR (2021) *Argynnis idalia (Regal Fritillary)*
MNFI (2021) *Speyeria idalia (Regal Fritillary)*
Selby (2007) *Regal Fritillary (Speyeria idalia Drury): a technical conservation assessment*
WIDNR (2021) *Regal Fritillary (Speyeria idalia)*
WildEarth Guardians (2013) *Petition to list the Regal Fritillary (Speyeria idalia) under the Endangered Species Act*

Rusty Patched Bumble Bee	**Status**	**Endangered (2017)**	82 FR 3186

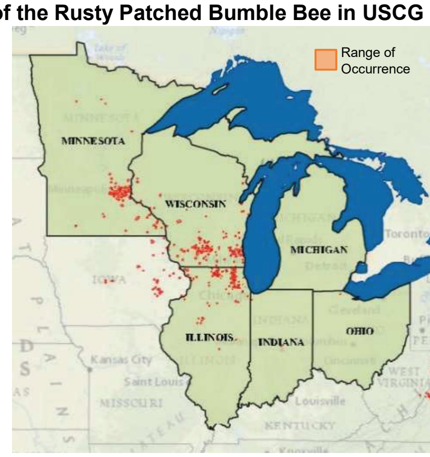
Scientific Name	*Bombus affinis*	**Critical Habitat**	N/A

Photo: UW-Madison Arboretum

Appearance: The Rusty Patched Bumble Bee (RPBB) is a eusocial (highly social) organism forming colonies consisting of a single queen, female workers, and males. Colony sizes are considered large compared to other bumble bees, and healthy colonies may consist of up to 1,000 individual workers in a season. Queens and workers differ slightly in size and coloration; queens are larger than workers. All RPBB have entirely black heads, but only workers and males have a rusty, reddish patch centrally located on the abdomen.

Life History: RPBB annual cycle begins in early spring with colony initiation by solitary queens and progresses with the production of workers throughout the summer and ending with the production of reproductives, males and new queens, in mid to late summer and early fall. The queen, or foundress, searches for suitable nest sites and collects nectar and pollen from flowers to support the production of her eggs, which are fertilized by sperm she has stored since mating the previous fall. Thus, she is solely responsible for establishing the colony. As the workers hatch and the colony grows, they assume the responsibility of food collection, colony defense, and care of the young, while the foundress remains within the nest and continues to lay eggs. During later stages of colony development, in mid-July or August to September, the new queens and males hatch from eggs. The foundress dies at the end of the season, and the new queens (gynes, or reproductive females) mate before hibernating.

Range of the Rusty Patched Bumble Bee in USCG Region 5



Current Threats:

- Habitat loss and degradation
- Intensive farming
- Disease
- Pesticides
- Climate change

Distribution/Habitat: RPBB has been observed and collected in a variety of habitats, including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens. RPBB requires areas that support sufficient food (nectar and pollen from diverse and abundant flowers), undisturbed nesting sites in proximity to floral resources, and overwintering sites for hibernating queens. Historically, the species was widely distributed across areas of Quebec, North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Illinois, Kentucky, Tennessee, Indiana, Michigan, Ontario, Ohio, Pennsylvania, New York, Vermont, Maine, Massachusetts, New Hampshire, Delaware, Rhode Island, Connecticut, New Jersey, Maryland, Virginia, District of Columbia, West Virginia, North Carolina, South Carolina, and Georgia. The current range consists of Illinois, Indiana, Iowa, Maine, Massachusetts, Minnesota, Ohio, Virginia, West Virginia, Wisconsin, and Ontario, Canada.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X		X	X	X

Additional References
USFWS (2016) *Rusty Patched Bumble Bee (Bombus affinis) species status assessment*
USFWS (2019) *Draft recovery plan for the Rusty Patched Bumble Bee (Bombus affinis)*
USFWS (2019) *Rusty Patched Bumble Bee (Bombus affinis) fact sheet*
USFWS (2020) *Rusty Patched Bumble Bee (Bombus affinis)*
USFWS (2021) *Rusty Patched Bumble Bee map*

4.7 Fishes

Lake Sturgeon	**Status**	**Under Review**	84 FR 41691
Scientific Name	*Acipenser fulvescens*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Lake Sturgeon is a primitive, heavy-bodied, torpedo-shaped fish, partially covered with bony plates rather than scales. The body is angular (five-sided) in young individuals but more cylindrical in adults. The snout is short, rounded, and conical, and the tail is sharklike in profile (i.e., the upper lobe is longer than the lower lobe). The mouth is located on the underside of the head, and the lower lip has a lobe at each corner. Four smooth barbels are located in front of the mouth. Young Lake Sturgeon are gray or brown dorsally with dusky dorsal and lateral blotches. Adults are gray to yellowish-green dorsally and white ventrally.

Life History: Lake Sturgeon migrate to their annual spawning grounds between late April and early June, preferring to spawn in shallow, rocky areas along riverbanks. Lake Sturgeon spawning is dependent on water temperature and flow. Males arrive at the spawning sites ahead of the females, cruising in groups of eight or more, often so close to the surface that their tails, backs, or snouts are out of the water. Spawning begins as soon as a female enters the group. Each about one-eighth in. in diameter, the fertilized eggs are sticky and cling to rocks and other solid materials in the water until they hatch. The eggs hatch in 5 to 8 days, depending on the water temperature. In 12 to 14 days, the fry (newly hatched fish) are 1 in. long and have fully developed mouths and barbels.

Range of the Lake Sturgeon in USCG Region 5

Current Threats:

- Historical overharvesting
- Habitat degradation
- Water pollution
- Dams (spawning, habitat fragmentation)

Distribution/Habitat: Lake Sturgeon are widely distributed in North America, found in three major drainages: the Mississippi River, the Great Lakes, and the Hudson Bay. While they occur in the greatest abundance in the large lakes and rivers of the Great Lakes region of the United States and Canada, most of the Lake Sturgeon's natural range in the United States is in the Mississippi River basin from the Upper Mississippi River and its major tributaries to the southern border of Arkansas. Formerly abundant throughout much of this area, the Lake Sturgeon has been drastically reduced or eliminated throughout most of its southern range.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams, Bays and Estuaries

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:
Galarowicz, T. (2003) *Conservation assessment for Lake Sturgeon (Acipenser fulvescens)*
USFWS (2001) *Lake Sturgeon (Acipenser fulvescens)*
WIDNR (2008) *Lake Sturgeon (Acipenser fulvescens)*

Pallid Sturgeon	Status	Endangered (1990)	55 FR 36641

Scientific Name	*Scaphirhynchus albus*	Critical Habitat	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Pallid Sturgeons have a unique dinosaur-like appearance. They have a flattened snout, long slender tail, and are armored with lengthwise rows of bony plates instead of scales. Their mouth is toothless and positioned under the snout for sucking small fish and invertebrates from the river bottom. The skeleton structure of a Pallid Sturgeon is primarily cartilaginous. Pallid Sturgeons can weigh up to 80 lb and reach lengths of 6 ft.

Life History: Pallid Sturgeon can be long-lived, with females reaching sexual maturity later than males. Females do not spawn each year. Spawning appears to occur between March and July, with lower latitude fish spawning earlier than those in the northern portion of the range. Adult Pallid Sturgeon can move long distances upstream prior to spawning, a behavior that can be associated with spawning migration. Females likely spawn at or near the apex of these movements. Spawning appears to occur adjacent to or over coarse substrate (boulder, cobble, gravel) or bedrock, in deeper water, with relatively fast, converging flows. Newly hatched larvae are predominantly pelagic, drifting in the currents for 11 to 13 days and likely dispersing several hundred km downstream from spawn and hatch locations.

Range of the Pallid Sturgeon in USCG Region 5

Current Threats:

- Habitat degradation
- Water quality
- Entrainment
- Disease or predation

Distribution/Habitat: The historical distribution of the Pallid Sturgeon includes the Missouri and Yellowstone Rivers in Montana, downstream to the Missouri-Mississippi confluence, and the Mississippi River possibly from near Keokuk, Iowa, downstream to New Orleans, Louisiana. Since listing in 1990, wild Pallid Sturgeon have been documented in the Missouri River between Fort Benton and the headwaters of Fort Peck Reservoir, Montana; downstream from Fort Peck Dam, Montana to the headwaters of Lake Sakakawea, North Dakota; downstream from Garrison Dam, North Dakota to the headwaters of Lake Oahe, South Dakota; from Oahe Dam downstream to within Lake Sharpe, South Dakota; between Fort Randall and Gavins Point Dams, South Dakota and Nebraska; downstream from Gavins Point Dam to St. Louis, Missouri (including Illinois); in the lower Milk and Yellowstone Rivers, Montana and North Dakota; the lower Big Sioux River, South Dakota; the lower Platte River, Nebraska; the lower Niobrara River, Nebraska; and the lower Kansas River, Kansas. Pallid Sturgeon observations and records have increased with sampling effort in the Mississippi River basin. The contemporary downstream extent of Pallid Sturgeon ends near New Orleans, Louisiana. Additionally, the species has been documented in the lower Arkansas River, the lower Obion River, Tennessee, as well as navigation pools 1 and 2, i.e., downstream from Lock and Dam 3, in the Red River, Louisiana.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

USFWS (2003) *Pallid Sturgeon recovery plan*
USFWS (2014) *Revised recovery plan for the Pallid Sturgeon (Scaphirhynchus albus)*
USFWS (2019) *Pallid Sturgeon (Scaphirhynchus albus) fact sheet*

Popeye Shiner	Status	Under Review	76 FR 59836
Scientific Name	*Notropis ariommus*	**Critical Habitat**	N/A

Photo: North American Native Fishes Assoc.

Appearance: The Popeye Shiner is distinguished from other similar species of shiners (genus *Notropis*) by its very large eye, the diameter of which is usually >1.5 times its snout length. The body is characterized as laterally compressed and moderately to somewhat elongate (i.e., slender), with a moderate head, round to slightly pointed snout, and a large, terminal mouth. The dorsum is dusky (scales distinctly outlined by melanophores) and pale olive to olive-green, fading ventrally to white; the lower two-thirds of the body is silvery. Lateral stripe present and diffuses anteriorly. Breeding males have small, densely spaced tubercles on the head, body (except along breast or urosome), and pectoral fins.

Life History: Popeye shiners are assumed to reproduce in spring or summer, but little is known about their reproductive activities or requirements. Spawning likely occurs from late May to late June. Popeye Shiners feed on various aquatic invertebrates and terrestrial insects that fall in the water or fly just above the surface.

Range of the Popeye Shiner in USCG Region 5

Current Threats:

- Habitat degradation
- Water pollution
- Dams (spawning, habitat fragmentation)

Distribution/Habitat: Popeye shiners are found in extremely clear waters in moderate-sized streams. These streams usually have slow to moderate flow and many long slow pools where the Popeye Shiners reside. Popeye Shiners tend to be rare and highly localized. Historically, most of the occupied localities were centralized in and around Tennessee, Kentucky, West Virginia, and Virginia, extending outwards into adjacent states: Alabama, Georgia, Indiana, North Carolina, Ohio, and Pennsylvania. Today, Popeye Shiners occur in spotty distributions across the Ohio, Tennessee, and Cumberland River drainages, with most of its occupied localities continuing to be centralized within Tennessee, Kentucky, West Virginia, and Virginia. Popeye Shiners are now believed to be extirpated from Alabama, Pennsylvania, and Indiana, although a 2006 Indiana survey reported collections in at least one locality. One recent occurrence from Pennsylvania results from collecting one individual believed to have washed downstream from an upper West Virginia extant population. Popeye Shiners still occur in the Scioto River drainage of Ohio and were last collected in Georgia in the South Chickamauga Creek in 1993. It is unclear if this species still occurs in North Carolina.

Primary Habitat in Action Area/RAM: Rivers and Streams

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References:
NEAFWA (2018) *Popeye Shiner five factor status review*
ODNR (2017) *Stream fishes of Ohio field guide*

Scioto Madtom	**Status**	**Endangered (1975)**	40 FR 17590
Scientific Name	*Noturus trautmani*	**Critical Habitat**	N/A

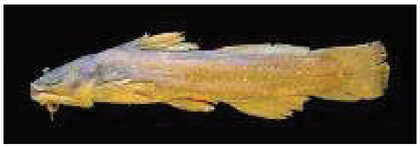


Photo: The Ohio State University

Appearance: The Scioto Madtom has a long, slender body that is gray to dusky olive-brown above and has four dark saddles. The low adipose fin is broadly joined to the caudal fin with a small notch between the fins. The adipose fin is clear, without a dark bar or blotch. The short pectoral spine has five to seven large teeth on the rear edge and small teeth along the front. The caudal fin has a straight edge or is slightly rounded. The caudal fin has two dark bands, one in the middle of the fin, and one near the clear edge. There are 13 to 16, usually 14, anal rays. The Scioto Madtom grows to 2.25 in. (6.1 cm) total length.

Life History: Little is known of reproductive habits of the Scioto Madtom, though it likely spawned in summer and migrated downstream in the fall.

Range of the Scioto Madtom in USCG Region 5

Current Threats:

- Habitat degradation
- Water pollution
- Competition

Distribution/Habitat: The Scioto Madtom prefers stream riffles of moderate current over gravel bottoms with high-quality water free of suspended sediments. It is an omnivorous bottom feeder that eats a wide variety of plant and animal life, which it finds with its sensory barbels hanging down in front of its mouth. It is believed to be endemic to the Scioto River basin in central Ohio. Only 18 individuals of the Scioto Madtom were ever collected. All were found along one stretch of Big Darby Creek, and all but one was found within the same riffle known as Trautman's riffle. The riffle habitat was composed of glacial cobble, gravel, sand, and silt substrate, with some large boulders.

Primary Habitat in Action Area/RAM: Rivers and Streams

Associated Vulnerable Habitats**:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
				X	

Additional References:

USFWS (2009) *Scioto Madtom (Noturus trautmani) 5-year review*
USFWS (2019) *Scioto Madtom (Noturus trautmani) fact sheet*

Sicklefin Chub	Status	Under Review	82 FR 60362

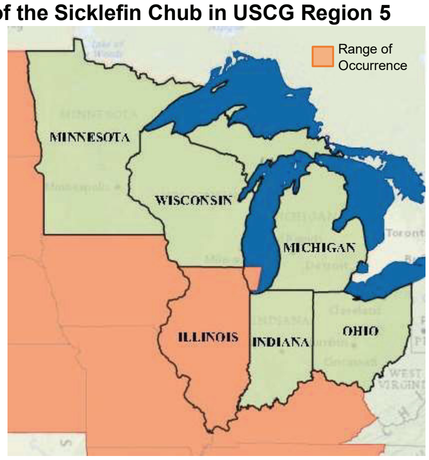
Scientific Name	*Macrhybopsis meeki*	Critical Habitat	N/A

Photo: Uland Thomas via Illinois Department of Natural Resources

Appearance: The Sicklefin Chub is a small, obligate large-river minnow that has evolved specific phenotypic adaptations to the formerly turbid, moderate velocity Missouri River. These included a fusiform body shape, long sickle-shaped pectoral fins, a deeply forked caudal fin, reduced optic brain lobes and eyes, and development of external sensory organs, termed compound taste buds. It is usually light green to brown above, often with many dark brown and silver specks and silver sides. Maxillary barbels are positioned behind the blunt and slightly overhanging snout. Maximum size rarely exceeds 95 mm.

Life History: The Sicklefin Chub can reach sexual maturity at age 2, with most fish mature by age 3. Spawning occurs throughout the summer at water temperatures of 18 to 28°C (64.4 to 82.4°F). Multiple stages of eggs in gravid females suggest that the fish spawn multiple times during the summer. Sicklefin Chub are "pelagic-spawning cyprinids," small-bodied fish that produce semi-buoyant, nonadhesive eggs within pelagic zones of large flowing streams. These fish produce eggs that achieve semi-buoyancy soon after fertilization but require water movement to remain in suspension.

Range of the Sicklefin Chub in USCG Region 5



Current Threats:

- Dams
- Water pollution and industrial depletion
- Dredging of river substrates

Distribution/Habitat: The Sicklefin Chub historically occurred in 1,150 mi of the mainstem Mississippi River, from the mouth of the Missouri River to the Gulf of Mexico. USFWS estimates that as of 2001, it was still present in the entire mainstem, but it is now considered rare everywhere except the Middle Missouri River. The Sicklefin Chub historically occurred in 1,950 mi of the Mainstem Missouri River, from the mouth of Cow Creek, Montana, to the confluence of the Mississippi River. As of 2001, it occupied 1,015 mi of the Missouri River: Cow Creek, Montana, to the headwaters of Fort Peck Reservoir; Fort Peck Dam to the headwaters of Lake Sakakawea; and from Gavins Point Dam to the confluence of the Mississippi River. The Sicklefin Chub historically occurred in at least 70 mi of the Lower Yellowstone River, from the mouth of Thirteen Mile Creek to the confluence of the Missouri River. Very few Sicklefin Chub have been collected in the Kansas River. In Illinois, this species lives in the main channel of the Mississippi River, which has a strong current and turbid water.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

NatureServe (2021) *NatureServe Explorer – Sicklefin Chub*

WildEarth Guardians (2016) *Petition to list the Sturgeon Chub (Macrhybopsis gelida) and Sicklefin Chub (Macrhybopsis meeki) under the U.S. Endangered Species Act*

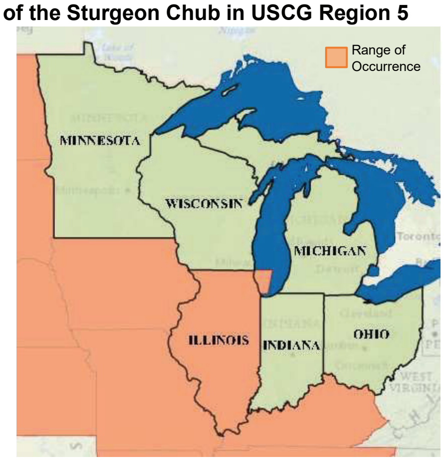
Sturgeon Chub	**Status**	**Under Review**	82 FR 60362
Scientific Name	*Macrhybopsis gelida*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: The Sturgeon Chub is a slender, streamlined benthic minnow that inhabits mainstem, turbid rivers and resides over sandy and gravel shoals. Generally, its appearance is a light brown back with silvery-colored sides and belly. The defining characteristic is its long snout that overhangs the mouth, similar to the morphology of sturgeon species, and the presence of ridge-like projections on many scales. Similar to other chub species, maxillary barbels and external taste buds cover the head and body and are used to locate food in highly turbid waters. The maximum size has been reported to be 70 mm; however, adults exceeding 100 mm have been captured in the channelized Missouri River.

Life History: The Sturgeon Chub reaches sexual maturity at age 2. Spawning occurs throughout the summer at water temperatures of 18.3 to 22.7°C (65 to 72.9°F). Multiple stages of eggs in gravid females suggest that the fish spawns multiple times during the summer. Estimates of fecundity range from 2,000 to 5,310 eggs per female. Sturgeon Chub are pelagic-spawning cyprinids, small-bodied fish that produce semi-buoyant, nonadhesive eggs within pelagic zones of large flowing streams. These fish "produce eggs that achieve semi-buoyancy soon after fertilization but require water movement to remain in suspension."

Range of the Sturgeon Chub in USCG Region 5



Current Threats:

- Dams
- Water pollution and industrial depletion
- Dredging of river substrates
- Non-native fish competition

Distribution/Habitat: Historically, the Sturgeon Chub occurred throughout 2,100 mi of the main stem Missouri River and 1,150 mi of the main stem Mississippi River. The species also was found in the Yellowstone River in Montana and North Dakota and 30 tributaries to the Yellowstone and Missouri Rivers. As of 2001, Sturgeon Chub occupied approximately 1,155 mi or about 55% of its former range in the Missouri River. The species also continues to be found in 11 of 30 tributaries to the Yellowstone and Missouri Rivers that were documented as providing Sturgeon Chub habitat. Field studies have documented a viable population of Sturgeon Chub in the Middle Mississippi River and the Wolf Island area of the Lower Mississippi River. They are "fairly common" in the middle Missouri River and rare elsewhere, meaning that in the Middle Missouri River, they may be found in their preferred habitat within their range but are highly unlikely to be found in their preferred habitat within their range outside the Middle Missouri. A 2010 study indicated that Sturgeon Chub had been extirpated from a majority (75%) of 60 Great Plains stream fragments surveyed. In Illinois, this species lives in the main channel of the Mississippi River, which has a strong current and turbid water.

Primary Habitat in Action Area/RAM: Ports, Canals, Industrial Areas, Rivers and Streams

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

NatureServe (2021) *NatureServe Explorer – Sturgeon Chub*
WildEarth Guardians (2016) *Petition to list the Sturgeon Chub (Macrhybopsis gelida) and Sicklefin Chub (Macrhybopsis meeki) under the U.S. Endangered Species Act*

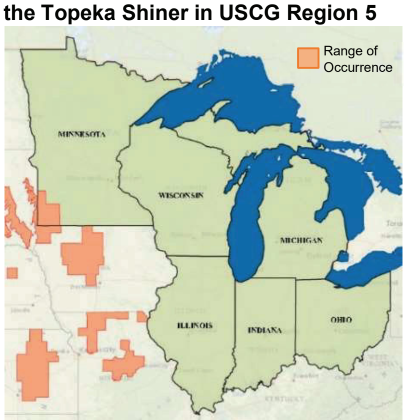
Topeka Shiner	**Status**	**Endangered (1998)**	63 FR 69008
Scientific Name	*Notropis topeka*	**Critical Habitat**	69 FR 44736

Photo: Missouri Department of Conservation

Appearance: The Topeka shiner is a small, stout minnow, not exceeding 75mm in total length. The head is short with a small, moderately oblique (slanted or sloping) mouth. The eye diameter is equal to or slightly longer than the snout. The dorsal fin is large, with a height more than one-half the predorsal length of the fish, originating over the leading edge of the pectoral fins. Dorsally the body is olivaceous (olive-green), with a distinct dark stripe preceding the dorsal fin. A dusky stripe is exhibited along the entire longitudinal length of the lateral line. The scales above this line are darkly outlined with pigment, appearing crosshatched. Below the lateral line, the body lacks pigment, appearing silvery-white. A distinct chevron-like spot exists at the base of the caudal (tail) fin.

Life History: The Topeka Shiner is characteristic of small, headwater, prairie streams with good water quality and cool temperatures. They are pelagic in nature, occurring in mid-water and surface areas, and are primarily considered schooling fish. In Minnesota, Iowa, and South Dakota, Topeka Shiners depend heavily on off-channel habitats, such as oxbows, that may be only periodically connected to nearby streams. Definitions of Topeka Shiners' general diet vary among studies, although insect larvae and microcrustacea seem to be consistently important. The species is primarily a diurnal feeder on insects, with chironomids (midges), other dipterans (true flies), and ephemeropterans (mayflies) making up the bulk of the diet.

Range of the Topeka Shiner in USCG Region 5



Current Threats:

- Water pollution
- Dams
- Sedimentation
- Predation by introduced species

Distribution/Habitat: The Topeka shiner is known to occur in portions of South Dakota, Minnesota, Kansas, Iowa, Missouri, and Nebraska. In South Dakota, Topeka Shiners were known at 11 localities in the Vermillion and James River watershed at the time of listing. Since listing, Topeka Shiners have been captured from an additional 48 streams. In Minnesota, Topeka Shiners were known from 15 locales in eight streams in the Rock and Big Sioux River watersheds at the time of listing and are now known from 75 sites in at least 17 named streams. In Kansas, Topeka Shiners were extant in several watersheds within the Kansas and Cottonwood River basins at the time of listing. In Iowa, at the time of listing, the Topeka Shiner was known extant at 10 sites. Since 1999, the species has been captured from streams or off-channel pools of 16 tributaries to the North Raccoon River and five off-channel pools adjacent to the mainstem North Raccoon River. The species also has been captured in low numbers from two tributaries in the Des Moines River and five tributaries of the Boone watershed. In Missouri, three populations were believed extant at the time of listing. At present, two populations exist in the wild.

Primary Habitat in Action Area/RAM: Rivers and Streams, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), and Submersed Vegetation

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:
USFWS (2009) *Topeka Shiner (Notropis topeka) 5-year review*
USFWS (2019) *Biological Opinion: effects to the Topeka Shiner from the implementation of state project 059-602-026, County State Aid Highway 2, Pipestone County, Minnesota*
MNDNR (2021) *Notropis topeka (Topeka Shiner)*

4.8 Herptiles

Alligator Snapping Turtle	Status	Under Review	80 FR 37568

Scientific Name	*Macrochelys temminckii*	Critical Habitat	N/A

Photo: Eva Kwiatek via illinois.edu

Appearance: The Alligator Snapping Turtle is characterized by a large head and three rows of spiked scutes (enlarged scales or laminae). The rows of spiked scutes usually form three distinct complete or incomplete keeled ridges on the brown carapace (upper shell), distinguishing *M. temminckii* from the Snapping Turtle (*Chelydra serpentina*). Some of the marginal scutes on the carapace occur in a double row rather than the single row seen in *Chelydra*. A strongly hooked beak is present on most but not all specimens. The tongue has a unique worm-like appendage ("fishing lure"). The plastron (lower shell) is relatively small. The Alligator Snapping Turtle is the largest freshwater turtle in the United States, reaching a record carapace length of 800 mm (31.5 in.), and weight of 113.9 kg (251 lb).

Life History: Alligator Snapping Turtles are long-lived organisms. In captivity, mating has been observed from February to October, but geographic variation in mating season is poorly understood. Males are capable of sperm production year-round. Females ovulate in the spring, and most nesting occurs in May through July. Females appear to breed annually but may skip a year if they have poor foraging success. Clutch size may range from 9 to 40 and may vary geographically. Alligator Snapping Turtles are omnivorous and consume a wide variety of plant and animal matter.

Range of the Alligator Snapping Turtle in USCG Region 5

Current Threats:

- Habitat alteration and destruction
- Overutilization
- Disease and predation
- Inadequacy of existing regulatory mechanisms

Distribution/Habitat: Habitat consists of slow-moving, deep water of rivers, sloughs, oxbows, and canals or lakes associated with rivers (e.g., large impoundments including reservoirs); and also swamps, bayous, and ponds near rivers, and shallow creeks that are tributary to occupied rivers, sometimes including swift upland streams. This turtle sometimes enters brackish waters near river mouths. The indigenous range of Alligator Snapping Turtle encompasses eastern Texas, eastern Oklahoma, extreme southeastern Kansas and adjacent southwestern Missouri; the Mississippi River Valley of eastern Missouri up the valley northward through western Illinois, southern Indiana, and southeastern Iowa; western Kentucky and Tennessee (including disjunct populations in central Indiana and Tennessee); and other Gulf Coast drainages in Arkansas, Alabama, Louisiana, Mississippi, southwestern Georgia, and northern Florida as far south as the Santa Fe and Suwanee Rivers.

Primary Habitat in Action Area/RAM: Shoreline (beach/land), Ports, Canals, Industrial Areas, Rivers & Streams, Ponds & Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X				

Additional References:

CBD (2012) *Petition to list 53 amphibians and reptiles in the United States as threatened or endangered species under the Endangered Species Act*
Fuller and Somma (2021) *Macrochelys temminckii (Troost in Harlan, 1835)*
Indiana Herp Atlas (2021) *Alligator Snapping Turtle (Macrochelys temminckii)*
INHS (2021) *Alligator Snapping Turtle Macrochelys temminckii (Troost, in Harlan, 1835)*
Reed et al. (2002) *The Alligator Snapping Turtle [Macrochelys (Macroclemys) temminckii]: a review of ecology, life history, and conservation, with demographic analysis of the sustainability of take from wild populations*

Blanding's Turtle	**Status**	**Under Review**	80 FR 37568
Scientific Name *Emydoidea blandingii*		**Critical Habitat**	N/A

Photo: Todd Pierson via fws.gov

Appearance: Blanding's Turtles are dark brown to black with some yellow spotting on the carapace. The carapace is domed and elongated, and the plastron is hinged at the pectoral-abdominal seam. The characteristic that most easily separates it from other species within its range is the bright yellow color of the entire ventral portion of its throat and long neck. The vent is located posterior to the margin of the carapace, and the plastron is slightly concave in males. Across most of their range, adults of both sexes range from approximately 150 to 240 mm in carapace length, and from about 750 to 1,400 g in body mass.

Life History: Blanding's Turtles make seasonal movements among aquatic areas, possibly related to seasonally abundant resources or access to mates. Winter dormancy is primarily between mid-October/November until late March, but Blanding's Turtles have been recorded active until early December and as early as March 1. Adult *Emydoidea* are primarily carnivorous or omnivorous, consuming crayfish and other crustaceans, insects, other invertebrates, and vegetable matter. Females mature between ages 14 and 20. On average, nesting takes place from late May to early July, with nest construction taking 2 to 2.5 hours to complete. Clutch sizes range from 3 to 19 eggs.

Range of Blanding's Turtle in USCG Region 5

Current Threats:

- Habitat alteration and destruction
- Wetland degradation
- Pesticides and herbicides
- Water management activities
- Population fragmentation
- Overutilization
- Disease or predation

Distribution/Habitat: In general, Blanding's Turtles occupy various eutrophic wetlands such as swamps, marshes, beaver dams, permanent and temporary ponds/pools, and slow-flowing streams. Blanding's Turtles frequently emerge from the water to bask on logs and tussocks or sedge clumps. The main range extends disjunctly from southeastern Ontario, adjacent Quebec, and southern Nova Scotia, south into New England, and west through the Great Lakes to western Nebraska, Iowa, and extreme northeastern Missouri. Except for two populations in the western portion of their range (Minnesota and Nebraska), populations are frequently small, discontinuous, and often isolated. In the eastern USA and Canada, small and disjunct populations occur in southeastern New York, Massachusetts, New Hampshire, and Nova Scotia. A major population center of this species included southeastern Ontario, the lower peninsula of Michigan, Wisconsin, and Minnesota. Two populations of note are in southeastern Minnesota (>5,000 adults) and north-central Nebraska (>130,000 individuals).

Primary Habitat in Action Area/RAM: Shoreline (beach/land), Rivers and Streams, Bays and Estuaries, Ponds and Lakes, Wetlands, Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, Sedge Meadow, Bog, Calcareous Fen, Mudflats, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:
CBD (2012) *Petition to list 53 amphibians and reptiles in the United States as threatened or endangered species under the Endangered Species Act*
Congdon et al. (2008) *Emydoidea blandingii (Holbrook 1838) – Blanding's Turtle. Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*

Copperbelly Water Snake, Northern DPS	Status	Threatened (1997)	62 FR 4183

Scientific Name	*Nerodia erythrogaster neglecta*	Critical Habitat	N/A


Photo: University of Kentucky

Appearance: Copperbelly Water Snakes have solid, dark, dorsal coloration with bright orange-red ventral coloration typically visible from the side. Juveniles often have obvious dorsal banding for the first year or two of their life. This banding is gradually lost, leading to the typical solid, dark, dorsal color over time. Copperbelly Water Snakes may be confused with the co-occurring Northern Water Snake (*Nerodia sipedon sipedon*), which may occasionally display similar dark dorsal coloration. Yet, the Northern Water Snake lacks the solid-colored ventral coloration, and instead has a pattern of half-moon-shaped spots. The Copperbelly Water Snake grows 3 to 5 ft in length, with females often larger than males

Life History: Copperbelly Water Snakes emerge from hibernacula in early spring, at which point they remain nearby hibernacula for some time. As ambient and water temperatures increase, the snakes begin moving to adjacent wetlands for foraging and searching for mates. Courtship and mating activities for this species primarily occur in the spring but may extend into the early summer. As ephemeral forested wetlands dry out during the summer, snakes increasingly rely on upland habitats for foraging and aestivation. In fall, Copperbelly Water Snakes migrate to hibernacula sites, typically located in or near bottomland forests. Although hibernacula sites may include root wads, dense brush piles, fieldstone piles, and potentially muskrat or beaver lodges, more often abandoned crayfish burrows are used.

Range of Copperbelly Water Snake in USCG Region 5

Current Threats:

- Habitat loss and fragmentation
- Overcollection
- Predation
- Inadequate existing regulatory mechanisms
- Small isolated populations
- Other natural or artificial factors

Distribution/Habitat: Copperbelly Water Snakes migrate seasonally across their habitat, including wetlands like bottomland forests and scrub-shrub swamps and surrounding upland forest and forest edge. Generally, wetlands used by this species have shallow water, an open canopy, and short, dense vegetation. Copperbelly Water Snakes also frequently use upland habitats including forest and grasslands, for both foraging and movement among wetlands across the landscape. The historical range of the Copperbelly Water Snake is somewhat convoluted but certainly included south-central Michigan and northeastern Ohio, southwestward through Indiana to extreme southeastern Illinois and adjacent Kentucky. The northern distinct population segment is defined as all populations occurring north of 40˚ north latitude. At the time of listing, the northern distinct population segment consisted of eight clusters knows to have individuals present in the ten years prior, with snakes found at only five of these clusters in 1996.

Primary Habitat in Action Area/RAM: Wetlands, Upland Areas

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
	X	X		X	

Additional References:

Allender et al. (2015) *The natural history, ecology, and epidemiology of Ophidiomyces ophiodiicola and its potential impact on free-ranging snake populations*
USFWS (2008) *Northern population segment of the Copperbelly Water Snake (Nerodia erythrogaster neglecta) recovery plan*

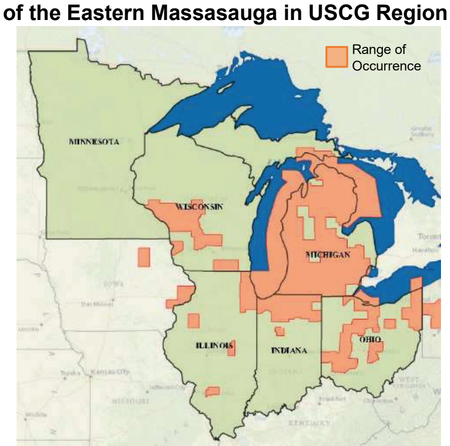
Eastern Massasauga	**Status**	**Threatened (2016)**	81 FR 67193
Scientific Name	*Sistrurus catenatus*	**Critical Habitat**	N/A


Photo: U.S. Fish & Wildlife Service

Appearance: The Eastern Massasauga Rattlesnake is a small, heavy-bodied snake with a heart-shaped head and vertical pupils. The average length of an adult is approximately 0.6 m (2 ft), with a maximum length of approximately 1 m (3 ft). Adult Eastern Massasauga Rattlesnakes are mostly gray or light brown with large, light-edged chocolate brown to black blotches on the back and smaller blotches on the sides. Its belly is marbled dark gray or black, and there are brown stripes on the sides of the head, each bordered by a narrow, white stripe. Its tail has several dark brown rings and is tipped by gray-yellow keratinized rattles.

Life History: The annual cycle of Eastern Massasauga Rattlesnake is characterized by two seasons: the active and inactive or winter dormant seasons. The start of the active season varies by latitude, but generally, it begins in March or April when Eastern Massasauga Rattlesnakes emerge from their winter hibernacula and move to their summer habitat, where mating and parturition occurs in later summer. Like most pitvipers, the Eastern Massasauga Rattlesnake is ovoviviparous, meaning embryos develop within eggs held by the female and gives birth to live young. Data indicate that average brood size varies significantly across the range (average 9.3). In fall, Eastern Massasauga Rattlesnakes return to their winter areas to hibernate.

Range of the Eastern Massasauga in USCG Region 5



Current Threats:

- Habitat loss and modification (conversion)
- Development
- Prescribed fire and mowing
- Road mortality
- Persecution and collection
- Disease

Distribution/Habitat: Individual snakes can be found in a wide variety of habitats, including old fields, bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, sedge meadows, peatlands, forest edge, scrub-shrub forest, floodplain forests, and coniferous forests. The documented historical range of the Eastern Massasauga Rattlesnake included sections of western New York, western Pennsylvania, southeastern Ontario, the upper and lower peninsulas of Michigan, the northern two-thirds of Ohio and Indiana, the northern three-quarters of Illinois, the southern half of Wisconsin, extreme southeast Minnesota, east-central Missouri, and the eastern third of Iowa. The limits of the current range of the Eastern Massasauga Rattlesnake resemble the boundaries of its historical range. However, the geographic distribution of extant localities has been restricted by the loss of the populations from much of the area within the boundaries of that range.

Primary Habitat in Action Area/RAM: Wetlands, Upland Areas

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	X

Additional References:

USFWS (2015) *Species status assessment for the Eastern Massasauga Rattlesnake (Sistrurus catenatus)*
USFWS (2019) *Draft recovery plan for the Eastern Massasauga Rattlesnake (Sistrurus catenatus)*

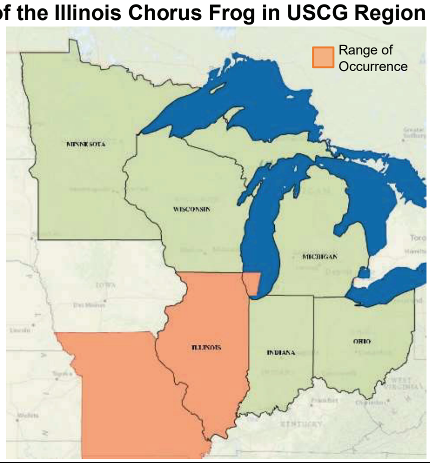
Illinois Chorus Frog	**Status**	**Under Review**	80 FR 37568
Scientific Name	*Pseudacris illinoensis*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: The Illinois Chorus Frog (ICF) is a small (1.4 to 1.75 in. and 0.2 oz) tan to gray frog. Its body is stout and toad-like with robust forearms. Its skin is granular rather than smooth. It has dark brown or black lines on its back with a white belly. It has a characteristic dark masklike stripe from snout to shoulder, a dark spot under each eye, and a V- or Y-shaped mark between the eyes. The throat (vocal pouch) of the male ICF darkens during the breeding season. ICF tadpoles can be distinguished from other tadpoles by their round shape, large size, the forward attachment point of the tail, and large tail height.

Life History: ICF spends most of its life underground, where it digs forward through the sandy soil with its unusually strong forearms, rather than backward with its hind legs like most fossorial amphibians. The ICF is the only known frog capable of feeding below ground, but surface feeding is also likely. The ICF is among the earliest Illinois frogs to emerge and call, often while snow is on the ground and air temperatures are below freezing in late winter or early spring. Breeding begins soon after emergence. Eggs and sperm clusters of 10 to 40 eggs are deposited on the underside of submerged or floating vegetation. ICF eggs likely hatch into tadpoles within a few days. After about two months, ICF tadpoles undergo metamorphosis into the terrestrial form and disperse from the pond around late May or early June.

Range of the Illinois Chorus Frog in USCG Region 5



Current Threats:

- Agricultural drainage
- Habitat loss
- Habitat fragmentation
- Habitat degradation
- Climate change
- Invasive species
- Pollution
- Disease

Distribution/Habitat: ICF populations are restricted to Missouri, Arkansas, and Illinois. ICF likely migrated into Illinois along river floodplains containing sands or sandy soils deposited by either water or wind. In Illinois, ICF records occur in three widely separated sandy floodplain regions. The northern region covers the largest area; it occurs along the east side of the Illinois River in the central portion of the state from Tazewell County in the north to Scott County in the south and east to Logan County. The central region near the Mississippi River in Monroe and Madison Counties has significantly been reduced to roughly 250 acres in Madison County. The southern region near the junction of the Ohio and Mississippi Rivers in extreme southern Illinois in Alexander County has a single population with multiple breeding ponds in the area around Horseshoe Lake Conservation Area.

Primary Habitat in Action Area/RAM: Ponds and Lakes, Wetlands, Upland Areas

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, Wet Meadow, Beach and Sand Bar, and Open Water

Potential Range by State

IL	IN	MI	MN	OH	WI
X					

Additional References:

Henning and Hinz (2016) *Conservation guidance for Illinois Chorus Frog*

Spotted Turtle	**Status**	**Under Review**	80 FR 37568
Scientific Name	*Clemmys guttata*	**Critical Habitat**	N/A

Photo: Massachusetts Division of Fisheries and Wildlife

Appearance: The Spotted Turtle is a relatively small freshwater turtle species, with an adult carapace (upper shell) length averaging 9 to 14 cm. The species is recognized by its black keel-less, unserrated carapace overlaid with an irregular pattern of yellow or yellow-orange spots. The plastron (lower shell) is orange to yellow-orange with black blotches on each scute; however, the plastron tends to become more black with age. The head is black, with yellow to yellow-orange spots and large orange "ear" patches on either side. The legs are black with yellow-orange spots on the upper surface and orange to pinkish-orange on the lower surface.

Life History: Spotted Turtles aggregate in aquatic habitats in early spring to mate and tend to show fidelity to breeding sites. Nesting takes place from May to June and is primarily nocturnal. However, females may disperse outside their regular home range to oviposit. Egg incubation is at least 72 days in the wild. In northern North America, hatchling emergence occurs around September and October though neonates may overwinter in the nest chamber and emerge the following spring. Clutch sizes for northern Spotted Turtles range from one to seven eggs, with a mean of four to five eggs. Food items reported for U.S. Spotted Turtles include algae, cranberries, earthworms, aquatic insect larvae, small crustaceans, snails, tadpoles, salamanders, and carrion from fish and birds.

Range of the Spotted Turtle in USCG Region 5

Current Threats:

- Habitat alteration and destruction
- Road mortality
- Overcollection
- Predation
- Stochastic events

Distribution/Habitat: Spotted Turtles occur in high organic content wetlands with unpolluted shallow waters, soft substrates, and high amounts of aquatic and emergent vegetation, including ponds, vernal pools, ditches, acidic bogs, alkaline fens, Cattail/tussock marshes, shallow graminoid meadow marsh, woodland streams, sheltered edges of shallow bays, and various swamp habitats. The Spotted Turtle's current distribution is restricted to eastern North America. However, disjunct subpopulations range from southern Ontario and Maine southward along the Atlantic Coastal Plain to central Florida, and westward through Pennsylvania, Ohio, Indiana, northeastern Illinois, and across the lower peninsula of Michigan.

Primary Habitat in Action Area/RAM: Rivers and Streams, Bays and Estuaries, Ponds and Lakes, Wetlands, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, Sedge Meadow, Bog, Calcareous Fen, Mudflats, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	

Additional References:

Ernst and Lovich (2009) *Turtles of the United States and Canada, 2nd Edition*
Indiana Herp Atlas (2021) *Spotted Turtle (Clemmys guttata)*
INHS (2021) *Spotted Turtle Clemmys guttata (Schneider, 1792)*
MNFI (2021) *Clemmys guttata (Spotted Turtle)*
ODNR (2018) *Reptiles of Ohio field guide*

Streamside Salamander	**Status**	**Under Review**	76 FR 59836
Scientific Name	*Ambystoma barbouri*	**Critical Habitat**	N/A

Photo: Andrew Hoffman via Indiana Herp Atlas

Appearance: The Streamside Salamander is of medium size, with a relatively small head, short snout, stout body, short limbs, relatively short and fat tail, 14 to 15 deeply impressed costal grooves on the body, and similarly impressed grooves along most of the tail. The dorsal ground color is dark gray, black, or brown but is largely hidden by a dense pattern of gray (dorsally) and light blue-gray (laterally) lichenose frosting. The ventral ground color is slightly lighter, with more discrete lichenose blotches. Larvae are dark green-brown dorsally and laterally, dirty white ventrally, with a sharp transition to the pale mid-ventral coloration laterally at a point below the limb insertions. They have a dark throat and a wide dorsal tail fin that extends to the rear of the head.

Life History: Like other members of the genus, adult Streamside Salamanders spend most of their lives underground. Migration to the breeding stream begins in autumn and continues in late winter. The breeding period is extensive, commencing in January/February and extending through April. In streams, eggs are almost always attached to the undersides of flat limestone rocks. Clutches are usually deposited in shallow pools or runs of 10 to 20 cm depth, with a preference for pools. Eggs incubate for a period ranging from 29 to 82 days. Larvae feed primarily on a diversity of zooplankton and chironomid fly larvae but will take isopods and amphipods if their prey is not too large to swallow. The larval period is approximately 7 to 9 weeks.

Range of the Streamside Salamander in USCG Region 5

Current Threats:

- Habitat alteration and destruction
- Urban development
- Deforestation
- Siltation
- Predation
- Stochastic weather events

Distribution/Habitat: The species inhabits upland deciduous forests or rolling topography. Most populations occur on a substrate of limestone bedrock, but some inhabit substrates of sandstone or shale. For breeding habitat, it is dependent on ephemeral first- and second-order streams having natural barriers that prevent the ingress of fish, so salamanders are never found far from the hills that provide such habitat. The range of the Streamside Salamander lies largely within the upper Bluegrass Region in the middle portion of the Ohio River Drainage. The majority of the range encompasses central Kentucky and the immediately adjacent areas of southwestern Ohio and southeastern Indiana. However, outlying populations occur in western and southern Kentucky, northern Tennessee, and western West Virginia.

Primary Habitat in Action Area/RAM: Streams and Rivers, Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, and Floodplain Forest

Potential Range by State

IL	IN	MI	MN	OH	WI
	X			X	

Additional References:

CBD (2010) *Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act*
Indiana Herp Atlas (2021) *Small-Mouthed Salamander (Ambystoma texanum)*
Kraus (2013) *Amphibians of Ohio*

Wood Turtle	**Status**	**Under Review**	80 FR 56423
Scientific Name	*Glyptemys insculpta*	**Critical Habitat**	N/A

Photo: Michigan Natural Features Inventory

Appearance: The Wood Turtle is a medium-sized turtle. The carapace (upper shell) length ranges from 12 to 24 cm (4.7 to 9.4 in.). Its low-keeled carapace ranges in color from brown to grayish brown to tan and is accompanied by black and yellow flecks, at times with yellow rays. Scutes on the carapace have an irregular, pyramidal appearance from the concentric circles formed by growth rings and ridges. Dorsal portions of the head, arms, legs, and tail are dark brown, while the neck, throat, and forelegs are yellow, orange, or red. Females are generally pale yellow in color, while pigmentation in males is often bright yellow, orange, or red.

Life History: In the Upper Great Lakes Region, the active season for the Wood Turtle generally begins with the emergence of turtles from streams in April or May and lasts until September or October as turtles return to their overwintering stream. Overwintering typically begins in October. Wood Turtles have been found mating from April until November, although mating is more widely documented in the fall. Females search for nesting habitat and lay eggs from late May until early July, peaking in June. Clutch sizes are known to be as high as 20 eggs. Hatchlings emerge from the nest between August and October.

Range of the Wood Turtle in USCG Region 5

Current Threats:

- Habitat destruction and modification
- Urbanization
- Flood control
- Pollution
- Adult removal
- Road mortality
- Low recruitment

Distribution/Habitat: Wood Turtles are most often found in and around clear, moderate to fast-moving rivers and streams with sand, gravel, or cobble substrates. Wood Turtles are habitat generalists, using a wide variety of forested habitats close to water. Wood Turtles are native to eastern North America. They range in the northeast from Nova Scotia, New Brunswick, and Maine, southwest along the Atlantic coast to Maryland, Virginia, and West Virginia, northwest to Wisconsin, northeast Iowa, and eastern Minnesota, and north to southern Ontario and southern Quebec.

Primary Habitat in Action Area/RAM: Streams and Rivers, Wetlands, Upland Areas

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Mudflats, Sedge Meadow, Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
		X	X	X	X

Additional References:
Bowen and Gillingham (2004) *R9 species conservation assessment for Wood Turtle – Glyptemys insculpta (LeConte, 1830)*
Jones and Willey (2015) *Status and conservation of the Wood Turtle in the northeastern United States*
Jones et al. (2018) *Conservation plan for the Wood Turtle in the northeastern United States*
MNDNR (2021) *Glyptemys insculpta (Wood Turtle)*
MNFI (2021) *Glyptemys insculpta (Wood Turtle)*
WIDNR (2016) *Wisconsin Wood Turtle (Glyptemys insculpta) status assessment and conservation strategy*

4.9 Mammals

Canada Lynx, Contiguous DPS	**Status**	**Threatened (2000)**	65 FR 16053

Scientific Name	*Lynx canadensis*	**Critical Habitat**	71 FR 66008

Photo: U.S. Fish & Wildlife Service

Appearance: The Canada Lynx is a medium-sized cat with long legs and large, well-furred paws. In winter, the lynx's fur is dense and has a grizzled appearance with a grayish-brown mix of buff or pale brown fur on the back, and a grayish-white or buff-white fur on the belly, legs, and feet. In summer, its fur is more reddish to gray-brown. It has long tufts of black hairs extending from the tips of its ears; a short, completely black-tipped tail; and often a distinct dish-like facial ruff of pale hairs tipped black. The Canada Lynx generally measures 75 to 90 cm (30 to 35 in.) long and weighs 6 to 14 kg (14 to 31 lb).

Life History: Lynx are highly specialized hare predators and require landscapes that consistently support relatively high hare densities. Hare abundance strongly influences Lynx denning area selection, pregnancy rates, and litter sizes; survival (kitten, subadult, and adult), recruitment, and dispersal rates; and population age structure, home range sizes, density, and distribution. Lynx typically mate in March and April, and kittens are born from late April to mid-June. Juveniles remain closely associated with their mothers until February or March, when family groups begin to break up, with young dispersing in April and May to establish their home ranges.

Range of the Canada Lynx in USCG Region 5

Current Threats:

- Inadequate forest management regulations
- Climate change

Distribution/Habitat: The Canada Lynx is broadly distributed across northern North America from eastern Canada to Alaska. It is strongly associated with the expansive, continuous boreal forests of those areas. Its range largely overlaps that of its primary prey, the snowshoe hare, which is also a boreal forest specialist. When USFWS listed the distinct population segment (DPS) under the ESA, they defined its range as the forested portions of Maine, New Hampshire, New York, Vermont, Michigan, Minnesota, Wisconsin, Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming. It seems likely that lynx occurred historically in some states (New York, Vermont, Wisconsin, Oregon, and Utah) only intermittently as dispersers or as small, naturally ephemeral populations, not as persistent resident breeding populations. In other states (New Hampshire, Michigan, Colorado, and Wyoming), it remains uncertain whether resident lynx occurred historically as small but persistent breeding populations or only ephemerally. Parts of the remaining states (Idaho, Maine, Minnesota, Montana, and Washington) show the strongest evidence of historical and recent (at the time of listing and since then) persistent resident populations.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
		X	X		X

Additional References:

USFWS (2013) *Canada Lynx (Lynx canadensis) fact sheet*
USFWS (2017) *Species status assessment for the Canada Lynx (Lynx canadensis) contiguous United States Distinct Population Segment*

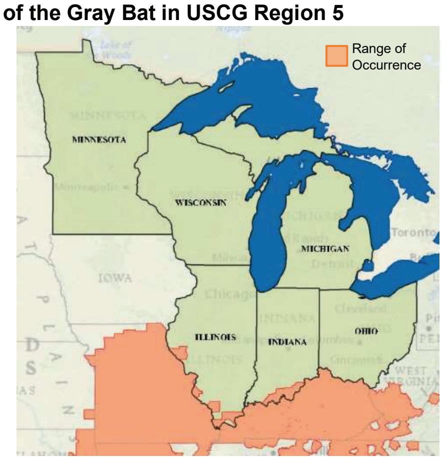
Gray Bat	**Status**	**Endangered (1976)**	41 FR 17736
Scientific Name	*Myotis grisescens*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Gray Bat can reach a body length of 3.5 in. (8.9 cm), a wingspan of 9 to 11 in. (22.9 to 27.9 cm), and a forearm length of 1.8 in. (4.6 cm). Although typically gray, the fur can turn to a reddish-brown color during the summer. Gray Bats also have a calcar (spur of cartilage) on their foot, which is used for stability during flight. Gray Bats are distinguished from other bats by the unicolored fur on their back. In addition, following their molt in July or August, Gray Bats have dark gray fur, which often bleaches to a chestnut brown or russet.

Life History: Gray Bats roost, breed, rear young, and hibernate in caves year-round. They migrate between summer and winter caves and will use transient or stopover caves along the way. Mating occurs as bats return to winter caves in September and October. By November, most gray bats are hibernating. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm over winter and become pregnant the following spring. A few hundred to many thousands of pregnant females congregate to form maternity colonies. Males and nonreproductive females gather in smaller groups to form "bachelor colonies." A single pup is born in late May or early June. Young begin to fly 20 to 25 days after birth. Gray Bats feed primarily on flying insects over rivers and lakes. Aquatic insects, particularly mayflies, make up most of their diet.

Range of the Gray Bat in USCG Region 5



Current Threats:

- Human disturbance
- Flooding and reservoir construction
- Commercialization of caves

Distribution/Habitat: The Gray Bat occupies a limited geographic range in limestone karst areas of the southeastern United States. They are mainly found in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee. A few can be found in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina.

Primary Habitat in Action Area/RAM: Rivers and Streams, Ponds and Lakes, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Sedge Meadow, and Shallow Marsh Vegetation (Annuals, Perennials, Shrub)

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X				

Additional References:
FFWC (2021) *Gray Bat (Myotis grisescens)*
KDFWR (2021) *Gray Bat (Myotis grisescens)*
USFWS (1997) *Gray Bat (Myotis grisescens) fact sheet*
USFWS (2021) *Gray Bat (Myotis grisescens) species profile*

Gray Wolf	**Status**	**Delisted (2020)**	85 FR 69778

Scientific Name	*Canis lupus*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Gray Wolves generally weigh 23 to 46 kg (50 to 100 lb) as adults. They are usually a mixed gray, but a small percentage are black or white.

Life History: Most wolves live in family groups or packs consisting of two to eight members, although packs up to 21 have been reported. Each pack inhabits an area of 51 to 555 km^2 (20 to 214 mi^2) and tends to be territorial. There is a dominance hierarchy within each pack, and generally only the top-ranking male and female breed. Pups are produced from early April through early May, and litter sizes average four to seven. Some offspring remain with the pack, and others leave the territory as they mature. Prey consists of white-tailed deer, moose, and beaver.

Range of the Gray Wolf in USCG Region 5

Current Threats:

- Human persecution
- Habitat deterioration
- Reduction of prey populations

Distribution/Habitat: Prior to European settlement, the Gray Wolf inhabited most of North America south to at least 20 degrees latitude. Human persecution, habitat deterioration, and the reduction of prey populations led to the decline of wolves. Wolves were almost eliminated from the western United States by the 1930s. In Wisconsin and Michigan, wolves were eliminated by the mid-1960s. At that time, only a small number of wolves survived in northeastern Minnesota and on Isle Royale in Michigan, although large populations remained in Canada and Alaska. After listing under the ESA, wolf populations began to expand. This expansion led to wolves naturally recolonizing northwest Wisconsin, and the first breeding pack was confirmed in Douglas County in 1978. While initial population growth was slow, by the mid-1990s, Wisconsin's wolf population began to increase and expand steadily. Wolves in the Western Great Lakes region surpassed federal recovery goals in the winter of 1999-2000, when Wisconsin and Michigan had a combined total of 100 wolves for 5 consecutive years, and the population in Minnesota remained stable or continued to grow. Minnesota's Gray Wolf population has remained stable over the last 10 years, with most areas of suitable habitat in the state now occupied.

Primary Habitat in Action Area/RAM: Upland Areas

Associated Vulnerable Habitats: None

Potential Range by State

IL	IN	MI	MN	OH	WI
		X	X		X

Additional References:

MNDNR (2021) *Canis lupus (Gray Wolf)*
USFWS (2021) *Gray Wolf (Canis lupus) species profile*
WIDNR (2021) *Wolves in Wisconsin*

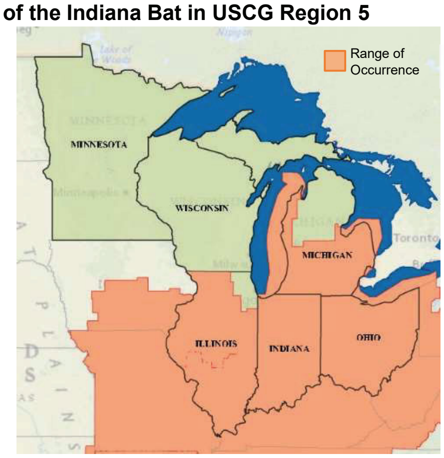
<u>Indiana Bat</u>	**Status**	**Endangered (1967)**	32 FR 4001
Scientific Name	*Myotis sodalis*	**Critical Habitat**	41 FR 41914

Photo: U.S. Fish & Wildlife Service

Appearance: The Indiana Bat is quite small, weighing only one-quarter of an ounce (about the weight of three pennies), although, in flight, it has a wingspan of 9 to 11 in. Its fur is a dull grayish chestnut rather than bronze, with the basal portion of the hairs on the back a dull-lead color. This bat's underparts are pinkish to cinnamon, and its hind feet are smaller and more delicate than in the Little Brown Bat (*M. lucifugus*), which it closely resembles. The calcar (heel of the foot) is strongly keeled.

Life History: Indiana Bats mate during fall before they enter caves to hibernate. They require cool, humid caves with stable temperatures, under 50°F but above freezing. Females store the sperm through winter and become pregnant in spring soon after they emerge from the caves. After migrating to their summer areas, females roost under the peeling bark of dead and dying trees in groups of up to 100 or more. Such groups are called maternity colonies. Each female in the colony gives birth to only one pup per year. Young bats are nursed by the mother, who leaves the roost tree only to forage for food. The young stay with the maternity colony throughout their first summer.

Range of the Indiana Bat in USCG Region 5



Current Threats:

- Human disturbance
- Commercialization of caves
- Changes in cave structure (e.g., gates)
- Habitat loss and fragmentation
- Pesticides and contaminants

Distribution/Habitat: Indiana Bats hibernate during winter in caves or, occasionally, in abandoned mines. During summer, they roost under the peeling bark of dead and dying trees. They are found over most of the eastern half of the United States. Almost half of all Indiana Bats (207,000 in 2005) hibernate in caves in southern Indiana. In 2005, other states that supported populations of over 40,000 included Missouri (65,000), Kentucky (62,000), Illinois (43,000), and New York (42,000). Other states within the current range of the Indiana Bat include Alabama, Arkansas, Connecticut, Iowa, Maryland, Michigan, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia. The 2005 population estimate is about 457,000 Indiana Bats, half as many as when the species was listed as endangered in 1967.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X		X	

<u>Additional References:</u>

USFWS (2006) *Indiana Bat (Myotis sodalis) fact sheet*
USFWS (2019) *Indiana Bat (Myotis sodalis)*

Little Brown Bat	**Status**	**Under Review**	

Scientific Name	*Myotis lucifugus*	**Critical Habitat**	N/A

Photo: Kentucky Department of Fish & Wildlife Resources

Appearance: Little Brown Bats weigh between 5.5 and 12.5 g (0.19 to 0.44 oz). Individual bats' weights vary seasonally and are least in the spring as bats emerge from hibernation. Adult forearm lengths range from 36 to 40 mm (1.4 to 1.6 in.), and total body length is 8.0 to 9.5 cm (3.1 to 3.7 in.). Adult Little Brown Bat wingspan is 222 to 269 mm (8.75 to 10.5 in.). Body-color ranges from pale tan to reddish to dark brown and is lighter on the ventral side. Feet have long toe hairs extending to the tips of the toes.

Life History: The life cycle of the Little Brown Bat begins at emergence from hibernation. Emerging males and females repeatedly mate and with multiple partners prior to flying to their summer roosting areas. The pregnant females group together in a nursery roost that is notable for its warm temperatures (pregnant females cannot thermoregulate very efficiently). After 50 to 60 days gestation, each female gives birth to a single pup. The pup will cling to the mother and even go out on her feeding flights tightly attached to her fur. Soon, though, the pup gets too large for these free rides and must remain in the nursery roost where it is cared for and fed by the mother. Pups are weaned in 3 to 4 weeks, and then they join the females on their nightly forays and in both their day and night roosts. Females become sexually mature around nine months, and males become sexually mature at one year of age. A Little Brown Bat, especially if it survives its first winter, may live 20 or even 30 years.

Range of the Little Brown Bat in USCG Region 5

Current Threats:

- White-nose syndrome
- Human disturbance
- Changes in cave structure (e.g., gates)
- Development
- Forest management activities
- Wind facility construction

Distribution/Habitat: Little Brown Bats are habitat generalists, using most cover types available to them in a variety of ecosystems. Much of their foraging activity is associated with aquatic habitats, so lakes and streams seem to play a significant factor in habitat use. The Little Brown Bat is widely distributed throughout the northern United States into Canada. It is present in lesser numbers in southern states and is absent from the southern Great Plains. The historical range included most of the contiguous United States, except Arizona, Louisiana, Texas, and Alaska.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

Bat Conservation International (2020) *Meet the Little Brown Bat*
The Pennsylvania State University (2014) *Little Brown Bat (Myotis lucifugus)*
USFWS (2019) *Little Brown Bat (Myotis lucifugus) fact sheet*
USFWS (2021) *Little Brown Bat (Myotis lucifugus) species profile*
WIDNR (2017) *Little Brown Bat (Myotis lucifugus) species guidance*

Northern Bog Lemming	**Status**	**Under Review**	80 FR 56423

Scientific Name	*Synaptomys borealis*	**Critical Habitat**	N/A

Photo: Montana Natural Heritage Program

Appearance: The Northern Bog Lemming closely resembles other microtine rodents with which it may share habitat. Grooved upper incisors, a very short tail (18 to 25 mm; 0.7 to 1.0 in.), and grizzled grayish brown to chestnut-colored pelage, with a buffy orange patch at the base of the ear, can help distinguish Bog Lemmings of the genus *Synaptomys* from other microtines. In the Northern Bog Lemming, lower molars lack distinct inward angles on the outer (labial) edge, the upper incisors frequently have labial spines, and the palate has a sharply pointed spine at its posterior end.

Life History: Little is known about this rare species' habits. The diet of Northern Bog Lemmings consists of herbaceous vegetation, primarily grasses and sedges, but they also will eat snails, slugs, and other invertebrates. Northern Bog Lemmings are active throughout the year, day and night. Globular nests of grass or sedge are hidden in short underground burrows, under logs, in sphagnum hummocks, or on the surface under the snow. The breeding season for Northern Bog Lemmings occurs from May through August. Gestation lasts approximately 3 weeks. Litters of up to eight young are possible, with an average of four young per litter. One day after giving birth, females can breed again, and young Northern Bog Lemmings are sexually mature at 5 to 6 weeks. Predators of Northern Bog Lemmings include hawks, owls, and weasels.

Range of the Northern Bog Lemming in USCG Region 5

Current Threats:

- Altered hydrology and water chemistry
- Peat harvest
- Timber harvest and associated activities
- Loss of beavers
- Wildfire
- Snowmobiles
- Invasive plants
- Mineral exploration
- Climate change
- Life history factors

Distribution/Habitat: Northern Bog Lemmings typically occur in open, wet habitats dominated by sphagnum moss, ericaceous shrubs, and graminoids (acid peatland and open rich peatland systems). Subspecies exhibit different habitat preferences, including conifer forests, shrublands, alpine meadows, and dry sagebrush hillsides. In Minnesota, Northern Bog Lemmings have been found in open bog, shrub carr, and black spruce swamp. The Northern Bog Lemming ranges across much of boreal North America from the southern two-thirds of Alaska south into northern Washington and east across Canada to the Atlantic coast. In the conterminous United States, it is found near the Canadian border in Washington, Idaho, Montana, North Dakota, Minnesota, New Hampshire, and Maine. Despite its extensive distribution, the Northern Bog Lemming is unpredictable in occurrence, and nowhere is it considered common. In Minnesota, it was classified as a species of special concern in 1984 due to its rarity in the state. It was first reported in Lake of the Woods County in 1932. Since then, less than a dozen occurrences have been documented in Roseau, Clearwater, Beltrami, Koochiching, Itasca, and St. Louis Counties.

Primary Habitat in Action Area/RAM: Wetlands

***Associated Vulnerable Habitats*:** Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:
MNDNR (2021) *Synaptomys borealis (Northern Bog Lemming)*
WildEarth Guardians (2014) *Petition to list the Northern Bog Lemming (Synaptomys borealis) under the U.S. Endangered Species Act*

Northern Long-Eared Bat	**Status**	**Threatened (2015)**	80 FR 17973
Scientific Name	*Myotis septentrionalis*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Northern Long-Eared Bat is a medium-sized bat about 3 to 3.7 in. in length with a wingspan of 9 to 10 in. Its fur color can be medium to dark brown on the back and tawny to pale-brown on the underside. As its name suggests, this bat is distinguished by its long ears, particularly compared to other bats in its genus, *Myotis*.

Life History: Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, they emerge from their hibernacula, ovulate, and the stored sperm fertilizes an egg. During the summer, Northern Long-Eared Bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live trees and snags (dead trees). This bat has also been found rarely roosting in structures, like barns and sheds. Northern Long-Eared Bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible.

Range of the Northern Long-Eared Bat in USCG Region 5

Current Threats:

- White-nose syndrome
- Human disturbance
- Changes in cave structure (e.g., gates)
- Development
- Surface mining
- Wind facility construction

Distribution/Habitat: The Northern Long-Eared Bat is widely but sparsely distributed across forested regions of the eastern United States. It ranges across southern Canada and up to Newfoundland. It extends down into Florida, through the south-central states and the Dakotas, into eastern British Columbia. The species' range includes the following 37 states and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:
Ollendorff (2002) *Animal Diversity Web - Myotis septentrionalis*
USFWS (2015) *Northern Long-Eared Bat (Myotis septentrionalis) fact sheet*
USFWS (2021) *Northern Long-Eared Bat (Myotis septentrionalis) species profile*
WIDNR (2017) *Northern Long-Eared Bat (Myotis septentrionalis) species guidance*

Plains Spotted Skunk	**Status**	**Under Review**	77 FR 71759

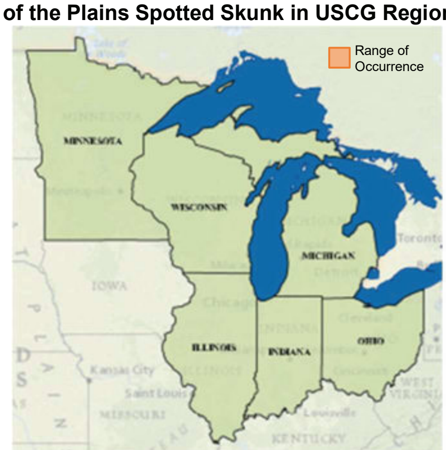
Scientific Name	*Spilogale putorius interrupta*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Plains Spotted Skunk is a small, slender mammal with short legs and a tail with prominent, long hairs. Bodyweight ranges from 300 to 1,300 g (0.75 to 2.75 lb), and total length ranges from 36 to 61 cm (14 to 23.75 in.). The Plains Spotted Skunk is black overall with narrow white stripes and spots. Four white stripes on the neck, back, and sides run longitudinally from the head to the middle of the body. The four white stripes break into patches or spots on the hindquarters. In addition, there is a white spot on the forehead and in front of each ear.

Life History: Plains Spotted Skunks spend the winter in dens, but they are not true hibernators and may awaken on mild days to feed. They are social, non-territorial animals. Mating usually takes place in April, and litters of four to six young are born in July. The young are weaned after about 54 days. This species is mainly nocturnal and escapes detection by climbing a tree or freezing in place. If a Plains Spotted Skunk feels threatened, it will balance on its forefeet with its hind legs and tail in the air, directed towards the threat. From this position, the skunk can aim and accurately spray the intruder with musk. The Plains Spotted Skunk is omnivorous but is primarily an insectivore and feeds on insects during all seasons of the year.

Range of the Plains Spotted Skunk in USCG Region 5



Current Threats:

- Agricultural conversion
- Loss of forest habitats
- Altered disturbance and fire regimes
- Small and fragmented populations
- Disease

Distribution/Habitat: This subspecies lives in a wide range of habitats, including forests, prairies, brushy areas, farmyards, and cultivated land. Regardless of habitat type used, the Plains Spotted Skunk requires extensive vegetative cover. Brushy borders along fields, fence rows, farm buildings, woodpiles, heavily vegetated gullies, leaf litter, or downed logs may provide the required extensive cover. The Plains Spotted Skunk currently (and historically) occurs between the Mississippi River and the Continental Divide from Minnesota to the Gulf of Mexico. Historical records indicate that the Plains Spotted Skunk was broadly distributed across its range through the early to mid-1900s and was one of the most common mesocarnivores (a carnivore whose diet consists of 50 to 70% meat) where suitable habitat occurred. Likewise, harvest records in the Midwest indicate that population levels in most states were at their highest through the mid-1900s, during which harvest in most years exceeded 100,000 Plains Spotted Skunks. More contemporary records consistently show that the Plains Spotted Skunk underwent declines in the mid to late 1900s. Declines occurred first in Missouri and Oklahoma in the late 1930s and early 1940s, followed by Nebraska in the mid-1940s, and Kansas, Iowa, and Minnesota in the mid to late 1940s.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		

Additional References:

Eastern Spotted Skunk Cooperative Study Group (2018) *Eastern Spotted Skunk conservation plan*
MNDNR (2021) *Spilogale putorius (Eastern Spotted Skunk)*

Prairie Gray Fox	**Status**	**Under Review**	77 FR 71759

Scientific Name	*Urocyon cinereoargenteus spp. ocythous)*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Gray Fox has a distinguishable appearance with gray fur on its upper body; reddish fur on its neck, the sides of the belly, and inner legs; and white on the rest of its underbody. The guard hairs (long, coarse hairs that protect soft underfur) are banded with white, gray, and black, which gives the fox's fur a grizzled appearance. It has a black-tipped tail and a coarse dorsal mane of black-tipped hairs at the base of its tail. The Gray Fox is smaller than the Red Fox *(Vulpes vulpes),* with a total length of 80 to 112.5 cm (31.5 to 44.3 in.), a weight of 3 to 7 kg (6.6 to 15.4 lb), and males are slightly larger than females.

Life History: Gray Fox will use dens year-round, but predominantly when young are born. For the Prairie Gray Fox, breeding lasts from late January through February in southern Illinois and from late January through March in Wisconsin. The average litter size for the Gray Fox is 3.8 pups per female, with litters ranging from 1 to 7 pups. The Gray Fox is active at night, with activity at sunrise sharply decreasing and increasing again at sunset. The Gray Fox is primarily an opportunistic carnivore, with mammals composing most of its diet in the Midwest.

Range of the Prairie Gray Fox in USCG Region 5
Spatial data not available

Current Threats:

- Hunting and trapping
- Residential and commercial development
- Roads
- Non-native diseases

Distribution/Habitat: Gray Fox dens are usually located in wooded areas and include underground burrows, cavities in trees or logs, woodpiles, and rock outcrops or cavities under rocks. Gray Fox use woody cover in deciduous or pine forest, but they also use edge habitat and early old fields (open habitats transitioning from field to forest and are dominated by forbs, grass, and shrubs, and small trees). The Gray Fox tends to select against agricultural areas. The Gray Fox has a wide distribution, from the Canadian border at Manitoba to Quebec, and southward through the eastern and southern United States, and to northern Colombia and Venezuela. The Gray Fox is absent from the northwestern United States and the Great Plains in the United States. The Prairie Gray Fox subspecies ranges primarily west of the Mississippi and Illinois Rivers through portions of the Central Plain states. The historical range for this subspecies included western Wisconsin, Minnesota, Iowa, Missouri, Arkansas, and the eastern sections of North and South Dakota, Nebraska, Kansas, and Oklahoma in the United States, and the southernmost sections of Ontario and Manitoba, Canada.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
			X		X

Additional References:

COSEWIC (2015) *COSEWIC assessment and status report on the Gray Fox Urocyon cinereoargenteus in Canada*

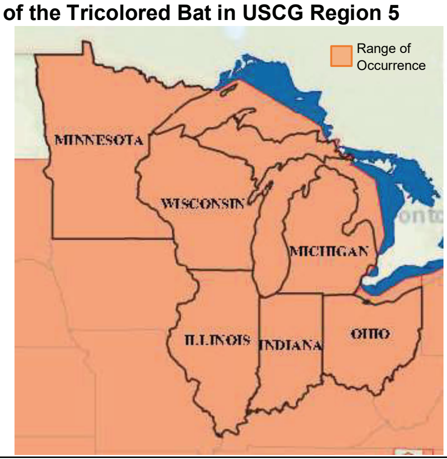
Tricolored Bat	**Status**	**Under Review**	82 FR 60362
Scientific Name	*Perimyotis subflavus*	**Critical Habitat**	N/A

Photo: Missouri Department of Conservation

Appearance: The Tricolored Bat, formerly known as the Eastern Pipistrelle (*Pipistrellus subflavus*), is a small bat weighing 0.2 to 0.3 oz (5 to 8 g) with a wingspan of 8 to 10 in. (21 to 26 cm). The term "tricolored" refers to the bat's yellowish-brown coat that is dark at the base, yellowish-brown in the middle, and dark at the tips. The wing membranes are blackish, but the face and ears have a pinkish color. An obvious identifying characteristic of this species is the pink color of the skin on the radius bone. Its feet are also relatively large compared to its body size.

Life History: Tricolored Bats hibernate from October into April. During this time, they enter a state of torpor in which their body temperature drops to that of the surrounding air temperature. Tricolored Bats mate in the fall and females give birth to litters in the spring, usually of two young. While the young are growing, the mothers roost in small maternity colonies. After about 4 weeks, the young can fly and accompany their mothers on foraging flights. They become independent after another week or two. Tricolored Bats forage early in the evening and may catch up to half their body weight in insects each hour. They forage mainly over water and tend to avoid deep woods or open fields. Tricolored Bats eat moths, flies, beetles, and ants.

Range of the Tricolored Bat in USCG Region 5



Current Threats:

- White-nose syndrome
- Human disturbance
- Changes in cave structure (e.g., gates)
- Development
- Surface mining
- Wind facility construction

Distribution/Habitat: Tricolored Bats hibernate in caves, mines, and tunnels. While this species is often found hibernating in the same sites as large populations of other bats, such as Little Brown Bats (*Myotis lucifugus*) and Northern Myotis (*M. septentrionalis*), Tricolored Bats tend to occupy the deeper portions of the hibernaculum where temperatures and humidity are higher. Tricolored Bats generally roost singly in the summer, often in trees, but some males and non-reproductive females also roost in their winter hibernaculum. The Tricolored Bat is distributed throughout the eastern United States, ranging as far west as Nebraska, Kansas, Oklahoma, and Texas, and from southern Canada south to Honduras. States in which this population is known to or is believed to occur include Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

Primary Habitat in Action Area/RAM: Rivers and Streams, Ponds and Lakes, Upland Areas

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Open Water, Submersed Vegetation, Rooted Floating Aquatics, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Sedge Meadow, and Shallow Marsh Vegetation (Annuals, Perennials, Shrub)

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

MNDNR (2021) *Perimyotis subflavus (Tricolored Bat)*
USFWS (2017) *Tricolored Bat (Perimyotis subflavus) fact sheet*

4.10 Birds

Eastern Black Rail	**Status**	**Threatened (2020)**	85 FR 63764

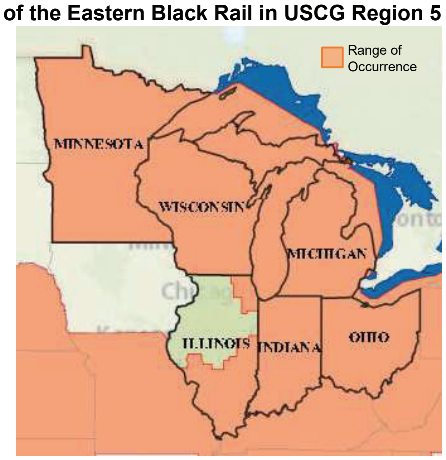
Scientific Name	*Lateralus jamaicensis ssp. jamaicensis*	**Critical Habitat**	N/A

Photo: Scott Bowers via National Audubon Society

Appearance: The Eastern Black Rail, subspecies of Black Rail, is the smallest rail in North America. Adults range from 10 to 15 cm in total length and have a wingspan of 22 to 28 cm. Adults are generally pale to blackish gray, with a small blackish bill and bright red eyes. The underparts from chin to abdomen are uniformly colored but are lighter on the chin and throat. The nape and upper back are chestnut, and the remaining back, uppertail feathers, and remiges (wing flight feathers) are dark gray to blackish with small white spots and sometimes washed with chestnut-brown. The lower abdomen, undertail feathers, and flanks are blackish streaked with narrow white and dark gray barring, washed with chestnut.

Life History: Eastern Black Rail have four life stages: egg, chick, juvenile (hatch-year), and adult. The egg stage lasts for approximately 26 days. Eggs are laid in a bowl constructed of live and dead fine-stemmed emergent grasses, rushes, or other herbaceous plant species, often with a canopy and a ramp. Once an egg hatches, the chick stage begins and lasts for approximately 1.5 months until the chick enters the juvenile stage. Hatching is synchronous, and chicks remain in the nest until all eggs have hatched. The juvenile stage may last up to 10.5 months until an individual obtains its first breeding plumage and becomes sexually mature at approximately 1 year of age. Adults presumably breed each year and are probably monogamous.

Range of the Eastern Black Rail in USCG Region 5



Current Threats:

- Habitat fragmentation and conversion
- Altered plant communities
- Altered hydrology
- Groundwater declines
- Groundwater-related subsidence
- Drainage modifications
- Land management
- Climate change
- Oil/chemical spills and environmental contaminants
- Predation

Distribution/Habitat: The Eastern Black Rail is a wetland-dependent bird primarily associated with herbaceous, persistent, emergent wetland plant cover. The subspecies requires dense overhead cover and soils that are moist to saturated (occasionally dry) and interspersed with or adjacent to very shallow water (typically ≤ 3 cm). The substrate of the ideal habitat is generally considered to be moist soil with small scattered pools. In the United States, Eastern Black Rail are found in both coastal and interior areas, but the majority of detections are from coastal sites. A 2012 interior assessment concluded that Eastern Black Rail are currently vagrants (casual or accidental vagrants) in Arkansas, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, New Mexico, Ohio, and Wisconsin. Some of these states have conducted marshbird surveys following the 2012 assessment, which have yielded few additional detections of Eastern Black Rail in Nebraska and South Dakota. In addition, there appear to be small non-vagrant populations in Kansas and Colorado.

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

USFWS (2019) *Species status assessment for the Eastern Black Rail (Laterallus jamaicensis jamaicensis)*
USFWS (2021) *Recovery outline for the Eastern Black Rail (Laterallus jamaicensis jamaicensis)*

Golden-Winged Warbler	Status	Under Review	76 FR 31920

Scientific Name	*Vermivora chrysoptera*	Critical Habitat	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: Classic Golden-Winged Warblers are gray-backed and whitish-bellied, with a yellow crown and large yellow wing patches; males have a black and females a gray facial mask and throat. Although the Golden-Winged Warbler is described as a distinct species, it is closely related to and hybridizes with Blue-Winged Warbler (*V. cyanoptera*). Phenotypically distinct first-generation hybrids (Brewster's Warbler) display the dominant plumage characters of a white belly and reduced head patterning. Backcrosses between hybrids and Golden-Winged or Blue-Winged Warblers were thought to produce the distinct Lawrence's Warbler, which expressed recessive traits of a yellow belly and more extensive head patterning. However, many individuals who appear at first glance to be clearly one species can, on closer inspection, show color flushes typical of the other.

Life History: The species is single-brooded. Females appear to select the nest site—usually on the ground—often at the base of leafy herbaceous growth (e.g., *Solidago*) and well-concealed by leafy vegetation or in some cases by tussock grass or sedge, and sometimes within dense patches of shrubby growth (e.g., *Rubus*). Clutch size ranges from four to six. Recently fledged birds wander widely and utilize many different habitat community types.

Range of the Golden-Winged Warbler in USCG Region 5

Current Threats:

- Natural succession
- Changes in disturbance regime
- Development and land-use change
- Public and private forested land policy
- Interactions with Blue-Winged Warbler
- Brood parasitism
- Climate change
- Migratory obstacles
- Non-breeding season habitat loss

Distribution/Habitat: Although the Golden-Winged Warbler utilizes mature forest throughout its annual cycle, disturbed patches of habitat within a forested matrix are important for nesting even during the breeding season. There appear to be three essential components to Golden-Winged Warblers nesting habitat—grassy and herbaceous openings, shrubs or tree saplings (generally <10 cm diameter), and taller deciduous trees. The Golden-Winged Warbler is a Nearctic/Neotropical long-distance migrant songbird that breeds mainly in the Great Lakes and St. Lawrence/Champlain states and provinces from Manitoba to Vermont and the Appalachian Mountains from New York to Tennessee. It spends the northern hemisphere winter in tropical habitats from Central America to the northern Andes of Colombia and Venezuela. Minnesota, Wisconsin, and Michigan currently harbor an estimated 76% of the total global breeding population. The Golden-Winged Warbler has been extirpated as a breeding species from Missouri, Iowa, Illinois, and Indiana, where habitat loss has been more concentrated, is virtually extirpated from Ohio, and risks extinction from Michigan and Wisconsin by 2100.

Primary Habitat in Action Area/RAM: Upland Areas

***Associated Vulnerable Habitats*:** None

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

Roth et al. (2019) *Golden-Winged Warbler status review and conservation plan*

Piping Plover	**Status**	**Endangered (1985)**	50 FR 50726

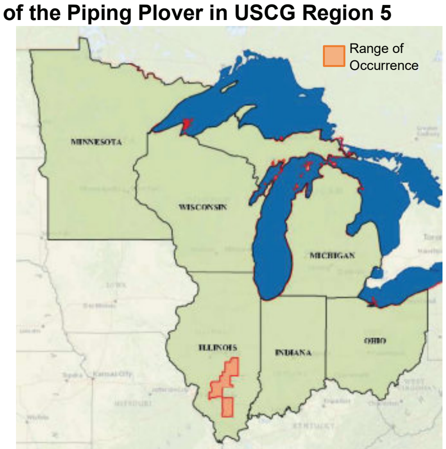
Scientific Name	*Charadrius melodus*	**Critical Habitat**	66 FR 22938


Photo: U.S. Fish & Wildlife Service

Appearance: The Piping Plover is a small North American shorebird approximately 17 cm (6.7 in.) in length with a wingspan measuring about 38 cm (15 in.). Light sand-colored upper plumage and white undersides blend in well with the Piping Plover's principal beach habitats. During the breeding season, the legs and bill are bright orange, and the bill has a black tip. Other distinctive markings include a single black band across the upper breast and a smaller black band across the forehead. During winter, the legs pale, the bill turns black, and darker markings are lost.

Life History: In the Great Lakes region, Piping Plovers breed and raise young on the shores of the Great Lakes. Birds begin arriving on breeding grounds in late April, and most nests are initiated by mid to late May. Finished nest cups are shallow depressions approximately 6 cm (2.3 in.) in diameter and 2 cm (0.8 in.) deep. Both adults actively defend nest territories. Females lay an egg approximately every other day; clutches are complete at three or four eggs. Both sexes share incubation duties that last 25 to 31 days. Eggs typically hatch from late May to late July. In Michigan, chicks fledge approximately 21 to 30 days after hatching. Piping Plovers depart Great Lakes breeding areas from mid-July to early September to migrate to overwintering areas.

Range of the Piping Plover in USCG Region 5



Current Threats:

- Shoreline development
- Inlet dredging
- Artificial structures
- Predation
- Human disturbance
- Contaminants

Distribution/Habitat: Piping Plovers use numerous areas within breeding and wintering habitats for foraging, including wet sand in the wash zone, intertidal ocean beach, wrack lines, washover passes, mud, sand and algal flats, and shorelines of streams, ephemeral ponds, lagoons, and salt marshes. Piping Plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, Canada. Piping Plovers were extirpated from Great Lakes beaches in Illinois, Indiana, New York, Ohio, Pennsylvania, and Ontario by the late 1970s, although occasional nesting has occurred since then. Under the protection of the ESA, the Great Lakes Piping Plover population reached a high since listing, at 76 breeding pairs in 2017. Of these, 52 pairs were found nesting in Michigan, and 24 were found in other Great Lakes states (and provinces), including 8 pairs in Wisconsin and 14 in Ontario, Canada. Outside the core Great Lakes Piping Plover breeding areas in Michigan, Wisconsin, and Ontario, a pair was discovered at Illinois Beach State Park, Lake County, Illinois, in 2009 but unfortunately was unsuccessful. However, the birds returned to Illinois, breeding successfully in 2015. Great Lakes Piping Plovers returned to New York in 2015 and 2016 and had limited breeding success. Breeding pairs of Great Lakes Piping Plovers returned to Pennsylvania in 2017 and nested again in 2018.

Primary Habitat in Action Area/RAM: Shoreline (beach/land), Rivers and Streams, Bays and Estuaries, Ponds and Lakes

***Associated Vulnerable Habitats*:** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

USFWS (2003) *Recovery plan for the Great Lakes Piping Plover (Charadrius melodus)*
USFWS (2009) *Piping Plover (Charadrius melodus) 5-year review*
USFWS (2020) *Piping Plover (Charadrius melodus) 5-year review*

Rufa Red Knot	**Status**	**Threatened (2014)**	79 FR 73706

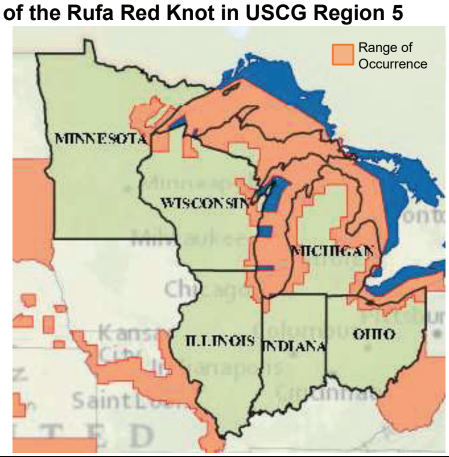
Scientific Name	*Calidris canutus rufa*	**Critical Habitat**	N/A

Photo: U.S. Fish & Wildlife Service

Appearance: The Rufa Red Knot is a medium-sized shorebird about 9 to 11 in. (23 to 28 cm) in length. The Red Knot is easily recognized during the breeding season by its distinctive rufous (red) plumage (feathers). The face, prominent stripe above the eye, breast, and upper belly are a rich rufous-red to a brick or salmon-red, sometimes with a few scattered light feathers mixed in. The feathers of the lower belly and under the tail are whitish with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black.

Life History: The Rufa Red Knot's typical life span is at least 7 years. Pair bonds form soon after the birds arrive on the breeding grounds, in late May or early June, and remain intact until shortly after the eggs hatch. Female Rufa Red Knot lay only one clutch per season with a typical clutch size of four eggs. The incubation period lasts approximately 22 days from the last egg laid to the last egg hatched. Young are precocial, leaving the nest within 24 hours of hatching and foraging for themselves. Females are thought to leave the breeding grounds and start moving south soon after the chicks hatch in mid-July. After that, parental care is provided solely by the males, but about 25 days later, males also abandon the newly fledged juveniles and move south. Not long after, they are followed by the juveniles. Each year some Red Knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 mi (30,000 km) annually.

Range of the Rufa Red Knot in USCG Region 5



Current Threats:

- Habitat loss
- Disruption of predator cycles on breeding grounds
- Reduced prey availability
- Asynchronies in timing migratory cycle
- Hunting and predation
- Harmful algal blooms
- Human disturbance
- Oil spills
- Wind energy development

Distribution/Habitat: The Rufa Red Knot migrates annually between its breeding grounds in the central Canadian Arctic and four wintering regions: the Southeast United States and through the Caribbean; the Western Gulf of Mexico from Mississippi through Central America; northern Brazil and extending west along the northern coast of South America; and Tierra del Fuego at the southern tip of South America (mainly in Chile) and extending north along the Patagonian coast of Argentina. The Rufa Red Knot is a regular, normally "rare" (near-annual but usually single individuals or very small flocks of two to five birds) spring and fall migrant along the shores of the Great Lakes, and a "casual" (less than annual) migrant inland throughout the Mississippi Flyway.

Primary Habitat in Action Area/RAM: Shoreline (beach/land), Rivers and Streams, Bays and Estuaries, Ponds and Lakes

Associated Vulnerable Habitats: Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, Submersed Vegetation, Floodplain Forest, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Sedge Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

USFWS (2014) *Rufa Red Knot background information and threats assessment*
USFWS (2019) *Recovery outline for the Rufa Red Knot (Calidris canutus rufa)*
USFWS (2020) *Species status assessment report for the Rufa Red Knot (Calidris canutus rufa)*

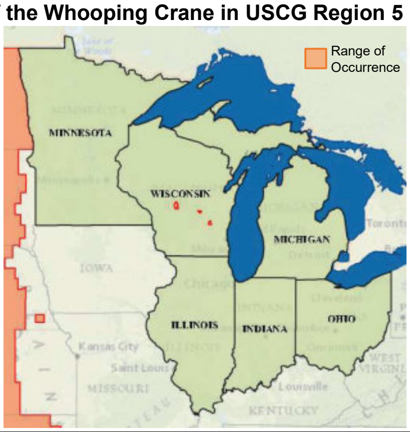
Whooping Crane	**Status**	**Endangered (1967)** (except where listed as an experimental population)	66 FR 14107
Scientific Name	*Grus americana*	**Critical Habitat**	43 FR 20938

Photo: U.S. Fish & Wildlife Service

Appearance: The Whooping Crane is the tallest North American bird. Males, which may approach 1.5 m in height, are larger than females. Adults are snowy white except for black primary feathers on the wings and a bare red face and crown. The bill is a dark olive-gray, which becomes lighter during the breeding season. The eyes are yellow, and the legs and feet are gray-black. Immature cranes are a reddish cinnamon color that results in a mottled appearance as the white feather bases extend. The juvenile plumage is gradually replaced through the winter months and becomes predominantly white by the following spring as the dark red crown and face appear. Yearlings achieve the typical adult appearance by late in their second summer or fall.

Life History: The Whooping Crane's life span is estimated to be 22 to 24 years in the wild. They are omnivorous feeders. Whooping Cranes are monogamous and form life-long pair bonds but will remate following the death of a mate. They construct nests of bulrush and lay one to three eggs (usually two). The incubation period is about 29 to 31 days. Both sexes share incubation and brood-rearing duties. Whooping Cranes migrate singly, in pairs, family groups, or small flocks and are sometimes accompanied by sandhill cranes. On the wintering grounds, pairs and family groups occupy and defend territories. Spring migration is preceded by dancing, unison calling, and frequent flying.

Range of the Whooping Crane in USCG Region 5



Current Threats:

- Human disturbance
- Habitat conversion
- Extreme weather events
- Contaminant spills
- Collisions with power lines and fences
- Disease and parasites
- Predation

Distribution/Habitat: The wild population's nesting area in Wood Buffalo National Park is a poorly drained region interspersed with numerous potholes. Bulrush is the dominant emergent in the potholes used for nesting. On the wintering grounds at Aransas National Wildlife Refuge in Texas, Whooping Cranes use salt marshes dominated by salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye. Areas selected for the proposed eastern migratory experimental population closely mimic the habitat of the naturally occurring wild population in Canada and Texas. The historical range of the Whooping Crane once extended from the Arctic coast south to central Mexico, and from Utah east to New Jersey, into South Carolina, Georgia, and Florida. The historical breeding range once extended across the north-central United States and the Canadian provinces, Manitoba, Saskatchewan, and Alberta. A separate non-migratory breeding population occurred in southwestern Louisiana. The natural wild population nests in Wood Buffalo National Park in Saskatchewan, Canada, and winters on the Texas Gulf Coast. An experimental non-migratory population was established in Florida in 1993, and several facilities hold captive populations. The experimental Eastern migratory population, which breeds within the Action Area, was established in 2001.

Primary Habitat in Action Area/RAM: Wetlands

Associated Vulnerable Habitats: Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrub), Submersed Vegetation, and Wet Meadow

Potential Range by State

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

Additional References:

USFWS (2012) *Whooping Crane (Grus americana) 5-year review*
USFWS (2019) *Whooping Crane (Grus americana) species status and fact sheet*

5.0 EFFECTS ON PROTECTED SPECIES AND CRITICAL HABITATS

In order to streamline response actions in the event of an emergency, effects determinations made in this BE were predetermined collaboratively with the USFWS. The effects analysis in **Section 5.0** focuses on the effects of the response actions, not the effects of the oil or spilled materials. The SRM provided in **Appendix F** presents the effects pathways for which the effects analysis was derived. For each species within each habitat type, the exposure to direct interactions and stressors, individual response to the action, and risk of injury or death to the individual were considered. Information on each species' known range and characteristics was used to determine which of the defined environments (habitat type) may be occupied by each species. The potential for each species to occur in each habitat type was weighed heavily in the SRM and in determining the level of effect a particular response action might have on a species in a particular environment.

Effect determinations were based on those used for ESA section 7 consultation (USFWS and NMFS, 1998). Responses of species to actions within the defined habitat types were assigned to the following categories:

- No effect (color-coded as green on SRM) applied to individuals whose habitat did not overlap with the Action Area habitats defined in **Section 3.1** and **3.2** (Example 1 below). Additionally, if the activity occurred in an environment identified for a species but did not impact the specific occupied habitat type within the environment, a no effect determination was made (Example 2 below).
    - Example 1: Freshwater mussels do not occur, nor are individuals found along shorelines (per the definition in **Section 3.1**); therefore, all response actions and interrelated actions occurring on Shoreline Habitat would have no effect on mussels due to no overlap.
    - Example 2: All listed mussels are identified as occurring in Rivers and Streams. Access of personnel by foot traffic will not disturb occupied habitat of mussels within Rivers and Streams; hence, a no effect determination was made across this animal category for this specific activity within Rivers and Streams.
- May affect, not likely to adversely affect due to insignificant or discountable effects (color-coded as yellow on SRM). Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those effects extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.
- May affect, not likely to adversely affect due to implementation of BMPs to avoid or minimize the impact (color-coded as orange in SRM). For example, birds whose habitat for feeding, nesting, or otherwise includes Shoreline Habitat may be affected by the response action occurring in Shoreline Habitats, but impacts are reduced by using BMPs.
- May affect, likely to adversely affect - individuals of the species are likely to interact directly with sub-activities or structures associated with the activity or are likely to be exposed to one or more stressors caused by the activity and are likely to experience an adverse

individual response. Discuss possible additional BMPs and conservation measures with USFWS (color-coded as red in SRM).

- Special considerations needed, high level of concern (denoted with a "!" in SRM). For species containing "!" in the response activity column of the SRM, coordinate activity use in the Action Area in response planning if the species and or critical habitat is known within the spill area.

5.1 Effects Analysis on Species

Effects determinations for each species were carefully established by considering the level of impact of BMPs and conservation measures on each response action in collaboration with USFWS. Strict adherence to BMPs and conservation measures reduces the impact of response actions on listed species and/or their habitat from "may affect, likely to adversely affect" to "may affect, not likely to adversely affect" by eliminating or minimizing exposure of the species to the response itself. General BMPs and conservation measures are listed in **Section 2.2.1**, and activity specific BMPs and conservation measures are listed in **Section 2.2.2**. The effects analysis is organized by the environment in which a response activity will occur (**Appendix G**) and is further detailed by species (**Appendix H**).

Development and discussion of BMPs and conservation measures are a part of emergency consultation (under the MOA). Therefore, these Appendices should be reviewed by OSCs and FOSCs during pre-spill planning efforts as well as during active spill response planning. The BMPs employed should consider all facets of response, including those interrelated/interdependent activities described in the RAM.

The list of species that were determined to be "affected, but not likely to be adversely affect," or "may affect, not likely to adversely affect due to insignificant or discountable effects" is extensive for R5. Details are specified in **Appendix G**: Effects by Environment and **Appendix H:** Effects by Species.

The following pages describe only those species for which a "may affect, likely to adversely affect" (color-coded red in the SRM) determination was made and for which specific BMPs need to be developed and discussed with USFWS as part of the Response framework (see **Section 2.1.1**, **Figure 2**). For many combinations of environment, response action, and possible species vulnerability in which a "may affect" determination was made, analyses of exposure, response, and risk were used to distinguish between "may affect, not likely to adversely affect" and "may affect, likely to adversely affect":

- <u>Exposure</u>: Will the species be exposed to the direct and/or indirect effects of the response action? If no, then the action is considered "no effect."

- <u>Response</u>: If "yes, the species will be exposed to the direct and/or indirect effects of the response action", will the species react to the action? If no, then the action is considered "not likely to adversely affect."

- <u>Risk</u>: If "yes, the species will react to the action", will the response cause adverse effects to any individual members of the species? If yes, but BMPs and/or conservation measures will avoid or minimize impacts to discountable or insignificant level, then the action is "may affect, not likely to adversely affect." If yes, and effects cause significant impact despite the BMPs and/or conservation measures in place, the action is "likely to adversely affect."

Shorelines

Within Shoreline environments and associated vulnerable habitats, after consideration of the use of BMPs and conservation measures for many types of activities, the highest remaining risk to species is associated with Deflection and Containment activities. A "may affect, likely to adversely affect" determination was made for use of dikes and berms for the following species:

- Dwarf Lake Iris
- Pitcher's Thistle

Ports, Canals, and Industrial Areas

Within Ports, Canals, and Industrial Areas and associated vulnerable habitats, the following species were determined to likely be adversely affected by certain response actions:

- Northern Riffleshell
- Orangefoot Pimpleback
- Pyramid (Pink) Pigtoe
- Rough Pigtoe
- Scaleshell
- Winged Mapleleaf

Activities for which a "may affect, likely to adversely affect" determination was made were:

- <u>Deflection and Containment</u>: Booming
- <u>Recovery Activities</u>: Skimming, Vacuuming, and Sorbents
- <u>Removal/Cleanup Activities</u>: Flushing, Steam Cleaning, Sandblasting, and Manual Removal/Cleaning of Oil
- <u>Submerged Oil Activities</u>: Detection of non-floating/submerged oil, Recovery of non-floating/submerged oil, Containment of non-floating/submerged oil
- <u>Locating, Tracking, and Support Activities</u>: Deployment of buoys
- <u>Waste Management Activities</u>: Temporary storage (on water)

Rivers and Streams (Inland)

Within Rivers and Streams (Inland) and associated vulnerable habitats, the "may affect, likely to adversely affect" determinations were made for the following species:

- Eastern Prairie Fringed Orchid
- Western Prairie Fringed Orchid
- Clubshell
- Fanshell
- Fat Pocketbook
- Higgins' Eye Pearlymussel
- Longsolid
- Northern Riffleshell
- Orangefoot Pimpleback
- Pink Mucket
- Pyramid (Pink) Pigtoe
- Rabbitsfoot (Critical Habitat)
- Rayed Bean
- Rough Pigtoe
- Round Hickorynut
- Salamander Mussel
- Scaleshell
- Sheepnose
- Snuffbox
- Spectaclecase
- Winged Mapleleaf
- Illinois Cave Amphipod
- Popeye Shiner
- Scioto Madtom
- Topeka Shiner (Critical Habitat)

Activities for which a "may affect, likely to adversely affect" determination was made for the species listed above were:

- Deflection and Containment: Dikes and Berms, Booming, Construction Barriers, Dams, Pits, and Trenches, Culvert blocking; For Eastern and Western Prairie Fringe Orchids highest risk activities are only installation of Dikes and Berms
- Recovery Activities: Skimming, Vacuuming, and Sorbents
- Removal/Cleanup Activities: Flooding, Flushing, Steam Cleaning, Sandblasting, and Manual Removal/Cleaning of Oil
- Submerged Oil Activities: Detection of non-floating/submerged oil, Recovery of non-floating/submerged oil, Containment of non-floating/submerged oil
- Wildlife Protection Activities: Deterrence and Hazing for Popeye Shiner, Scioto Madtom, and Topeka Shiner and its designated critical habitat
- Locating, Tracking, and Support Activities: Use of Vessels, Use of Vehicles, Deployment of buoys
- Waste Management Activities: Temporary storage (on water)

Bays and Estuaries

Within Bays and Estuaries and associated vulnerable habitats, the "may affect, likely to adversely affect" determination was made for the following species:

- Northern Riffleshell

Activities for which a "may affect, likely to adversely affect" determination was made were:

- Deflection and Containment: Dikes and Berms, Booming, Construction Barriers, Dams, Pits, and Trenches
- Recovery Activities: Skimming, Vacuuming, and Sorbents
- Removal/Cleanup Activities: Flooding, and Manual Removal/Cleaning of Oil
- Submerged Oil Activities: Detection of non-floating/submerged oil, Recovery of non-floating/submerged oil, Containment of non-floating/submerged oil
- Locating, Tracking, and Support Activities: Deployment of buoys

Ponds and Lakes (Inland)

Within Ponds and Lakes and associated vulnerable habitats, the "may affect, likely to adversely affect" determinations were made for the following species:

- Clubshell
- Fanshell
- Fat Pocketbook
- Higgins' Eye Pearlymussel
- Longsolid
- Northern Riffleshell
- Orangefoot Pimpleback
- Pink Mucket
- Pyramid (Pink) Pigtoe
- Rabbitsfoot (Critical Habitat)
- Rayed Bean
- Rough Pigtoe
- Round Hickorynut
- Salamander Mussel
- Scaleshell
- Sheepnose
- Snuffbox
- Spectaclecase
- Winged Mapleleaf
- Topeka Shiner (Critical Habitat)

Activities for which a “may affect, likely to adversely affect” determination was made for the species listed above were:

- Deflection and Containment: Dikes and Berms, Booming, Construction Barriers, Dams, Pits, and Trenches, Culvert Blocking
- Recovery Activities: Skimming, Vacuuming, and Sorbents
- Removal/Cleanup Activities: Flooding, Flushing, Steam Cleaning, Sandblasting, and Manual Removal/Cleaning of Oil
- Submerged Oil Activities: Detection of non-floating/submerged oil, Recovery of non-floating/submerged oil, Containment of non-floating/submerged oil
- Wildlife Protection Activities: Deterrence and Hazing for Topeka Shiner only and its designated critical habitat
- Locating, Tracking, and Support Activities: Use of Vessels, Use of Vehicles, Deployment of buoys
- Waste Management Activities: Temporary storage (on water)

Wetlands

Within Wetlands and associated vulnerable habitats, the “may affect, likely to adversely affect” determinations were made for the following species:

- Dwarf Lake Iris
- Linda’s Roadside Skipper
- Mitchell’s Satyr Butterfly
- Monarch Butterfly
- Poweshiek Skipperling (Critical Habitat)
- Regal Fritillary
- Rusty Patched Bumble Bee

Activities for which a “may affect, likely to adversely affect” determination was made for the species listed above were:

- Deflection and Containment: Dikes and Berms for Dwarf Lake Iris only
- Removal/Cleanup Activities: Mechanical sand cleaning (<1 inch and >1 inch) for all listed species above except Dwarf Lake Iris

Uplands

Within Upland areas and associated vulnerable habitats, the “may affect, likely to adversely affect” determinations were made for the following species:

- Dwarf Lake Iris
- American Hart’s-tongue Fern
- Iowa Pleistocene Snail

Activities for which a “may affect, likely to adversely affect” determination was made for the species listed above were:

- Deflection and Containment: Dikes and Berms for Dwarf Lake Iris only and Booming for Iowa Pleistocene Snail only
- Removal/Cleanup Activities: Sandblasting, Mechanical sand cleaning (<1 inch and >1

inch), and Manual Removal/Cleaning of Oil for American Hart's-tongue Fern
  - Manual Removal/Cleaning of Oil only for Iowa Pleistocene Snail

5.2 Effects Analysis on Critical Habitat

Designated critical habitat for several species overlaps the Action Area and a "may affect, likely to adversely affect" determination may be warranted for:

- Activities in Uplands for Designated Critical Habitat for Short's Bladderpod in Indiana (**Figure 9**)
- Activities in Rivers and Streams for Designated Critical Habitat for Rabbitsfoot in Illinois, Indiana, Ohio (**Figure 10**)
- Activities in Rivers and Streams for Proposed Designated Critical Habitat for Round Hickorynut in Indiana, Michigan, Ohio (**Figure 11**)
- Activities in Wetlands for Designated Critical Habitat for Poweshiek Skipperling in Michigan, Minnesota, Wisconsin (**Figure 12**)
- Activities in Rivers and Streams and Ponds and Lakes for Designated Critical Habitat for Topeka Shiner in Minnesota (**Figure 13**)

Some response actions identified as potentially affecting individuals of a species may not affect their habitat. For example, "Use of Aircraft" is identified as affecting piping plover, but those effects would likely affect the birds themselves (e.g., noise/presence of aircraft disturbing nesting birds) and not necessarily the habitat. Specific activities within each environment are listed in **Table 5**. Additionally, activities identified as "may affect, but not likely to adversely affect," or "may affect, not likely to adversely affect due to insignificant or discountable effects" for designated or proposed designated critical habitat are presented in **Table 5**. This includes PCE's of designated and proposed critical habitat for:

- Dakota Skipper in Minnesota
- Hine's Emerald Dragonfly in Illinois, Michigan, Wisconsin
- Canada Lynx in Minnesota
- Indiana Bat in Indiana, Illinois, Michigan, Ohio
- Piping Plover, Great Lakes Population in Illinois, Indiana, Michigan, Minnesota, Ohio, Wisconsin

5.3 No Effects

"No Effect" determinations for response activities used in the RAM Environments is provided in **Table 6**. The "No Effect" determination presented in the BE is a result of coordination between the USCG, EPA, USFWS, NOAA, DOI, and other subject matter experts with the best available information at the time. While these determinations are presented here, this BE does not supersede any formal consultation or NRDA processes necessitated by a spill. "No Effect" determinations should be confirmed at the onset in the spill response planning process at the onset of a specific spill response. In general, the "No Effect" determination was applied to species whose habitat did not overlap with the Action Area habitats or where the activity was not expected to occur in occupied habitat of the species for the environment where the spill occurs.

Section 6.0 & 7.0

6.0 CUMULATIVE EFFECTS

The purpose of this section is to provide an overview of the potential cumulative effects on listed species and their critical habitats that are related to future, non-federal (i.e., state, tribal, municipal, or private) actions with potential to occur in the Action Area. Cumulative effects discussed in addition to the species-specific “current stressors and threats” discussed in **Appendix E**, provide additional context for the USFWS. Cumulative effects and “current stressors and threats” are external to the R5 RCP (i.e., associated with baseline conditions) and, therefore, are outside the scope of the determinations of effect made in the SRM (**Appendix F**).

Non-Federal Actions within Action Area

The geographic span of Region 5 and the Action Area is very large and any number of federal and/or nonfederal actions may be occurring at any particular time. The current stressors and threats listed for each species provides an overview of the primary issues facing these species, which may result in part from such actions. Examples of non-federal actions that would expand the scope of the BE might be extension of railroads in the area, or private land being used for development of oil and gas in the private sector. The effects of these stressors will continue into the future.

7.0 DETERMINATION OF EFFECTS

This BE serves as a framework to addresses Actions that have not yet occurred. As such, effects on the species population will be determined by the Services and part of the administrative record for consultations. Additionally, this BE may be changed, updated, and revised as needed to address regulatory changes. The **Table of Changes** that precedes this document identified such revisions that may occur after the BE is finalized and accepted as part of the administrative record.

References

8.0 REFERENCES

Delin, G. N., H.I. Essaid, I.M. Cozzarelli, M.H. Lahvis, and B.A. Bekins. (1998). Ground Water Contamination by Crude Oil near Bemidji, Minnesota. https://mn.water.usgs.gov/projects/bemidji/. Site Accessed January 5, 2022.

Environmental Protection Agency (EPA). (1999). Monitored Natural Attenuation of Petroleum Hydrocarbons. U.S. EPA Remedial Technology Fact Sheet. Office of Research and Development, National Risk Management Research Laboratory.

Environmental Protection Agency (EPA) and US Coast Guard (USCG). (2018). Region 5 Regional Contingency Plan / Area Contingency Plan.

Exxon Mobil. (2014). Oil Spill Response Field Manual (revised). Exxon Mobil Research and Engineering Company. http://cdn.exxonmobil.com/~/media/global/files/energy-and-environment/oil-spill-response-field-manual_2014_e.pdf

Fingas, M. (2011). Buoys and Devices for Oil Spill Tracking. International Oil Spill Conference Proceedings: March 2011, Vol. 2011, No. 1, pp. abs9.

Hey and Associates, Inc. (2015). Draft Biological Assessment for the West Shore Pipe Line Company Lockport Crude Oil Release Lockport, Will County, Illinois. Prepared For: United States Environmental Protection Agency, Region 5 Emergency Response Branch. Unpublished report. 62 pp.

Millennium Ecosystem Assessment (MA). 2005. Ecosystems and Human Well-Being: Synthesis "Archived copy" (PDF). Archived (PDF) from the original on 3 December 2013. Retrieved 29 January 2013. Island Press, Washington. 155pp.

Ojea, Elena; Chiabai, Aline; Martin-Ortega, Julia (September 2010). Classifying Ecosystem Services for Economic Valuation: The case of forest water services (PDF). BIOECON Conference. hdl:10810/14215.

National Transportation Safety Board (NTSB). (2010). https://www.ntsb.gov/Investigations/Accident Reports/Reports/PAR1201.pdf

National Research Council. (2013). Committee on the Effects of the Deepwater Horizon Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico; Ocean Studies Board; Division on Earth and Life Studies. An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico. National Academies Press (US); pp. 71. DOI: 10.17226/18387

National Oceanic and Atmospheric Administration (NOAA). (2010). Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments was originally a joint effort between NOAA and the USCG.

NOAA. (2016a). Office of Response and Restoration (NOAA SCAT) Shoreline Cleanup and Assessment Technique (SCAT). http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/shoreline-cleanup-and-assessment-technique-scat.html

NOAA. (2016b). Office of Response and Restoration, Special Monitoring of Applied Response Technologies (SMART). Accessed via website at: http://response.restoration.noaa.gov/smart.

The Ecological and Economic Foundation, chapter 1, p.19, TEEB, 2010 (2010), The Economics of Ecosystems and Biodiversity Ecological and Economic Foundations. Edited by Pushpam Kumar. Earthscan: London and Washington.

UMRBA, 2014. Upper Mississippi River Spill Response Plan & Resource Manual.

USCG, 2006. Oil Spill Response Technician (OSRT) Course: Student Booklet.

USCG, 2016. Guidelines for the U.S. Coast Guard Oil Spill Removal Organization Classification Program. https://homeport.uscg.mil/

USCG, Sep 2011. Pollution Incident Response Course: Student Guides. Marine Safety School, Training Center Yorktown: Yorktown, VA.

USCG Sector Lake Michigan. (2022). Sector Lake Michigan Geographic Response Plan. Available from https://rrt5.org/SubAreas.aspx. Site Accessed January 5, 2022.

USFWS, 2021. National Listing Workplan 5-Year Workplan (January 2021 Version). https://www.fws.gov/endangered/what-we-do/listing-workplan.html. Site Accessed May 2021.

USFWS. 2021. National Domestic Listing Workplan: Fiscal Years 21-25, 5-Year Workplan (January 2021 Version). https://www.fws.gov/endangered/esa-library/pdf/National-Listing-Workplan-FY21-FY25.pdf. Site Accessed January 6, 2022.

USFWS. 2022. Environmental Conservation Online System (ECOS). https://ecos.fws.gov/ecp/species-reports. Site Accessed January 6, 2022.

USFWS, ILDNR, and ILEPA, 2021. LOCKPORT NRD RESTORATION OVERVIEW DOCUMENT. Case: 1:21-cv-05424 Document #: 4-4 Filed: 10/13/21 Page 1 of 7 PageID #:62. https://www.justice.gov/enrd/consent-decree/file/1441491/download. Site Accessed January 5, 2022.

USFWS and NMFS. (1998). Endangered Species Conservation Handbook. Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act.

Windward LLC, 2014. Biological assessment of the Alaska federal/state preparedness plan for response to oil & hazardous substance discharges/releases (Unified Plan). Final. Windward Environmental LLC and ERM, Seattle, WA.

Windward Environmental LLC, and Ecology and Environment, Inc. (2016). Regional Response Team 10 (RRT10) Northwest Area Contingency Plan, 2016. Section 9412: Non-floating Oil Spill Response Tool. Web: https://www.rrt10nwac.com

Figures

LIST OF FIGURES

Figure 1. The Pre-Spill Planning Process (Appendix A of the MOA)

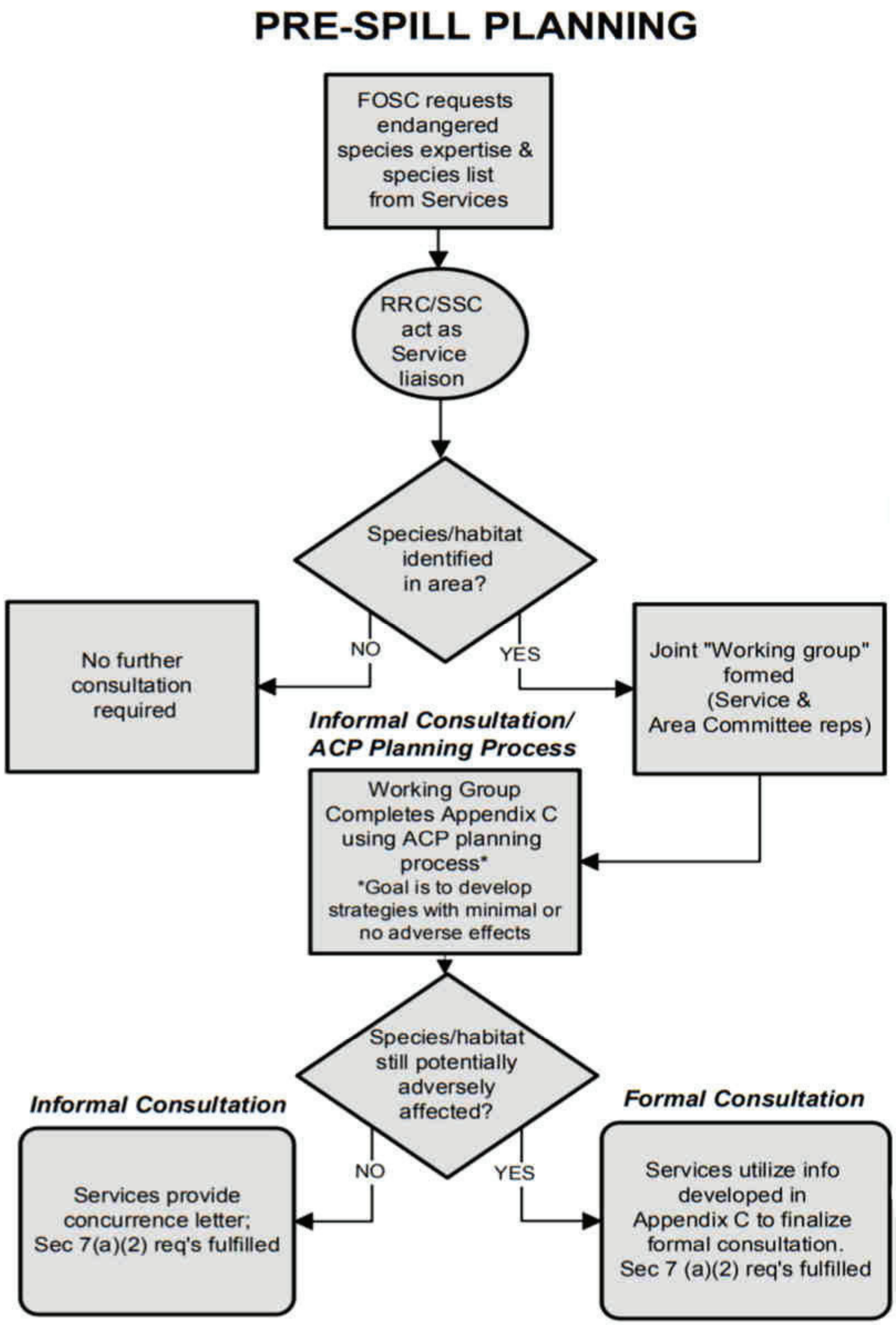
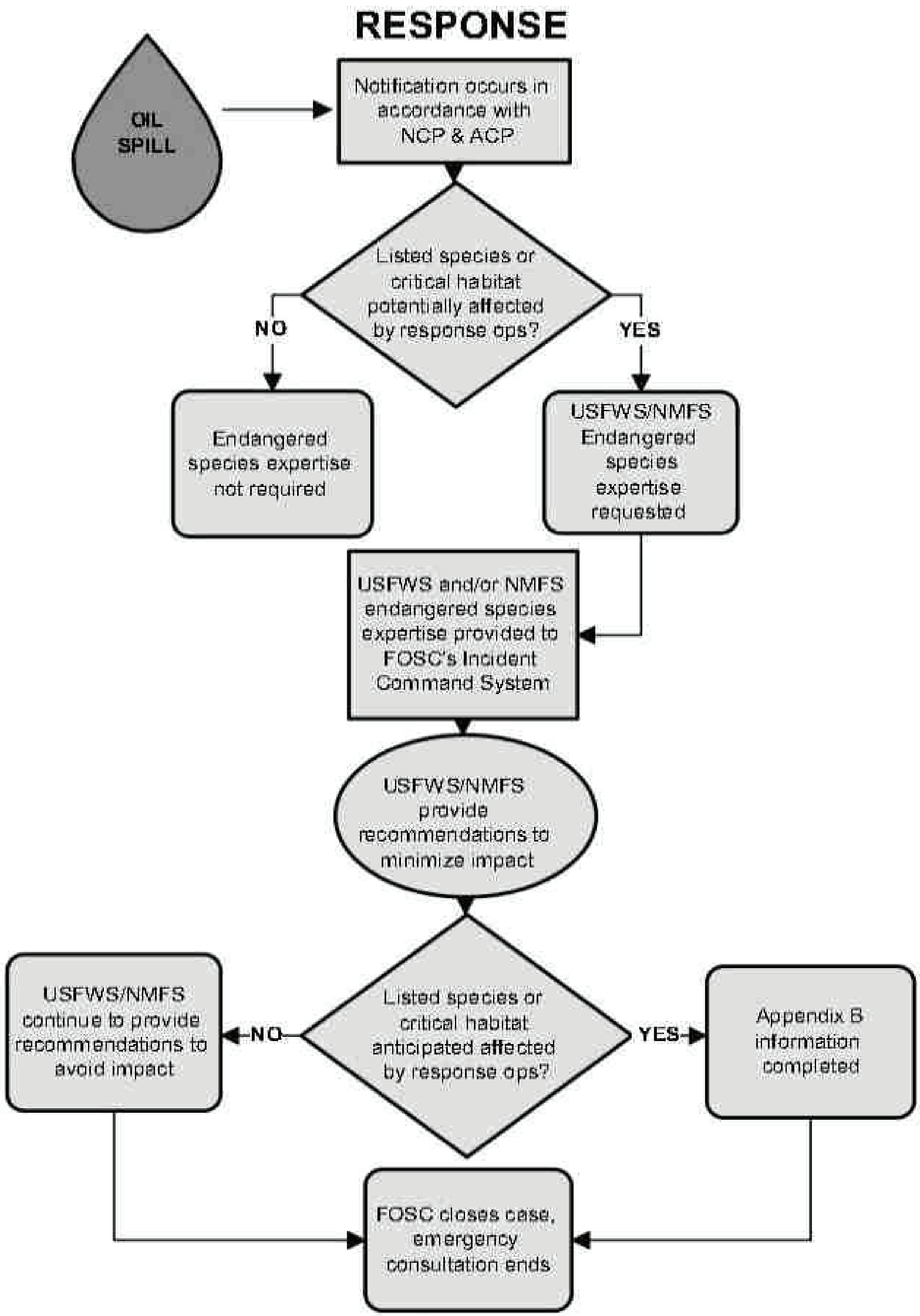
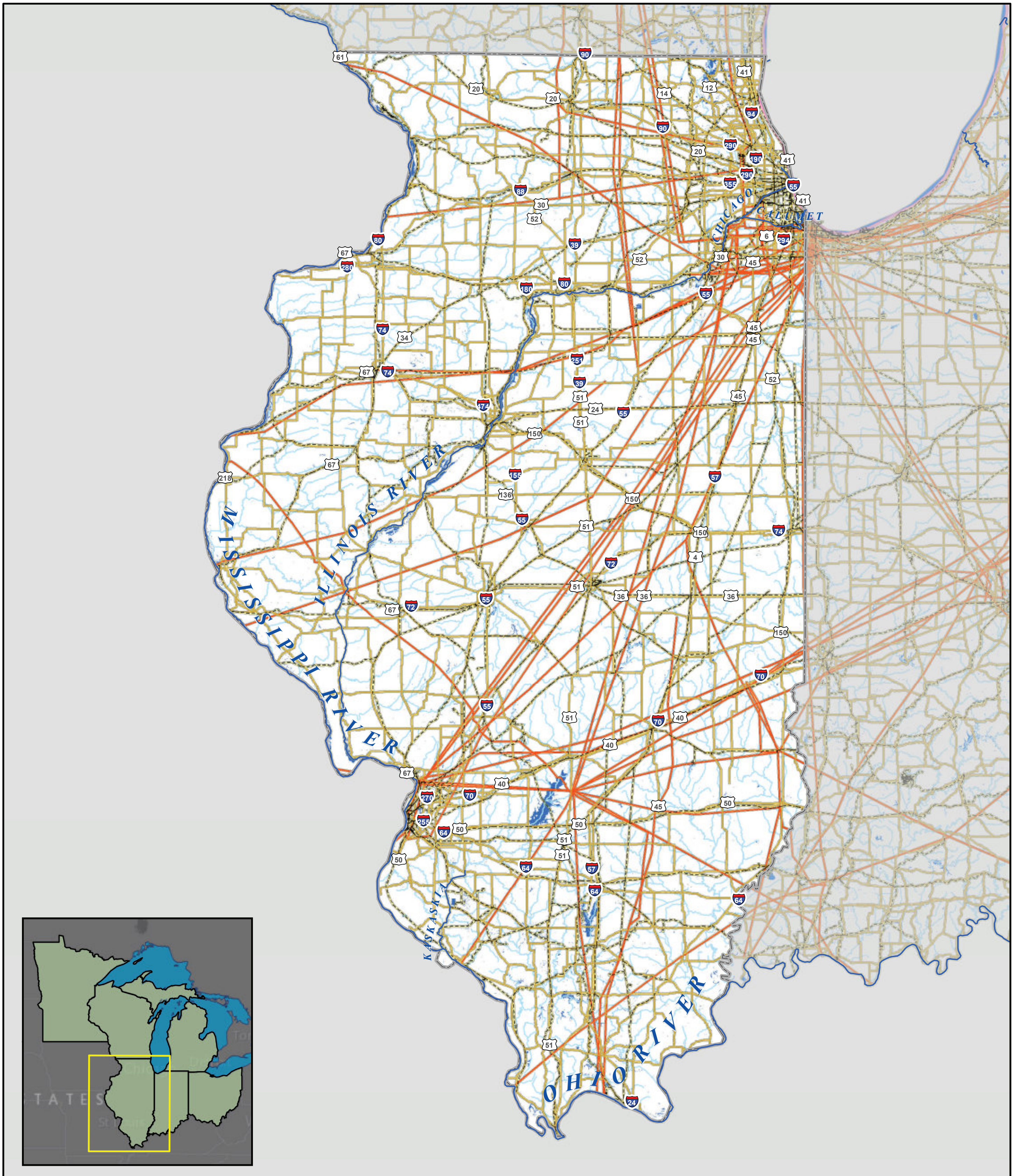


Figure 2. Spill Response Procedures (Appendix A of the MOA)





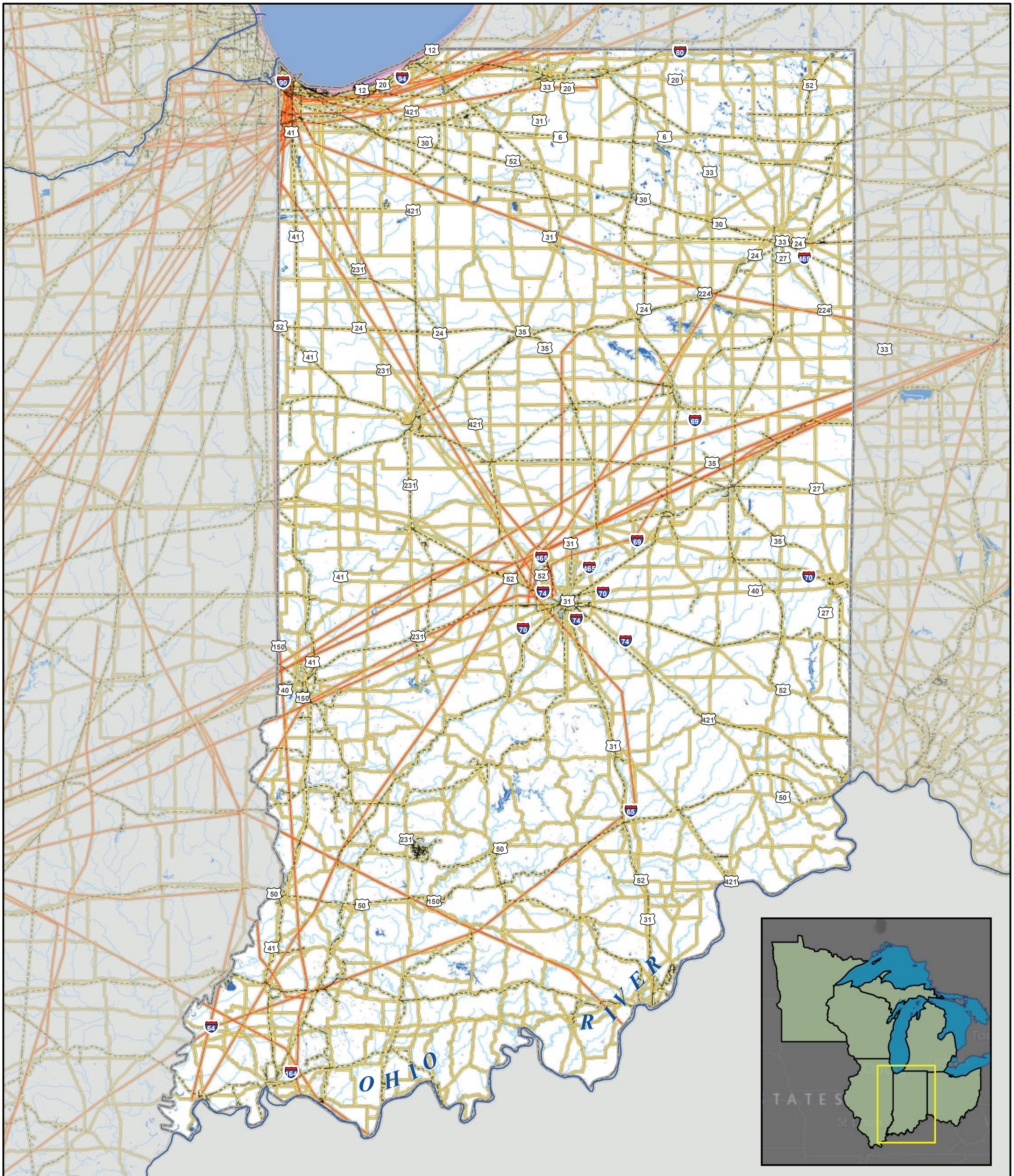
0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

OVERVIEW OF ILLINOIS ACTION AREA

SCALE 1:3,900,000

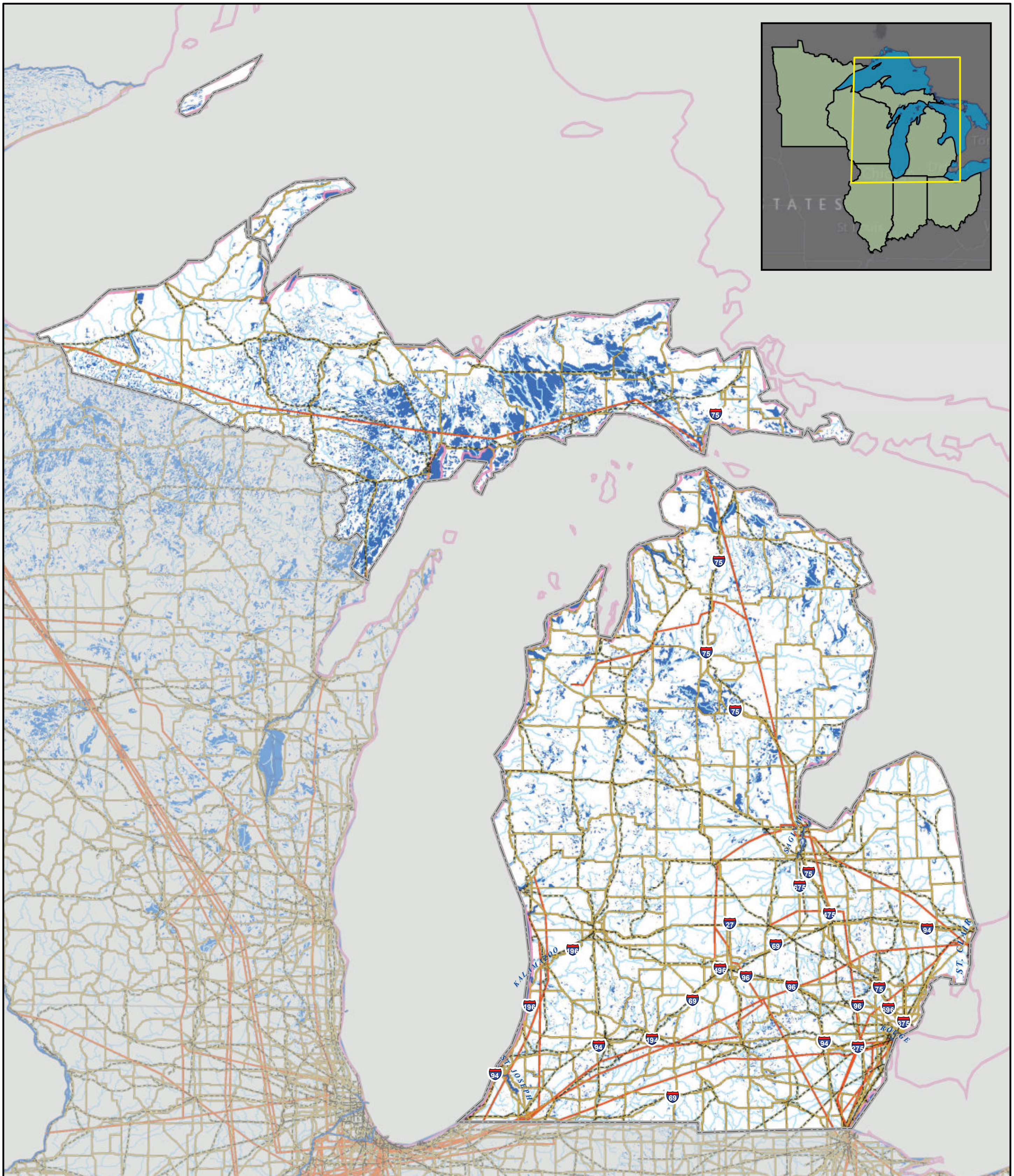
Petroleum Pipeline	Commercial Navigable Waterway	Lakes & Ponds
Major Road	Rivers & Streams	1-Mile Coastal Inland Buffer
Railroad		Action Area

N



0 10 20 40 60 Miles 0 10 20 40 60 80 Kilometers	**OVERVIEW OF INDIANA ACTION AREA**	**SCALE 1:2,800,000**
	Petroleum Pipeline Major Road Railroad Commercial Navigable Waterway Rivers & Streams Lakes & Ponds 1-Mile Coastal Inland Buffer Action Area	N

Basemap courtesy of Esri. Date: 5/7/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

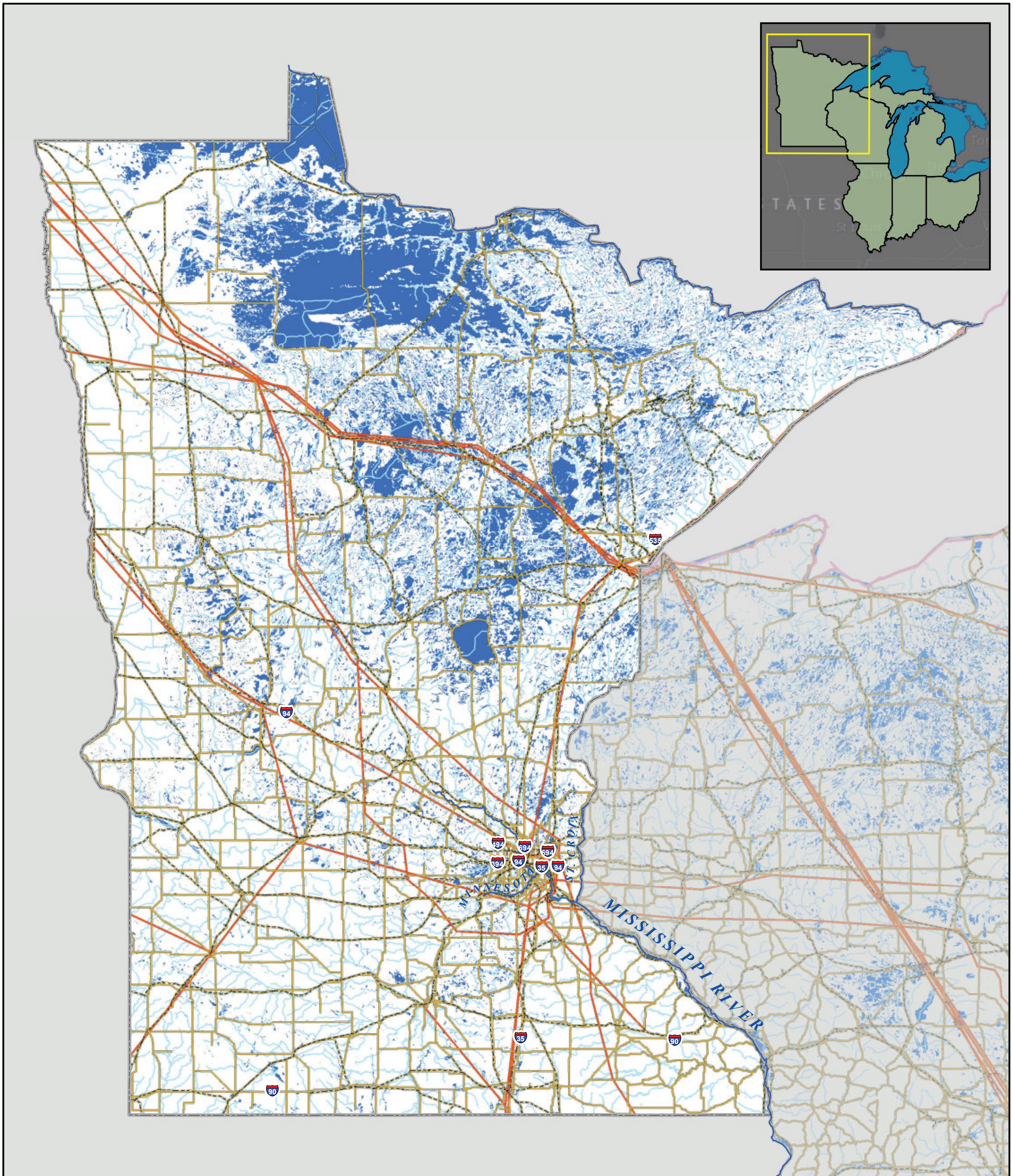
OVERVIEW OF MICHIGAN ACTION AREA

SCALE 1:5,000,000

Petroleum Pipeline	Commercial Navigable Waterway
Major Road	Rivers & Streams
Railroad	

Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area

N



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

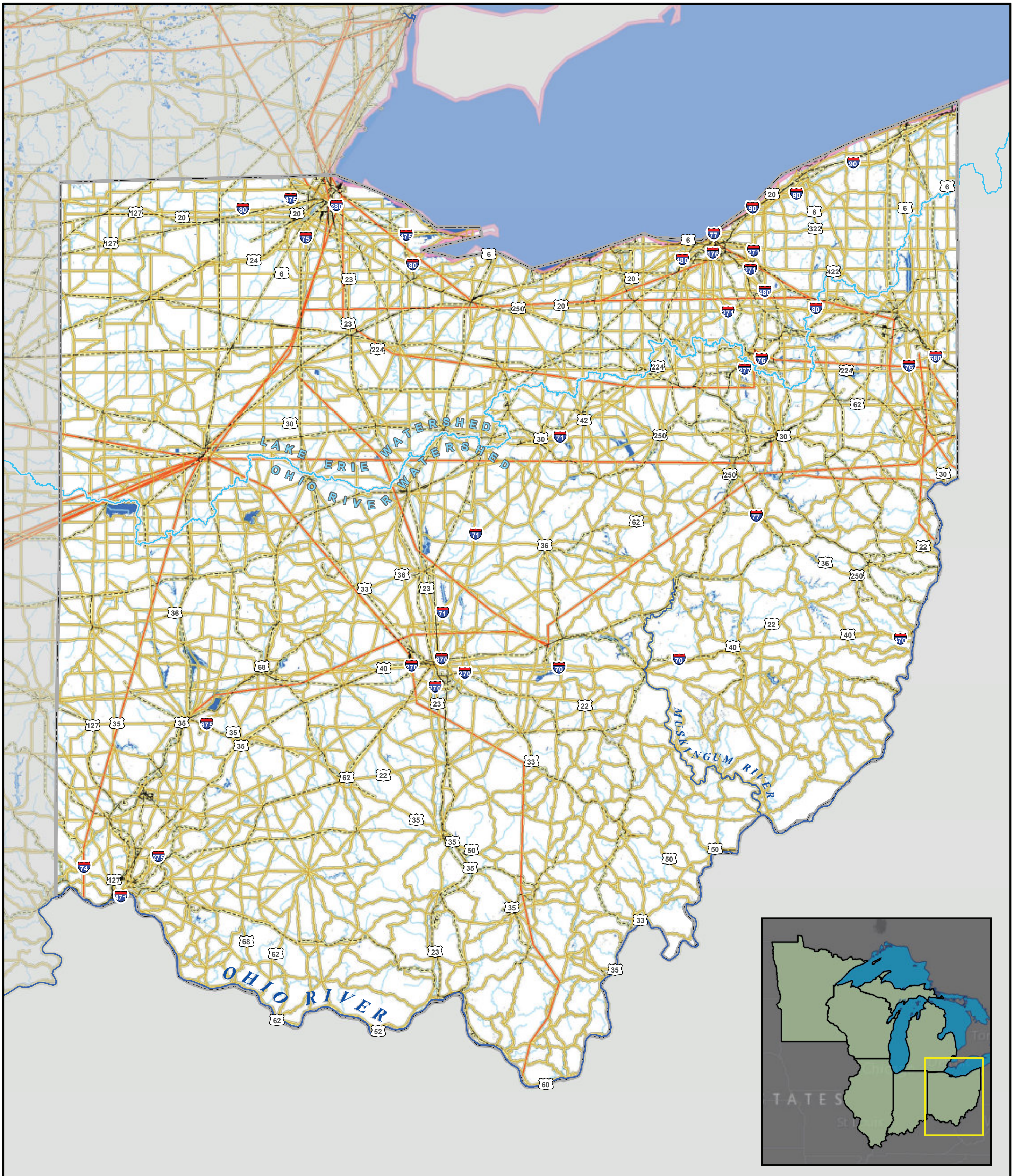
OVERVIEW OF MINNESOTA ACTION AREA

SCALE 1:4,800,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area

N

Basemap courtesy of Esri. Date: 5/7/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

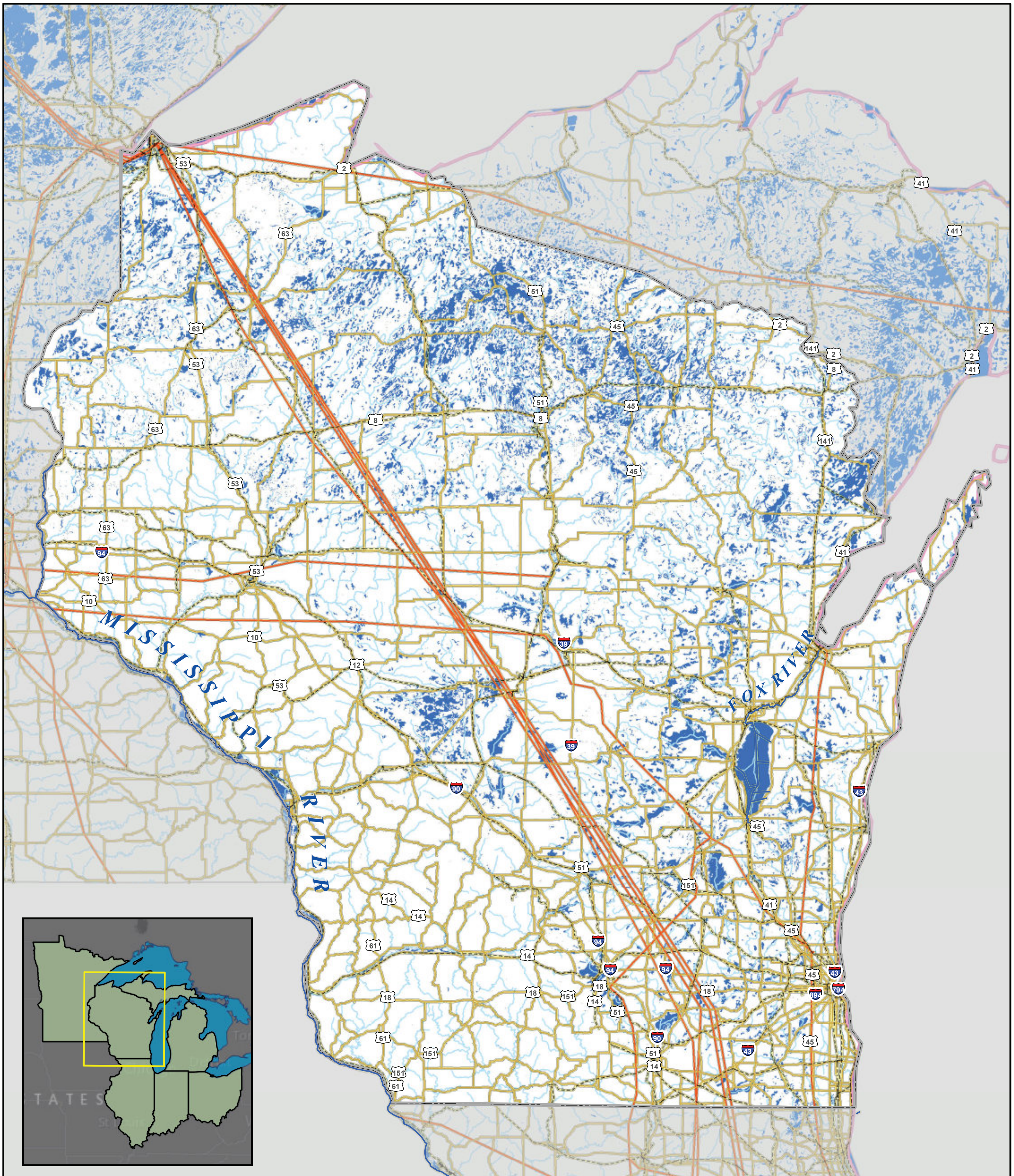
OVERVIEW OF OHIO ACTION AREA

SCALE 1:2,800,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
Watershed Boundary
1-Mile Coastal Inland Buffer
Action Area

N

Basemap courtesy of Esri. Date: 5/6/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

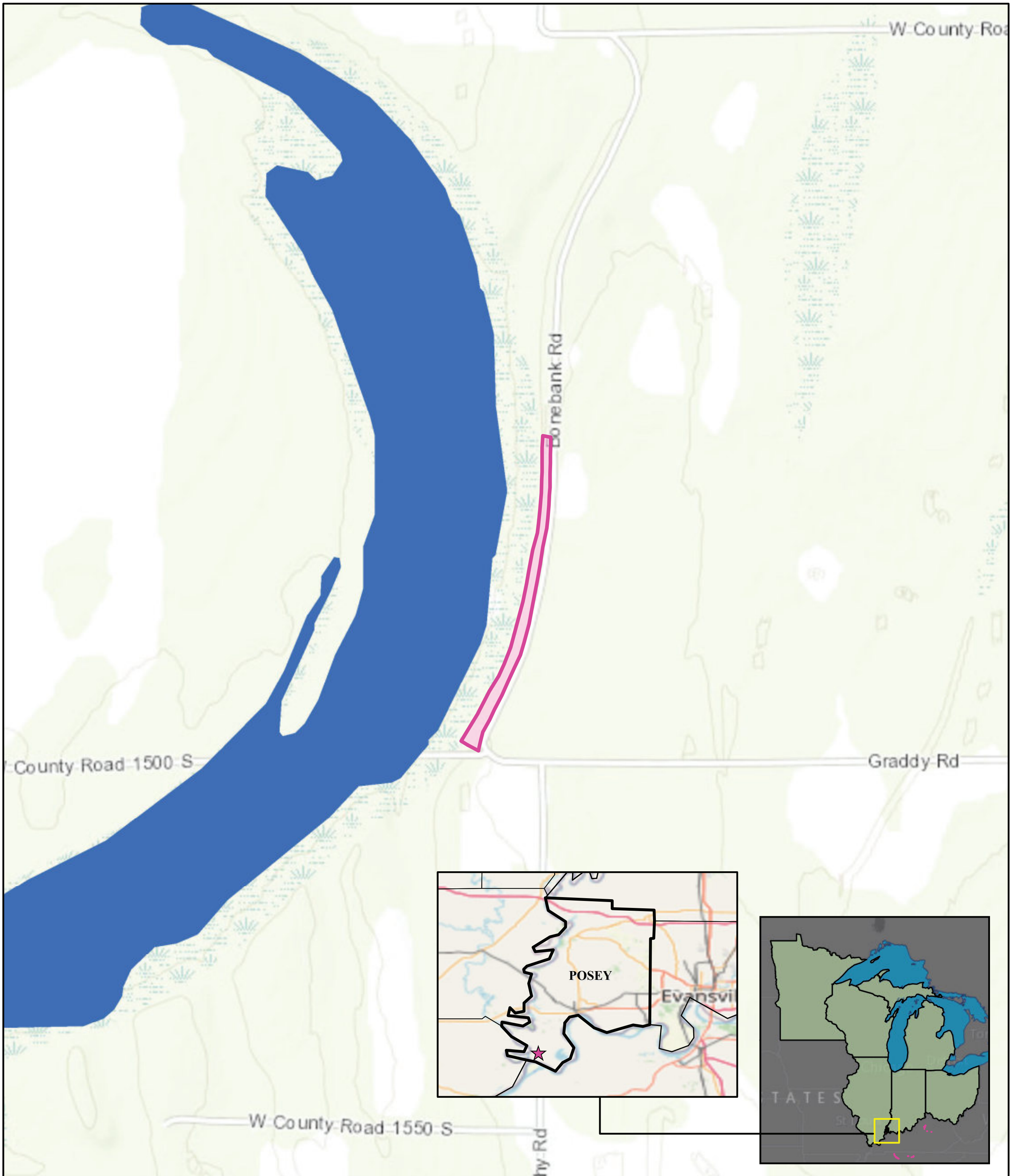
OVERVIEW OF WISCONSIN ACTION AREA

SCALE 1:3,600,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area

N

Basemap courtesy of Esri. Date: 5/7/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

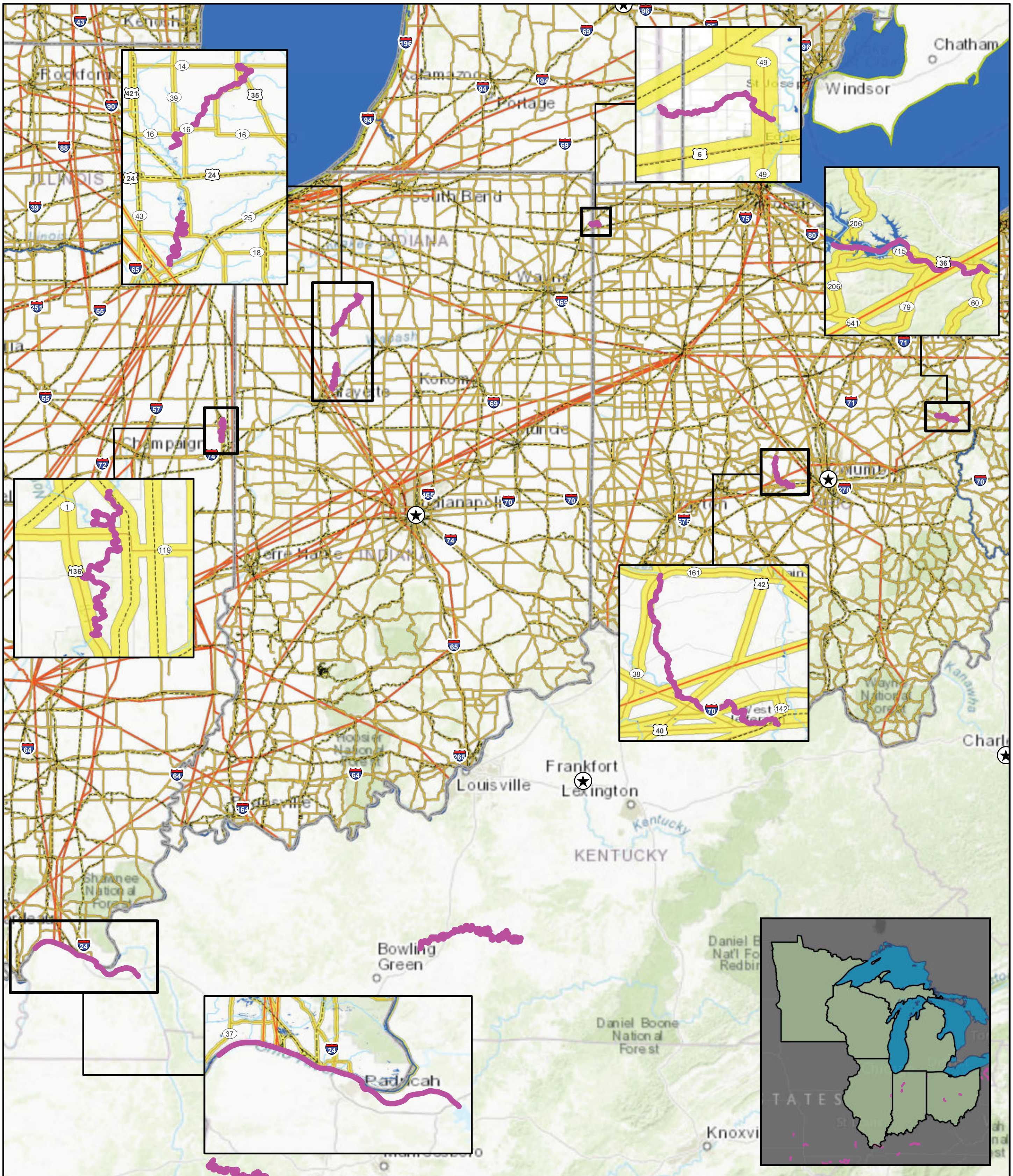


SHORT'S BLADDERPOD (*PHYSARIA GLOBOSA*)
CRITICAL HABITAT IN ACTION AREA

SCALE 1:15,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Short's Bladderpod (*Physaria globosa*) Critical Habitat

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator



RABBITSFOOT (*QUADRULA CYLINDRICA CYLINDRICA*) CRITICAL HABITAT IN ACTION AREA

SCALE 1:4,500,000

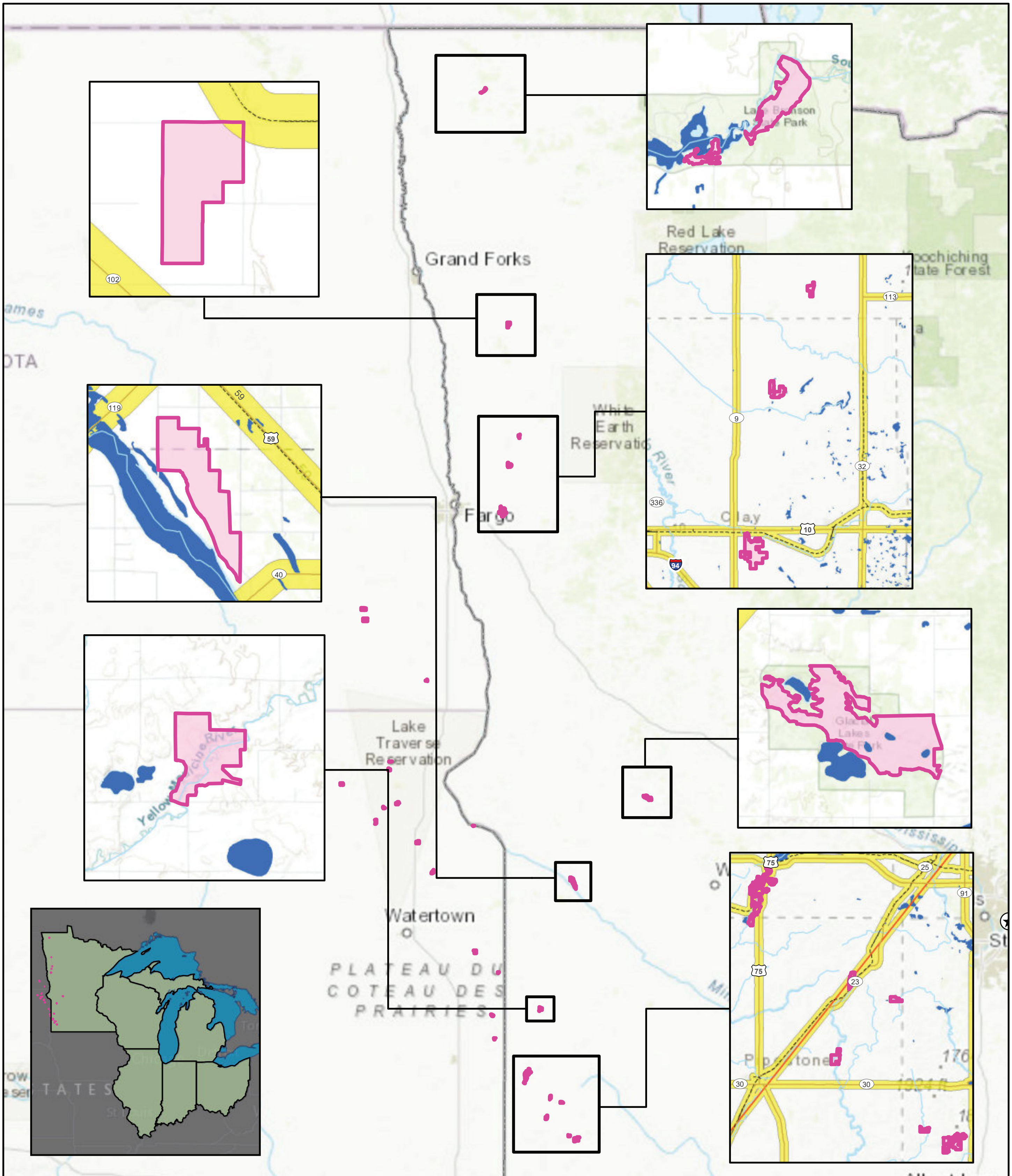
0 12.5 25 50 75 Miles

0 10 20 40 60 80 Kilometers

Legend:
- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action
- Rabbitsfoot (*Quadrula cylindrica cylindricai*) Critical Habitat

N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

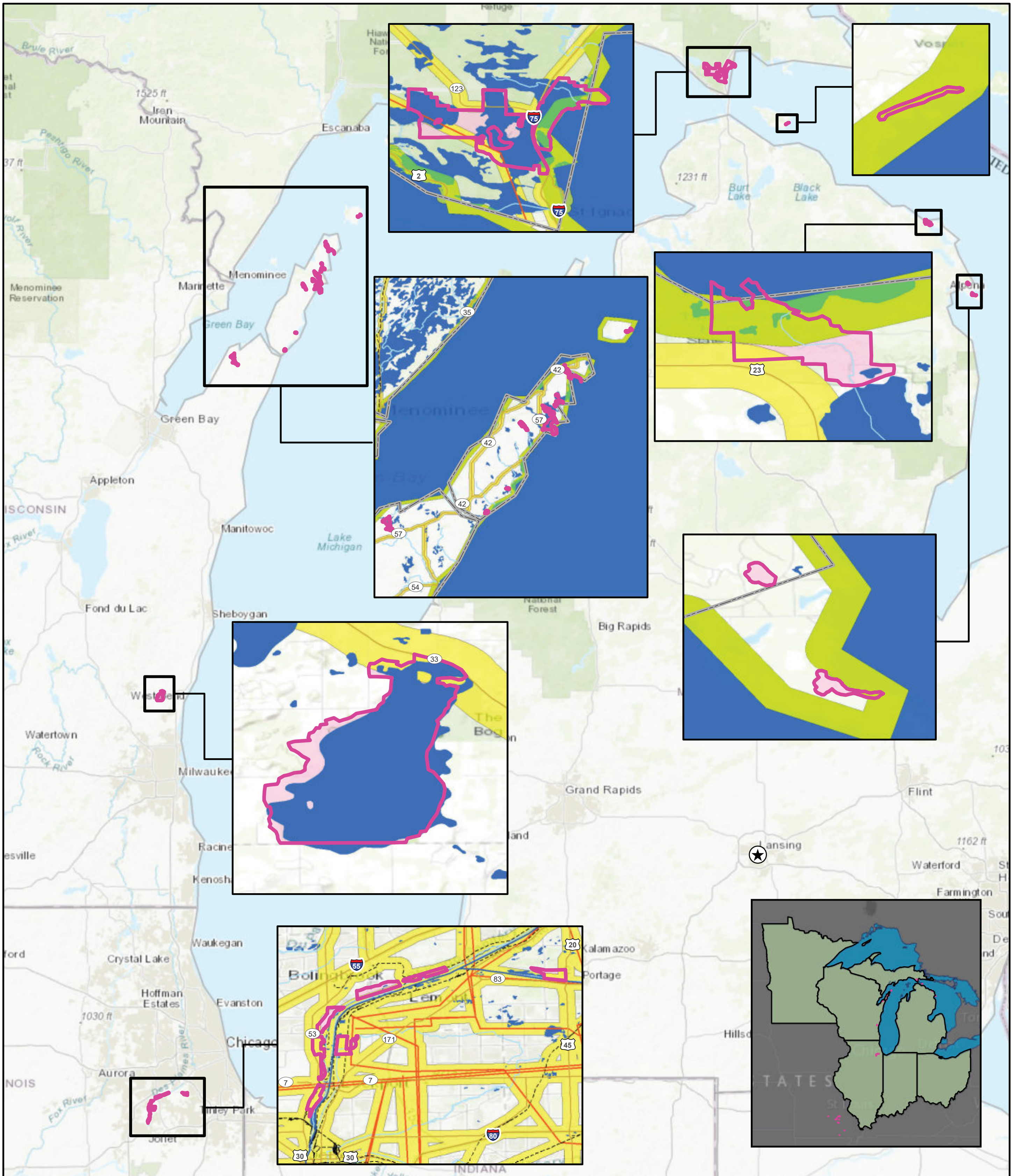
DAKOTA SKIPPER (*HESPERIA DACOTAE*)
CRITICAL HABITAT IN ACTION AREA

SCALE 1:3,900,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Dakota Skipper (*Hesperia dacotae*) Critical Habitat

N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator

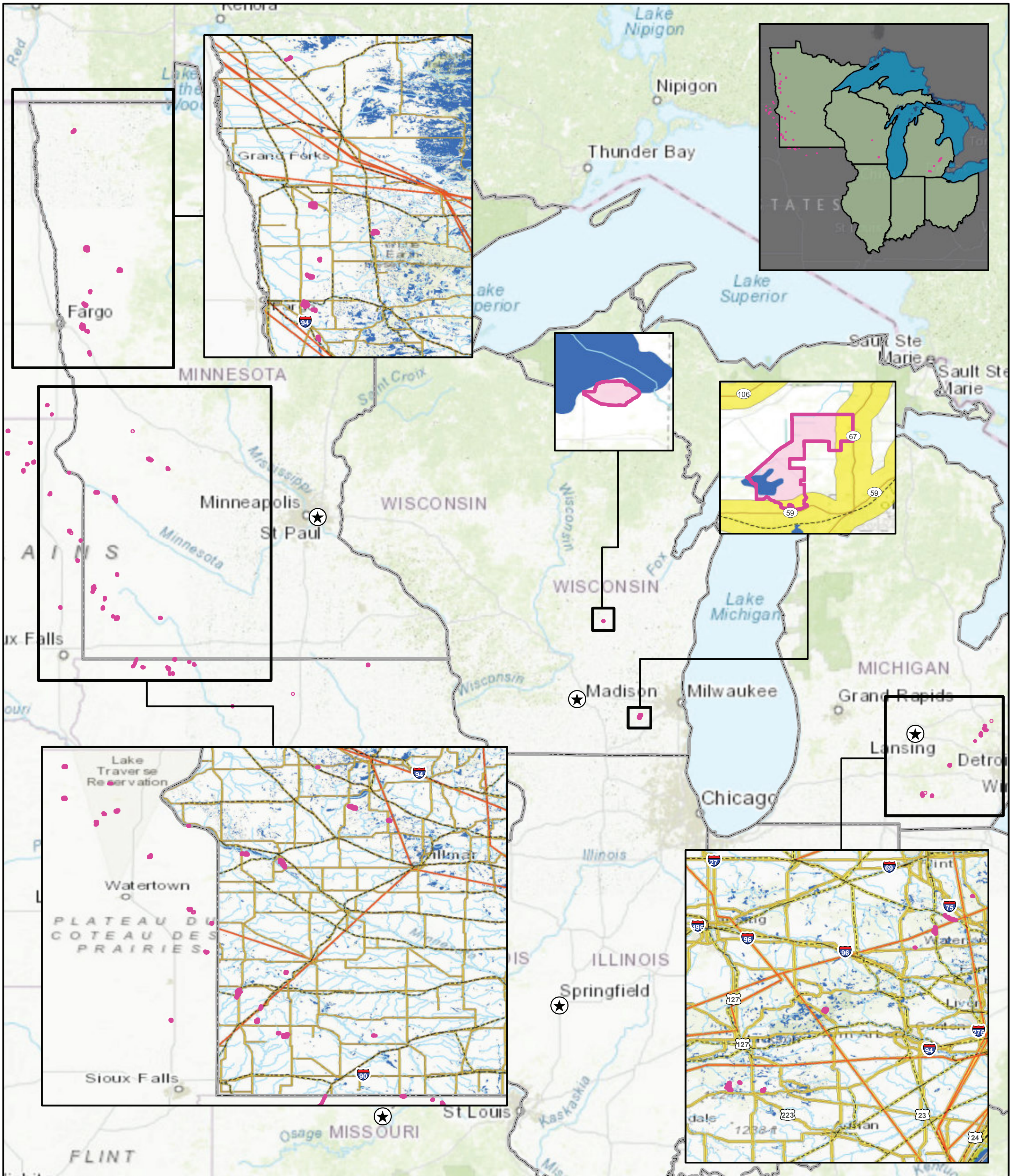


0 10 20 40 60 Miles 0 10 20 40 60 80 Kilometers	**HINE'S EMERALD DRAGONFLY (*SOMATOCHLORA HINEANA*) CRITICAL HABITAT IN ACTION AREA**	**SCALE 1:3,400,000**

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Hine's Emerald Dragonfly (*Somatochlora hineana*) Critical Habitat

N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator

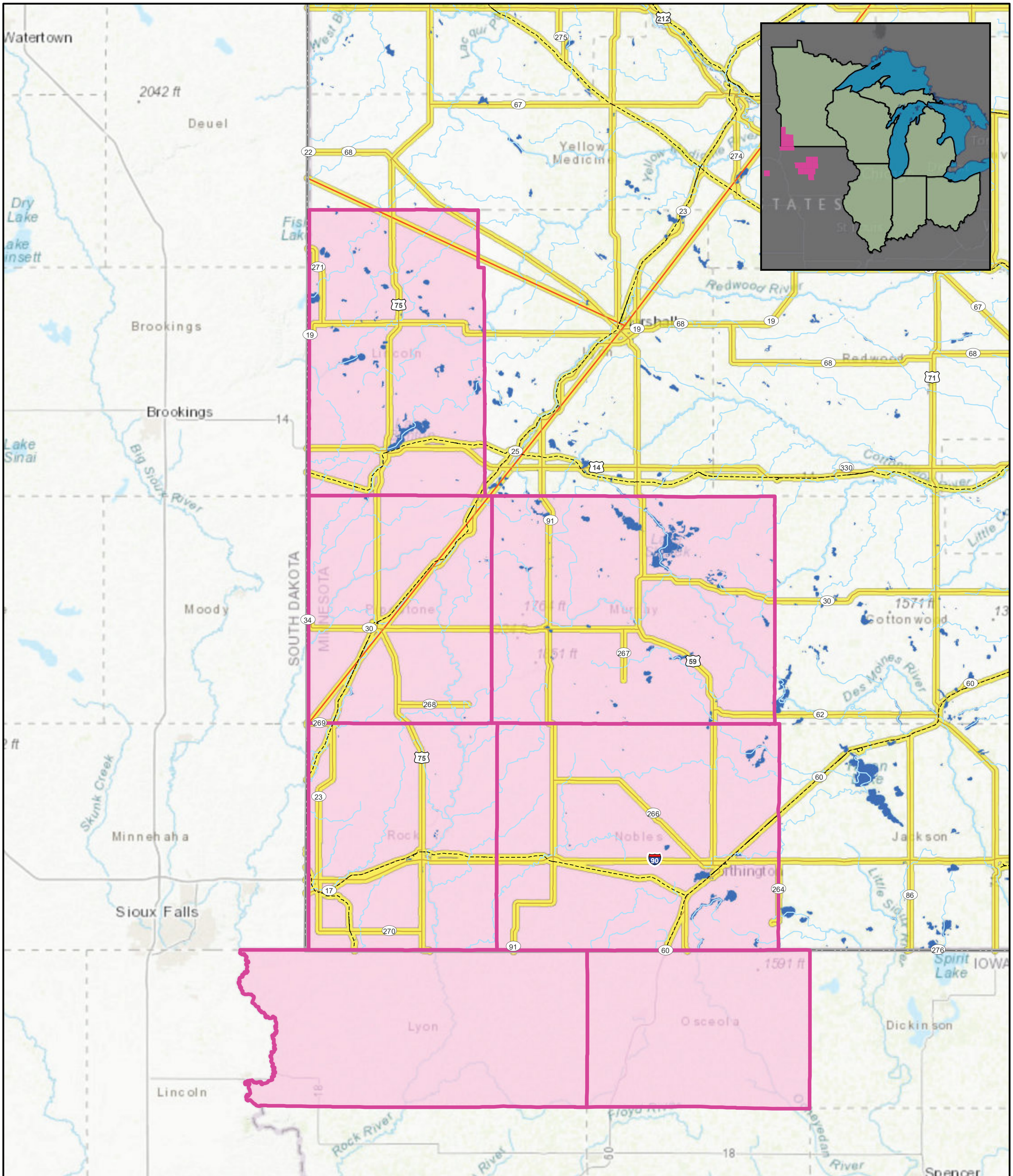


POWESHIEK SKIPPERLING (*OARISMA POWESHIEK*) CRITICAL HABITAT IN ACTION AREA

SCALE 1:8,400,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Poweshiek Skipperling (*Oarisma poweshiek*) Critical Habitat

N



TOPEKA SHINER (*NOTROPIS TOPEKA*) CRITICAL HABITAT IN ACTION AREA

SCALE 1:1,250,000

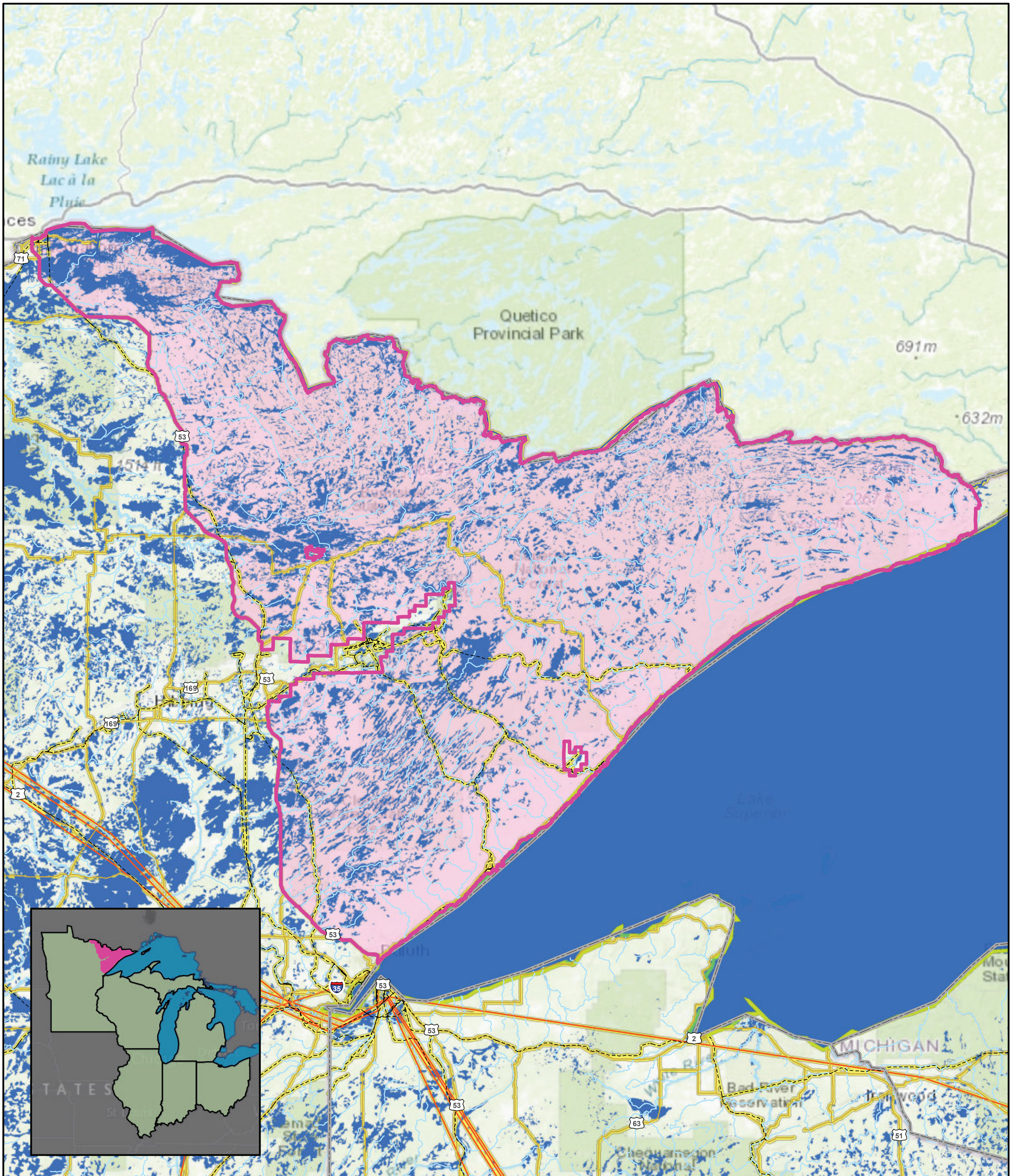
Miles: 0 4 8 16 24

Kilometers: 0 4 8 16 24 32

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Topeka Shiner (*Notropis topeka*) Critical Habitat

N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator



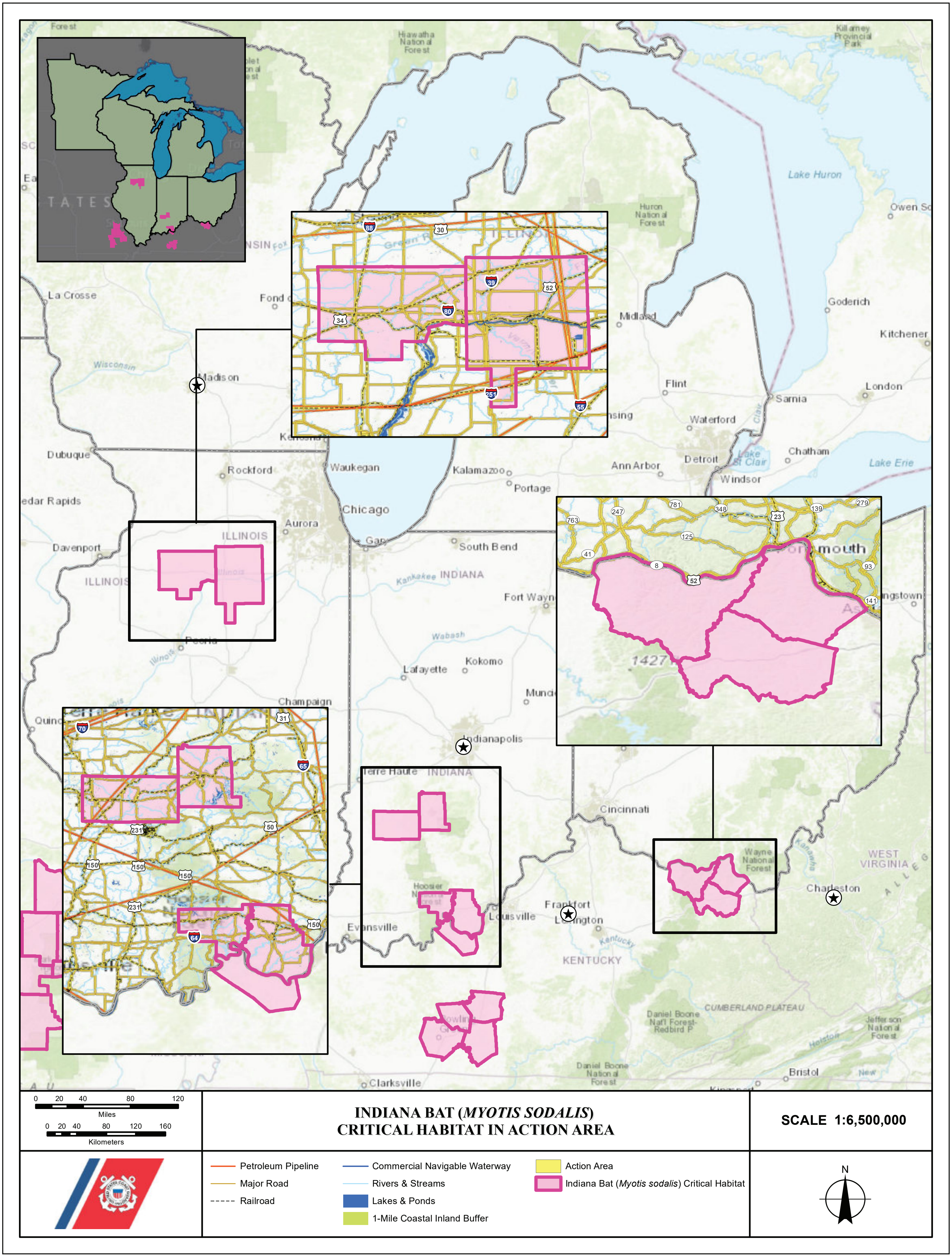
CANADA LYNX (*LYNX CANADENSIS*) CRITICAL HABITAT IN ACTION AREA

SCALE 1:2,200,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Canada Lynx (*Lynx canadensis*) Critical Habitat

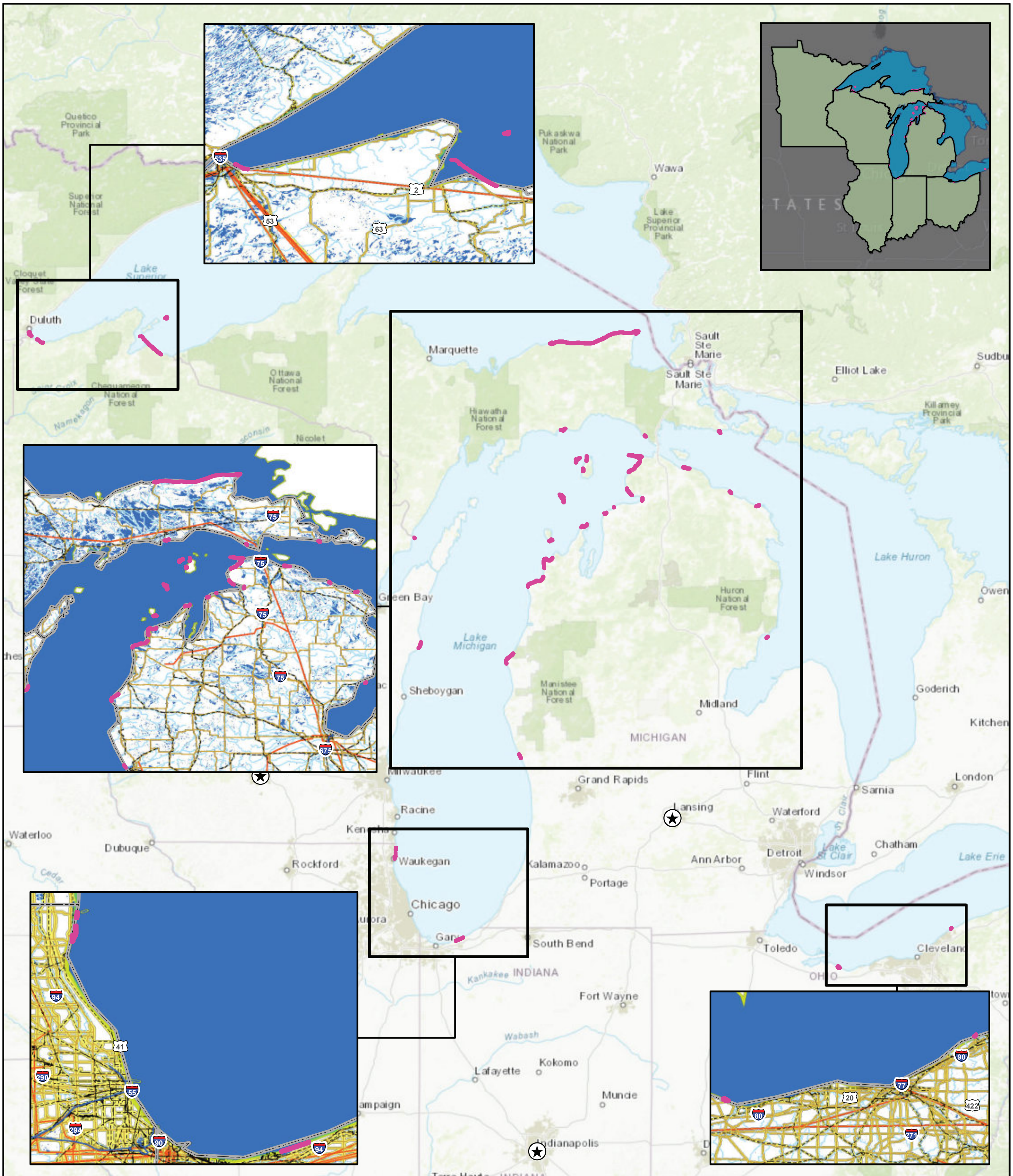
N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator



INDIANA BAT (*MYOTIS SODALIS*)
CRITICAL HABITAT IN ACTION AREA

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator



0 20 40 80 120 Miles 0 20 40 80 120 160 Kilometers	**PIPING PLOVER (*CHARADRIUS MELODUS*)** **CRITICAL HABITAT IN ACTION AREA**	**SCALE 1:6,900,000**

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Piping Plover (*Charadrius melodus*) Critical Habitat

N

Basemap courtesy of Esri. Date: 1/12/2022 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator

LIST OF TABLES

Table 1. Active Response Plans within Region 5 (January 2022)

State	Sub-Area Boundary	Coverage	Document Name	Details *
EPA Region 5 Inland Areas	-	*Any state/county not covered under a Sub-Area boundary*	*Region 5 Inland Zone Area Contingency Plan*	*https://rrt5.org/RCPInlandZoneACP.aspx*
Ohio	Great Rivers	Illinois, Indiana, and Ohio	Ohio River Umbrella Plan	https://rrt5.org/Portals/0/ResponsePlans/OhioRiverUmbrellaPlan_091415.pdf
	Detroit/SE Michigan	Southeast Michigan, Northwest Ohio, and portions of Lake Huron and Lake Erie	Northwest Ohio & Southeast Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2019.1%20NOSMAC%20Plan.pdf
	Cincinnati	Southeast Indiana and Southwest Ohio	EPA Region 5 Sub-Area Contingency Plan for Ohio River/Cincinnati Area	https://rrt5.org/Portals/0/PDFs/OhioRiverSACP_June2021.pdf
	SE Ohio/Huntington	Southern and Southeast Ohio, Ohio River bordering WV	Huntington/Ohio River Sub-Area Response Plan	https://rrt5.org/Portals/0/docs/HERO-nps23-012606-01.pdf
	SE Ohio/Upper Ohio River	Eastern and Southeastern Ohio	SE Ohio Sub-Area Spill Response Plan Initial Incident Action Plan	https://rrt5.org/Portals/0/ResponsePlans/SE_Ohio_Sub-Area_Response_Plan_IAP_5_17_16.pdf?timestamp=1499692536162
	Great Black Swamp Island	Northwest Ohio and Southeast Michigan	Northwest Ohio & Southeast Michigan Area	https://rrt5.org/Portals/0/PDFs/2019.1%20NOSMAC%20Plan.pdf
	Upper Ohio River	Ohio River	Federal Region III Regional Response Team/ Region III Regional Oil and Hazardous	https://nrt.org/sites/72/files/2019-11-20_Final_RRT3_%20RCP_rev1.pdf
	Ohio River	Ohio River bordering Kentucky	Region 4 Regional/Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2019_Region4_RegionalContingencyPlan.pdf
Indiana	Western Lake Superior	Coastal Zone of Lake Michigan and Navigable waters that flow into Lake Michigan	Sector Lake Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Contingency_Plan.pdf
	Great Rivers	Illinois, Indiana, and Ohio	Ohio River Umbrella Plan	https://rrt5.org/Portals/0/ResponsePlans/OhioRiverUmbrellaPlan_091415.pdf
	NW Indiana	Northwest Indiana	Coast Guard Sector Lake Michigan Area	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Conting
	Great Black Swamp Inland	Northeast Indiana	Northwest Ohio & Southeast Michigan Area	https://rrt5.org/Portals/0/PDFs/2019.1%20NOSMAC%20Plan.pdf
	White River	Central Indiana Surrounding the White River	Region 5 Inland Zone Area Contingency Plan	https://rrt5.org/RCPInlandZoneACP.aspx
	Patoka	Southwest Indiana	Region 5 Inland Zone Area Contingency Plan	https://rrt5.org/RCPInlandZoneACP.aspx
	Louisville/South Indiana	Southern Indiana	Region 5 Inland Zone Area Contingency Plan	https://rrt5.org/RCPInlandZoneACP.aspx
	Cincinnati	Southeast Indiana and Southwest Ohio	EPA Region 5 Sub-Area Contingency Plan for Ohio River/Cincinnati Area	https://rrt5.org/Portals/0/PDFs/OhioRiverSACP_June2021.pdf
Illinois	Western Lake Superior	Coastal Zone of Lake Michigan and Navigable waters that flow into Lake Michigan	Sector Lake Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Contingency_Plan.pdf
	Upper Mississippi River	Commercially navigable mainstem Upper Mississippi River	Upper Mississippi River Spill Response Plan & Resource Manual	https://umrba.org/sites/default/files/documents/umrplan.pdf
	Mississippi River (Pools)	Commercially navigable mainstem of Mississippi River		

Table 1. Active Response Plans within Region 5 (January 2022)

State	Sub-Area Boundary	Coverage	Document Name	Details *
Illinois (cont'd)	Chicago	Southwest Lake Michigan and Four Counties in Northwest Illinois	Greater Chicago Sub-Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/GreaterChicagoSub-areaContingencyPlan_June_2018_Public.pdf
	Chicago	Will County, Illinois	U.S. EPA Region 5 Will County, Illinois Initial Incident Action Plan (IAP)	https://rrt5.org/Portals/0/PDFs/Will%20County%20IAP%20final%209_19_18.pdf
	St. Louis	Madison, Monroe, and St. Clair Counties, Illinois	Greater St. Louis Sub-area Contingency Plan	https://rrt5.org/Portals/0/docs/Greater_StLouisSACP_2016_8_Public.pdf
	Great Rivers	Southern Illinois	Great Rivers Subarea Contingency Plan	https://rrt5.org/Portals/0/ResponsePlans/GreatRiversSACP_PublicVersion_Oct2020.pdf
	Great Rivers	Pope and Massac counties in Southern Illinois	U.S. EPA REGION 5 The Great Rivers – Paducah/Metropolis Spill Response Plan	https://rrt5.org/portals/0/PDFs/20190221_IAP%20Metropolis%20Paducah.pdf
	Great Rivers	Illinois, Indiana, and Ohio	Ohio River Umbrella Plan	https://rrt5.org/Portals/0/ResponsePlans/OhioRiverUmbrellaPlan_091415.pdf
Michigan	Western Lake Superior	Coastal Zone of Lake Michigan and Navigable waters that flow into Lake Michigan	Sector Lake Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Contingency_Plan.pdf
	North Michigan	Upper Peninsula and northern portion of lower Peninsula of Michigan	Northern Michigan Area Contingency Plan	https://rrt5.org/Portals/0/docs/ACP-NorthernMI-EPAUSCG-Aug2015.pdf
	North Lower Western Michigan	Seventeen Counties in Western Michigan	Inland Zone Sub-Area Contingency Plan (SACP) for North Lower Western Michigan	https://rrt5.org/Portals/0/PDFs/NLWM_SACP_MainBodyPlan_Aug2021_final.pdf
	Detroit/SE Michigan	Southeast Michigan, Northwest Ohio, and portions of Lake Huron and Lake Erie	Northwest Ohio & Southeast Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2019.1%20NOSMAC%20Plan.pdf
	South Lower Western Michigan	Seven Counties in Southwestern Michigan	Western Michigan Sub-Area Contingency Plan	https://rrt5.org/Portals/0/docs/ACP_WesternMichigan.pdf
Wisconsin	Western Lake Superior	Coastal Zone of Lake Michigan and Navigable waters that flow into Lake Michigan	Sector Lake Michigan Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Contingency_Plan.pdf
	Upper Mississippi River	Commercially navigable mainstem Upper Mississippi River	Upper Mississippi River Spill Response Plan & Resource Manual	https://umrba.org/sites/default/files/documents/umrplan.pdf
	St. Croix Nation Scenic Riverway	Saint Croix and Namekagon Rivers	National Park Service St. Croix National Scenic Riverway Initial Incident Action Plan (IAP)	https://rrt5.org/Portals/0/PDFs/NPS_Initial_Incident_Action_Plan.pdf
	Green Bay/Horicon	Horicon Marsh	Horicon Marsh Initial Incident Action Plan	https://rrt5.org/Portals/0/ResponsePlans/IAP_May%202015_v8.pdf
	Milwaukee	Southeast Wisconsin	Coast Guard Sector Lake Michigan Area	https://rrt5.org/Portals/0/PDFs/2020_Sector_Lake_Michigan_Area_Conting
Minnesota	Red River Valley	Six counties in western Minnesota	Red River Valley Sub-Area Contingency Plan	https://rrt5.org/Portals/0/docs/RedRiverSD_Sep2003.pdf
	Siouxland	Five counties in northeast Minnesota	Siouxland Subarea Contingency Plan	https://rrt5.org/Portals/0/docs/SiouxlandSACP_PublicAccess_Sept2020.pdf
	Western Lake Superior	Western Lake Superior	Western Lake Superior Area Contingency Plan	https://rrt5.org/Portals/0/PDFs/WesternLakeSuperiorACP_rev_2017.pdf
	Western Lake Superior	Isle Royal National Park	Strategic Protection Plan Response Considerations: Isle Royale National Park	https://rrt5.org/Portals/0/docs/IRReport081703_full.pdf?timestamp=1499693031760
	Minneapolis/St. Paul	Minneapolis/St. Paul	Inland Zone Sub-Area Contingency Plan (SACP) for Minneapolis/St. Paul	https://rrt5.org/Portals/0/PDFs/MplsStP_SACP_MainBodyPlan%20Final%20Jan%202021.pdf

Table 1. Active Response Plans within Region 5 (January 2022)

State	Sub-Area Boundary	Coverage	Document Name	Details *
Minnesota (cont'd)	Mississippi (Pool): Mississippi River (Twin Cities Pool)	Commercially navigable mainstem Upper Mississippi River	Upper Mississippi River Spill Response Plan & Resource Manual	https://umrba.org/sites/default/files/documents/umrplan.pdf
	Upper Mississippi River	Commercially navigable mainstem Upper Mississippi River	Upper Mississippi River Spill Response Plan & Resource Manual	https://umrba.org/sites/default/files/documents/umrplan.pdf
	St. Croix Nation Scenic Riverway	Saint Croix and Namekagon Rivers	National Park Service St. Croix National Scenic Riverway Initial Incident Action Plan (IAP)	https://rrt5.org/Portals/0/PDFs/NPS_Initial_Incident_Action_Plan.pdf

* All referenced plans can be retrieved at www.rrt5.org if links are broken.

Table 2. Overview of Response Actions Anticipated to be used in R5

Primary Response Activities	
Deflection and Containment Activities	Booming Dikes or Berms Construction barriers, dams, pits, and trenches Culvert blocking
Recovery Activities	Skimming Vacuuming Sorbents
Removal/cleanup Activities	Flooding Flushing Steam Cleaning Sandblasting Mechanical (non-chemical) sand cleaning (surface, <1 inch) Mechanical (non-chemical) sand cleaning and excavation (>1 inch) Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
Submerged Oil Activities	Detection of non-floating or submerged oil Recovery of non-floating or submerged oil Containment of non-floating or submerged oil
Wildlife Protection Activities	Deterrence and Hazing Capture and care of contaminated species or recovery of contaminated carcasses
Locating, Tracking, and Support Activities	Use of Aircraft Use of Vessels Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Creation/use of Staging Areas (on land) Natural attenuation - allow habitat to recover naturally while monitoring Deployment of buoys Locating, Sampling and monitoring: Air, land, water (includes SCAT) Access of personnel by foot traffic
Secondary Response Activities	
Waste Management Activities	Waste Handling Temporary Storage (on water) Temporary Storage (on land) Decontamination
Not included in RAM	
	Disinfection Phytoremedation Air Sparging

Table 3. Impacts of Response Actions on Vulnerable Habitats within Region 5.

Vulnerable Habitat in Region 5	Description	Corresponding RAM Habitat	Response Impacts[1] Least	Some	Most
Beach and Sand Bar	*Beaches:* areas infrequently flooded with non-vegetated sand or gravel. It typically includes sand spoil banks, beaches, and other sandy areas that are upland. This general class may have small inclusions of grasses or forbs (<10%), trees (<10%), or shrubs (<25%). *Sand Bar:* areas that are temporarily flooded and exposed with non-vegetated sand flats. They are typically found in or near the main channel and are often associated with wing dams, shorelines, and islands.	Shorelines Ports, Canals, Industrial Areas Coastal Nearshore Rivers and Streams Bays and Estuaries Ponds and Lakes	Sorbents/Solidifiers Low-Pressure Ambient Flushing Hand Tool/Oil Removal Cleaning	Vacuum Light Equipment Oil Removal	Sediment Removal Heavy Equipment Removal
Bog	A bog is a distinctive type of freshwater wetland that accumulates peat derived from sphagnum conditions and low oxygen levels contribute to slow decay of organic material, resulting in layers of peat that can be meters deep. Due to a lack of inflows and outflows, and the impermeability of the peat layer, most bogs receive nearly all of their water from surface rather than ground water.	Wetlands	Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low Pressure, Ambient-Water Flushing In-Situ Burning Collection by Direct Suction Debris/Vegetation Removal	Natural Attenuation/Phytoremediation	Light Equipment Oil Removal Peat/Sediment Removal
Calcareous Fen	Calcareous fens are one of the rarest habitat types in the United States. They typically form on or near slight slopes from upwelling groundwater trapped by a layer of peat. Like bogs, fens are characterized by a peat substrate, but are fed by a supply of cold, oxygen-deprived groundwater rich in calcium and magnesium bicarbonates. As they occur on sites of cold-water seepage, active springs and trout streams are often associated with fens.	Wetlands	Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Collection by Direct Suction Debris/Vegetation Removal	Natural Attenuation/ Phytoremediation	Light Equipment Oil Removal Peat/Sediment Removal
Deep Marsh Annuals	The deep marsh annuals habitat includes portions of lakes, ponds, marshes, or backwaters that are >10% vegetated with wild rice (Zizania). While this habitat is dominated by wild rice, it may have inclusions of submersed, non-rooted-floating aquatics, rooted-floating aquatics, or emergent vegetation. During normal water conditions, there is little flow, though there can be wind-generated currents and stronger flows at inlets and outlets. During flood conditions, these habitats can be connected to rivers or streams, have strong currents, and the potential to carry large amounts of debris.	Ponds and Lakes Wetlands	Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Debris/Vegetation Removal	Natural Attenuation/ Phytoremediation	Light Equipment Oil Removal Sediment Removal
Deep Marsh Perennials	The deep marsh perennials habitat includes portions of lakes, ponds, marshes, or backwaters that are semi-permanently flooded and more than 10% vegetated with persistent emergent vegetation During normal water conditions, there is little flow, though there can be wind-generated currents and stronger flows at inlets and outlets. During flood conditions, these habitats can be connected to rivers or streams, have strong currents, and the potential to carry large amounts of debris.	Ponds and Lakes Wetlands	Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Debris/Vegetation Removal	Natural Attenuation/ Phytoremediation	Light Equipment Oil Removal Sediment Removal

Table 3. Impacts of Response Actions on Vulnerable Habitats within Region 5.

Vulnerable Habitat in Region 5	Description	Corresponding RAM Habitat	Response Impacts[1] Least	Some	Most
Deep Marsh Shrub	The Deep Marsh Shrub Habitat is found in or around lakes, ponds, backwaters, or shorelines that are >25% vegetated with semipermanently flooded shrubby vegetation. This general class may have inclusions of submersed, nonrooted-floating aquatics, rooted-floating aquatics, or emergent vegetation. This habitat is more common in southern aquatic systems.	Ponds and Lakes Wetlands	Exclusion or Deflection Booming Natural Attenuation Sorbents Flooding Low-Pressure, Ambient-Water Flushing Solidifiers	In-Situ Burning Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil Removal Sediment Removal
Floodplain Forest	Floodplain Forest represents areas on islands, near the shoreline, or around lakes, ponds, and backwaters that are >10% vegetated with seasonally flooded forests. This general class is typically found growing at or near the water table where it becomes inundated from spring flooding and high-water events.	Rivers and Streams Ponds and Lakes Wetlands	Natural Attenuation Sorbents/Solidifiers Flooding Low-Pressure, Ambient-Water Flushing	Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil Removal
Mudflats	Most common in tidal environments, mudflats also occupy marginal areas of backwaters, estuaries, lakes, ponds, or shorelines that are prone to seasonal flooding and subsequently exposed to non-vegetated mud. Though typically barren, incursions of emergent vegetation, forbs, grasses, or sedges of less than 10% cover may be present. Water may be present depending on season or weather patterns.	Rivers and Streams Ponds and Lakes Wetlands	Sorbents Low-Pressure, Ambient-Water Flushing Hand Tool Oil Removal/Cleaning	Vacuum Light Equipment Oil Removal	Heavy Equipment Oil Removal Sediment Removal
Open Water	The open waters habitat includes main river channels and portions of lakes, ponds, and backwaters that remain permanently flooded all year and appear less than 10% vegetated. These habitats are subject to varying currents and wave action.	Ports, Canals, and Industrial Areas Coastal Nearshore Coastal Offshore Rivers and Streams	Sorbents/Sorbent Boom Debris/Vegetation Removal Containment Booming	In-Situ Burning	Sediment Removal
Rooted Floating Aquatics	Rooted-Floating Aquatics represent portions of lakes, ponds, marshes, backwaters, or channel borders that are >10% vegetated with water lilies (Nymphaea and Nuphar) or American Lotus (Nelumbo). This general class is dominated by rooted-floating aquatics, but may have inclusions of submersed, nonrooted-floating aquatics, or emergent vegetation.	Shorelines Ports, Canals, and Industrial Areas Coastal Nearshore Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands	Containment Booming Sorbents/Sorbent Booming Debris/Vegetation Removal Natural Attenuation	Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers In-Situ Burning	Sediment Removal
Sedge Meadow	The sedge meadows habitat includes lowland areas around lakes, ponds, backwaters, and along seasonally flooded shorelines. Similar to wet meadows, these habitats are close to 100% vegetated with perennial grasses and forbs. T Though the peat and muck soils remain saturated most of the year, there is little standing water present (except after flooding or precipitation events). Sedge meadow habitat is rare and limited in occurrence in the Upper Mississippi River system.	Ponds and Lakes Bays and Estuaries Shorelines Wetlands	Flooding Collection by Direct Suction Low-Pressure, Ambient-Water Flushing In-Situ Burning	Natural Attenuation/Phytoremediation Debris/Vegetation Removal	Light Equipment Oil Removal Sorbents Hand Tool Oil Removal/Cleaning Nutrient Enrichment Sediment Removal

Table 3. Impacts of Response Actions on Vulnerable Habitats within Region 5.

Vulnerable Habitat in Region 5	Description	Corresponding RAM Habitat	Response Impacts[1]: Least	Response Impacts[1]: Some	Response Impacts[1]: Most
Shallow Marsh Annuals	The shallow marsh annuals habitat includes portions of lakes, ponds, backwaters, mudflats, or shorelines that are seasonally flooded and more than 10% vegetated with annual (non-persistent) emergent vegetation. During normal water conditions, there is little flow, though there can be wind-generated currents and stronger flows at inlets and outlets. During flood conditions, these habitats can be connected to rivers or streams, with strong currents and possibly large amounts of debris.	Ponds and Lakes Wetlands	Low-Pressure, Ambient-Water Flushing Flooding Exclusion or Deflection Booming Sorbents/Sorbent Boom In-Situ Burning Debris/Vegetation Removal	Natural Attenuation/Phytoremediation	Light Equipment Oil Removal Sediment Removal
Shallow Marsh Perennials	The shallow marsh perennials habitat includes portions of lakes, ponds, backwaters, or shorelines that are seasonally flooded and more than 10% vegetated with persistent emergent vegetation. During normal water conditions, there is little flow, though there can be wind-generated currents and stronger flows at inlets and outlets. During flood conditions, these habitats can be connected to rivers or streams, with strong currents and possibly large amounts of debris.	Ponds and Lakes Wetlands	Exclusion or Deflection Booming Sorbents/Sorbent Boom Flooding Low-Pressure, Ambient-Water Flushing In-Situ Burning Debris/Vegetation Removal	Natural Attenuation/Phytoremediation	Light Equipment Oil Removal Sediment Removal
Shallow Marsh Shrub	The Shallow Marsh Shrub Habitat represents areas near the shoreline or around lakes, ponds, and backwaters that are >25% vegetated with seasonally flooded shrubby vegetation. It typically grows with mixed emergent grasses and forbs.). Shallow marsh shrubs are typically found growing in soils that are saturated or inundated with little water.	Ponds and Lakes Wetlands	Exclusion or Deflection Booming Natural Attenuation Sorbents Flooding Low-Pressure, Ambient-Water Flushing Solidifiers	In-Situ Burning Vacuum Debris/Vegetation Removal Hand Tool Oil Removal/Cleaning	Light Equipment Oil Removal Sediment Removal
Submersed Vegetation	The submersed vegetation habitat is those portions of lakes, ponds, channel borders, or backwaters that appear more than 10% of vegetation fully underwater. It generally is found in areas which are flooded year-round and have water depths between 0.5 and 2 meters. Submersed vegetation occurring at depths greater than 2 meters may be classified as open water.	Ports, Canals, and Industrial Areas Coastal Nearshore Coastal Offshore Rivers and Streams Ponds and Lakes Wetlands	Containment Booming Sorbents/Sorbent Boom Debris/Vegetation Removal Natural Attenuation	In-Situ Burning Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers	Sediment Removal
Wet Meadow	The wet meadows habitat includes lowland areas that are close to 100% vegetated with perennial grasses and forbs. Wet meadows are common along the shores of shallow lakes, stream margins, and the edges of marshes, and can occur in areas of restricted drainage. Though the soils remain saturated most of the year, there is little standing water present (except after flooding or precipitation events).	Wetlands	Flooding Collection by Direct Suction Low-Pressure, Ambient-Water Flushing In-Situ Burning	Natural Attenuation/Phytoremediation Debris/Vegetation Removal	Light Equipment Oil Removal Hand Tool Oil Removal/Cleaning Sorbents Sediment Removal

[1] Inland Response Tactics Manual (UMBRA, 2013)

Table 4. Species considered and reviewed for the R5 Action Area.

			Occurrence in Action Area[1]							Habitat[2]	
Common Name	Scientific name	Status[1]	Critical Habitat[2]	IL	IN	MI	MN	OH	WI	Terrestrial	Aquatic
Plants											
American Hart's-tongue Fern	*Asplenium scolopendrium var.*	T				X				X	
Decurrent False Aster	*Boltonia decurrens*	T		X						X	
Dwarf Lake Iris	*Iris lacustris*	T				X			X	X	
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	T		X	X	X		X	X	X	
Fassett's Locoweed	*Oxytropis campestris var. chartacea*	T							X	X	
Houghton's Goldenrod	*Solidago houghtonii*	T				X				X	
Lakeside Daisy	*Hymenoxys herbacea*	T		X		X		X		X	
Leafy Prairie-clover	*Dalea foliosa*	E		X						X	
Leedy's roseroot	*Rhodiola integrifolia ssp. leedyi*	T					X			X	
Mead's Milkweed	*Asclepias meadii*	T		X	X				X	X	
Michigan Monkey Flower	*Mimulus michiganensis*	E				X				X	
Minnesota Dwarf Trout Lily	*Erythronium propullans*	E					X			X	
Northern Wild Monkshood	*Aconitun noveboracense*	T						X	X	X	
Pitcher's thistle	*Cirsium pitcheri*	T		X	X	X			X	X	
Prairie Bush-clover	*Lespedeza leptostachya*	T		X			X		X	X	
Short's Bladderpod	*Physaria globosa*	E	D		X					X	
Short's Goldenrod	*Solidago shortii*	E			X					X	
Small whorled pogonia	*Isotria medeoloides*	T		X		X		X		X	
Tennessee Pondweed	*Potamogeton tennesseensis*	UR						X			X
Virginia Sneezeweed	*Helenium virginicum*	T						X		X	
Virginia Spiraea	*Spirea virginiana*	T						X		X	
Western Prairie Fringed Orchid	*Platanthera praeclara*	T					X			X	
Snails											
Iowa Pleistocene Snail	*Discus macclintocki*	E		X						X	
Clams (Freshwater Mussels)											
Clubshell	*Pleurobema clava*	E		X	X	X		X			X
Fanshell	*Cyprogenia stegaria*	E		X	X			X			X
Fat Pocketbook	*Potamilus capax*	E		X	X						X
Higgins' Eye Pearlymussel	*Lampsilis higginsii*	E		X			X		X		X

Table 4. Species considered and reviewed for the R5 Action Area.

Common Name	Scientific name	Status[1]	Critical Habitat[2]	Occurrence in Action Area[1] IL	IN	MI	MN	OH	WI	Habitat[2] Terrestrial	Aquatic
Longsolid	*Fusconaia subrotunda*	P	PCH	X	X			X			X
Northern Riffleshell	*Epioblasma torulosa rangiana*	E		X	X	X		X			X
Orangefoot Pimpleback	*Plethobasus cooperianus*	E		X							X
Pink Mucket	*Lampsilis abrupta*	E		X	X			X			X
Purple Cat's Paw Pearlymussel	*Epioblasma obliquata obliquata*	E						X			X
Pyramid (Pink) Pigtoe	*Pleurobema rubrum*	UR						X			X
Rabbitsfoot	*Quadrula cylindrica cylindrica*	T	D	X	X			X			X
Rayed Bean	*Villosa fabalis*	E	PCH		X	X		X			X
Rough Pigtoe	*Pleurobema plenum*	E			X						X
Round Hickorynut	*Obovaria subrotunda*	P	PCH	X	X	X		X			X
Salamander mussel	*Simpsonaias ambigua*	UR		X	X	X	X	X	X		X
Scaleshell	*Leptodea leptodon*	E		X							X
Sheepnose	*Plethobasus cyphyus*	E	PCH	X	X		X	X	X		X
Snuffbox	*Epioblasma triquetra*	E	PCH	X	X	X		X	X		X
Spectaclecase	*Cumberlandia monodonta*	E	PCH	X			X		X		X
White Catspaw	*Epioblasma obliquata perobliqua*	E			X			X			X
Winged Mapleleaf	*Quadrula fragosa*	E					X		X		X
Crustaceans											
Illinois Cave amphipod	*Gammarus acherondytes*	E		X							X
Insects											
American Burying Beetle	*Nicrophorus americanus*	T				X		X		X	
Bog Buckmoth	*Hemileuca sp.*	UR							X	X	
Dakota Skipper	*Hesperia dacotae*	T	D				X			X	
Frosted Elfin Butterfly	*Callophrys irus*	UR		X	X	X		X	X	X	
Hine’s Emerald Dragonfly	*Somatochlora hineana*	E	D	X		X			X	X	
Hungerford’s Crawling Water Beetle	*Brychius hungerfordi*	E				X					X
Karner Blue Butterfly	*Lycaeides melissa samuelis*	E		X	X	X	X	X	X	X	
Linda's Roadside Skipper	*Amblyscirtes linda*	UR		X						X	
Mitchell’s Satyr Butterfly	*Neonympha mitchellii mitchellii*	E			X	X		X		X	
Monarch Butterfly	*Danaus plexippus plexippus*	C		X	X	X	X	X	X	X	

Table 4. Species considered and reviewed for the R5 Action Area.

Common Name	Scientific name	Status[1]	Critical Habitat[2]	Occurrence in Action Area[1] IL	IN	MI	MN	OH	WI	Habitat[2] Terrestrial	Aquatic
Poweshiek Skipperling	*Oarisma poweshiek*	E	D			X	X		X	X	
Rattlesnake-master Borer Moth	*Papaipema eryngii*	UR		X						X	
Regal Fritillary	*Speyeria idalia*	UR		X	X	X	X	X	X	X	
Rusty Patched Bumble Bee	*Bombus affinis*	E		X	X		X	X	X	X	
Fish											
Lake Sturgeon	*Acipenser fulvescens*	UR		X	X	X	X	X	X		X
Pallid Sturgeon	*Scaphirhynchus albus*	E		X							X
Popeye Shiner	*Notropis ariommus*	UR						X			X
Scioto Madtom	*Noturus trautmani*	E						X			X
Sicklefin Chub	*Macrhybopsis meeki*	UR		X							X
Sturgeon Chub	*Macrhybopsis gelida*	UR		X							X
Topeka Shiner	*Notropis topeka*	E	D				X				X
Herptiles											
Alligator Snapping Turtle	*Macroclemys temmincki*	UR		X	X						X
Blanding's Turtle	*Emydoidea blandingii*	UR		X	X	X	X	X	X	*X	X
Copperbelly Watersnake, N. DPS	*Nerodia erythrogaster neglecta*	T			X	X		X		X	X
Eastern Massasauga	*Sistrurus catenatus*	T		X	X	X		X	X	X	X
Illinois Chorus Frog	*Pseudacris illinoensis*	UR		X						X	X
Spotted Turtle	*Clemmys guttata*	UR		X	X	X		X		X*	X
Streamside Salamander	*Ambystoma barbouri*	UR			X			X		X	X
Wood Turtle	*Glyptemys insculpta*	UR				X	X	X	X	X	X
Mammals											
Canada Lynx	*Lynx canadensis*	T	D			X	X		X	X	
Gray Bat	*Myotis grisescens*	E		X	X					X	
Gray Wolf	*Canis lupus*	DR				X	X		X	X	
Indiana Bat	*Myotis sodalis*	E	D	X	X	X		X		X	
Little brown Bat	*Myotis lucifugus*	UR		X	X	X	X	X	X	X	
Northern Bog Lemming	*Synaptomys borealis*	UR					X			X	
Northern Long-eared Bat	*Myotis septentrionalis*	T		X	X	X	X	X	X	X	

Table 4. Species considered and reviewed for the R5 Action Area.

			Occurrence in Action Area[1]							Habitat[2]	
Common Name	Scientific name	Status[1]	Critical Habitat[2]	IL	IN	MI	MN	OH	WI	Terrestrial	Aquatic
Plains Spotted Skunk	*Spilogale putorius interrupta*	UR					X			X	
Prairie Gray Fox	*Urocyon cinereoargenteus ocythous*	UR					X		X	X	
Tricolored Bat	*Perimyotis subflavus*	UR		X	X	X	X	X	X	X	
Birds											
Eastern Black Rail	*Laterallus jamaicensis ssp.*	T		X	X	X	X	X	X	X	
Golden-winged Warbler	*Vermivora chrysoptera*	UR		X	X	X	X	X	X	X	
Piping Plover, Great Lakes	*Charadrius melodus*	E	D	X	X	X	X	X	X	X	
Rufa Red Knot	*Calidiris canutus rufa*	T	PCH	X	X	X	X	X	X	X	
Whooping Crane, Non-essential Experimental Pop.	*Grus americana*	E		X	X	X	X	X	X	X	

[1] Status designations: E = endangered, T = threatened, UR = under review, P = proposed for listing, DR = delisted due to recovery, D = designated critical habitat, PCH = proposed critical habitat under review (USFWS, 2021; USFWS, 2022)

[2] Primary habitat occupied by the species. Species denoted with an asterisk are those that can occupy both terrestrial and aquatic habitats.

Table 5. Effects Analysis Summary of Response Actions on Critical Habitats within the Action Area.

Species with Critical Habitat[1]:	Environment (Habitat) within Action Area[2]						
	1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Short's Bladderpod (*Physaria globosa*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Sandblasting Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Booming Creation/Use of New Access Points Creation/use of Staging Areas (on land) Access of personnel by foot traffic Temporary Storage (on land) Decontamination Waste Handling
Rabbitsfoot (*Quadrula cylindrica cylindrica*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Skimming Vacuuming Sorbents Flushing Steam Cleaning Sandblasting Manual removal /Cleaning Detection of oil Recovery of oil Containment of oil Deployment of buoys Temporary Storage (on water) Waste Handling	Booming Dikes or Berms Construction of barriers, etc. Culvert blocking Skimming Vacuuming Sorbents Flooding Flushing Steam Cleaning Sandblasting Manual removal /Cleaning Detection of oil Recovery of oil Containment of oil Use of Vessels Use of Vehicles Deployment of buoys Temporary Storage (on water) Waste Handling	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.
Round Hickorynut (*Obovaria subrotunda*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Skimming Vacuuming Sorbents Flushing Steam Cleaning Sandblasting Manual removal /Cleaning Detection of oil Recovery of oil Containment of oil Deployment of buoys Temporary Storage (on water) Waste Handling	Booming Dikes or Berms Construction of barriers, etc. Culvert blocking Skimming Vacuuming Sorbents Flooding Flushing Steam Cleaning Sandblasting Manual removal /Cleaning Detection of oil Recovery of oil Containment of oil Use of Vessels Use of Vehicles Deployment of buoys Temporary Storage (on water) Waste Handling	Booming Skimming Vacuuming Sorbents Flushing Steam Cleaning Sandblasting Manual removal /Cleaning Detection of oil Recovery of oil Containment of oil Deployment of buoys Temporary Storage (on water) Waste Handling	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.
Dakota Skipper (*Hesperia dacotae*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Dikes or Berms Construction of barriers, etc. Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Use of Vehicles Creation/Use of New Access Points Creation/use of Staging Areas (on land) Access of personnel by foot traffic Temporary Storage (on land) Decontamination Waste Handling

Table 5. Effects Analysis Summary of Response Actions on Critical Habitats within the Action Area.

Species with Critical Habitat[1]:	Environment (Habitat) within Action Area[2]						
	1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Hine's Emerald Dragonfly (*Somatochlora hineana*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Dikes or Berms Construction of barriers, etc. Culvert blocking Flooding Flushing Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Creation/Use of New Access Points Access of personnel by foot traffic Waste Handling	No Effect
Poweshiek Skipperling (*Oarisma poweshiek*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Booming Dikes or Berms Construction of barriers, etc. Culvert blocking Flooding Flushing Manual removal /Cleaning Deterrence and Hazing Capture and Care Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Access of personnel by foot traffic Waste Handling	*Upland concern is for runoff and impacts to hydrology* Booming Dikes or Berms Construction of barriers, etc. Flooding Flushing Manual removal /Cleaning Creation/Use of New Access Points Access of personnel by foot traffic Creation/use of Staging Areas (on land) Temporary Storage (on land) Decontamination Waste Handling
Topeka Shiner (*Notropis topeka*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Dikes or Berms Construction of barriers, etc. Culvert blocking Skimming Vacuuming Flooding Flushing Steam Cleaning Sandblasting Detection of oil Recovery of oil Containment of oil Deterrence and Hazing Use of Vessels Deployment of Buoys Waste Handling Temporary Storage (on water)	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Dikes or Berms Construction of barriers, etc. Skimming Vacuuming Flooding Flushing Steam Cleaning Sandblasting Detection of oil Recovery of oil Containment of oil Deterrence and Hazing Use of Vessels Deployment of Buoys Waste Handling Temporary Storage (on water)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.
Canada Lynx (*Lynx canadensis*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Use of Vehicles Use of Vessels Booming Skimming Manual removal /Cleaning Deterrence and Hazing Capture and Care Creation/Use of New Access Points Creation/use of Staging Areas (on land) Access of personnel by foot traffic Waste Handling Temporary Storage (on land) Decontamination

Table 5. Effects Analysis Summary of Response Actions on Critical Habitats within the Action Area.

Species with Critical Habitat[1]:	Environment (Habitat) within Action Area[2]						
	1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Indiana Bat (*Myotis sodalis*)	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Skimming Deterrence and Hazing Use of Aircraft Capture and Care Creation/Use of New Access Points Creation/use of Staging Areas (on land) Access of personnel by foot traffic Temporary Storage (on land) Decontamination Manual removal /Cleaning Use of Vehicles Waste Handling	Booming Skimming Deterrence and Hazing Use of Aircraft Capture and Care Creation/Use of New Access Points Creation/use of Staging Areas (on land) Access of personnel by foot traffic Temporary Storage (on land) Decontamination Manual removal /Cleaning Use of Vehicles Waste Handling
Piping Plover, Great Lakes Population (*Charadrius melodus*)	Booming Dikes or Berms Skimming Vacuuming Sorbents Flooding Flushing Steam Cleaning Sandblasting Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Deterrence and Hazing Capture and Care Use of Aircraft Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Creation/use of Staging Areas (on land) Deployment of buoys Access of personnel by foot traffic Temporary Storage (on water) Temporary Storage (on land) Decontamination Waste Handling	Not Applicable due to species and habitat not identified as occurring in this environment.	Booming Dikes or Berms Construction of barriers, etc. Skimming Vacuuming Sorbents Flooding Flushing Steam Cleaning Sandblasting Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Detection of oil Recovery of oil Deterrence and Hazing Capture and Care Use of Aircraft Use of Vessels Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Creation/use of Staging Areas (on land) Deployment of buoys Access of personnel by foot traffic Temporary Storage (on water) Temporary Storage (on land) Decontamination Waste Handling	Booming Dikes or Berms Construction of barriers, etc. Skimming Vacuuming Sorbents Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Detection of oil Recovery of oil Deterrence and Hazing Capture and Care Use of Aircraft Use of Vessels Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Creation/use of Staging Areas (on land) Deployment of buoys Access of personnel by foot traffic Temporary Storage (on water) Temporary Storage (on land) Decontamination Waste Handling	Booming Dikes or Berms Skimming Vacuuming Sorbents Flooding Flushing Steam Cleaning Sandblasting Mechanical sand cleaning (<1 inch) Mechanical sand cleaning/excavation (>1 inch) Manual removal /Cleaning Deterrence and Hazing Capture and Care Use of Aircraft Use of Vehicles Use of machinery/supporting equipment Creation/Use of New Access Points Creation/use of Staging Areas (on land) Deployment of buoys Access of personnel by foot traffic Temporary Storage (on water) Temporary Storage (on land) Decontamination Waste Handling	Not Applicable due to species and habitat not identified as occurring in this environment.	Not Applicable due to species and habitat not identified as occurring in this environment.

[1] Species listed are those designated or with proposed Primary Constituent Elements within the Action Area.

[2] Some response actions have been abbreviated for use in this table; refer to the Response Action Matrix for full descriptions of responses used in the Action Area

No effect due to no overlap between species and action or no impacts on species from action.

This applied to individuals whose habitat did not overlap with the action area habitats defined in Section 3.1 and 3.2 and was not identified for the response action. Example: Freshwater mussels do not occur nor are individuals found along shorelines (per the definition in Section 3.1); therefore, all response actions and interrelated actions occurring on Shoreline Habitat would not affect mussels due to no overlap.

May affect, not likely to adversely affect due to insignificant or discountable effects

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact; For example, birds whose habitat for feeding, nesting, or otherwise includes Shoreline Habitat, may be affected by the response action occurring in Shoreline Habitats, but impacts are reduced by utilizing BMP's (color coded as orange on Species Action Matrix).

May affect, likely to adversely affect - discuss possible BMPs with Services

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Shoreline (beach/land)																																
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																	
American Hart's-tongue Fern																																	
Decurrent False Aster																																	
Dwarf Lake Iris																																	
Eastern Prairie Fringed Orchid																																	
Fassett's Locoweed																																	
Houghton's Goldenrod																																	
Lakeside Daisy																																	
Leafy Prairie-clover																																	
Leedy's Roseroot																																	
Mead's Milkweed																																	
Michigan Monkey Flower																																	
Minnesota Dwarf Trout Lily																																	
Northern Wild Monkshood																																	
Pitcher's Thistle																																	
Prairie Bush-clover																																	
Short's Bladderpod																																	
Short's Goldenrod																																	
Small whorled pogonia																																	
Tennessee Pondweed																																	
Virginia Sneezeweed																																	
Virginia Spiraea																																	
Western Prairie Fringed Orchid																																	
Snails																																	
Iowa Pleistocene Snail																																	
Clams (Freshwater Mussels)																																	
Clubshell																																	
Fanshell																																	
Fat Pocketbook																																	
Higgins' Eye Pearlymussel																																	
Longsolid																																	
Northern Riffleshell																																	
Orangefoot Pimpleback																																	
Pink Mucket																																	
Purple Cat's Paw Pearlymussel																																	
Pyramid (Pink) Pigtoe																																	
Rabbitsfoot																																	
Rayed Bean																																	
Rough Pigtoe																																	

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Shoreline (beach/land)																																
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Clams (Freshwater Mussels) cont'd																																	
Round Hickorynut																																	
Salamander mussel																																	
Scaleshell																																	
Sheepnose																																	
Snuffbox																																	
Spectaclecase																																	
White Catspaw																																	
Winged Mapleleaf																																	
Crustaceans																																	
Illinois Cave Amphipod																																	
Insects																																	
American Burying Beetle																																	
Bog Buckmoth																																	
Dakota Skipper																																	
Frosted Elfin Butterfly																																	
Hine's Emerald Dragonfly																																	
Hungerford's Crawling Water Beetle																																	
Karner Blue Butterfly																																	
Linda's Roadside Skipper																																	
Mitchell's Satyr Butterfly																																	
Monarch Butterfly																																	
Poweshiek Skipperling																																	
Adjacent to Occupied Wetland																																	
Unoccupied Cricital Habitat																																	
Rattlesnake-master Borer Moth																																	
Regal Fritillary																																	
Rusty Patched Bumble Bee																																	
Fish																																	
Lake Sturgeon																																	
Pallid Sturgeon																																	
Popeye Shiner																																	
Scioto Madtom																																	
Sicklefin Chub																																	
Sturgeon Chub																																	
Topeka Shiner																																	

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Shoreline (beach/land)

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Herptiles																																	
Alligator Snapping Turtle			■	■											■	■	■										■						
Blanding's Turtle			■	■											■	■	■										■						
Copperbelly Watersnake, N. DPS	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Eastern Massasauga	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Illinois Chorus Frog	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Spotted Turtle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Streamside Salamander	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Wood Turtle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mammals																																	
Canada Lynx	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Gray Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Gray Wolf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Indiana Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Little Brown Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Bog Lemming	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Long-eared Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Plains Spotted Skunk	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Gray Fox	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tricolored Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Birds																																	
Eastern Black Rail	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Golden-winged Warbler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Kirtland's Warbler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Piping Plover, Great Lakes Population			■	■											■	■	■				■												
Rufa Red Knot			■	■											■	■	■				■												
Whooping Crane, Non-essential Experimental Pop.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Rivers and Streams																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Plants																																		
American Hart's-tongue Fern	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Decurrent False Aster					■										■		■	■	■	■	■						■				■		■	
Dwarf Lake Iris	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Eastern Prairie Fringed Orchid					■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fassett's Locoweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Houghton's Goldenrod		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Lakeside Daisy		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leafy Prairie-clover		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leedy's Roseroot		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mead's Milkweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Michigan Monkey Flower																				■	■						■						■	
Minnesota Dwarf Trout Lily															■		■										■		■				■	
Northern Wild Monkshood															■		■										■		■				■	
Pitcher's Thistle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Bush-clover	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Short's Bladderpod															■		■										■		■				■	
Short's Goldenrod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Small whorled pogonia	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tennessee Pondweed																				■														
Virginia Sneezeweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Virginia Spiraea					■															■	■								■					
Western Prairie Fringed Orchid					■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Snails																																		
Iowa Pleistocene Snail	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Clams (Freshwater Mussels)																																		
Clubshell													■	■				■	■	■			■	■	■				■			■	■	■
Fanshell													■	■				■	■	■			■	■	■				■			■	■	■
Fat Pocketbook													■	■				■	■	■			■	■	■				■			■	■	■
Higgins' Eye Pearlymussel													■	■				■	■	■			■	■	■				■			■	■	■
Longsolid													■	■				■	■	■			■	■	■				■			■	■	■
Northern Riffleshell													■	■				■	■	■			■	■	■				■			■	■	■
Orangefoot Pimpleback													■	■				■	■	■			■	■	■				■			■	■	■
Pink Mucket													■	■				■	■	■			■	■	■				■			■	■	■
Purple Cat's Paw Pearlymussel													■	■				■	■	■			■	■	■				■			■	■	■
Pyramid (Pink) Pigtoe													■	■				■	■	■			■	■	■				■			■	■	■
Rabbitsfoot													■	■				■	■	■			■	■	■				■			■	■	■
Rayed Bean													■	■				■	■	■			■	■	■				■			■	■	■
Rough Pigtoe													■	■				■	■	■			■	■	■				■			■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Rivers and Streams

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Clams (Freshwater Mussels) cont'd																																		
Round Hickorynut													■	■				■	■	■			■	■	■				■			■	■	■
Salamander mussel													■	■				■	■	■			■	■	■				■			■	■	■
Scaleshell													■	■				■	■	■			■	■	■				■			■	■	■
Sheepnose													■	■				■	■	■			■	■	■				■			■	■	■
Snuffbox													■	■				■	■	■			■	■	■				■			■	■	■
Spectaclecase													■	■				■	■	■			■	■	■				■			■	■	■
White Catspaw													■	■				■	■	■			■	■	■				■			■	■	■
Winged Mapleleaf													■	■				■	■	■			■	■	■				■			■	■	■
Crustaceans																																		
Illinois Cave Amphipod							■						■	■		■		■	■	■	■	■	■	■	■				■			■	■	■
Insects																																		
American Burying Beetle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Bog Buckmoth	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Dakota Skipper	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Frosted Elfin Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hine’s Emerald Dragonfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hungerford’s Crawling Water Beetle							■									■		■	■	■	■			■	■				■			■		■
Karner Blue Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Linda's Roadside Skipper					■	■	■								■	■	■	■	■	■	■						■		■		■		■	
Mitchell’s Satyr Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Monarch Butterfly					■	■	■								■	■	■	■	■	■	■						■		■		■		■	
Poweshiek Skipperling	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Adjacent to Occupied Wetland																																		
Unoccupied Cricital Habitat																																		
Rattlesnake-master Borer Moth	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Regal Fritillary					■	■	■								■	■	■	■	■	■	■						■		■		■		■	
Rusty Patched Bumble Bee					■	■	■								■	■	■	■	■	■	■						■		■		■		■	
Fish																																		
Lake Sturgeon							■					■	■	■					■	■		■	■	■	■				■			■		■
Pallid Sturgeon							■					■	■	■					■	■		■	■	■	■				■			■		■
Popeye Shiner							■					■	■	■					■	■		■	■	■	■				■			■		■
Scioto Madtom							■					■	■	■					■	■		■	■	■	■				■			■		■
Sicklefin Chub							■					■	■	■					■	■		■	■	■	■				■			■		■
Sturgeon Chub							■					■	■	■					■	■		■	■	■	■				■			■		■
Topeka Shiner							■					■	■	■					■	■		■	■	■	■				■			■		■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Rivers and Streams																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Herptiles																																		
Alligator Snapping Turtle																																		
Blanding's Turtle																																		
Copperbelly Watersnake, N. DPS																																		
Eastern Massasauga																																		
Illinois Chorus Frog																																		
Spotted Turtle																																		
Streamside Salamander																																		
Wood Turtle																																		
Mammals																																		
Canada Lynx																																		
Gray Bat																																		
Gray Wolf																																		
Indiana Bat																																		
Little Brown Bat																																		
Northern Bog Lemming																																		
Northern Long-eared Bat																																		
Plains Spotted Skunk																																		
Prairie Gray Fox																																		
Tricolored Bat																																		
Birds																																		
Eastern Black Rail																																		
Golden-winged Warbler																																		
Kirtland’s Warbler																																		
Piping Plover, Great Lakes Population																																		
Rufa Red Knot																																		
Whooping Crane, Non-essential Experimental Pop.																																		

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Ponds and Lakes

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Plants																																		
American Hart's-tongue Fern	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Decurrent False Aster	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Dwarf Lake Iris	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Eastern Prairie Fringed Orchid	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fassett's Locoweed					■										■	■	■			■	■						■				■		■	
Houghton's Goldenrod																				■	■						■						■	
Lakeside Daisy		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leafy Prairie-clover		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leedy's Roseroot		■			■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mead's Milkweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Michigan Monkey Flower																				■	■						■						■	
Minnesota Dwarf Trout Lily															■		■										■		■				■	
Northern Wild Monkshood															■		■										■		■				■	
Pitcher's Thistle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Bush-clover	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Short's Bladderpod															■		■										■		■				■	
Short's Goldenrod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Small whorled pogonia	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tennessee Pondweed																				■														
Virginia Sneezeweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Virginia Spiraea					■															■	■								■					
Western Prairie Fringed Orchid					■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Snails																																		
Iowa Pleistocene Snail	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Clams (Freshwater Mussels)																																		
Clubshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fanshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fat Pocketbook	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Higgins' Eye Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Longsolid	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Riffleshell													■	■				■	■	■	■	■	■	■	■				■			■	■	■
Orangefoot Pimpleback	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pink Mucket	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Purple Cat's Paw Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pyramid (Pink) Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rabbitsfoot													■	■				■	■	■	■	■	■	■	■				■			■	■	■
Rayed Bean													■	■				■	■	■	■	■	■	■	■				■			■	■	■
Rough Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Ponds and Lakes

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Clams (Freshwater Mussels) cont'd																																		
Round Hickorynut	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Salamander mussel													X	X				X	X	X	X	X	X	X	X				X			X	X	X
Scaleshell	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sheepnose	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Snuffbox													X	X				X	X	X	X	X	X	X	X				X			X	X	X
Spectaclecase	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
White Catspaw	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Winged Mapleleaf	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Crustaceans																																		
Illinois Cave Amphipod	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Insects																																		
American Burying Beetle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bog Buckmoth	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dakota Skipper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Frosted Elfin Butterfly	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hine's Emerald Dragonfly					X	X	X			X	X				X	X	X	X	X	X	X	X	X		X		X				X	X		
Hungerford's Crawling Water Beetle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Karner Blue Butterfly	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Linda's Roadside Skipper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Mitchell's Satyr Butterfly	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Monarch Butterfly	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Poweshiek Skipperling	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Adjacent to Occupied Wetland																																		
Unoccupied Cricital Habitat																																		
Rattlesnake-master Borer Moth	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Regal Fritillary	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Rusty Patched Bumble Bee	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fish																																		
Lake Sturgeon							X					X	X	X					X	X		X	X	X	X				X			X		X
Pallid Sturgeon	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Popeye Shiner	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Scioto Madtom	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sicklefin Chub	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sturgeon Chub	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Topeka Shiner							X					X	X	X					X	X		X	X	X	X				X			X	X	X

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Ponds and Lakes																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Herptiles																																		
Alligator Snapping Turtle				■				■					■	■													■						■	
Blanding's Turtle				■				■					■	■													■						■	
Copperbelly Watersnake, N. DPS	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
Eastern Massasauga	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■
Illinois Chorus Frog				■									■	■						■							■							
Spotted Turtle				■				■					■	■													■						■	
Streamside Salamander	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Wood Turtle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mammals																																		
Canada Lynx	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Gray Bat				■											■	■	■										■		■		■		■	
Gray Wolf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Indiana Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Little Brown Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Bog Lemming	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Long-eared Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Plains Spotted Skunk	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Gray Fox	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tricolored Bat				■											■	■	■										■		■		■		■	
Eastern Black Rail	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Golden-winged Warbler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Kirtland's Warbler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Piping Plover, Great Lakes Population				■													■												■				■	
Rufa Red Knot				■													■												■				■	
Whooping Crane, Non-essential Experimental Pop.	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Wetlands

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Plants																																		
American Hart's-tongue Fern	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Decurrent False Aster		■	■	■	■	■	■	■	■	■	■		■	■	■		■	■	■	■	■	■	■				■				■	■	■	
Dwarf Lake Iris			■	■	■					■					■	■	■	■	■	■	■						■						■	
Eastern Prairie Fringed Orchid					■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fassett's Locoweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Houghton's Goldenrod																				■	■						■						■	
Lakeside Daisy	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leafy Prairie-clover	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Leedy's Roseroot	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Mead's Milkweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Michigan Monkey Flower																				■	■						■						■	
Minnesota Dwarf Trout Lily	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Wild Monkshood	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pitcher's Thistle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Bush-clover	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Short's Bladderpod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Short's Goldenrod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Small whorled pogonia	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tennessee Pondweed																				■														
Virginia Sneezeweed																				■	■						■						■	
Virginia Spiraea	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Western Prairie Fringed Orchid					■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Snails																																		
Iowa Pleistocene Snail	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Clams (Freshwater Mussels)																																		
Clubshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fanshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fat Pocketbook	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Higgins' Eye Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Longsolid	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Riffleshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Orangefoot Pimpleback	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pink Mucket	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Purple Cat's Paw Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pyramid (Pink) Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rabbitsfoot	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rayed Bean	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rough Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Wetlands																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Clams (Freshwater Mussels) cont'd																																		
Round Hickorynut	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Salamander mussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Scaleshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sheepnose	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Snuffbox	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Spectaclecase	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
White Catspaw	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Winged Mapleleaf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Crustaceans																																		
Illinois Cave Amphipod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Insects																																		
American Burying Beetle		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■		■		■				■	■	■	
Bog Buckmoth					■	■	■			■	■				■		■	■	■	■	■	■	■		■		■				■	■		
Dakota Skipper	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Frosted Elfin Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hine’s Emerald Dragonfly					■	■	■			■	■				■		■	■	■	■	■	■	■		■		■				■	■		
Hungerford’s Crawling Water Beetle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Karner Blue Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Linda's Roadside Skipper					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Mitchell’s Satyr Butterfly					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Monarch Butterfly					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Poweshiek Skipperling					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Adjacent to Occupied Wetland																																		
Unoccupied Cricital Habitat																																		
Rattlesnake-master Borer Moth	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Regal Fritillary					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Rusty Patched Bumble Bee					■	■	■			■	■				■	■	■			■	■				■		■				■	■		■
Fish																																		
Lake Sturgeon	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pallid Sturgeon	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Popeye Shiner	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Scioto Madtom	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sicklefin Chub	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sturgeon Chub	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Topeka Shiner	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

Wetlands

	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Herptiles																																		
Alligator Snapping Turtle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Blanding's Turtle		■	■	■		■	■	■	■	■	■											■	■				■				■		■	
Copperbelly Watersnake, N. DPS				■		■	■	■	■	■	■									■		■	■				■				■	■	■	
Eastern Massasauga				■		■	■	■	■	■	■									■		■	■				■				■	■	■	
Illinois Chorus Frog				■						■	■									■		■	■				■				■	■		
Spotted Turtle		■	■	■		■	■	■	■	■	■											■	■				■				■	■	■	
Streamside Salamander	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Wood Turtle		■	■	■		■	■	■	■	■	■											■	■				■				■		■	
Mammals																																		
Canada Lynx	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Gray Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Gray Wolf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Indiana Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Little Brown Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Bog Lemming		■	■	■		■	■			■	■				■	■	■				■		■		■		■				■	■	■	
Northern Long-eared Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Plains Spotted Skunk	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Prairie Gray Fox	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tricolored Bat	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Birds																																		
Eastern Black Rail				■		■	■			■	■						■				■		■		■						■	■	■	
Golden-winged Warbler				■		■	■			■	■						■				■		■		■						■	■	■	
Kirtland's Warbler	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Piping Plover, Great Lakes Population	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rufa Red Knot	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Whooping Crane, Non-essential Experimental Pop.		■	■	■		■	■			■	■						■				■		■		■		■				■	■	■	

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Uplands																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Plants																																		
American Hart's-tongue Fern		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Decurrent False Aster	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	
Dwarf Lake Iris			■	■	■					■					■	■	■	■	■	■	■						■						■	
Eastern Prairie Fringed Orchid	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fassett's Locoweed					■										■	■	■			■	■						■				■		■	
Houghton's Goldenrod	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■
Lakeside Daisy		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Leafy Prairie-clover		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Leedy's Roseroot		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Mead's Milkweed				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Michigan Monkey Flower	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		■	■
Minnesota Dwarf Trout Lily		■	■	■		■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Northern Wild Monkshood		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Pitcher's Thistle		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Prairie Bush-clover				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Short's Bladderpod		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Short's Goldenrod				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Small whorled pogonia				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Tennessee Pondweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Virginia Sneezeweed	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Virginia Spiraea	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Western Prairie Fringed Orchid		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Snails																																		
Iowa Pleistocene Snail		■	■	■	■	■	■								■	■	■	■	■	■	■	■	■				■				■		■	
Clams (Freshwater Mussels)																																		
Clubshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fanshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Fat Pocketbook	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Higgins' Eye Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Longsolid	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Northern Riffleshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Orangefoot Pimpleback	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pink Mucket	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Purple Cat's Paw Pearlymussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pyramid (Pink) Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rabbitsfoot	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rayed Bean	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Rough Pigtoe	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Uplands																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Clams (Freshwater Mussels) cont'd																																		
Round Hickorynut	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Salamander mussel	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Scaleshell	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sheepnose	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Snuffbox	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Spectaclecase	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
White Catspaw	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Winged Mapleleaf	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Crustaceans																																		
Illinois Cave Amphipod	■	■	■	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Insects																																		
American Burying Beetle			■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Bog Buckmoth	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Dakota Skipper				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Frosted Elfin Butterfly				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Hine's Emerald Dragonfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Hungerford's Crawling Water Beetle	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Karner Blue Butterfly				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Linda's Roadside Skipper				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Mitchell's Satyr Butterfly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Monarch Butterfly				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Poweshiek Skipperling																																		
Adjacent to Occupied Wetland				■	■	■	■			■	■		■	■	■	■	■	■	■	■	■	■	■		■		■				■	■	■	
Unoccupied Cricital Habitat		■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■	■	■	■	■	■				■				■		■	
Rattlesnake-master Borer Moth				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Regal Fritillary				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Rusty Patched Bumble Bee				■	■	■	■	■	■	■	■				■	■	■			■	■						■				■		■	
Fish																																		
Lake Sturgeon	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Pallid Sturgeon	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Popeye Shiner	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Scioto Madtom	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sicklefin Chub	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Sturgeon Chub	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Topeka Shiner	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Table 6. Summary of No-Effect by Response within an Effected Environment for Listed Species in Region 5.

	Uplands																																	
	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Sandblasting	Steam Cleaning	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of Machinery/Supporting Equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decanting	Decontamination
Herptiles																																		
Alligator Snapping Turtle																																		
Blanding's Turtle																																		
Copperbelly Watersnake, N. DPS																																		
Eastern Massasauga																																		
Illinois Chorus Frog																																		
Spotted Turtle																																		
Streamside Salamander																																		
Wood Turtle																																		
Mammals																																		
Canada Lynx																																		
Gray Bat																																		
Gray Wolf																																		
Indiana Bat																																		
Little Brown Bat																																		
Northern Bog Lemming																																		
Northern Long-eared Bat																																		
Plains Spotted Skunk																																		
Prairie Gray Fox																																		
Tricolored Bat																																		
Birds																																		
Eastern Black Rail																																		
Golden-winged Warbler																																		
Kirtland's Warbler																																		
Piping Plover, Great Lakes Population																																		
Rufa Red Knot																																		
Whooping Crane, Non-essential Experimental Pop.																																		

LIST OF APPENDICES

Appendix A

Appendix A

Inter-agency Memorandum of Agreement (MOA)

Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act

I. INTRODUCTION

A. Parties. The Parties to this agreement are the U.S. Coast Guard (USCG), the U.S. Environmental Protection Agency (USEPA), the Department of the Interior (DOI) Office of Environmental Policy and Compliance, the U.S. Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration's (NOAA's) - National Marine Fisheries Service (NMFS) and National Ocean Service (NOS).

B. The Parties have conducted a review of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and associated oil spill response activities to coordinate their actions under Section 1321(d) of the Clean Water Act and Section 7(a)(1) of the Endangered Species Act, as amended (16 U.S.C. 1531 et seq.) (ESA). Section 1321(d) of the Clean Water Act establishes the NCP and assigns responsibilities to Federal agencies in mitigating damage from oil and hazardous materials spills, including the conservation of fish and wildlife. Section 7(a)(1) of the ESA requires all Federal agencies, in consultation with and with the assistance of the Secretaries of the Interior or Commerce, as appropriate, to review their programs and utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of listed species. As a result of this review, recommended procedures have been developed that will achieve better conservation of listed species and critical habitat during implementation of oil spill response activities.

C. This agreement provides a general framework for cooperation and participation among the Parties in the exercise of their oil spill planning and response responsibilities. Following the recommended procedures presented in this agreement will better provide for the conservation of listed species, improve the oil spill planning and response procedures delineated in the NCP, and ultimately streamline the process required by Section 7(a)(2) of the ESA.

II. PURPOSE

A. This agreement is intended to be used at the area committee level primarily to identify and incorporate plans and procedures to protect listed species and designated critical habitat during spill planning and response activities. Proactive regional planning may also take into consideration concerns for proposed and candidate species, as well as listed species' habitat not yet designated as critical.[1]

[1] Adverse effects on non-designated critical habitat used by listed species has a potential for having an adverse affect on these listed species. Therefore, planners should consider these areas if information is available.

B. This agreement coordinates the consultation requirements specified in the ESA regulations, 50 CFR 402, with the pollution response responsibilities outlined in the NCP, 40 CFR 300. It addresses three areas of oil spill response activities: pre-spill planning activities, spill response event activities, and post-spill activities. The agreement identifies the roles and responsibilities of each agency under each activity. By working proactively before a spill to identify potential effects of oil spill response activities on listed species and critical habitat, and jointly developing response plans and countermeasures (response strategies) to minimize or avoid adverse effects, impacts to listed species and critical habitat should be reduced or avoided completely. Should a spill occur, response plans and countermeasures will be used to implement response actions to minimize damage from oil discharges in a manner that reduces or eliminates impacts to listed species and critical habitat. In the event that oil spill response actions may result in effects on listed species or critical habitat, the agreement provides guidance on how to conduct emergency consultation under the ESA. It also describes the steps for completing formal consultation, if necessary, after the case is closed, if listed species or critical habitat have been adversely affected.

C. The goal of this agreement is to engage in informal consultation wherever possible during planning and response. With adequate planning and ongoing, active involvement by all participants, impacts to listed species and critical habitat and the resulting need to conduct subsequent ESA Section 7(a)(2) consultations will be minimized or obviated.

III. LEGAL AUTHORITIES

A. The Federal Water Pollution Control Act (FWPCA), 33 U.S.C. § 1321., requires that when a spill occurs, the President take such action as necessary to ensure effective and immediate removal of a discharge, and mitigation or prevention of a substantial risk of a discharge of oil into the waters of the United States. The National Contingency Plan (NCP), 40 CFR Part 300, prepared in accordance with the FWPCA, assigns duties to Federal agencies to protect the public health and welfare, including fish, wildlife, natural resources and the public. The NCP designates the Federal On Scene Coordinator (FOSC) as the person responsible for coordinating an oil spill response. (The abbreviation OSC is used in the NCP, while the abbreviation for Federal On Scene Coordinator is FOSC in this agreement.) Nothing in this agreement limits the authority of the Federal On Scene Coordinator as defined in the NCP.

B. The Endangered Species Act of 1973 (ESA), as amended, 16 U.S.C. §1531 et seq., provides a means to protect threatened and endangered species and the ecosystems upon which they depend. The ESA requires that Federal agencies insure that the actions they authorize, fund, or carry out do not jeopardize listed species or adversely modify their designated critical habitat. Regulations for conducting Section 7 consultation are set forth in 50 CFR Part 402.

IV. DEFINITIONS

The following definitions apply to this agreement and are taken from the definitions contained in either the NCP or the March 1998 USFWS & NMFS Endangered Species Consultation Handbook. For definitions of terms not listed below, refer to the USFWS & NMFS Endangered Species Consultation Handbook and the NCP as appropriate.

Area Committee - the entity appointed by the President consisting of members from qualified personnel of Federal, state, and local agencies with responsibilities that include preparing an area contingency plan for an area designated by the President. The chairs of the Area Committee are the USCG for coastal and Great Lakes plans, and the USEPA for inland plans. In some instances the Regional Response Team (RRT) may act as the Area Committee. In this MOA, the term Area Committee also includes the RRT acting as the Area Committee.

Area Contingency Plan (ACP) - the plan prepared by an Area Committee (or the RRT acting as the Area Committee) that is developed to be implemented in conjunction with the NCP and Regional Contingency Plan (RCP), in part to address removal of a worst case discharge and to mitigate or prevent a substantial threat of such a discharge from a vessel, offshore facility, or onshore facility operating in or near an area designated by the President. A detailed annex containing a Fish and Wildlife and Sensitive Environments Plan prepared in consultation with the USFWS, NOAA, and other interested natural resource management agencies should be incorporated into each ACP. In this MOA, the term ACP also includes sub-area ACP's, sub-area contingency plans, geographic response plans and geographic response strategies as per 40 CFR 300.210.

Biological Assessment - information prepared by or under the direction of the Federal action agency (USCG or USEPA) regarding: 1) listed and proposed species and designated critical habitat that may be affected by proposed actions; and, (2) the evaluation of potential effects of the proposed actions on such species and habitat.

Biological Opinion - document which includes: (1) the opinion of the USFWS or NMFS as to whether or not a Federal action is likely to jeopardize the continued existence of listed species, or result in the destruction or adverse modification of designated critical habitat; (2) a summary of the information on which the opinion is based; and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat. This document will also contain an incidental take statement, that, if appropriate, exempts the Federal actions from the ESA Section 9 take prohibitions.

Candidate species – plant and animal taxa considered for possible addition to the List of Threatened and Endangered Species.

Case is Closed – When removal operations are complete in accordance with 40 CFR 300.320(b).

Critical habitat - areas designated by the USFWS and NMFS pursuant to Section 4 of the ESA for the purposes of identifying areas essential for the conservation of a threatened or endangered species and which may require special management considerations.

Emergency Consultation – an expedited consultation process that takes place during an emergency (natural disaster or other calamity) (50 CFR 402.05). The Services have determined that oil spill response activities qualify as an emergency action. The consultation may be initiated informally. The emergency continues to exist until the removal operations are completed and the case is closed in accordance with 40 CFR 300.320(b). The FOSC will continue to conduct emergency consultations, if needed, until the emergency is over and the case is closed. Formal, or informal, consultation is initiated after the emergency is over, at which time the USFWS and/or NMFS evaluates the nature of the emergency actions, the justification for the expedited consultation, and any impacts to listed species and their habitats.

Federal On Scene Coordinator (FOSC) - the Federal official predesignated by USEPA or the USCG to coordinate and direct responses under the FWPCA as defined in the NCP.

Formal Consultation[2] - a process between USFWS or NMFS and the Federal action agency (USCG or USEPA) that: (1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a Federal agency's written request and submission of a complete Section 7 consultation initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement, as appropriate, by either of the Services. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat. See informal consultation).

Incidental Take - take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant.

Informal Consultation - an optional process that includes all discussions and correspondence between the USFWS or NMFS and the Federal agency (USCG or USEPA) or designated non-Federal representative, prior to formal consultation, to determine whether a proposed Federal action may affect listed species or critical habitat. This process allows the Federal agency to utilize the Services' expertise to evaluate the agency's assessment of potential effects or to suggest possible modifications to the proposed action, which could avoid potential adverse effects. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat).

[2] Formal consultation can occur during planning or after the conclusion of emergency consultation if listed species or critical habitat have been affected.

Listed Species – for the purposes of this MOA, any species of fish, wildlife or plant, which has been determined to be endangered or threatened under Section 4 of the ESA.

National Contingency Plan (NCP) – National Oil and Hazardous Substances Pollution Contingency Plan. The NCP is a national plan that provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants and contaminants. The NCP is set forth in 40 CFR 300.

National Response Team (NRT) - a national team, defined under the NCP, responsible for national planning, policy, and coordination for hazardous substance and oil spill preparedness and response, consisting of representatives from agencies named in 40 CFR 300.175(b).

Regional Response Team (RRT) - a regional team of agency representatives that acts in two modes: the standing RRT and incident specific RRT. The Co-chairs are the USCG and USEPA. The standing team is comprised of designated representatives from each participating Federal agency, state governments and local governments (as agreed upon by the states). Incident-specific teams are formed from the standing team when activated for a response. The role of the standing RRT includes establishing regional communications and procedures, planning, coordination, training, evaluation, preparedness and related matters on a region-wide basis. It also includes assisting Area Committees in coordinating these functions in areas within their specific regions. The role and composition of the incident-specific team is determined by the operational requirements of the response. During an incident, it is chaired by the agency providing the FOSC.

Services – Term used to refer to both the USFWS and NMFS.

V. PROCEDURES

Oil spill planning and response procedures are set forth in the NCP. This agreement is intended to facilitate compliance with the ESA without degrading the quality of the response conducted by the FOSC, to improve the oil spill planning and response process, and ensure continued inter-agency cooperation to protect, where possible, listed species and critical habitat.

A. <u>PRE-SPILL PLANNING</u>

(1) While drafting Area Contingency Plans themselves may not result in effects to listed species, actions implemented under the plans may. It is essential that the Area Committee engage USFWS and NMFS during the ACP planning process while developing or modifying the ACP and response strategies. This informal consultation can be used to determine the presence of listed species or critical habitat, and the effects of countermeasures, and to ensure that measures to reduce or avoid impacts to listed species and critical habitats during oil spill response activities are developed. By consulting on the anticipated effects prior to implementing response actions, decisions can be made rapidly during the spill, harm from response actions can be

minimized, and implementation of response strategies specifically designed to protect listed species and critical habitat can be achieved.

(2) The pre-spill planning process is shown as a flow chart in Appendix A. The Area Committee Chair will request, in writing, that endangered species expertise and a species list be provided by the Services.[3] The request should also describe the area and include a general description of the countermeasures being considered and the planning process to be used (e.g., a workgroup). In order to document the request for consultation and planning involvement, the request shall be sent to both NOAA and USFWS. To obtain NMFS assistance, a request should be sent to the Department of Commerce (DOC) RRT representative, with a copy to the NOAA Scientific Support Coordinator (SSC) and the NMFS Regional Field Office. For USFWS support, a request should be sent to the local USFWS field office(s), with a copy to the USFWS Regional Response Coordinator (RRC) at the appropriate USFWS Regional Office(s) and the DOI RRT representative. It is the responsibility of the USFWS RRC, acting through the Ecological Services Assistant Regional Director, and the NOAA SSC to act as a liaison between the respective Service and the Area Committee. USFWS and NMFS will orally respond to the request within 30 days of receipt and provide a written response within 60 days. The response should include designation of a listed species expert to assist the Area Committee.

(3) If listed species or critical habitat are present in the planning area being considered the Area Committee should use a planning process that ensures engagement of Service experts.[4] This process shall ensure that the appropriate participants jointly gather and analyze the information needed to complete the Planning Template in Appendix C. This planning process constitutes informal consultation.[5] The goals of this planning process are to identify the potential for oil spill response activities to adversely affect listed species and critical habitat and to identify for inclusion in the ACP information on sensitive areas, emergency response notification contacts, and any other information needed. Methods should be developed to minimize identified adverse effects and, where necessary, the plan should be modified accordingly. If specific sources of potential adverse effects are identified and removed, the Services will provide a concurrence letter and Section 7(a)(2) requirements will be deemed to have been met.[6]

(4) If, after the process in Appendix C has been followed, it cannot be determined that adverse effects will not occur during a response action, the USCG or USEPA, as appropriate, will initiate formal consultation using the information gathered in Appendix C; this information will be used by the Services to complete formal

---

[3] 40 CFR 300.170(a).
[4] Process options include using an informal workgroup; formal workgroup, Environmental Risk Assessment process, or other process based on Area Committee needs.
[5] This process does not negate any regional consultations that have already occurred, nor alter the strategies/procedures in the ACP until the ACP is officially modified in consultation with USFWS or NMFS.
[6] Letter is required for the administrative record. See Appendix E.

consultation.[7] This will be a programmatic consultation that generally addresses oil spill response activities at issue in the plan area. At times when specific information is available about certain oil spill response methods and listed species and critical habitat, it may be possible to pre-approve particular activities that may be implemented in the event there is insufficient time to initiate emergency consultation before the need to take action.[8]

(5) All parties recognize that development and modification of the ACP is an ongoing process. Changes, including modifications to response actions or changes to the species list, should be addressed regularly through a dynamic planning process. The Services should contact the Area Committee or workgroup if they become aware of newly listed species that may be affected by planned response activities. The Area Committee should likewise notify the Services of changes to planned response activities. The Area Committee or workgroup should evaluate any changes and assess the need for additional consultation as needed.

B. OIL SPILL RESPONSE

During an oil spill event which may affect listed species and/or critical habitat, emergency consultations under the ESA are implemented (50 CFR 402.05) for oil spill response actions.[9] Emergency consultation may be conducted informally through the procedures that follow (See Appendix A). Emergency consultation procedures allow the FOSC to incorporate listed species concerns into response actions during an emergency. "Response" is defined in this agreement as the actions taken by the FOSC in accordance with the NCP. The FOSC conducts response operations in accordance with the NCP and agreement established in the ACP.

(1) As per the NCP and ACP, the FOSC will notify the RRT representatives of DOI and DOC through the established notification process regardless of whether listed species or critical habitat is present. Upon notification, the DOC and DOI representatives shall contact the NOAA SSC and RRC, respectively, and other appropriate Service contacts as provided in internal DOC or DOI plans, guidance, or other documents. If established in the ACP, the FOSC may also contact the Service regional or field offices directly (see Section V(A)(3) above). If listed species and/or critical habitat are present or could be present, the FOSC shall initiate emergency consultation by contacting the Services. The NOAA SSC and RRC shall coordinate appropriate listed species expertise. This may require timely on-scene expertise from the Services' local field offices. These Service representatives may, as appropriate, be asked by the FOSC to participate within the FOSC's Incident Command System and provide information to the FOSC.[10]

---

[7] Letter is required for the administrative record. See Appendix E.
[8] Due to time constraints associated with spill response, this does not mean that immediate spill response actions cannot occur to meet the requirements of 40 CFR 300.317. However, planning should address specific procedures for initiating emergency consultation for activities that are pre-approved and for those that have not been pre-approved.
[9] Based on pre-spill planning or discovered during the response.
[10] 40 CFR 300.175(b)(7) & (b)(9); 40 CFR 300.305(e).

(2) The ACP, including any agreed upon references cited in the ACP, should form the basis for immediate information on response actions. As part of emergency consultation, the Services shall provide the FOSC with any timely recommendations to avoid and/or minimize impacts to listed species and critical habitat.[11] The NOAA SSC should also be involved in these communications as appropriate. If incidental take is anticipated, and if no means of reducing or avoiding this take are apparent, the FOSC should also be advised and the incidental take documented. If available, the FOSC should consider this information in conjunction with the national response priorities established in the NCP.[12] The FOSC makes the final determination of appropriate actions.

(3) It is the responsibility of both the FOSC and the Services' listed species representatives to maintain a record of written and oral communications during the oil spill response. The checklist contained in Appendix B is information required to initiate a formal consultation in those instances where listed species and/or critical habitat have been adversely affected by response actions.[13] If it is anticipated that listed species and/or critical habitat may be affected, the FOSC may request that the USFWS and/or NMFS representative to the Incident Command System oversee and be responsible for the gathering of the required information in Appendix B while the response is still ongoing.[14] The FOSC may also choose to designate another individual to be responsible for collecting the information.[15] Although in some instances the drafting of information for Appendix B may be completed after field removal operations have ceased, it is anticipated that collection of the information should be complete before the case is officially closed and that no further studies will be necessary.

(4) It is the responsibility of the FOSC to notify the Services' representatives in the Incident Command System of changes in response operations due to weather, extended operations, or some other circumstance. It is the responsibility of the Services to notify the FOSC of seasonal variances (e.g., bird migration), or other natural occurrences affecting the resource. If there is no Service representative in the Incident Command System, the FOSC will ensure that the NOAA SSC and/or DOI representative to the RRT remains apprised of the situation. The Services will continue to offer recommendations, taking into account any changes, to avoid jeopardizing the continued existence of listed species or adversely modifying critical habitat, and to minimize the take of listed species associated with spill response activities.

---

[11] See Section 8.1 of the USFWS & NMFS Endangered Species Consultation Handbook (http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm).
[12] 40 CFR 300.317 National Response Priorities.
[13] See Section 8.2(B) of the USFWS & NMFS Endangered Species Consultation Handbook.
[14] If requested by the FOSC, the NOAA Scientific Support Coordinator (SSC) may coordinate this data collection.
[15] See Appendix D for example Pollution Removal Funding Authorization (PRFA) Statement of Work language.

C. POST RESPONSE

If listed species or critical habitat have been adversely affected by oil spill response activities, a formal consultation is required, as appropriate.[16] Informal emergency consultation shall remain active until the case is closed. The FOSC will initiate consultation on the effect of oil spill response activities (not the spill itself) after the case is closed. Every effort shall be made to ensure that relevant information generated as part of the consultation process is made available for use in the Natural Resource Damage Assessment (NRDA) process. (Note: NRDA activities are separate from this consultation.)

(1) After the FOSC determines that removal operations are complete in accordance with 40 CFR 300.320(b), the impacts of the response activities on listed species and critical habitat will be jointly evaluated by the FOSC and the Services.

(2) If listed species or critical habitat were adversely affected by oil spill response activities, the FOSC will follow the procedural requirements of 50 CFR 402.05(b) (see Appendix A). The document developed by following Appendix B, information required to initiate a formal consultation following an emergency, should be included with a cover letter to the Services requesting consultation and signed by the FOSC. The FOSC will work with the Services and the NOAA SSC, as appropriate, to ensure that Appendix B is complete.[17] This document comprises the FOSC's formal request for consultation.

(3) The Services normally issue a biological opinion within 135 days of receipt of the Section 7 consultation request (50 CFR 402.14). When a longer period is necessary, and all agencies agree, the consultation period may be extended. The final biological opinion will be prepared by the Services and provided to the FOSC, USFWS RRC, NOAA SSC, DOI and DOC RRT members, and the Area Committee Chair so that recommendations can be reviewed by the Area Committee, and where appropriate, implemented to minimize and/or avoid effects to listed species and critical habitat from future oil spill response actions.[18] The result of the consultation should be considered by the FOSC for inclusion in a lessons learned system so changes can be made to the ACP, as necessary, for the benefit of future oil spill response actions. If such changes to the ACP modify the anticipated effects to listed species or critical habitat, the Services should appropriately document the anticipated changes in future effects and complete any appropriate administrative steps.

---

[16] If only proposed species or proposed critical habitat have been adversely affected, a formal consultation is not required; however, ESA conference procedures should be followed as appropriate. See the USFWS & NMFS Endangered Species Consultation Handbook for conference information.
[17] The NOAA SSC may also assist.
[18] Recommendations may also be provided for addressing effects caused by spill response actions. This information should be provided to the NRDA process as appropriate.

VI. Points of Contact. The following are the points of contact for each Party:

USCG: Chief, Office of Response, Coast Guard Headquarters (G-MOR), (202) 267-0516.

USEPA: Oil Program Center, U.S. Environmental Protection Agency, (703) 603-8823.

NOAA - NMFS: Section 7 Coordinator, Endangered Species Division, Office of Protected Resources, (301) 713-1401.

USFWS: National Spill Response Coordinator, U.S. Fish and Wildlife Service, Division of Environmental Quality, (703) 358-2148.

NOAA - NOS: Director, Office of Response and Restoration, (301) 713-2989 x101.

DOI: Office of Environmental Policy and Compliance, (202) 208-6304.

VII. Funding and Resources. This agreement is not a fiscal or funds obligation document. Nothing in this agreement shall be construed as obligating any of the Parties to the expenditure of funds in excess of appropriations authorized by law or otherwise commit any of the Parties to actions for which it lacks statutory authority. It is understood that the level of resources to be expended under this agreement will be consistent with the level of resources available to the Parties to support such efforts. Any activities involving reimbursement or contribution of funds between the Parties to this agreement will be handled in accordance with applicable laws, regulations and procedures. Such activities will be documented in separate agreements with specific projects between the Parties spelled out. The separate agreements will reference this general agreement.

VIII. Effective Date. The terms of this agreement are effective upon signature by all Parties.

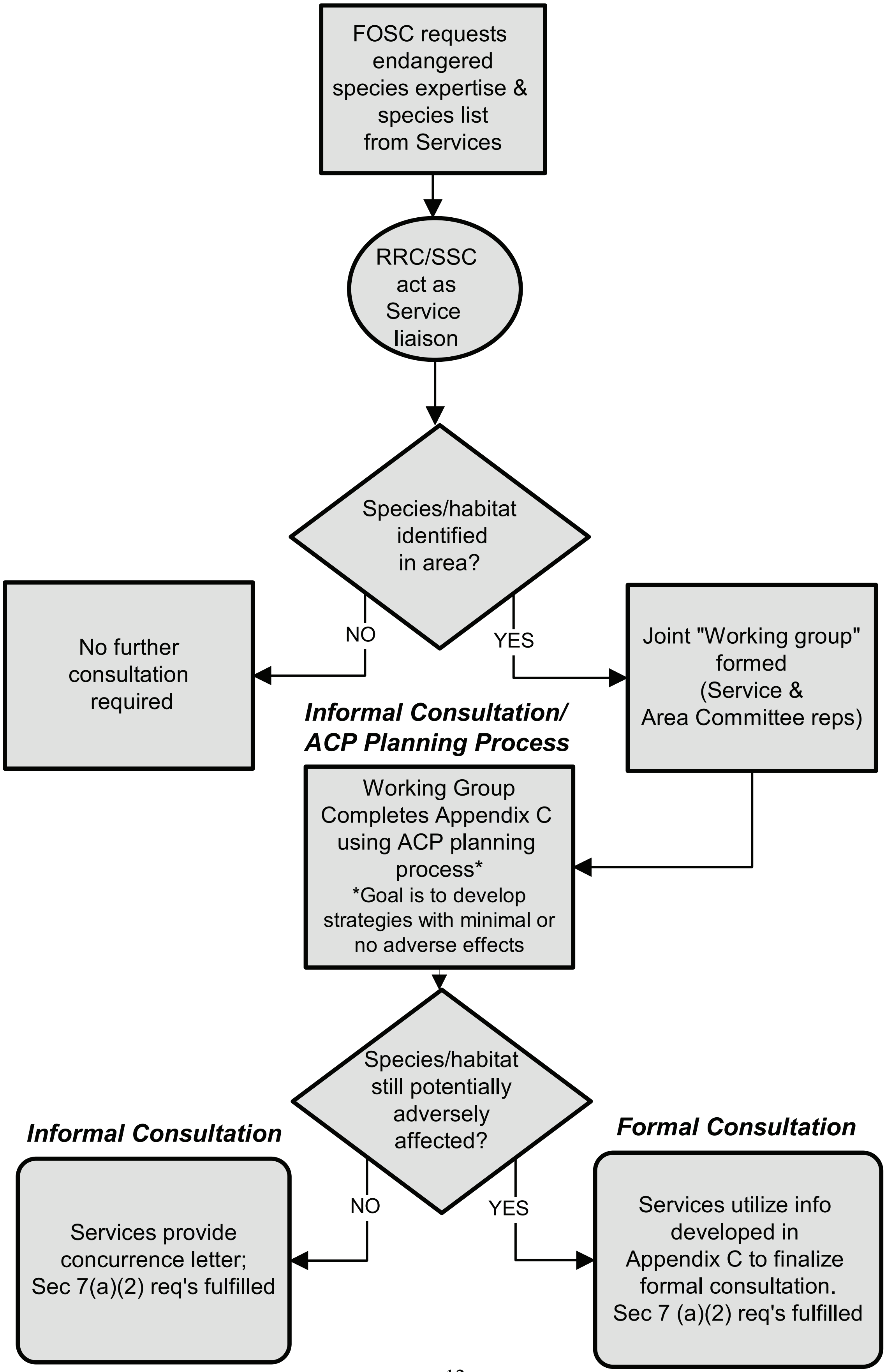
IX. Modification. This agreement may be modified upon the mutual written consent of the Parties.

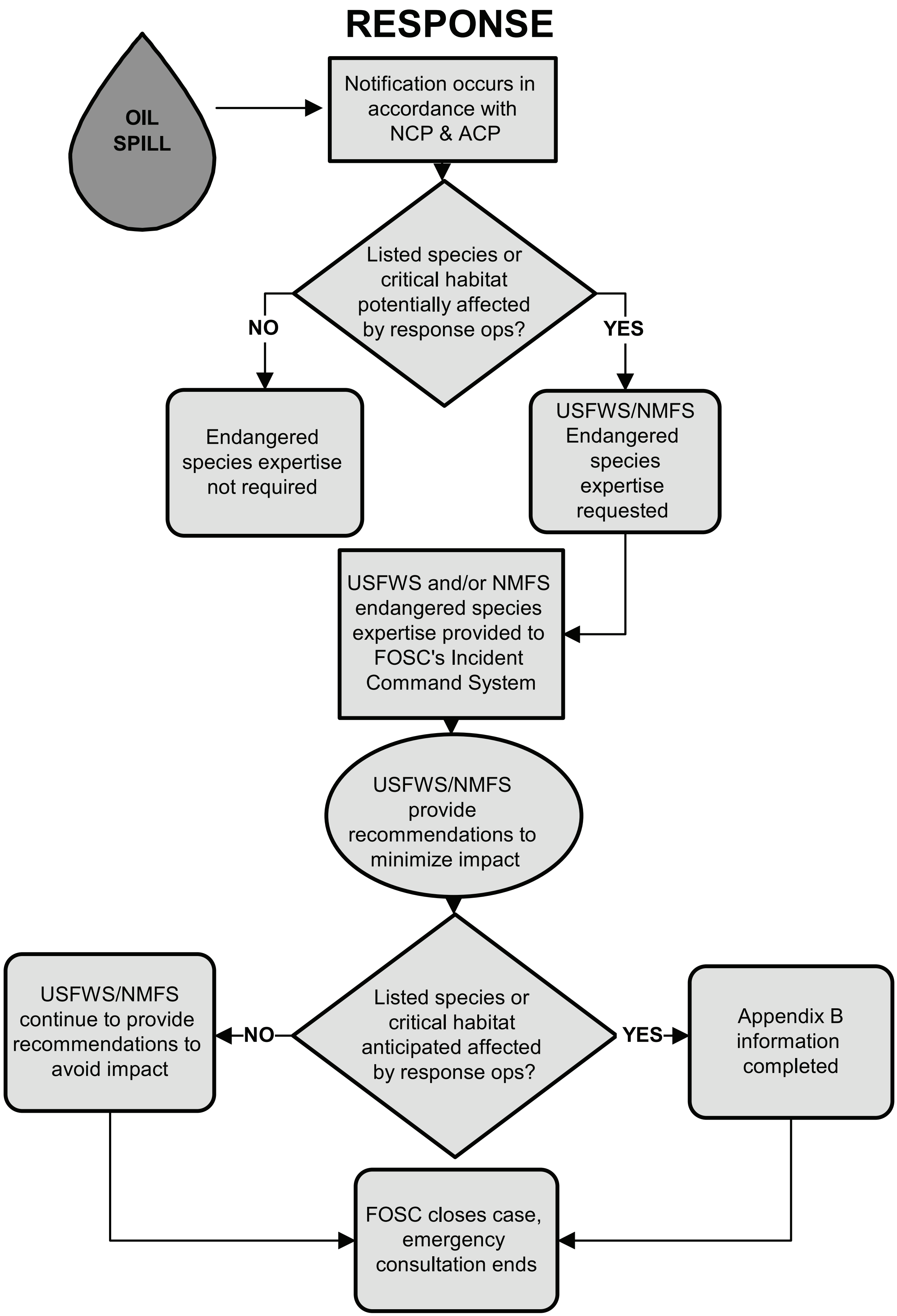
X. Termination. The terms of this agreement, as modified, with the consent of all Parties, will remain in effect until terminated. Any Party upon 60 days written notice to the other Parties may terminate their involvement in this agreement.

Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act

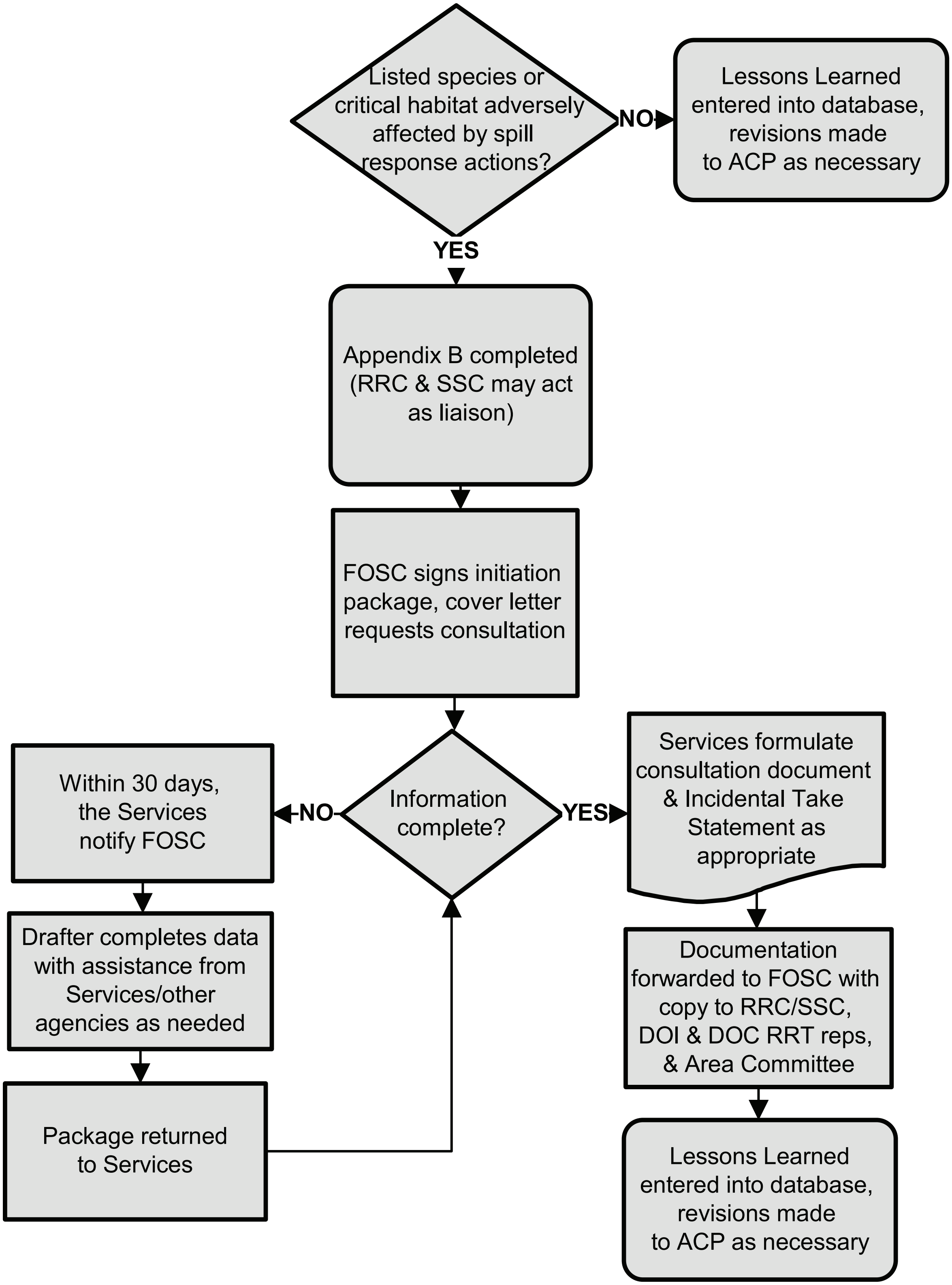
Approved By:	**Date**:
Assistant Commandant for Marine Safety and Environmental Protection U.S. Coast Guard	5/25/01
Acting Assistant Administrator Office of Solid Waste and Emergency Response U.S. Environmental Protection Agency	7/22/01
Acting Director U.S. Fish and Wildlife Service	8 June 2001
William T. Hogarth Acting Assistant Administrator for Fisheries National Marine Fisheries Service National Oceanic and Atmospheric Administration	5/15/01
for Assistant Administrator National Ocean Service National Oceanic and Atmospheric Administration	5/30/01
Director Office of Environmental Policy and Compliance Department of the Interior	6/13/01

PRE-SPILL PLANNING




RESPONSE
OIL SPILL
Notification occurs in accordance with NCP & ACP
Listed species or critical habitat potentially affected by response ops?
NO
YES
Endangered species expertise not required
USFWS/NMFS Endangered species expertise requested
USFWS and/or NMFS endangered species expertise provided to FOSC's Incident Command System
USFWS/NMFS provide recommendations to minimize impact
Listed species or critical habitat anticipated affected by response ops?
NO
YES
USFWS/NMFS continue to provide recommendations to avoid impact
Appendix B information completed
FOSC closes case, emergency consultation ends

POST RESPONSE



APPENDIX B

EMERGENCY CONSULTATION
INFORMATION CHECKLIST IN ANTICIPATION OF FOLLOW-UP FORMAL CONSULTATION (50 CFR 402.05)

As soon as practicable after the emergency is under control, which occurs when the case is closed, the FOSC initiates consultation (either formal or informal, as appropriate) with the Services if listed species and/or critical habitat have been affected. The FOSC should ensure that the following checklist is completed before the case is closed. After the case is closed, this information along with a cover letter requesting consultation will be sent to the Services.

1. Provide a description of the emergency (the oil spill response).

2. Provide an evaluation of the emergency response actions and their impacts on listed species and their habitats, including documentation of how the Services' recommendations were implemented, and the results of implementation in minimizing take.

3. Provide a comparison of the emergency response actions as described in #2 above with the pre-planned countermeasures and information in the ACP.

APPENDIX C

PLANNING TEMPLATE

One of the goals of the Area Contingency Plan (ACP) planning process is to develop strategies or actions that reduce the potential for planned oil spill response activities to adversely affect listed species and designated critical habitat. The planning process may also develop strategies that purposefully protect these resources. The following template is recommended for use by a working group of both Service and Area Committee representatives to develop a document that 1) is used to complete consultation pursuant to Section 7 (a)(2) of the Endangered Species Act of 1973, as amended, and 2) produces information to be included in the appropriate sections of the ACP. To streamline the consultation process, the various sections of this document could be drafted during the planning process and used to develop or modify the ACP.[19] This development process will assist all parties in gaining a thorough understanding of the actions under review and provide opportunities for any Section 7 consultation related issues to be raised and addressed in the planning process, rather than during the oil spill response action.

This template is intended to guide the thought process of creating consultation documents and incorporates content requirements set forth in 50 CFR 402.12 as well as information pertinent to the National Contingency Plan requirements under the Fish and Wildlife Annex; not every item will be applicable to every situation.[20]

Introduction

This section generally should be completed in one, or possibly two paragraphs.

- General overview of the response strategy including: (1) a <u>brief</u> description - one to two sentences; (2) background, history, etc. as appropriate; (3) purpose of the response strategy; (4) identification of the species and designated critical habitat that may be affected (for consultations that will address large numbers of species, it may be desirable to present this list in the form of a table either attached or presented in another section. Also, if species that may potentially occur in the area are not included in this document, explain why).
  This should be developed jointly by the action agency and the Services.

Description of the Proposed Response Strategy

- Provide a description of the response strategy being considered. This is likely to be a detailed description taken substantially from the ACP. It should include how the

[19] It is not required that this planning template be formally written or completed during informal consultation, especially if no modifications to the strategy are required. However, it can be very useful in documenting the [team's] thought process for the administrative record, serving as a guide, or providing additional documentation as needed.

[20] The guide on "Developing Consensus Ecological Risk Assessments" provides procedures which may be helpful in exploring and analyzing these issues. Copies can be obtained from USCG Headquarters (G-MOR-2).

response action will be implemented, including equipment and methods. Examples include use of dispersants to avoid shoreline impacts, and deployment of booms to protect sensitive areas. Include all known aspects of the action, such as time frames, why the action is appropriate, indirect effects, etc. An example of an indirect effect may be hauling boom on, or driving vehicles through, a sensitive dune area to gain access to a spill site.
This should be developed by the action agency with the assistance of the Services.

- Provide a description of specific area that may be affected by the response strategy (i.e. Sample Bay, 100-mile section of outer coastline, etc.). Include some measure of the area potentially impacted (i.e., "This plan addresses oil spill response activities that may be conducted out two miles from the coast throughout the 100 mile coastline area encompassed by this ACP"). If different activities are being proposed in different areas, identify this. The team should discuss the appropriateness of presenting this information in terms of the activities that will be conducted within each area, or the areas where each activity will be conducted. For example, "Dispersants may be applied throughout the 10 mile coastline length of Area A and the 25 mile coastline length of Area B." Maps may be useful.
This should be developed mainly by the action agency; however, modifications may be made with the assistance of the Services and subject to the approval process for chemical countermeasures in the NCP as appropriate.

- Identify how to quickly obtain species/habitat information during a spill (i.e. first refer to ACP and site summary sheet, call State FWS, check website, etc.).
This should be developed jointly by the action agency and the Services.

- Identify emergency response points of contact to be notified during a spill. Establish spill parameters for notification as necessary. These should be included in emergency notification numbers as well as on any site summary sheets, in geographic response plans, etc.
This should be developed jointly by the action agency and the Services.

<u>Description of the Affected Environment</u>

- Describe the listed species and designated critical habitat areas that may be affected by the action in terms of overall range and population status. Include the number and location of known subpopulations within and adjacent to the action area (i.e., identify the areas known to be used by the species and, if appropriate, identify the specific times periods of use, such as February - April). Discuss the action area in relation to the distribution of the entire population (e.g., edge of the range, center of population abundance, key reproductive area, etc.). Present views of Service recognized experts on the species, if appropriate.
This should be provided by the Services.

- Ensure that these sensitive areas are referenced in the ACP (i.e. via ESI maps, specially generated GIS maps, site summary sheets, or other digitized format, etc.). *This should be completed by the action agency.*

- Provide biological data on listed species: historical use, presence, and potential use of habitat areas within the action area. Literature and other documents containing such information may be incorporated by reference. Provide species observation information, and recent results of species surveys, including, if appropriate, a description of methods, time of year surveys were performed, level of effort, and confidence intervals. Again, literature and other documents containing such information may be incorporated by reference. Maps may be useful to depict this information.
  The Services should assist in developing this information. In many instances the Services will be able to supply this information from their records.

- Identify other designated sensitive areas, both adjacent to and within the proposed action area. These include National Wildlife Refuges, National Marine Sanctuaries, etc.
  This should be developed jointly by the action agency and the Services.

Analysis of the Effects of the Action

- Describe all effects of the response strategy relative to the listed species of concern and its habitat, including designated critical habitat. This should include direct, indirect, beneficial, and cumulative effects as well as effects from interrelated and interdependent actions, if any.
  This should be developed jointly by the action agency and the Services.

- Describe any measures that may avoid or lessen adverse effects as well as any measures that will enhance the species' present condition. If appropriate, delineate the locations of such measures. A discussion of environmental "tradeoffs" (including no action) may be appropriate. For example, "Dispersants may be toxic to the listed aquatic species when used in concentrations above 70%; however, oil coming ashore and smothering the listed species in tidal marshes is of greater concern due to the extremely poor conservation status of this species." Reference any already completed relevant reports, studies, biological assessments, etc.
  This should be developed jointly by the action agency and the Services.

Modification to Strategy (as needed)

If necessary, after joint analysis of the information, the action or strategy may be modified.

- Describe the new strategy or action. For example, "Dispersants will not be used in

concentrations above X% or in areas less than three feet deep. They may be used in Area A and Area B. A Service representative from Regional field office B will be contacted during an oil spill response during the months of February - April in Area B."
This should be developed jointly by the action agency and the Services.

Documentation

This template is a guide to help you through the planning process, however, when sections are written out as the process is completed, the final document serves the same purpose as a biological assessment. It may be used to complete consultation pursuant to Section 7 of the ESA.

- The document should be maintained on file by the Services and may be referred to during an oil spill response.

- The Area Committee will ensure that this document becomes part of the ACP as appropriate such as:
- Included as an appendix to the Dispersant or In Situ Burn Operations Plan;
- Included as a reference document in the appropriate section of the ACP;
- Include relevant information in sections of the ACP such as Notifications, Site Summary Sheets, Geographic Response Plans, GIS maps, etc.

- The document should include points of contact from both the action agency and the Services.

APPENDIX D

SAMPLE POLLUTION REMOVAL FUND AUTHORIZATION (PRFA) LANGUAGE*

This Statement of Work (SOW) language is intended as sample language only. The language can be tailored to ensure that the FOSC is provided with the resources needed to meet the desired activities or functions required. Accordingly, more precise or succinct language may be used.

PRFA SOW additional/optional work elements to meet the FOSC's ESA mandated activities associated with removal actions:
…..
To arrange for, and as appropriate coordinate with, the resources needed to meet the conference and consultation requirements of the ESA.
Specific activities anticipated under this requirement include:
(a) Providing the expertise needed to make sensitive removal decisions which could potentially impact on listed species or critical habitats associated with this incident;
(b) Gathering and documenting the information needed to provide input into the aforementioned decisions and to document the resulting impact of removal actions; and
(c) As required, preparing the consultations required of the FOSC for the Service(s).

Funding under this agreement is provided for:
(a) Salaries, travel and per diem;
(b) Appropriate charges for use of equipment or facilities;
(c) Any actual expenses for goods and/or services reasonably obtained in order to provide the agreed upon support to the FOSC removal activities (including contracts.)

* Developed by the National Pollution Funds Center

APPENDIX E

SAMPLE LETTERS FOR REQUESTING CONCURRENCE OR FORMAL CONSULTATION

These sample letters have been developed to assist the Parties to this agreement in documenting the requirements of the Endangered Species Act. This is suggested wording only and may be used to complete the administrative record as needed. The request for concurrence can be used after the planning process for a particular area or countermeasure when it has been determined that no adverse effects will occur. The Services will provide a concurrence letter, as appropriate, for documentation. Alternatively, the request for formal consultation can be used after planning results indicate that adverse effects may still occur. If this is the case, the Services will evaluate the information developed jointly by the workgroup and issue a biological opinion.

Request for Concurrence Letter:

Mr./Ms. xxx
U.S. Fish and Wildlife Service/National Marine Fisheries Service
Division of Endangered Species

Dear Mr./Ms. xxx:

In accordance with the requirements of Section 7 of the Endangered Species Act, I am seeking your concurrence that the [Coast Guard's/EPA's] implementation of the [name of plan] is not likely to adversely affect the [identify the listed species and designated critical habitat that may be affected. Note, in cases where many listed species or critical habitat designations may be involved, it may be appropriate to refer to an attached list]. This [name of plan] has been developed with the assistance of [name of Service staff] of the U.S. Fish and Wildlife Service/National Marine Fisheries Service and in accordance with the procedures identified at 40 CFR Part 300, the National Contingency Plan. To assist in completing informal consultation, please find attached the Biological Evaluation that has been produced through the planning process described in the Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act using the Planning Template contained in Appendix C of that Agreement.

Thank you for your efforts in this matter. If you require additional information, please contact [provide a contact with a telephone number].

Sincerely,

Request for formal consultation:

Mr./Ms. xxx:
U.S. Fish and Wildlife Service/National Marine Fisheries Service
Division of Endangered Species

Dear Mr./Ms. xxx:

In accordance with the requirements of Section 7 of the Endangered Species Act, I am requesting the initiation of Formal Consultation on the effects of the [Coast Guard's/EPA's] implementation of the [name of plan]. Through informal consultation with your staff [or identify the appropriate Service office(s)], we have determined that implementation of spill response activities in accordance with the subject [name of plan] is likely to result in adverse effects to [identify the listed species and designated critical habitat that may be affected. Note, in cases where many listed species or critical habitat designations may be involved, it may be appropriate to refer to an attached list]. This [name of plan] has been developed with the assistance of [name of Service staff] of the U.S. Fish and Wildlife Service/National Marine Fisheries Service and in accordance with the procedures identified at 40 CFR Part 300, the National Contingency Plan. While these actions may result in short-term adverse effects, it is our belief that the species [and designated critical habitat areas] will ultimately benefit from them. To assist in completing Formal Consultation, please find attached the Biological Evaluation that has been produced through the planning process described in the Inter-agency Memorandum of Agreement Regarding Oil Spill Planning and Response Activities Under the Federal Water Pollution Control Act's National Oil and Hazardous Substances Pollution Contingency Plan and the Endangered Species Act using the Planning Template contained in Appendix C of that Agreement.

Thank you for your efforts in this matter. If you require additional information, please contact [provide a contact with a telephone number].

Sincerely,

Appendix B

Appendix B. List of Preparers and Contacts

Name	Agency	Email	Role
Jerry Popiel	USCG	Jerome.A.Popiel@uscg.mil	USCG Project Manager
Anthony Mangoni	USCG	Anthony.J.Mangoni@uscg.mil	ESA Workgroup
Scott Binko	USCG	Scott.A.Binko1@uscg.mil	ESA Workgroup
Robert Allen	USCG	Robert.E.Allen@uscg.mil	ESA Workgroup
Phil Delphey	USFWS	Phil_Delphey@fws.gov	ESA Workgroup
Sean Sweeney	USFWS	sean_sweeney@fws.gov	ESA Workgroup
Annette Trowbridge	USFWS	annette_trowbridge@fws.gov	ESA Workgroup
Trina Soyk	USFWS	trina_Soyk@fws.gov	ESA Workgroup
Valincia Darby	DOI	Valincia_Darby@ios.doi.gov	ESA Workgroup
John Nelson	DOI	John_Nelson@ios.doi.gov	ESA Workgroup
Lee Barbi	USEPA	lee.barbi@epa.gov	ESA Workgroup
Rachel Pryor	NOAA	Rachel.L.Pryor@noaa.gov	ESA Workgroup
Greg Zimmerman	EnviroScience	gzimmerman@enviroscienceinc.com	Project Principle
Becca Winterringer	EnviroScience	bwinterringer@enviroscienceinc.com	Project Manager
Joe Papineau	EnviroScience	jpapineau@enviroscienceinc.com	Subject Matter Expert
Emily Grossman	EnviroScience	egrossman@enviroscienceinc.com	Subject Matter Expert
Anna Piazza	EnviroScience	apiazza@enviroscienceinc.com	GIS Analyst
Melissa Vaccarino	EnviroScience	mvaccarino@enviroscienceinc.com	Editor
Christina Voorhees	EnviroScience	cvoorhees@enviroscienceinc.com	Technical Reviewer

Appendix C

Appendix C-1. Region 5 Response Action Matrix - Deflection and Containment - Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Deflection and containment Activities										
Booming	A boom specifically designed for pollution response is a floating, physical barrier, placed on the water to contain and concentrate the oil until it can be removed. Deflection is moving oil away from sensitive areas. Diversion is moving oil toward recovery sites that have slower flow, better access, etc. Exclusion is placing boom to prevent oil from reaching sensitive areas. Booms must be properly deployed and maintained (including removing accumulated debris), and re-adjusted to changing water flow directions, water levels, and wave conditions. Proper deployment involves use of mooring systems (e.g., anchors, land lines) and skilled teams. Tidal-seal boom is a special type of boom designed to be deployed in the intertidal zone (NOAA, 2010). Boom has four basic components: flotation, skirt, tension members, and ballast. Freeboard and draft are the portions of a boom's flotation and skirt above and below the waterline, respectively. In terms of quantity, regulations require vessel and facility response plan holders to have a specific amount of boom available for shoreline protection purposes for maximum most probable and worst case discharges. EPA, USCG and BSEE regulations vary. For example, for skimming operations covered by USCG OSRO guidelines, there are typically 300' of boom deployed per skimming system (USCG, 2016). The minimum boom properties include: 1) nearshore/offshore: boom height (draft plus freeboard) ≥ 42" for containment, capable of withstanding 6' waves; boom height ≥ 18" for shoreline protection; 2) rivers and canals: boom height 6-18", capable of operating in 1' wave heights; 3) inland: boom height 18-42", capable of operating in 3' wave heights; 4) Great Lakes: boom height 18-42", capable of operating in 4' wave heights (USCG, 2016).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Uplands		Bog Calcareous Fen Deep Marsh Annuals/Perennials/Shrub Open Water Rooted Floating Aquatics Shallow Marsh Annuals/Perennials/Shrub Submersed Vegetation	Less effective in rough water. Less effective in high winds. Less effective in fast currents. Weather affects booming (e.g., booms begin to fail by entrainment when the effective current or towing speed exceeds 0.7 knots perpendicular to the boom). Waves, wind, debris, and ice contribute to boom failure (NOAA, 2010).	What type of boom will be used? (There are four basic types - internal foam flotation, self-inflating, pressure-inflatable, fence.) (Exxon Mobil, 2014). Will the boom be anchored, and if so, what is the anchoring system include? Where will the boom be anchored? How is the boom being used, i.e., for containment, deflection, or protection? How long is boom left in place? Where is oil-contaminated boom disposed of? What machinery (vessels, trucks, etc.) are used to recover boom? What size is the boom? Why might the boom fail? (There are 5 basic types of boom failure: entrainment, drainage, splash over, submergence, planning. Exxon Mobil, 2014.) Is there netting or skirting and what is the size and material? *Note: Sorbent boom is discussed separately below.	Use of Vehicles Use of Vessels Use of Machinery Access by foot Use of Staging Areas Skimming Sorbents Decontamination Demobilization Waste Handling and Storage	Securing/Deploying/ Removing boom - uses anchors, anchor chain and lines, shoreline structures. Presence of boom and aggregation of oil.	Wildlife disturbance by presence of people and boom; crushing; destruction of benthic habitat/ organisms by anchors or anchor chain; entanglement in lines. Exposure of perching birds or mammals to oiled boom; effects on wading and surface wildlife due to aggregation of oil; risk of entanglement.	Plants, small mammals, insects, wading birds, nesting birds, fish, molluscs, reptiles, and amphibians could all be affected by Booming activities.
Dikes or berms	A dike or berm is constructed along the upper intertidal zone to prevent incoming tides from depositing oil onto back-shore areas. (Exxon Mobil, 2014). Motor graders can be used to build the dikes or berms if the beach can sustain motor traffic well. If the beach cannot sustain motor traffic well, front-end loaders or bulldozers can be used (Exxon Mobil, 2014). Typically disturbs upper 2 ft of beach sediments (Exxon Mobil, 2014).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Only constructed along the upper intertidal zone.	What types of equipment will be used to build the dikes or berms? (Motor graders, if beach can sustain motor traffic well.) What are digging and building and access ramifications?	Use of vehicles Use of machinery associated w/ constructing / disassembly Access by foot	Construction/ Deconstruction; presence of the dike/berm.	Crushing, noise, habitat disturbance; loss of access to essential resources (e.g., food, refuge, nesting area).	Small coastal land animals, coastal plants, birds that forage in or nest near shorelines and beaches; invertebrates; and fish would most likely be affected by habitat disturbance and loss of access to essential resources.
Construction barriers, dams, pits, and trenches	Land based tactic, with the objective of containing spilled oil and limiting spreading of oil slicks when the oil threatens sensitive habitats and other barrier options (e.g., boom, skimmers, less invasive barriers, etc.) are not feasible (NOAA, 2010). A physical barrier (other than a boom) is placed across an area to prevent oil from passing. Barriers can consist of earthen berms, trenching, or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used (NOAA, 2010). These physical barriers are typically used in conjunction with skimming or other recovery techniques (e.g., sorbents, vacuuming). Alaska Clean Seas (2010), ADEC's STAR Manual (Nuka Research, 2006) provide in-depth descriptions of these response actions. (Windward LLC, 2014).	Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used at the mouths of creeks or streams (to prevent oil from entering or being released from a certain location) (NOAA, 2010).	Are permits required for the construction of dike, berm, or dam? Where will disposal of construction material take place? What tools are being used to construct the barriers or dams (soil, gravel, sand, dump truck, equipment operator, front-end loader, excavator, hand tools, and shovels)?	Use of machinery Skimming Vacuuming (when applicable) Waste handling and storage Access by foot	Manual construction/ deconstruction using heavy equipment, and placement of components (i.e., sandbags). Personnel activity associated with construction (WindWard LLC, 2014).	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil); loss of aquatic organisms (if in streams, wetlands, or intertidal areas); wildlife disturbance (noise, trampling); restriction of wildlife access to resources (WindWard LLC, 2014). Note: Obstruction to movement applies to both the listed species themselves as well as predators and prey (which could lead to indirect effects to listed species).	Small coastal land animals, coastal plants, birds that forage in or nest near water, invertebrates (aquatic and terrestrial), fish, reptiles and amphibians may be affected.
Culvert blocking	A culvert is a drain or a pipe that allows water to flow under a road or railroad (Merriam-Webster, 2017 web). Open culverts present a potential route for spilled oil to enter otherwise unaffected areas (WindWard LLC, 2014). Culvert blocking typically involves placing a physical barrier across the opening.	Rivers and Streams		Beach and Sand Bar Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Submersed Vegetation	Land based tactic.	What are current water levels? Will the culvert be blocked with a temporary or permanent fixture (plywood, plug, plastic sheeting, sandbags)? Will deflection booming be used to block the culvert? (WindWard LLC, 2014) Is there a particular size of culvert which this is useful or when should you move to making a dam, for example? Is there a potential for water chemistry to change as a result of the culvert being blocked (indirect effects)?	Use of Machinery, New Access Points *(applicable when added as a response tool)* Access points and staging areas Access by foot	Construction, placement of barrier, replumbing of outlet (WindWard LLC, 2014).	Wildlife habitat disturbance, alteration of stream hydrology, obstruction to migration or general movement (WindWard LLC, 2014). Note: Obstruction to movement applies to both the listed species themselves as well as predators and prey (which could lead to indirect effects to listed species).	Species potentially affected include fish, insects, aquatic invertebrates, plants, amphibians, reptiles, and small land animals.

Appendix C-2. Region 5 Response Action Matrix - Recovery Activities - Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Recovery Activities										
Skimming	Skimmers are mechanical devices that physically remove the free or contained oil from the surface of the water. There are many different types of skimmers but they can be grouped into four categories based on oil recovery principles (Exxon Mobil, 2014). The main types (with examples) are 1) weir (Simple, self-leveling, integral screw auger, advancing and boom/weir systems); 2) hydrodynamic (water jet, submersion plane/belt, and rotating vane); 3) oleophilic (drum, disc, rope mop, sorbent lifting belt, and brush); and 4) other (paddle belt, trawl/boom skimmers) (Exxon Mobil, 2014). They are placed at the oil/water interface to recover, or skim, oil from the water's surface and may be operated independently from shore, be mounted on vessels, or be completely self-propelled (NOAA, 2010). Exxon-Mobil (2014) also rated the expected performance of 15 generic types of skimmers according to 12 performance criteria (p. 9-4), which helps responders determine the most effective type during a spill and provides a detailed description of 15 types of skimmers.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Shallow Marsh Vegetation Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather impacts skimming; generally less effective in rough water (waves beyond 2-3 ft in height) and strong currents. Rising wind and waves, debris, seaweed, kelp, and ice will reduce efficiency. Skimmers can be used in all water depths. Skimming vessels are slow moving, aimed at surface water, and typically deployed in areas where the floating oil is aggregated, either naturally or by other response activities.	What type of skimmer and ancillary support/storage capabilities are needed? Availability/size/quantity/mobility of storage devices for recovered oil? Does the discharged product present a hazard to people operating equipment? Access for support equipment (e.g., power, pumps, storage bladders, hydraulic power units, vessels)? How many vessels will be used during skimming (e.g., booming, towing)? What is the size of the vessels? What is the operational speed of the vessels? Traffic to and from skimming sites could cause harm. What type of skimmer is used (based on water depth and product type)? Where/how will skimmed oil be disposed of? Is boom utilized for skimming operations? What are the operating requirements for the skimmer (e.g., duration, frequency)? Is it an area where boats normally transit? How will the skimmer be transported to the site (vessel, vehicle, foot?).	Booming Dikes or Berms Construction Barriers, Dams, Pits, and Trenches Culvert Blocking Vacuuming Use of vessels Use of vehicles Waste handling and storage	Operation of skimmer Shore-Based: Stationary. Open Water: Mobile (in transit).	Wildlife disturbance (Noise), entrainment in skimmer system.	Species potentially affected include food resources (e.g.: plankton), larval fish, invertebrates, juvenile turtles, birds, and plants smaller than 3" and at the water surface.
Vacuuming	A vacuum unit attached via a hose to a truck, mounted on vessels for water-based operations, or hand-carried to remote sites; used to remove oil accumulations on water in the absence of skimmers and to recover oil pooled against a shoreline, concentrated in trenches, trapped in vegetation or pooled in natural depressions on all shoreline types (except where inaccessible). Unsafe for recovery of gasoline. Primary equipment includes a vacuum unit with a 2-3 inch suction hose and skimming head. Suction rates vary depending on the equipment, but be 50-100 gallons per minute for pooled oil and 25-50 gallons per minute for oil on water. Supporting equipment may include boom, low-pressure water hoses, leaf blowers/air movers. Typically requires shoreline access or road access for heavy equipment, barge or landing craft. Support personnel include 1 worker per suction hose, 1-2 workers for containing/herding the oil and 1 foreman for every 10 workers (Exxon Mobil, 2014). The equipment can range from small, portable units that can fill 55 gallon drums to large supersuckers that can be mounted to a truck or vessel, and can generate enough suction to lift large rocks (NOAA, 2010). Depending on the thickness of the slick, a mixture of oil and water enters the collection chamber; positioning of the intake end of the hose is critical to minimize the amount of water collected.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sandbar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Typically requires shoreline access points, but can be used in any accessible habitat type. Less effective in areas with waves and tidal energy.	Where will the vacuuming take place (shore-based or in open water)? How will the vacuuming equipment be transported to the site? Will decanting take place (via permit)? What supporting equipment (boom, water hoses, leaf blowers, etc.) will also be used? What type of vacuum and ancillary support/storage capabilities are needed (e.g., vac truck, other pumps, portable vacuum)? Availability/size/quantity/mobility of storage devices for recovered oil? What support equipment is needed? Access for support equipment (e.g., power, storage bladders, vessels)? What is the size of the vessels? What is the operational speed of the vessel? Traffic to and from vacuuming sites could cause harm. Where/how will vacuumed oil be disposed of? Is boom utilized for vacuuming operations? What are the operating requirements for the vacuum (e.g., duration, frequency)?	Booming Construction Barriers, Dams, Pits, and Trenches Culvert Blocking Use of Vessels Use of Vehicles Use of Skimmers Access by foot traffic	Operation of vacuum.	Entrainment, habitat and wildlife disturbance (noise).	Species potentially affected include entrainment of plankton, larval fish, small fish, juvenile turtles, invertebrates, plants, nesting/foraging birds, and small mammals

Appendix C-2. Region 5 Response Action Matrix - Recovery Activities - Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Recovery Activities										
Sorbents	Sorbents are used when oil is free floating or stranded on shore or as a secondary treatment method after gross oil removal or in sensitive habitats where access is restricted. Sorbents can recover small amounts of oil through absorption (the penetration of oil into the sorbent material) and/or adsorption (the adherence of oil onto the surface of sorbent material. To enhance recovery, most sorbents are both oleophilic (attract oil) and hydrophobic (repel water) (Exxon Mobil, 2014). Sorbents are defined in the National Oil and Hazardous Substance Contingency Plan (40 CFR 300 series. Sorbents that have been reviewed by EPA and meet the regulatory definition of a sorbent in Subpart J should have an official letter from the EPA to be shared with the federal On Scene Coordinator. The composition of sorbents can include synthetic, organic, and inorganic materials. Synthetic materials include polyethylene/polyurethane foams and pads, and polypropylene fabric - which are generally the most effective, can absorb up to 25 times their weight, and available in many forms such as rolls, sheets, blankets, pom-poms, and loose (Exxon Mobil, 2014, p. 10-5). Organic sorbents are made biodegradable materials such as straw, peat moss, sawdust, coconut fiber, chicken feathers, corn cobs, wool, and wood chips (Exxon Mobil, 2014). Sinking agents are prohibited per the NCP (40 CFR 300.910 (e)). Inorganic sorbents include materials such as perlite, glass wool, and volcanic rock (rarely used) and difficult to apply. (Exxon Mobil, 2014). Deployment/removal of sorbents is labor intensive and typically done by hand by personnel in light motor vehicle or shallow water craft. Most disposal involves placing the sorbents into a plastic bag for disposal. Sorbents may be reused (by extracting adsorbed liquids) and can help to suppress waves and prevent splash over. Types of adsorbents include: 1) Type I - (roll, film, sheet, pad, blanket, web) - a material with length and width much greater than thickness and has both linear form and strength sufficient to be handled either saturated or unsaturated; 2) Type II - (loose) - an unconsolidated, particulate material without sufficient form and strength to be handled except with scoops and similar equipment; 3) Type III - (enclosed) - III(a), pillows - adsorbent material contained by an outer fabric or netting which has permeability to oil, but with small openings to substantially retain the sorbent material within the fabric or netting; III(b), adsorbent booms - adsorbent material contained by an outer fabric or netting which has permeability to or is permeable to oil but with small openings to substantially retain the sorbent material within the fabric or netting. The lengthwise dimension substantially exceeds other dimensions and with strength members running parallel with length. Booms are also provided with connections for coupling adsorbent booms together; 4) Type IV - agglomeration unit - an assemblage of strands, open netting, or other physical forms giving an open structure that minimally impedes the intrusion into itself of high viscosity oils. Normally for use with viscous oils, typically above 10 000 cP viscosity. Said oils are then held in this structure permitting the composite oil/structure to be handled (pompoms) (ASTM, 2012). Additional info on usage: Ex- 1) Adsorbent booms - some have ballasted skirts and a flotation core; typically are most effective on thin films of oil; may need to be rotated or tended; 2) Pads - available in various shapes/colors. They can be placed in confined areas to collect small quantities of oil (left for several hours); 3) Pillows - can be easily handled and placed in confined areas; 4) Pom-poms - can be strung together on a rope as a snare boom; most effective on viscous or weathered oil; can be used on-shore or in the water; can be used as a composite barrier inside a containment boom to limit the escape of oil; 5) Rolls - continuous sheet of sorbent material; can be used as a lining or for protection of walkways, boat decks, etc. 6) Sweeps - long sheets of sorbent material, reinforced with rope and stitching; 7) Loose fill/particulate - not recommended for use on water; mainly used to stabilize stranded oil in remote locations (Exxon Mobil, 2014).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sandbar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather impacts sorbent use; lightweight sorbents can be blown off the surface in windy conditions. Wave and tidal energy affect efficacy as well as the oil type and stickiness (NOAA, 2010).	Is there enough oil product ~~to~~ present to be absorbed? What kind of sorbent is applied and how buoyant is it? How is it being tended (based on saturation)? How often? Have dispersants been applied? (Dispersant use typically prevents oil from sticking to a sorbent's surface.) How will sorbents be disposed? Minimum size/diameter of sorbent material used. Will placement or use of sorbent booms create concentrations of oil that could lead to additional exposure? Are sorbents being used as a first response tool? Note: Sorbents should be removed from the environment after use.	Use of Vessels Use of Vehicles Booming Disposal Decontamination Access by foot traffic	Placement of Sorbents in water or on land. Tending sorbents - improper tending can lead to sorbent material breaking down (NOAA, 2010).	Secondary Ingestion or Coating. Disturbance of habitat; high traffic, frequent trips to site. Direct contact: Crushing or smothering. Exposure route disturbance (noise); exposure from personnel moving around (product placement).	Species potentially affected include small land animals, birds, nesting/juvenile turtles on beach, plants, and freshwater mussels.

Appendix C-3. Region 5 Response Action Matrix - Removal/Cleanup Activities Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Removal/cleanup Activities										
Flooding	The washing of oil stranded on land to the water's edge for collection via the use of a perforated header pipe or hose and ambient water pumped at low or high pressure. The oil is typically contained by booms and recovered via a skimmer or other equipment. Best used in heavily oiled areas when the oil is still fluid and only loosely adheres to the substrate, or where oil has penetrated into gravel sediments (NOAA, 2010).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Applicable on all shoreline types where equipment can be effectively deployed. However, not recommended for steep intertidal or shorelines with fine grains or muddy substrates.	What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? What is being used to collect the freed oil? How many personnel are required at the site? How will the site be accessed (vehicle, shallow craft, barge)? Describe the method or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system (by fire hose or header pipe)). Are there concerns with introduction of invasive species from the source of the water and impacts to local species? Will the use of flooding increase turbidity in the area?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Access by foot traffic Use of Vehicles Staging	Flooding operation. Re-mobilization (or refloating) of the oil to facilitate collection.	Sediment loss, erosion of the shoreline and shallow rooted vegetation, physical removal of organisms (by water pressure), smothered by sediments washed down the slope, high temperature water could harm (or kill) organisms, noise. Short Term: Oiled sediment may be transported to nearshore and down coast areas, contaminating them and burying benthic organisms (NOAA, 2010). Ingestion of transported oil. Direct contact with or ingestion of transported oil.	Species potentially affected by the use of Flooding include invertebrates, nearshore aquatic organisms, aquatic vegetation, amphibians, plants, nesting/wading/foraging birds, mammals, turtles, and fish.
Flushing	To remove fluid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation via ambient water temperature sprayed at low pressures, usually from hand-held hoses. Typically recovered by skimmers, vacuum or sorbents and used with a flooding system to prevent released oil from moving downstream (NOAA, 2010). Higher temperatures may be used to mobilize oil when appropriate for the area.	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Low-pressure flushing is best used on substrates, riprap, and solid, man-made structures, where the oil is still fluid, and in wetlands and along vegetated banks where oil is trapped in vegetation (NOAA, 2010). High-pressure flushing is typically used on bedrock, man-made structures, and gravel substrates when low-pressure flushing is not effective. Not normally used in rich, intertidal areas or where algae is present (NOAA, 2010).	What is being used to collect the freed oil? What temperature water will be used? How many personnel are required at the site? How will the site be accessed (vehicle, shallow craft, barge)? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Describe the method or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system (by fire hose or header pipe)). Are there concerns with introduction of invasive species from the source of the water and impacts to local species? Will the use of flushing increase turbidity in the area?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Access by foot traffic Staging	Operation of flushing unit. Re-mobilization (or refloating) of the oil to facilitate collection.	If containment methods are not sufficient, oil and oiled sediments may be flushed into adjacent areas. May cause sediment loss, erosion of shoreline and shallow rooted vegetation. High pressure flushing may drive oil deeper into the substrate. May physically displace benthic organisms (NOAA, 2010). Thermal effects. Direct contact with or ingestion of transported oil. Mobilized sediments may affect intertidal habitats/further oiling of adjacent areas (NOAA, 2010).	Species affected include invertebrates, fish, nearshore aquatic organisms, submerged aquatic vegetation, amphibians, plants, fish, mammals, and birds.
Steam cleaning	Steam or very hot water (171 deg F to 212 deg F) is sprayed with hand-held wands at high pressure (2,000 psi) to remove heavy residual oil from solid substrates or man-made structures (NOAA, 2010). Typically used when heavy oil residue must be removed for aesthetic reasons, hot water flushing is not effective, and few or little to no living resources are present (NOAA, 2010). (Higher temperatures and higher pressures may used to mobilize oil where environmental conditions allow.)	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used on solid substrates or man-made structures.	What is used to collect the oil in conjunction with the steam cleaning operation? How will personnel access the area? How many personnel are involved (typically 2 operators per unit)? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Where is the hot water going?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Access by Foot traffic Staging	Spraying. Re-mobilization (or refloating) of oil to facilitate collection.	Direct contact of hot water/steam at high pressure; noise; thermal effects. If containment methods are not sufficient, oil and oiled sediments may be flushed into adjacent areas. Direct contact and ingestion of re-mobilized oil. Mobilized sediments may affect intertidal habitats/further oiling of adjacent areas (NOAA, 2010).	Species affected include invertebrates, nearshore aquatic organisms, submerged aquatic vegetation, mammals, turtles, birds, fish, amphibians, and plants.
Sandblasting	Removal of heavy residual oil from solid substrates or man-made structures via sand moving at high velocity. May also be used to establish an exclusion zone. (Exxon Mobil, 2014). Utilized when heavy oil residue must be cleaned (typically for aesthetic reasons), and steam-cleaning is not effective (NOAA, 2010).	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used on solid or man-made structures. This is a tool that needs to be used on dry land, and not over water.	Do operations involve a sand supply truck and/or front end loader? What materials are being used to cover the ground? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Are you sure there are no other suitable methods? Issues of potential erosion, scouring, pushing oil deeper into crevices, etc.? How is sandblasted material collected/recovered? Will oil be flushed into adjacent areas? Do you anticipate using a medium other than sand? (If so, seek emergency consultation).	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Staging Access by foot traffic New Access Points	Sandblasting Operations.	Destruction of organisms and habitat in sandblasting zone (direct contact); oil may be channeled to a recovery area downstream (NOAA, 2010, Exxon Mobil, 2014). Noise. Ingestion of re-mobilized oil. Unrecovered used sand (adds sand to the environment), could cause deeper oil penetration.	Species affected include birds, mammals, reptiles and amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans

Appendix C-3. Region 5 Response Action Matrix - Removal/Cleanup Activities Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Different types of equipment can be used to promote evaporation and weathering or collecting oiled material off of a beach. Most of this type of activity involves a tractor or similar vehicle to pull the equipment or conduct the activity. Examples include: 1) Beach cleaner - Can be used on lightly oiled (tar balls or patties) sand or gravel beaches and is pulled by a tractor or self-propelled across a beach. Typically operates a 4 mph taking a skim cut 6 ft wide (Exxon Mobil, 2014). 2) Lightly oiled sediment mixing-discer - track-type tractor preferred with 8-12 ft wide discer. Tractor pulls discing equipment along an oiled area to promote evaporation and weathering by shoreline processes; typically used on lightly oiled, non-recreational sand and gravel beaches (Exxon Mobil, 2014). 3) Mechanical surface cleaner - elevating scraper - used to remove surface oil, tar balls, and patties on sand and gravel beaches (causes disturbance of upper sediments (<1 in) (Exxon Mobil, 2014).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Typically used in sand, gravel, cobble, or mud flats (Exxon Mobil, 2014). Used where surface sediments are amenable to, and accessible by, heavy equipment; should remove sediments only to the depth of oil penetration (NOAA, 2010).	What is the degree of oiling? What equipment will be used? What is the substrate type? Is there access to the beach for heavy equipment, or can access be constructed? Is the oil in form of tar balls? Can oil remain on the beach or in the area without causing problems? Will mixing the sediments expose subsurface organisms to undue hazards? Will tide cycles affect re-worked sediments? Can rubber-tired and/or track vehicle equipment operate on the beach? If tilling/discing sediments, how deep will equipment penetrate?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel	Working sand/sediment.	Habitat and/or wildlife disturbance or loss from noise, crushing, presence of people; Can distribute the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to PAHs if contaminated sediments are moved deeper into the beach).	Species affected include birds, mammals, reptiles , amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans
Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	There is mechanical equipment available to clean or remove sand/sediments that impacts > 1 inch deep (may go to 10 inches). Examples include: 1) Heavily Oiled Sediment Mixing-Tractor/Ripper - tractor fitted with a ripper or tines operated up and down the beach (so sediments remain and erosion is minimized to promote evaporation and weathering by shoreline processes 2) Bulldozer - pushes oiled substrate into the surf zone to accelerate natural cleaning while causing minimal erosion (Exxon Mobil, 2014). 3) Front-end loader - removes oiled material directly off beach and hauls it to a loading area.	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Typically used in sand, gravel, cobble, or mud flats (Exxon Mobil, 2014). Used where surface sediments are amenable to, and accessible by, heavy equipment; should remove sediments only to the depth of oil penetration (NOAA, 2010).	What is the degree of oiling? What equipment will be used? What is the substrate type? Is there access to the beach for heavy equipment, or can access be constructed? Is the oil in form of tar balls? Can oil remain on the beach or in the area without causing problems? Will mixing the sediments expose subsurface organisms to undue hazards? Will tide cycles affect re-worked sediments? Can tracked equipment be used on beach? What is the risk of sediment loss to water bodies? What is the risk of additional erosion due to substrate disturbance? How deep into sediment will cleaner or excavator operate?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel	Working sand/sediment.	Habitat and/or wildlife disturbance or loss from noise, crushing, presence of people; Can distribute the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to PAHs if contaminated sediments are moved deeper into the beach).	Species affected include birds, mammals, reptiles , amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans
Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Oiled sediment and debris are removed by hand, shovels, rakes, etc. Could also involve trailers or wheel barrows, debris boxes/bags, and ATVs with trailers. Typically used on mud, sand, gravel, and cobble when oiling is light, sporadic, and/or at or near the beach surface (stranded), or on beaches where there is little to no access for heavy equipment (Exxon Mobil, 2014).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Used on mud, sand, gravel, cobble when oil is light, sporadic, and/or at or near the beach surface, or when there is no beach access for heavy equipment (Exxon Mobil, 2014). Manual labor is highly impacted by weather conditions (e.g., heavy weather, thunderstorms, snow and ice, extreme temperatures).	Is area concentrated on one area of the beach? What is the degree of oiling? What is the substrate type? What is oiled and what methods of cleaning will be used? Can oil remain on beach without causing environmental problems? What equipment (non-mechanical) will be used to physically remove the oil/oiled material? How will the oiled material be collected/transported? How many workers will be needed? How will the site be accessed (i.e., foot traffic)? What logistical support will be necessary in order to support workers (e.g., facilities, utilities)? Will any additional ground cover be used for initially capturing oil?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel Access by foot traffic	Removal of oil/oiled material.	Disturbance from presence of people (noise, movement); trampling of small animals and vegetation; penetration of oil deeper into sediments. Removal of sediment/wrack removal (note - only removed if oiled).	Species affected include birds, mammals, beach invertebrates (insects), plants, reptiles, crustaceans, snails, and freshwater mussels.

Appendix C-4. Region 5 Response Action Matrix - Submerged Oil Activites - Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Submerged Oil Activities										
Detection of non-floating or submerged oil	"Non-floating oil" can be used to describe oils that have become either submerged or sunken. "Submerged oil" includes spilled oil that has neutral or near-neutral buoyancy and is below the water surface and in the water column. "Sunken oil" includes spilled oil that has negative buoyancy and sinks to the bottom of the water body. In some circumstances involving low current conditions, sunken oil in shallow waters may pool in depressions on the seabed or be moved along the seabed by prevailing currents. (RRT 10 Northwest Area Contingency Plan, 2016; API, 2016.) Examples of detection capabilities include: 1) Sonar systems - side-scan sonar, multi-beam echo sounder, sub-bottom profiler and 3D scanning sonar; 2) Underwater visualization systems - cameras and video; 3) Diver observations - with or without submersibles; 4) Towed or stationary sorbents - examples include sorbents attached to chains that are dragged on the bottom -typically 1' swath- and sorbents suspended in the water column or in cages; 5) Laser fluorosensors - a unit that is towed close to the bottom; 6) Visual observations by trained observers; 7) Bottom sampling - taking a sediment grab, core samplers, or wading-depth shovel pits; or 8) Water sampling in-situ analysis - flurometers and mass spectrometers are towed in the water column (USCG, 2016).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact detection.	What type of detection capability will be used? How deep is the water? What type of substrate is the bottom? What is the nature of the oil? Will dragging of sorbent material be used? Will sediment disturbance to occur?	Use of Vessels Use of Machinery/supporting equipment Access of Personnel via foot traffic	Use of people/ equipment in water column (to detect oil).	Sediment disturbance, Underwater sound (Sonar signals), strikes from equipment in the water.	Species affected include freshwater mussels, fish, reptiles, amphibians, aquatic plants, and birds.
Recovery of non-floating or submerged oil	Due to a large range of densities and properties of non-floating oils, recovery operations will be unique to the type of event, location, and availability of equipment and logistical support. Non-floating oil recovery has been successful when there are low current speeds and wave conditions, the oil is pumpable, the water is relatively shallow, and the oil is concentrated in natural collection areas (RRT 10 Northwest Area Contingency Plan, 2016). Recovery techniques include: 1) Suction dredge - dredging through use of pumps to hydraulically remove and transport the oil; 2) Diver-directed pumping and vacuuming - pumping capabilities refer to the use of a centrifugal or positive displacement pump at or below the water surface with a diver-directed suction hose. Vacuuming refers to a vacuum truck or unit above the water surface/on a barge that creates a vacuum, with a diver-directed hose attached; 3) Mechanical removal - excavators, clamshell dredges, environmental dredge buckets or other machinery used to grab, scoop, or pick up the sunken oil/oiled debris/oiled sediment; 4) Sorbent and V-SORS - sorbents attached to chains that are dragged on the bottom to recover liquid oil; 5) Trawls and nets - towed in the water column or on the bottom to recover viscous oil; 6) Manual removal - physical removal of viscous oil using hand tools (by wading in shallow water or divers); 7) Agitation/refloat/poling - agitation of oil on the bottom to get the oil to float to the surface for recovery (USCG, 2016).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact removal. Surface conditions may impact effectiveness of removal equipment.	What type of recovery equipment will be used? How deep is the water? What type of substrate is the bottom? How deep does the submerged oil penetrate? How will the oil/sediments be contained; what type of equipment will be used? What is the nature of the oil? Will divers be used to assess the progress? Will vacuuming be used? Will dredging via clamshell or a surface-suction device be used? Will dragging of sorbent material be conducted? Will sediment disturbance to remove oil occur?	Use of Vessels Use of Machinery Creation of Staging Areas Waste Handling and Storage Vacuuming	Working sediment.	Physical removal of substrate/habitat and species and/or disturbance of the water column.	Species affected include freshwater mussels, snails, aquatic insects, submerged aquatic vegetation, fish, reptiles, amphibians, plants, and birds
Containment of non-floating or submerged oil	Equipment and methods used to contain non-floating oil or reduce spreading on the bottom. Examples include: 1) Nets or curtains attached to the bottom and/or suspended from the surface; 2) Physical barriers such as artificial depressions (e.g., trenching); 3) Bottom boom; 4) Sheet piling; or 5) Sorbents in filter fences or cages (USCG, 2016).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact removal. Surface conditions may impact effectiveness of containment equipment.	What type of equipment will be used? How deep is the water? How deep does the submerged oil penetrate? What is the bottom substrate? What is the nature of the oil, i.e., will it refloat? Will divers be used to assess or aid in the process? Will sediment disturbance occur? How will containment/barrier structures be secured in place? How long will these structures be deployed? Will a bubble curtain be used to contain the oil?	Use of Vessels Use of Machinery Creation of Staging Areas Waste Handling and Storage	Containment of oily wastes below the surface.	Habitat disturbance from insertion of physical barriers or boom into sediment - crushing and turbidity, restriction of movement; direct contact with species (entanglement), noise.	Species affected include freshwater mussels, aquatic vegetation, fish, aquatic insects, amphibians, and reptiles.

Appendix C-5. Region 5 Response Action Matrix - Wildlife Protection Activities - Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Wildlife Protection Activities										
Deterrence and hazing ***To determine whether deterrence and hazing needs to be included in the consultation, evaluate the extent to which wildlife deterrence is already covered within designated oil spill response activities or other plans.**	Techniques that can be used to move wildlife from locations that are in the predicted path of the spilled oil. These techniques are intentionally used to deter wildlife from entering into areas that have been previously oiled or depart an area that has been or could be oiled to prevent harm. This does not include unintentional behavioral responses resulting from use of vessels, vehicles, and aircraft in support of other response activities. Deterrence and hazing includes techniques such as: 1) noise deterrence - including pyrotechnics, shotgun, or pistol-launched projectiles, air horns, motorized equipment, propane cannons, and recorded bird alarm sounds 2) scare devices, including deployment of reflective tape, helium-filled balloons, and scarecrows on oiled beaches 3) herding wildlife using aircraft, boats, or other vehicles 4) hazing by human presence (Exxon Mobil, 2014)	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Site specific activity - methods can be modified for site specific conditions depending on the location, movement of the oil, or presence and movement of the animals. Weather may impact use.	What are the potential effects of human activity and disturbance on the habitat? Are any nesting, rookery, or haulout sites nearby? Which devices will be used? How long/often will the devices be used? What animals are the target of the hazing*?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access by foot traffic Staging	Operation of the equipment - with the purpose to disturb the species so that they avoid the oiled area.	Habitat disruption, noise, human presence, activity.	Species affected include birds, small land animals, and mobile aquatic organisms (e.g.: fish).
Capture and care of contaminated species or recovery of contaminated carcasses **To determine whether capture and care needs to be included in the consultation, evaluate the extent to which it is already covered within designated oil spill response activities or other plans.*	During some spills, wildlife may become oiled, or die due to oiling. Capture, care for or recovery of the animals' carcass may need to be carried out by responders to help an animal's chances for survival or prevent other animals from further oil exposure. Capture and care for oiled wildlife can be a hazardous activity and requires specially trained personnel, equipment and facilities (Exxon Mobil, 2014). The sooner oiled wildlife are captured and rehabilitated, the better their chance for survival (Exxon Mobil, 2014). Note: Pre-emptive capture of unoiled animals requires a separate permitting action (under ESA Section 10) and is therefore not in the scope of this matrix.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather, terrain, presence of species.	What did the carcasses result from? What federal agency supports coordination of the removal? Who provides assistance? Where should the carcasses be taken to? Is there a Wildlife Branch Director to help coordinate efforts? What species are being recovered*? Are any permits necessary**?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access by foot Staging	Capture and care as directed by federal/state/territorial wildlife agencies and rescue centers.	Stress, transport, physical harm, application of cleaning products.	Species affected include birds, small land animals, reptiles and amphibians.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination										
Locating, Tracking, and Support Activities										
Use of aircraft	Aircraft (various types including fixed wing and helicopters) may be used during an oil spill to conduct overflights to track or monitor the location of the spill or transport responders to the site. The Coast Guard's MH65 is frequently used, which has a max speed of 175 kts with two turbine engines. In some cases (i.e., when a spill is offshore), a longer range aircraft may be used such as the Coast Guard C-130H, which has a cruising speed of 374 mph, a wingspan of 132', and has four turboprop engines - can be used to drop pumps, etc. to a site).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather is limiting: cloud ceiling, visibility affect use. Choice of aircraft may depend on availability, time needed on scene, and range.	Which type of aircraft will be used (airplanes, helicopters, drones, balloons, etc.)? How often will overflights take place? Can other remote sensing operations be used in its place? Are these aircraft carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? At what altitude will the aircraft be flying? Is there a known flight path? Will aircraft fly over sensitive habitat? Are there any existing restrictions in place? In emergency response situation, it may be possible to use permitting process through resource trustees to fly lower than would otherwise be allowed. Would you expect any air quality, water quality or noise concerns above background?	Use of vehicles Use of vessels	Conducting flights over the impacted spill area.	Wildlife disruption (noise), bird strikes.	Species can be affected by disruption (noise) and bird strikes. Species affected include birds and land animals.
Use of vessels	Various types of vessels may be used during an oil spill to locate, monitor, conduct operations, or transport people and equipment to the site. Vessel size typically depends on the water body environment and what is available from the Oil Spill Removal Organization or Coast Guard vessels in the area; however, the most commonly utilized vessels during spill responses include 12' punt boats, 14' Jon boats, 32' support vessels, rigged hulled inflatable boats (approximately 5-11'), and approximately 21' work boats. In some cases (i.e., larger spills, deeper water), larger vessels may be utilized such as a 46' fast response vessel, 200' oil spill response vessel (can travel 12 kts and has 4,000 barrel storage capacity), or 225' Sea Going Buoy Tender (13' draft, has Spilled Oil Recovery System onboard).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used based on capabilities; weather may impact use (thunderstorms, low visibility); draft of vessel may impact use.	Which type of vessels will be used (autonomous vessels, air boats, etc.)? How often will the vessels transit the area and at what speeds? How many vessels will be in the area? Where will fueling take place? Where will decontamination take place, if necessary? Where will vessels launch? Are these vessels carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? Are vessels being operated in atypical locations? Would you expect any air quality, water quality or noise concerns above background?	Use of vehicles Use of machinery Booming Skimming Decontamination	Vessel operation.	Wildlife disruption (noise), vessel strikes.	Species affected include birds, land animals, and fish.
Use of vehicles	Various types of vehicles and equipment (with wheels or tracks) may be used during oil spills to track spills, deploy equipment, and transport responders to the site (pick up trucks, atvs, etc. are often used).	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain and vehicle weight impact use. Used based on capabilities; weather may impact use (thunderstorms, low visibility).	What type of vehicle will be used (car, semi-tractor trailers, RVs, hover craft, backhoe, bulldozer, ATV, off-road vehicles, etc.)? What type of substrates will the vehicle be working on? How many vehicles will be used? How will they be re-filled (with gasoline, etc.)? How will vehicle be decontaminated if necessary? How will vehicle access sites? Are these vehicles carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? Are vehicles being operated in atypical locations? Would you expect any air quality, water quality or noise concerns above background?	Decontamination	Operation of vehicles.	Wildlife disruption (noise, lights), vehicle strikes, crushing/compaction.	Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans, and gastropods.
Use of machinery/supporting equipment	Various forms of machinery and equipment are used to support oil spill response activities (e.g., generators, pumps, 2-3" hoses, hydraulic power packs, lighting). For example, a CCN-150 is a submersible offloading pump with a max capacity with seawater of 3,500 gallons per minute at 98 ft, weighs 187 lbs, and is designed to fit into a 12.5 in diameter opening. The Coast Guard supplies a Deutz Hydraulic Power Unit which is used to drive hydraulic pumps (creates suction) and is capable of developing 3500 psi at 45-55 gallons per minute hydraulic flow. It weighs 1,735 lbs (USCG, 2006).	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain and machinery weight impact use as well as weather conditions.	What type of substrates will the machinery be working on? How many will be used? How will they be re-filled (with gasoline, etc.)? How will the machinery be decontaminated if necessary? How will machinery access sites? Would you expect any air quality, water quality or noise concerns above background?	Decontamination	Deployment/ presence of machinery in atypical locations.	Habitat disruption (noise, lighting), soil compaction.	Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans and gastropods.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
Creation/Use of New Access Points	Responders may need to create new access points in order to get people, equipment, vessels, and vehicles to a site to monitor, contain, or recover oil. This activity can range from putting a piece of wood down (4 by 6") to creating a new road for vehicle access. (*May need to define scope for purposes of consultation.)	Shorelines Ports, Canals, Industrial Areas Coastal Nearshore Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain, accessibility to response site. Size of new access point will depend on what needs to pass through.	What is the access point being created for (people, machine, or vessel)? Are other options available to access location? Can location be accessed through a less sensitive area? What kind of equipment and materials will be needed to create new access point? What will happen to access point after response concludes ("demobilization" of access point)?	Use of Machinery Use of Vehicles	Construction and use of new access point.	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil); wildlife disturbance (noise, trampling).	Species affected include small land animals, insects, plants, amphibians, reptiles, crustaceans, gastropods, and nesting/foraging birds.
Creation/use of Staging Areas (on land)	Responders may need to create new staging areas or convert certain existing areas into an area to store, set up, and transport people and equipment needed to conduct the oil spill response. This activity can range from using an existing parking lot to bringing in trailers/constructing a semi-permanent building. *Note: Services may need to discuss what is in the scope of pre-planning consultation for this activity.	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Limited by terrain type, accessibility to response site. Size/footprint will depend on the number of responders or types of equipment and tools that need to be staged.	How many personnel and what type of resources will be found at the staging area? When will the staging area be accessed? Will the staging area require lights? How/what kind of equipment will be used to access the staging area? Are responders using existing areas or creating a new staging area in an undeveloped area? Is flooring being created for responders to walk on/store equipment - i.e., pallets, boards, or carpet? How long will equipment be stored on site? Will oil or hazardous materials be stored on site (in frac tanks, or other types of containers)?	Use of Vehicles Use of Vessels New Access Points Use of Machinery Use of Aircraft	Construction and use of new staging area.	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil from storage of large equipment); wildlife disturbance (noise, trampling from large numbers of people, light - if applicable).	Species affected include small land animals, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, and gastropods.
Natural attenuation - allow habitat to recover naturally while monitoring	The reliance on natural processes (including biodegradation, dispersion, dilution, sorption, evaporation, etc.) to achieve site-specific remedial objectives within a timeframe that is reasonable compared to that offered by other response activities (EPA, 1999), i.e., there is no attempt to remove stranded oil or minimize impacts to the environment. "For areas in which a spill is logistically inaccessible for reasons of remoteness (e.g., the Arctic), stormy weather, or lack of equipment and manpower, natural attenuation might be the only option available" (National Research Council, 2013). The decision to use natural attenuation may take place for cases in which: 1) oil is not accessible; 2) when oiling has occurred on high-energy beaches or shorelines where wave action will remove a majority of the oil in a short period; 3) when there is a human health or worker safety issue (e.g., fast-moving water, rocky coastline, high-energy environment); or 4) when it is determined (e.g., through a Net Environmental Benefit Analysis) that responding to the oil may do more harm than good.	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used when other response techniques are not practical, natural removal rates are fast (e.g., gasoline evaporation, high energy coastlines) (USCG, 2011), or when areas are inaccessible and/or present a safety hazard to responders. May not be appropriate for areas with high numbers of people, mobile animals, or endangered species (NOAA, 2010).	Will effects manifest at the ecosystem level, resulting in radical changes in ecosystem structure and function? Are important ecological resources or human activities/resources threatened? Will stranded oil remobilize?	Use of Vessels (for tracking and surveillance) Use of Vehicles (for tracking and surveillance) Sample Collection Access of Personnel by Foot Traffic Deterrence and Hazing	If natural attenuation is a prescribed response action in a referenced ACP, then the BE should include a discussion of specific decision processes/criteria for these sites where "no response" is an option. (The decision process can be consulted on.) The natural attenuation option will most likely need to be addressed during the emergency response consultation.	Variable and incident-specific.	Most likely not able to determine species and habitats prior to a response unless specific sites are already identified for "natural attenuation" in the ACP. During a response, this will be discussed and identified within the Environmental Unit.
Deployment of buoys **NOTE: Applies to small buoys, not navigation aids.**	Tracking buoys can be used to study current patterns. This information can be useful in predicting the trajectory of an oil spill. Several designs are used such as radio- and satellite-tracking units (Exxon Mobil, 2014). Drift (unanchored) buoys and static buoys may be utilized. Used for tracking and surveillance of spilled product, or for marking the boundaries of environmentally sensitive areas or specially designated on-water zones potentially in the path of spilled product. Used to mark anchors or hazardous areas. An example is: the Orion Tracking Buoy, which is 9.8 in diameter, 6 in high and has a split globe with an outer ring, weighs 4 lbs and tracks spills via a single coplanar stripline transmission line (free-floating) (Fingas, 2011).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Adverse weather conditions could impact deployment and use of the buoys.	Are they static or drifting buoys? What will the buoys look like (how big, are they lighted, etc.)? How long will they remain at the deployment location? How will they be deployed? Will they be anchored? How will they be used? Will drift buoys be recovered? Are they large enough for birds to perch on? Are buoys grounded (i.e., at high/low tide)? Is there any rope or chain drag that could impact the benthic habitats? How is grounding avoided (particularly for environmentally sensitive areas)? What is the anchoring mechanism and the habitat that is being anchored into?	Use of Vessels Use of Aircraft New Access Points Staging	Deployment/anchoring/ presence of the buoys (including recovery) Light (or sounds) emitting from buoy.	Wildlife disturbance from buoy's signal (light, sound). Direct contact with chain or chain scour.	Species affected include waterfowl, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, mollusks, and fish.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
Locating, Sampling and monitoring: Air, land, water (includes Shoreline Cleanup Assessment Technique - SCAT)	During spills, responders collect samples of the spilled product and clean water (as a background), in order to determine or confirm the source of the spill. Typically, at least three samples are collected at the leading edge, the center of the spill, and clean water. Grab sampling involves lowering the sample jar into the water and skimming the oil layer or globules from the water surface into the jar; sheen net sampling involves slowly dragging a sheen net through an oil sheen and using its natural affinity to collect the oil (then placing in jar). Oil samples are sent to the United States Coast Guard Marine Safety Laboratory for analysis via established procedures. Shoreline Cleanup and Assessment Technique (SCAT) is a systematic approach to surveying an area during an oil spill response (begins early in the response and continues to ensure cleanup endpoints are met). During SCAT assessment, a team of people (including representatives from federal agencies [USCG, NOAA], the state, the responsible party, and other applicable stakeholders) walk the impacted area to verify shoreline oiling, cleanup effectiveness, and final evaluations (NOAA SCAT, 2016). Special Monitoring of Applied Response Technologies (SMART) is a cooperatively designed	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather, landscape, remoteness, accessibility, sea state.	What type of sampling will be conducted (grab sampling, sheen net sampling)? How will sampling be conducted (via foot, vessel, aircraft)? Where will sampling take place? What other equipment will be used during the sampling? How often will sampling take place, is there a sampling plan? Is your sample methodology destructive (e.g., will it impact sediment, species, etc.)? What is the duration of the sampling (e.g., will sampling device be left in the environment for continuous sampling or monitoring)? If sampling and monitoring will be long term, will noise be a factor? What kind of noise or other type of disturbance may the monitoring and sampling equipment produce?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access of personnel by foot traffic Staging	Sampling (all other activities are interrelated and covered in other activities).	Physical contact and/or containment in collection device.	Species affected include any that are targeted for sampling and monitoring.
Access of personnel by foot traffic	Personnel are deployed to the oil spill site to conduct visual observations, track oil, and conduct cleanup operations.	Shorelines Ports, Canals, Industrial Areas Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather, terrain, remoteness, accessibility.	How many personnel are necessary to complete the job? How much area will be affected by responders traveling to the incident site? Where will they operate out of (a facility, or temporary structure)? How will people get to the site (aircraft, vehicle, vessel)?	Use of Vessels Use of Vehicles Use of Machinery Use of Aircraft Staging	Accessing the site by foot.	Habitat disturbance (e.g., soil compaction, erosion from foot traffic); wildlife disturbance (e.g., noise, presence of people); Direct contact.	Species affected include plants, amphibians, reptiles, small land mammals, nesting birds, insects, and gastropods.

Appendix C-7. Region 5 Response Action Matrix - Secondary Response Activities/Waste Management Activities Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	Definition Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	Typical locations in the Region 5 action area where the response activity is implemented	Secondary Locations Factored into Species Response Matrix and Effects Analysis	Associated Vulverable Habitats within Region 5	Environmental conditions that limit where or when to use the response activity Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	Discussion questions/ Considerations Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	Potential inter-related and inter-dependent response activities Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	Aspects of spill response activity that are in scope of consultation Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	Potential impacts considered on ESA-listed species or their habitat Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	Associated Animal Groups Affected Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
SECONDARY RESPONSE ACTIVITIES - occurs only because a primary or support activity has occurred										
Waste Management Activities										
Waste Handling	Movement of collected oil or contaminated waste (soil, sediment, debris) during a spill response. In large spills, as much waste can be generated as the amount of oil spilled (Exxon Mobil, 2014). Non-oily wastes (e.g., sewage, domestic waste) that are generated during cleanup operations can be disposed of at local wastewater treatment plants and municipal landfills; oiled and hazardous wastes disposal can be disposed of via industrial landfilling, landfarming, open burning, portable incineration, commercial incineration- waste to energy facilities, reprocessing, reclaiming/recycling and further information regarding these options can be found in Exxon Mobil, 2014, p. 14-18 to 14-23.	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather conditions and topography may impact waste handling. Waste handling is also impacted by the type of equipment or materials used to recover the oil and the type, location, and amount of oil.	What is the size of the spill and the location of the spill? Are there local or regional regulatory requirements impact where waste handling takes place? What equipment will be needed to handle the waste? Is the waste a listed hazardous waste or exhibit characteristics of a hazardous waste? How will it be labeled? Are operations being carried out according to the waste management plan? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? What regulations apply? How will waste be transported to storage? How will waste be transported off site? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)? How will recovered oil be handled? Is there a potential for secondary releases and/or a need for secondary containment; if so, how will they be addressed? Is the waste being handled near a sensitive area?	Use of Vessels Use of Vehicles Use of Machinery Deterrence and Hazing Mobilization/Demobilization of personnel Booming Staging	Collection and movement of waste.	Accidental release of oil or oiled materials in a previously unaffected area (on water or land).	Species affected include all T&E species in areas of waste handling. Potential impacts are likely already covered by the activity that generated the waste.
Temporary Storage (on water)	There are numerous types of storage devices for waste and debris associated with oil spills; selection may depend on the type and amount of oil spilled and availability at the time of the spill. When oil recovery and transfer is conducted on-water, there are mainly two options: 1) towable on-water storage; and 2) onboard tanks (USCG, 2011). Barges are the preferred on water storage devices, especially tank barges which are designed to take on fluids. (Note: When barges contain less than 250 barrels of storage volume, they are considered equipment and do not require a US Coast Guard inspection or Tankerman's document.) Deck barges may also be used with a tote or tank on top. Other types of towable on-water storage include inflatable bladders and tanks (also called dracones) which are typically made out of rubber and flexible, but designed to store flammable or combustible liquids and be towed at slow rates. Additionally, there are inflatable, towable barges with open-top storage that can provide some freeboard and protection from seas (USCG, 2011). Tank vessels are an option for larger spills and when lightering may be necessary. Drawbacks may include a high freeboard, deep draft, and lack of availability - depending on the vessel size. The other type of onboard system is deck tanks. Use of these onboard systems may require extreme caution due to altering of vessel stability (USCG, 2011). An example of a inflatable barge, used offshore (not common) is the Canflex FCB-250 Sea Slug, which is found on Coast Guard buoy tenders with the Spilled Oil Recovery System (SORS). This inflatable barge is 66' in length, 9.2' in diameter, 6.7' draft, 2,870 lbs, and has a capacity of 26,400 gallons.	Shorelines Upland Areas Shorelines of Rivers and Streams, Bays and Estuaries, Ponds and Lakes		Beach and Sand Bar Mudflats Rooted Floating Aquatics	Weather conditions could impact temporary storage integrity; best operating conditions are in protected and calm water, however operation may occur in open and fast water. In calm water, vessels can work in depths as shallow as 3 ft, seas 1 ft and winds up to 15 kts. On water storage systems are not recommended in fast water over .8 kts due to potential for secondary spills and the difficulty of anchoring. Additionally, on water storage is difficult in broken ice conditions due to potential damage and loss to ice encounters (USCG, 2011).	What is the duration of storage (days, weeks, months)? What storage options are available/how will the oil or hazardous material be handled or transferred (tanks, barges, etc)? What is the storage capacity? What material is being stored? Is the waste being stored a listed hazardous waste or exhibit characteristics of a hazardous waste? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? Is there a potential for a secondary release? What regulations apply? Will security be provided to prevent unauthorized dumping? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)?	Use of Vessels Use of Machinery Booming Staging Decanting	Containment of oily wastes.	Secondary spillage from container failure or overfill (on water); Crushing substrate and turbidity from anchoring or spudding down of the temporary storage vessel/barge; Direct exposure (if open top, or uncovered), Exposure to off gassing (VOC's like BTEX, and other associated oil vapors).	Species affected include small land mammals, birds, insects, reptiles, and amphibians.

Appendix C-7. Region 5 Response Action Matrix - Secondary Response Activities/Waste Management Activities Version: August 5, 2022 (EnviroScience)

Spill response activity Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.	**Definition** Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.	**Typical locations in the Region 5 action area where the response activity is implemented**	**Secondary Locations Factored into Species Response Matrix and Effects Analysis**	**Associated Vulverable Habitats within Region 5**	**Environmental conditions that limit where or when to use the response activity** Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.	**Discussion questions/ Considerations** Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).	**Potential inter-related and inter-dependent response activities** Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.	**Aspects of spill response activity that are in scope of consultation** Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&E species.	**Potential impacts considered on ESA-listed species or their habitat** Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&E species. Includes physical, chemical, and/or biological exposure routes.	**Associated Animal Groups Affected** Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.
Temporary Storage (on land)	There are numerous options for storage of wastes and debris associated with oil spills. The selection of appropriate storage equipment and methods is based on the type and volume of material to be stored (Exxon Mobil, 2014). Descriptions of storage options (such as 55-gallon drums, containers, barges, and trucks) and estimated timeframes for their use can be found in Exxon Mobil, 2014, p. 14-6. Examples of more commonly used temporary storage devices (in larger spills, used on land) is a 30 cubic yard dumpster with open top or sealed top (22 ft long, 8 ft wide, 6 ft high), and a frac tank which can be used to store waste liquids (holds 21,000 gallons), which is made of steel, has a 516" by 96" by 141" footprint, and weighs 26,000 lbs - empty.	Shorelines Ports/Canals Coastal Nearshore Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather conditions could impact temporary storage integrity due to risk of flooding, storm water runoff. Terrain and accessibility may also impact temporary storage options.	What is the duration of storage (days, weeks, months)? What storage options are available/how will the oil or hazardous material be stored (dumpsters, tanks, barges, etc)? What is the storage capacity? What material is being stored? How will recovered oil be handled and stored? Is the waste being stored a listed hazardous waste or exhibit characteristics of a hazardous waste? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? What regulations apply? How will waste be transported to storage? Will security be provided to prevent unauthorized dumping? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)? Is there a potential for a secondary release? *Note: The Oil Spill Response Field Manual (Exxon Mobil, 2014), lists 25 types of storage and the estimated timeframe (days, weeks, months) for use to consider.	Use of Vessels Use of Vehicles Use of Machinery Deterrence and Hazing Booming Staging Dikes and berms Decanting	Establishment of temporary storage; Containment of oily wastes.	Secondary spillage from container failure or overfill (on water). Compaction/crushing from set up of storage containers (or applicable storage method). Direct exposure (if open top, or uncovered), Exposure to off gassing (VOC's like BTEX, and other associated oil vapors).	Species affected include birds, aquatic plants (submerged/rooted), insects, and benthic organisms.
Decanting	The process of removing or discharging recovered water from temporary storage devices (i.e., portable tanks, internal tanks, collection wells, or other storage containers) in order to maximize the use of available storage capacity for recovered oil. This is typically done during large spills in open water when large volumes of water are recovered along with the oil during the mechanical recovery process. (Mechanical recovery is often restricted by factors such as the skimming system's oil/water recovery rate and the amount of tank space available on the recovery unit. Additionally, the longer the oil remains in the water, the more it has the opportunity to emulsify (form a highly mixed oil/water liquid or mousse), necessitating more storage space.) There are often additional decision-making entities involved with the decision to decant such as the State On Scene Coordinator or the Unified Command to ensure that the discharged water will not cause additional harm. In addition to offshore areas, decanting may be necessary wherever available temporary storage capacity is insufficient to hold the total volume of recovered oil/water mixtures. (Alaska Department of Environmental Conservation, 2012).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries		Beach and Sand Bar Mudflats Open Water Submersed Vegetation Rooted Floating Aquatics	Not typically conducted on land. Sensitive habitats also impact use of decanting. (*Use of decanting may vary depending on region, additional conditions may be found in Area Contingency Plans.)	Is there a pre-approved area for decanting? Is a permit required? Has the State been contacted regarding decanting in State waters? Is there sufficient storage to prevent decanting? How will decanting aid the efficiency of the response? What type of product (i.e., Group 3 or 4 oils)? Is there booming set up in the area where decanting is occurring? How much decanting will occur (i.e., how many gallons - how long will it need to be done)?	Booming Skimming Use of Vessels Vacuuming	Re-introducing recovered contact water into the environment.	Direct exposure, ingestion of potentially oil contaminated water.	Species affected include fish, reptiles, amphibians, and birds.
Decontamination	Removal of oil from personnel, vessels, and equipment as necessary during oil spill responses. Personnel decontamination is required throughout the response; decontamination units can be fabricated on site or via commercial modular units (Exxon Mobile, 2014). Vessels may accumulate oil on their hulls and at the waterline and should not be brought into uncontaminated areas without being cleaned; therefore, hulls may be manually washed from a low-freeboard pontoon float inside a protected area (Exxon Mobil, 2014). Equipment decontamination will be necessary before equipment is moved to uncontaminated areas (i.e., boom, skimmers, etc.). if the cleaning station location does not have direct access to shore facilities, a barge may need to be procured to provide supplies, communications, shelter, and sanitary facilities (Exxon Mobil, 2014).	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Wind, weather, accessibility to oil recovery site.	Where will the decontamination procedures occur? Is there established infrastructure for environmental decontamination? What will be decontaminated? Will support equipment need to be brought in? Are there options for avoiding critical habitat? Is there potential for water contamination and terrestrial contamination? What will be used to decontaminate the people/equipment?	Use of Vehicles Use of Vessels Use of Machinery New access points Access of personnel by foot traffic Staging Waste handling Temporary storage	Setup and use of decon area. Breach of containment/runof.	Habitat and wildlife disturbance; compaction of substrate. Oil remobilizing into previously uncontaminated water/land, compromise of water quality; chemical cleaning agents.	Species affected include small land mammals, birds, insects, amphibians, plants, and reptiles.

Appendix C-8. Region 5 Response Action Matrix - References-Version: 11 May 2017; 18 June 2021 (EnviroScience)

40 CFR 300.915 (g)
Alaska Clean Seas, 2010. Technical Manual. Vol. 1 and 2. Alaska Clean Seas, Prudhoe Bay, AK.
Alaska Department of Environmental Conservation, Division of Spill Prevention and Response, Prevention and Emergency Response Program, May 2012. Decanting. Web: https://dec.alaska.gov/spar/ppr/permits/information/UC%20ADEC%20Decanting%20Guidance.pdf
American Petroleum Institute (API), 2016. Sunken Oil Detection and Recovery; API Technical Report 1154-1. First Edition, February 2016. Web: http://www.oilspillprevention.org/~/media/Oil-Spill-Prevention/spillprevention/r-and-d/inland/sunken-oil-technical-report-pp2.pdf
ASTM, 2012. ASTM F726-12, Standard Test Method for Sorbent Performance of Adsorbents, ASTM International, West Conshohocken, PA. Web: www.astm.org
EPA. 1999 (May). Monitored Natural Attenuation of Petroleum Hydrocarbons. U.S. EPA Remedial Technology Fact Sheet. Office of Research and Development, National Risk Management Research Laboratory (EPA/600/F-98/021).
Exxon Mobil, 2014. Oil Spill Response Field Manual (revised). Exxon Mobil Research and Engineering Company. Web: http://cdn.exxonmobil.com/~/media/global/files/energy-and-environment/oil-spill-response-field-manual_2014_e.pdf
Fingas, M., 2011. Buoys and Devices for Oil Spill Tracking. International Oil Spill Conference Proceedings: March 2011, Vol. 2011, No. 1, pp. abs9.
Merriam-Webster, 2017. Definition of culvert. Web: https://www.merriam-webster.com/dictionary/culvert
Commmittee on the Effects of the Deepwater Horizon Mississippi Canyon-252 Oil Spill on Ecosystem Services in the Gulf of Mexico; Ocean Studies Board; Division on Earth and Life Studies; National Research Council, Dec 2013. *An Ecosystem Services Approach to Assessing the Impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico.* National Academies Press (US); . pp. 71. DOI: 10.17226/18387
NOAA, 2010. Characteristics of Response Strategies: A Guide for Spill Response Planning in Marine Environments was originally a joint effort between NOAA and the USCG. The original document was based on information contained in Environmental Considerations for Marine Oil Spill Response, published by the American Petroleum Institute, National Oceanic and Atmospheric Administration, the U.S. Coast Guard, and the U.S. Environmental Protection Agency. The original printing was in 2001, NOAA revised the document in 2010.
NOAA, 2016. RRT VI Guidelines for Inshore/Nearshore in Situ Burn. Web: http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/in-situ-burning.html
NOAA Office of Response and Restoration, (NOAA SCAT) 2016. Shoreline Cleanup and Assessment Technique (SCAT). http://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills/resources/shoreline-cleanup-and-assessment-technique-scat.html
NOAA Office of Response and Restoration, 2016. Special Monitoring of Applied Response Technologies (SMART). Accessed via website at: http://response.restoration.noaa.gov/smart.
Nuka Research, 2006. *Spill Tactics for Alaska Responders (STAR)* . Prepared for Alaska Department of Environmental Conservation. Nuka Research & Planning Group, LLC, Seldovia, AK. Web: http://dec.alaska.gov/spar/PPR/star/docs.htm
Regional Response Team 10 (RRT10) Northwest Area Contingency Plan, 2016. Section 9412: Non-floating Oil Spill Response Too. Web: https://www.rrt10nwac.com
USCG, 2006. Oil Spill Response Technician (OSRT) Course: Student Booklet.
USCG, 2016. Guidelines for the U.S. Coast Guard Oil Spill Removal Organization Classification Program. https://homeport.uscg.mil/
USCG, Sep 2011. Pollution Incident Response Course: Student Guides. Marine Safety School, Training Center Yorktown: Yorktown, VA.
WindWard LLC, 2014. Biological Assessment of the Alaska Unified Plan.

Appendix D

1. Incident Name	2. Operational Period (Date / Time) From: To:	**RESOURCES AT RISK SUMMARY** **ICS 232-OS**

3. Environmentally-Sensitive Areas and Wildlife Issues

Site #	Priority	Site Name and/or Physical Location	Site Issues

Narrative

4. Archaeo-cultural and Socio-economic Issues

Site #	Priority	Site Name and/or Physical Location	Site Issues

Narrative

5. Prepared by: (Environmental Unit Leader) **Date / Time**

RESOURCES AT RISK SUMMARY (ICS FORM 232-OS)

Purpose. The Resources at Risk Summary provides information about sites in the incident area which are sensitive due to environmental, archaeo-cultural, or socio-economic resources at risk, and identifies incident-specific priorities and issues. The information recorded here may be transferred to ICS form 232a-OS, which acts as a key to the Area Contingency Plan (ACP) or Geographic Response Plan (GRP) site numbers shown on the Situation Map.

Preparation. The Environmental Unit Leader, with input from resource trustees, will complete this form for each operational period. It should be updated prior to the Planning Meeting.

Distribution. This form must be forwarded to the Planning Section Chief for possible inclusion in the IAP. All completed original forms MUST be given to the Documentation Unit.

Item #	Item Title	Instructions
1.	Incident Name	Enter the name assigned to the incident.
2.	Operational Period	Enter the time interval for which the form applies. Record the start and end date and time.
3.	Environmentally-Sensitive Area and Wildlife Issues Site Number	Enter site number, priority as it is related to degree of sensitivity, site location, and description. Use the Narrative section to clarify any issues.
	Priority Site Name and/or Physical Location Site Issues	Can come from an Area Contingency Plan (ACP) or Geographic Response Plan (GRP) or can be created during an incident. Priority specific to this incident.
4.	Archaeo-cultural and Socio-economic Issues	Name of the site (e.g., Marsh Pt., Glacier Creek, etc.) and/or physical location (e.g., address, lat/long, landmarks, etc.). Environmental concerns associated with this site and season. Enter name and position of person preparing form, and the date and time prepared. Normally would be the Environmental Unit Leader.
	Site Number	Can come from an ACP/GRP or can be created during an incident.
	Priority	Priority specific to this incident.
	Site Name and/or Physical Location	Name of the site (e.g., Marsh Pt., Glacier Creek, etc.) and/or physical location (e.g., address, lat/long, landmarks, etc.).
	Site Issues	Archaeo-cultural or socio-economic concerns associated with this site and season.
5.	Prepared By	Enter name and title of the person preparing the form (normally the Environmental Unit Leader).
	Date/Time	Enter date (month, day, year) and time prepared (24-hour clock).

Appendix E

Plants

PLANTS

American Hart's Tongue Fern (*Asplenium scolopendrium* L. var. *americanum*)

Federal Listing: Threatened
State Listing within the AA: Threatened in Michigan

Species Description
The American Hart's Tongue Fern has long, flat, entire (not serrated) fronds that are 20 to 40cm long. The frond apex is abruptly pointed to sometimes rounded, and the tip is never rooting. Sporangia are arranged in distinct elongated clusters (sori) with an elongated indusium. Plants are perennial with rhizomes with evergreen fronds (Michigan Flora Online, 2011).

Species Distribution
The distribution of American Hart's Tongue Fern is very limited and discrete. It is found in two counties within the eastern Upper Peninsula of Michigan, Chippewa and Mackinac Counties (about 12 occurrences); a few isolated, tiny colonies in Alabama (on another karst feature: cave entrances), and in central New York, which harbors 90 percent of the United States population. In contrast, this fern is locally abundant on the Bruce Peninsula of Ontario, Canada, again on in the Niagara escarpment. Other varieties of this fern are distributed in Japan and Europe (USFS, 2021).

American Hart's Tongue was first described by Linneaus in 1753 and is common in the British Isles and rare to frequent throughout Europe (USFWS, 1993). American Hart's Tongue Fern is an epiphytic fern, growing in small cracks in larger dolomitic limestone (limestone high in magnesium) boulders no more than a foot above the moist soil (USFS, 2021) within moist deciduous forest understories (Michigan Flora Online, 2011).Habitat in Michigan and New York is within the Niagara escarpment on shaded, moist boulders and ledges. This epipetric fern requires Silurian limestone, a substrate of high magnesium content. The Niagara escarpment was formed approximately 450 million years ago by corals inhabiting a vast and tropical inland sea and slowly was transformed into a dolomitic limestone (USFS, 2021).

American Hart's Tongue Fern is federally threatened in the United States (listed in 1989; USFWS, 2021), state endangered in Alabama, Michigan, and Tennessee, threatened in New York, and Sensitive or Special Concern in Ontario.

Distribution within Action Area

- Only occurs within Chippewa and Mackinac Counties in Michigan; 12 records have been described within these counties.
- The Hiawatha National Forest of the Eastern Region of the Forest Service is home to nine of the Michigan occurrences and is the only National Forest to harbor this species (USFS, 2021).

Critical Habitat
No critical habitat has been designated for the American Hart's Tongue Fern; however, this species is restricted to dolomitic limestone habitat (USFWS, 2021).

Life History
American Hart's Tongue Fern reproduces only via spores. Spores require cool, moist calcareous environments with an abundance of bryophytes (mosses, liverworts, hornworts) for seedling establishment. Seedlings have underdeveloped rhizomes and utilize the moisture associated with bryophyte beds to obtain resources. As seedlings mature and rhizomes get larger, they outcompete and replace bryophytes. Winter snow cover is necessary for long-term survival of a population by maintaining soil moisture and decreasing adverse effects from frost (USFWS, 1993).

Evergreen fronds remain green and functional throughout the winter. New fronds are produced at the start of each growing season and remain functional for two growing seasons. These fronds typically emerge in mid-June in Michigan. Spores are produced on 10-year-old fronds from May through August, and require moist habitat for fertilization, and protection from desiccation (USFWS, 1993).

Current Stressors and Threats

- Habitat loss
  Historical habitat loss has primarily occurred due to quarrying activities and tree removal. According to the Recovery Plan, quarrying activities have destroyed three of New York's populations and remans a threat to an additional site in New York and two southern sites. Logging activities that are concurrent with quarrying can exacerbate habitat destruction. Tree canopies provide increased humidity near the soil surface, a requirement of the American Hart's Tongue Fern. Removal of trees opens the canopy increasing light and decreasing humidity (USFWS, 1993).
- Development
- Potential trampling
- Climate change

Effects of climate change, especially in southern populations, limit this species to extremely rare sites (USFWS, 1993).

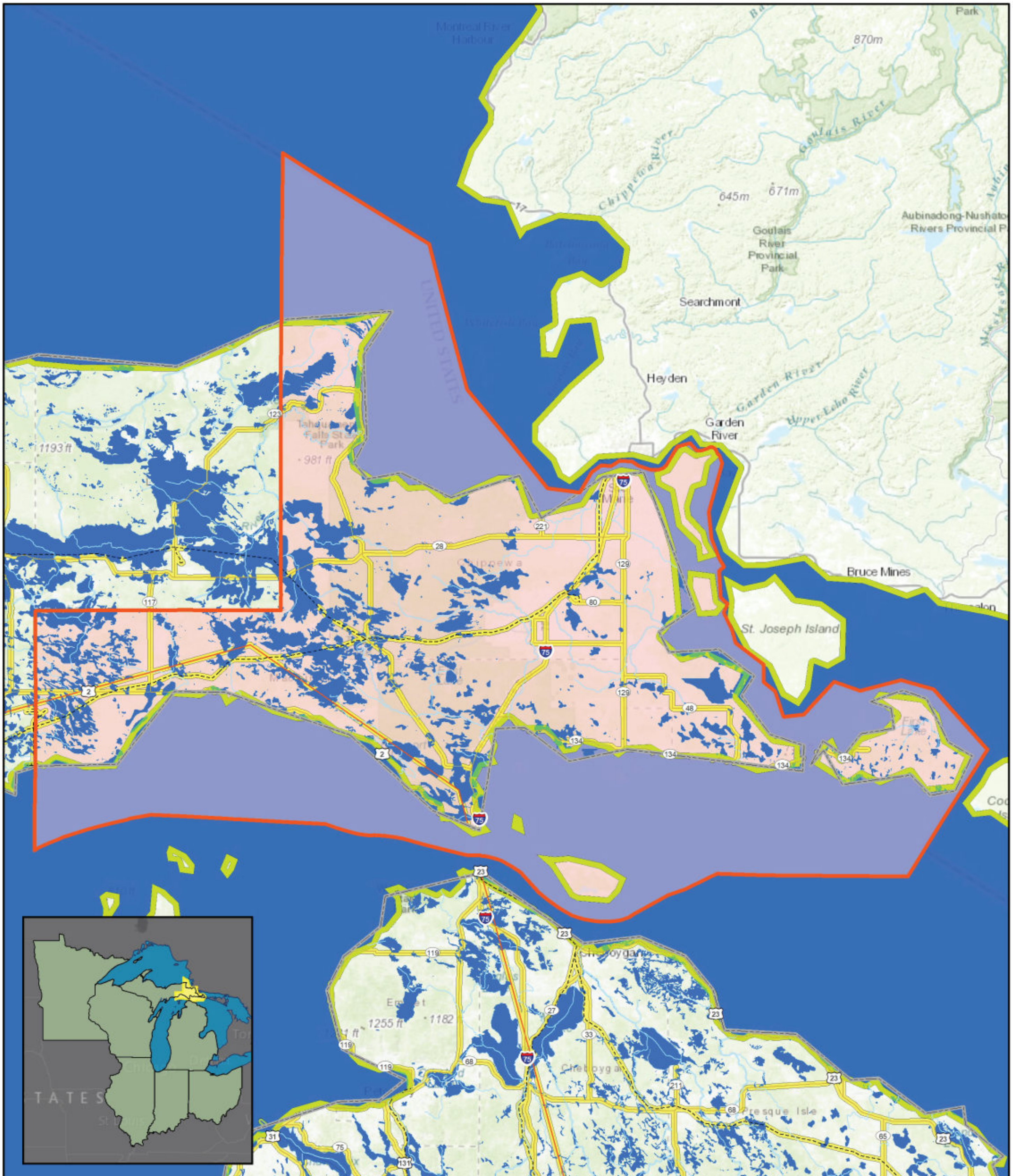
List of References

Michigan Flora Online. (2011). *Asplenium scolopendrium.* Retrieved from https://michiganflora.net/species.aspx?id=203

U.S. Fish & Wildlife Service (USFWS). (1993). American Hart's-Tongue recovery plan. Atlanta, Georgia. 33pp.

U.S. Fish & Wildlife Service (USFWS). (2021). American Hart's-Tongue Fern (*Asplenium scolopendrium* var. *americanum*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/4232

U.S. Forest Service (USFS). (2021). Plant of the week: American Hart's Tongue Fern (*Asplenium scolopendrium* L. var. *americanum*). Retrieved from https://www.fs.fed.us/wildflowers/plant-of-the-week/asplenium_scolopendrium_americanum.shtml



0 4 8 16 24
Miles
0 4 8 16 24 32
Kilometers

AMERICAN HART'S-TONGUE FERN (*ASPLENIUM SCOLOPENDRIUM VAR. AMERICANUM*) ACTION AREA OVERVIEW MAP

SCALE 1:1,500,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
American Hart's-Tongue Fern (*Asplenium scolopendrium var. americanum*) Counties of Occurrence

N

Basemap courtesy of Esri.
Date: 5/25/2021
Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS
Projection: WGS 1984 Web Mercator

Decurrent False Aster (*Boltonia decurrens*)

Federal Listing: Threatened
State Listing within AA: Threatened in Illinois

Species Description

The Decurrent False Aster is a perennial, herbaceous plant found in moist alluvial floodplains and prairie wetlands along the Illinois and Mississippi Rivers. It relies on periodic flooding to scour away other plants that compete for the same habitat (USFWS, 1990).

This herbaceous perennial plant becomes 3 to 7ft tall, forming either a solitary or a cluster of central stems that branch occasionally to abundantly. The central stems are light green, vertically veined, glabrous, and sometimes glaucous; they are terete (circular in circumference), except for the decurrent bases of the leaves. This latter characteristic causes them to appear heavily winged. Spreading to drooping alternate leaves occur along the entire length of these stems at regular intervals, becoming gradually smaller in size as they ascend. The leaves of the central stems are up to 7in long and 1.5in across; they are oblong-lanceolate in shape, while their margins are entire (toothless) and often slightly wavy (vertically) or undulate (horizontally). These leaves taper gradually, forming narrow acute tips, while their bases strongly clasp the central stems. The basal margins of these leaves extend downward 1 to 3in along their stems, forming pairs of wings up to 0.75in across. The upper leaf surface is medium to dark green and glabrous, while the lower leaf surface is a slightly lighter shade of green, glabrous, and sometimes glaucous. Leaf venation is pinnate; the central veins of these leaves are prominent, particularly toward their bases. Slender ascending lateral stems develop from the axils of the leaves, particularly along the middle to upper leaves of the central stems. The alternate leaves of these lateral stems are up to 3in long and 0.5in across; they are elliptic or linear-lanceolate in shape, entire along their margins, and either sessile or decurrent at their bases. When their bases are decurrent, the basal margins of these secondary leaves extend downward up to 1in along their stems, forming pairs of wings up to 0.25in across (Illinois Wildflowers, 2021).

The central stems terminate in large panicles of flowerheads (up to 2ft long and 2ft across) that are more or less dome-shaped. On robust plants, many lateral stems will also terminate in smaller panicles of flowerheads. The branches of these inflorescences are similar to the stems, except they are less winged from the decurrent bases of their leafy bracts. These bracts are up 3in long and 0.5in across and they are similar in appearance to the leaves of lateral stems, although they can become smaller in size. Each daisy-like flowerhead is 0.75 to 1in across, consisting of 40 to 60 ray florets that surround a dense head of 180+ disk florets. The ray florets are pistillate (female), while the disk florets are perfect (male and female). The petaloid rays of these flowerheads are linear-oblong in shape and white (rarely lavender or light purple). The corollas of the disk florets are about 2mm long, yellow, tubular in shape, and 5-lobed along their upper rims. Around the base of each flowerhead, light green phyllaries (floral scales) are arranged in about 3 overlapping series. These phyllaries are linear-oblanceolate in shape, membranous along their margins, and appressed together. When the flowerhead blooms, these phyllaries form an involucre that is shaped like a shallow plate or flat disk. The peduncles (basal stalks) of these flowerheads are up to 3in long (Illinois Wildflowers, 2021).

Species Distribution

The distribution of Decurrent False Aster includes the alluvial floodplain areas along the Illinois and Mississippi Rivers. In Illinois between 14 (USDA, 2021) and 20 counties (USFWS, 2021) support populations of Decurrent False Aster, and in Missouri between 4 counties (USDA, 2021) and 9 counties report populations along the Mississippi River (USFWS, 2021). However, counties supporting successful populations are likely to be much less. Additionally, known populations are likely not self-sustaining (USFWS, 2012).

Distribution within Action Area

- Counties within Illinois: Cass, Fulton, LaSalle, Logan, Marshall, Mason, Menard (not listed on ECOS), Morgan, Peoria, Pike, Schuyler, Scott, Tazewell, and Woodford (USDA, 2021)
- Additional counties include Brown, Bureau, Calhoun, Greene, Jersey, Madison, Putnam, and St. Clair (USFWS, 2021)

Critical Habitat

No critical habitat has been designated for the Decurrent False Aster.

Life History

Decurrent False Aster reproduces both vegetatively, by producing basal shoots, and sexually, by producing seeds. The typical blooming period begins late summer into autumn, lasting about 1 to 2 months. Mature achenes (seeds) are about 1.5 to 2.5mm in length. Achenes are obovoid, somewhat flattened, and slightly winged along their margins allowing them to be blown about by the wind or float on water. The root system is shallow and fibrous (Illinois Wildflowers, 2021).

Current Stressors and Threats

- Siltation
  Excessive silt deposition appears to be a major cause of the Decurrent False Aster's decline. Highly intensive agricultural practices create increased topsoil runoff, which smothers seeds and seedlings.
- Habitat destruction
  Habitat destruction is another threat and includes agriculture and building levees along the rivers. An increased need for agricultural land has eliminated wet prairies and marshes within the species' range. This includes draining natural lakes for conversion to row crops. Building levees along rivers and draining wetlands for cultivation has changed flood patterns, decreasing available habitat.
- Herbicides
  Herbicides also kill these plants and may be a factor in the decline of the species. Several communities of Decurrent False Asters have been found in areas of low-intensity agriculture. Biologists believe that the plant may actually benefit from occasional farming, which eliminates competitive plant species (USFWS, 2012).

List of References

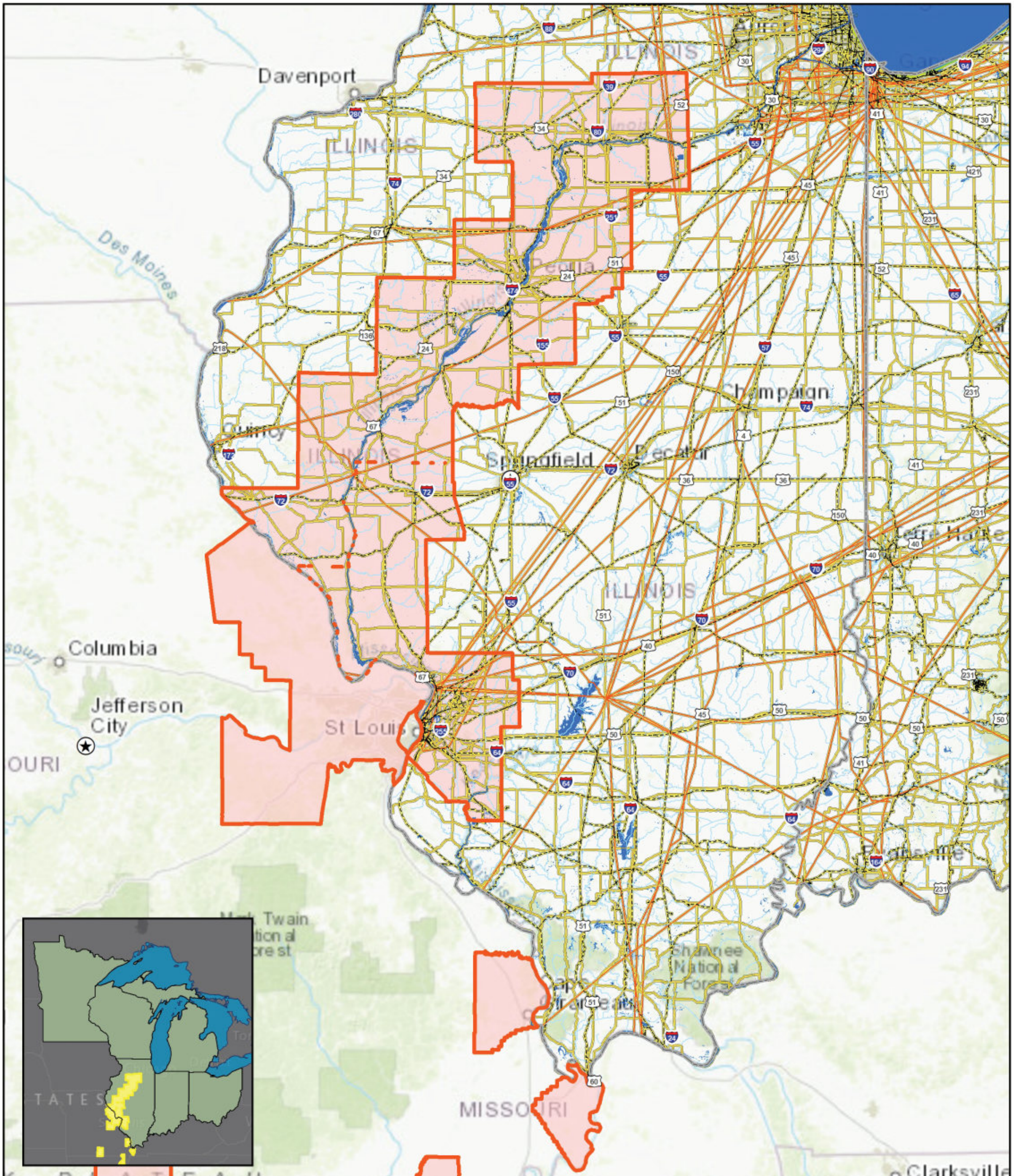
Illinois Wildflowers. (2021). Decurrent False Aster (*Boltonia decurrens*). Retrieved from https://www.illinoiswildflowers.info/wetland/plants/de_fsaster.html

U.S. Department of Agriculture (USDA). (2021). *Boltonia decurrens* plant profile. Retrieved from https://plants.usda.gov/core/profile?symbol=BODE2

U.S. Fish & Wildlife Service (USFWS). (1990). Decurrent False Aster recovery plan. Twin Cities, Minnesota. 26pp.

U.S. Fish & Wildlife Service (USFWS). (2012). Decurrent False Aster (*Boltonia decurrens*) 5-year review: summary and evaluation. Moline, Illinois. 15pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Decurrent False Aster (*Boltonia decurrens*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q26A



0 5 10 20 30
Miles
0 5 10 20 30 40
Kilometers

DECURRENT FALSE ASTER (*BOLTONIA DECURRENS*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Decurrent False Aster (*Boltonia decurrens*) Counties of Occurrence

N

Dwarf Lake Iris (*Iris lacustris*)

Federal Listing: Threatened
State Listing within AA: Threatened in Michigan and Wisconsin

Species Description
Plants are shorter in stature than most irises at less than 15cm (WIDNR, 2021) with leaves 1 - 2 cm wide (USFWS, 2019). Flowers 5 to 6cm wide (WIDNR, 2021) and are sky blue to deep blue to violet in color (USFS, 2021). Spreading sepals have white signal bordered by a deep purple color. Inflorescences typically contain one flower, although rarely two flowers can be observed. Leaves are stiff and upright arising from narrow creeping rhizomes that have an enlarged terminus with fibrous roots (USFS, 2021). These slender rhizomes distinguish Dwarf Lake Iris from small individual and juvenile plants of the widespread common blue flag (*Iris versicolor*; MNFI, 2004).

Species Distribution
The Dwarf Lake Iris occurs on the northern lakeshores of Lake Michigan and Lake Huron in Michigan and Lake Michigan in Wisconsin. This iris can be found in slightly acidic, shallow, moist, sandy, or rocky soils in sun-dappled, forested openings near the lakeshore where cool air flows off the lake creating this species-specific microclimate.

The dwarf lake iris is typically found near the shorelines of Lake Michigan and Lake Huron in Michigan and Lake Michigan in Wisconsin, but there are a few known inland populations found in Michigan's upper peninsula. The majority of dwarf lake iris populations occur in Michigan with approximately 80 known populations found in nine counties. The coastal range occurs from the Stonington Peninsula (Delta County) to Drummond Island (Chippewa County) and south to Wilderness State Park (Emmet County), Beaver Island (Charlevoix County), and Alpena (Alpena County) with the inland populations identified in Delta and Menominee counties (MNFI, 2004).

Distribution within Action Area
- Only occurs within the following Michigan Counties: Alpena, Charlevoix, Cheboygan, Chippewa, Delta, Emmet, Grand Traverse, Leelanau, Mackinac, Menominee, Presque Isle, and Schoolcraft (USFWS, 2021)
- Only occurs within Brown, Door, Kewaunee, and Oconto Counties in Wisconsin (USFWS, 2021)

Critical Habitat
No critical habitat has been designated for the Dwarf Lake Iris.

Life History
The blooming period occurs early May through early June. Fruiting occurs late June through late July. Seeds are dark brown in color (WIDNR, 2021)

Current Stressors and Threats
- Development
  Primary threats to this species habitat include the development of residential and vacation homes along the lakeshore.
- Habitat disturbance/destruction
  Chemical spraying, salting, and off-road vehicle use has caused disturbance and destruction of habitat (USFWS, 2019).
- Changes in hydrology
- Invasive species

List of References

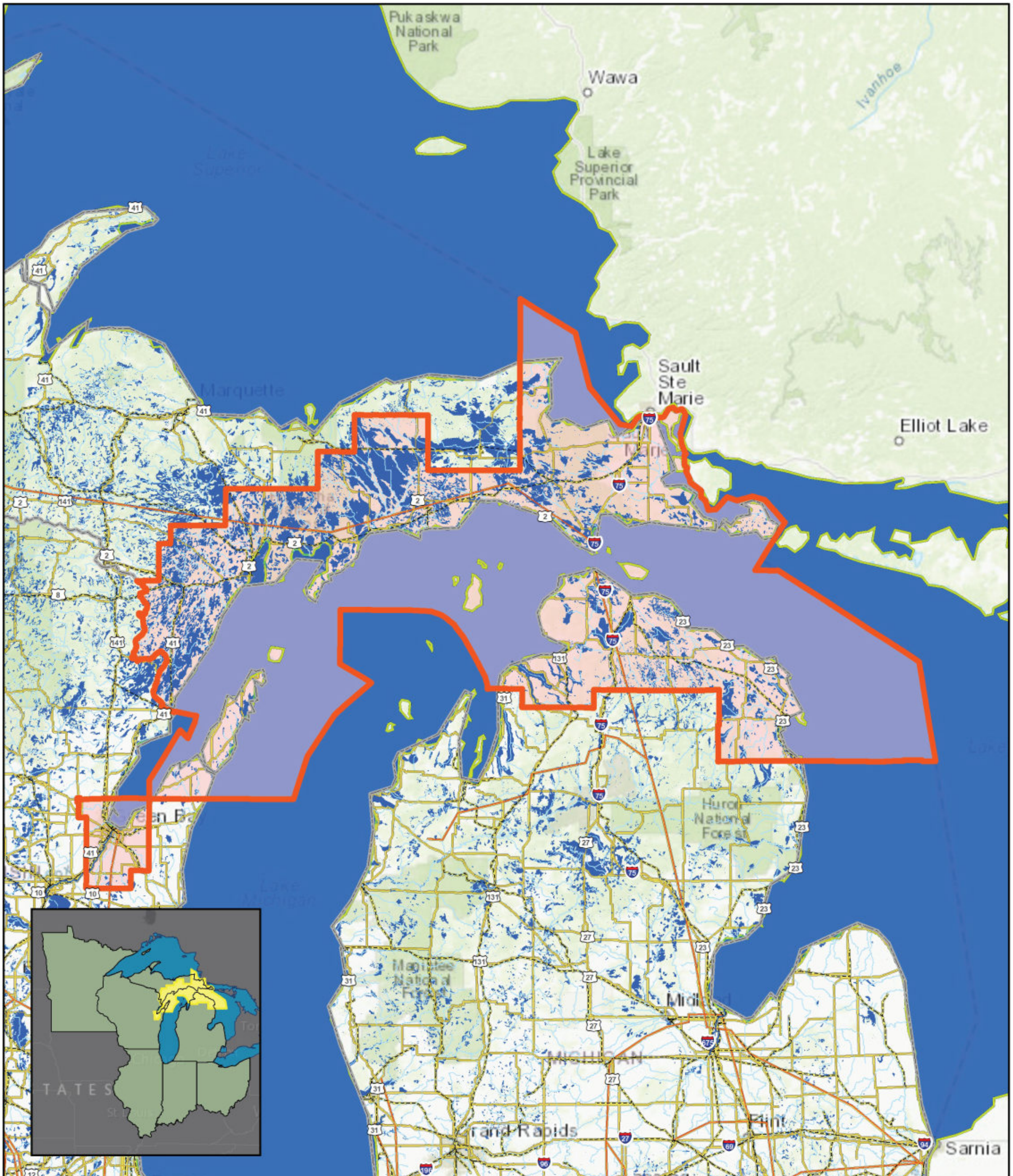
Michigan Natural Features Inventory (MNFI). (2004). *Iris lacustris,* Dwarf Lake Iris. Retrieved from https://mnfi.anr.msu.edu/abstracts/botany/Iris_lacustris.pdf

U.S. Forest Service (USFS). (2021). Our native irises: dwarf woodland irises. Retrieved from https://www.fs.fed.us/wildflowers/beauty/iris/Dwarf_Woodland/iris_lacustris.shtml

U.S. Fish & Wildlife Service (USFWS). (2019). Dwarf Lake Iris fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/plants/dwarflakeiris/dwarflak.html

U.S. Fish & Wildlife Service (USFWS). (2021). Dwarf Lake Iris (Iris lacustris) species profile. Retrieved from https://ecos.fws.gov/ecp/species/598

Wisconsin Department of Natural Resources (WIDNR). (2021). Dwarf Lake Iris *(Iris lacustris)*. Retrieved from https://dnr.wi.gov/topic/EndangeredResources/Plants.asp?mode=detail&SpecCode=PMIRI090H0



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

DWARF LAKE IRIS (*IRIS LACUSTRIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Dwarf Lake Iris (*Iris lacustris*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Eastern Prairie Fringed Orchid (*Platanthera leucophaea*)

Federal Listing: Threatened
State Listing within the AA: Threatened in Illinois, Indiana, Michigan, Ohio, and Wisconsin

Species Description
This plant is 8 to 40in tall and has an upright leafy stem with a flower cluster called an inflorescence. The 3-to-8-in lance-shaped leaves sheath the stem. Each plant has one single flower spike composed of 5 to 40 white flowers. Each flower has a three-part fringed lip less than 1in long and a nectar spur (tube-like structure) which is about 1 to 2in long. The Eastern Prairie Fringed Orchid occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, even bogs. A symbiotic relationship between the seed and soil fungi, called mycorrhizae, is necessary for seedlings to become established. This fungi helps the seeds assimilate nutrients in the soil (USFWS, 2021).

Species Distribution
Eastern Prairie Fringed Orchid can be found in a wide variety of habitats, from wet to mesic prairie or wetland communities, including, but not limited to, sedge meadows, fens, marshes, and marsh edges. It requires full sun for optimal growth with little to no woody encroachment or canopy coverage (USFWS, 2019).

The Eastern Prairie Fringed Orchid formerly occurred from eastern Iowa, Missouri, and Oklahoma eastward across southern Wisconsin, northern and central Illinois, southern Michigan, northern Indiana and Ohio, and northwestern Pennsylvania to western New York and adjacent southern Ontario. Disjunct populations also occurred in New Jersey, Virginia and Maine (USFWS, 1999).

Current populations are known to occur in Arkansas, Illinois, Indiana, Iowa, Maine, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Virginia, West Virginia, and Wisconsin.

Distribution within Action Area
- Illinois: 86 counties with historic or known populations
- Indiana: 57 counties with historic or known populations
- Michigan: 55 counties with historic or known populations
- Minnesota: 2 counties with historic or known populations
- Ohio: 57 counties with historic or known populations
- Wisconsin: 40 counties with historic or known populations

A complete list of counties can be found on ECOS (USFWS, 2021).

Critical Habitat
No critical habitat has been designated for the Eastern Prairie Fringed Orchid.

Life History
Flowering occurs from late June to early July, lasting from 7 to 10 days. Flower clusters emerge and are not much taller than surrounding grasses and sedges (USFWS, 1999).

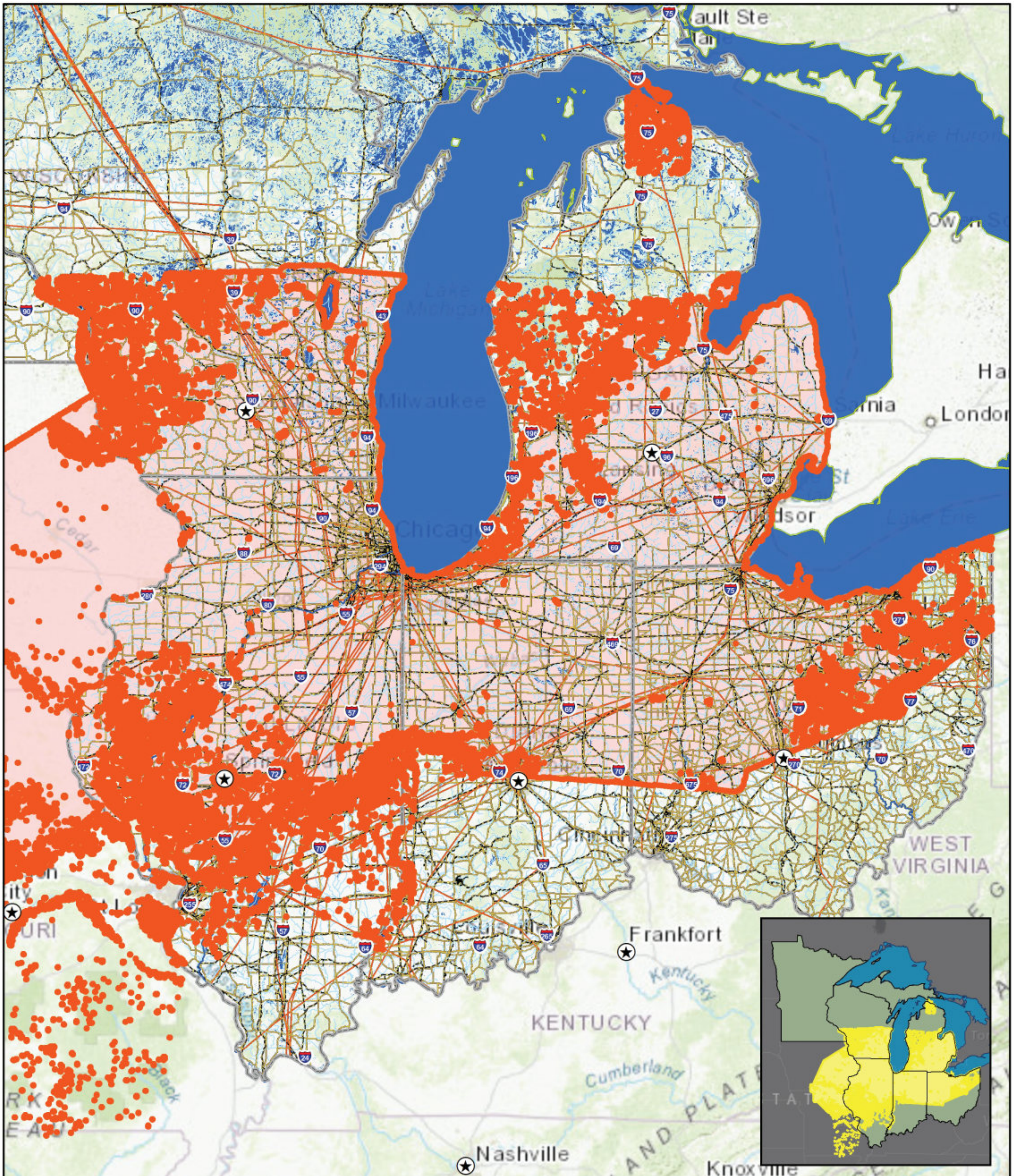
Current Stressors and Threats
- Habitat loss
  Early decline of this species is due to habitat loss through the conversion of natural habitats to cropland and pasture. Current declines are attributed to wetland drainage and development impacts to wetlands habitat. Additionally, habitat loss may also be due to habitat succession to woody habitats, competition from non-native species, and over-collection (USFWS, 1999).

List of References

U.S. Fish & Wildlife Service (USFWS). (1999). Eastern prairie fringed orchid (*Platanthera leucophaea* [Nuttall] Lindley) recovery plan. Fort Snelling, Minnesota. 57pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Eastern Prairie Fringed Orchid (*Platanthera leucophaea*). Retrieved from https://www.fws.gov/midwest/endangered/plants/epfo/index.html

U.S. Fish & Wildlife Service (USFWS). (2021). Eastern Prairie Fringed Orchid (*Platanthera leucophaea*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2GG



0 20 40 80 120 Miles 0 20 40 80 120 160 Kilometers	**EASTERN PRAIRIE FRINGED ORCHID (*PLATANTHERA LEUCOPHAEA*) ACTION AREA OVERVIEW MAP**

SCALE 1:7,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Eastern Prairie Fringed Orchid (*Platanthera leucophaea*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Fassett's Locoweed (*Oxytropis campestris var. chartacea*)

Federal Listing: Threatened
State Listing within the AA: Threatened in Wisconsin

Species Description
Fassett's Locoweed is a 4- to 12-in tall perennial herb of the pea family. It appears silvery-grey in color because of white, silky hairs that cover most of the plant. The flowers are pea-like, 0.5 to 0.75in long, and rose-pink to violet. An individual plant produces 1 to 20 stems, and each stem can have 10 to 20 flowers. The flowers product numerous pale yellow pods that contain small black seeds. On a mature plant the leaves, which grow from a common base, are 3 to 8in long and are made up of 18 to 30 leaflets, each about an inch or less in length (USFWS, 2003).

Species Distribution
Fassett's Locoweed grows on gentle, sand-gravel shoreline slopes around shallow lakes fed by groundwater seepage. These landlocked lakes are subject to frequent, large fluctuations of water levels (USFWS, 2003).

Fassett's Locoweed is found along the lakes and open shoreline and, to a lesser extent, on higher ground under the partial shade of adjacent vegetation. Nearly all lakes with historical populations of the species are less than 15ha (37 acres) in size and occur at approximately 350m in elevation. This suggests the distribution of Fassett's Locoweed may be related to the glacial history of Wisconsin (USFWS, 1991).

Distribution within Action Area

- Only occurs within Bayfield, Portage and Waushara Counties in Wisconsin (USFWS, 2003), and ECOS lists these three counties along with Douglas County (USFWS, 2021).
- The recovery plan lists the following named lakes:
  - Bayfield County: Pigeon Lake
  - Portage County: Pickerel Lake
  - Waushara County: Mud Lake, Plainfield Lake, Second (Fox) Lake, Sherman (Marks) Lake, Shumway Lake, Weymouth Lake, and Lake Huron
- Wisconsin Department of Natural Resources (DNR) owns two State Natural Areas that support Fassett's Locoweed (USFWS, 2003).
- Wisconsin DNR also has a landowner contact program with numerous private landowners to have voluntarily agreed to protect the plants on private shorelines (USFWS, 2003).

Critical Habitat
No critical habitat has been designated for Fassett's Locoweed.

Life History
Fassett's Locoweed plants live for several years, reappearing each spring from underground perennial tap roots. The species reproduces entirely by seed. Flowers bloom from mid-May through mid-June. Both small and large bees have been observed visiting flowers, but the pollinator is not definitely known (USFWS, 2003). While uppermost flowers are still in bloom, legumes have begun to develop in the lower part of the plant. Seed dispersal from mature seed pods begin by mid-July (USFWS, 1991). Fassett's Locoweed apparently depends on the open habitat provided during times of low lake levels and a large seed bank of dormant seeds in the soil for long-term population maintenance (USFWS, 2003).

Current Stressors and Threats

- Habitat loss
  Historical and current habitat loss through development along the lakes have been a primary threat for Fassett's Locoweed. Low water levels within the lake may also contribute to population declines.

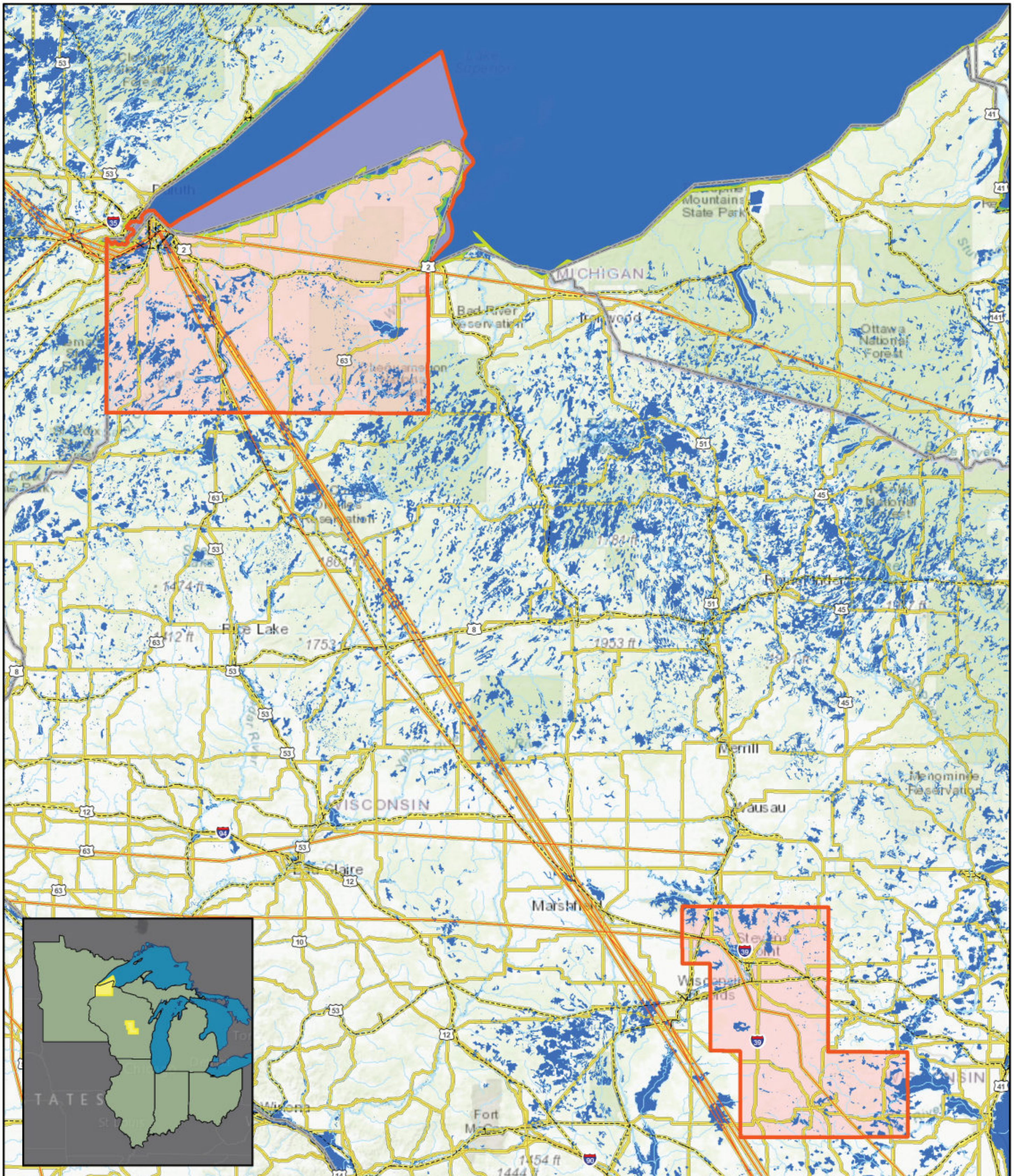
- Herbicide and pesticide use (USFWS, 1991)
- Cattle grazing and irrigation of surrounding agricultural lands which diminishes lake levels (USFWS, 2003).

List of References

U.S. Fish & Wildlife Service (USFWS). (1991). Fassett's Locoweed recovery plan. Twin Cities, Minnesota. 57pp.

U.S. Fish & Wildlife Service (USFWS). (2003). Fassett's Locoweed (Oxytropis campestris var. chartacea) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/plants/fassetts/fassetts.html

U.S. Fish & Wildlife Service (USFWS). (2021). Fassett's Locoweed (*Oxytropis campestris var. chartacea*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/209



0 5 10 20 30
Miles
0 5 10 20 30 40
Kilometers

FASSETT'S LOCOWEED (*OXYTROPIS CAMPESTRIS VAR. CHARTACEA*)
ACTION AREA OVERVIEW MAP

SCALE 1:2,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Fassett's Locoweed (*Oxytropis campestris var. chartacea*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Houghton's Goldenrod (*Solidago houghtonii*)

Federal Listing: Threatened
State Listing within the AA: Threatened in Michigan

Species Description
Houghton's Goldenrod is a perennial herbaceous member of the Asteraceae family. They are frequently tufted or clumped and can grow up to 75cm tall. Rhizomes are commonly produced from the caudex (thickened, branching, fibrous-rooted base). Stems are smooth and slender and sometimes reddish in color. Basal leaves are 20cm long and 20mm wide and slightly clasp at the base. Flat-topped inflorescence consists of relatively few (2 to 18), showy, large flower heads (USFWS, 1997).

Species Distribution
Houghton's Goldenrod is generally restricted to narrow bands of open, calcareous, lakeshore habitat requiring the natural dynamics of the Great Lakes system to maintain a suitable environment. Houghton's Goldenrod is primarily endemic to the Upper Great Lakes region, occurring on the northern shores of Lakes Michigan and Huron in Michigan and Ontario. Inland Houghton's goldenrod populations were known to occur in Crawford and Kalkaska Counties but following genetic analysis have now been identified as a new species, *Solidago vossii*. Additionally, a disjunct population occurs in Genesee County in the Bergen Swamp Nature Preserve in New York (USFWS, 1997). ECOS also lists Monroe County, New York (USFWS, 2021).

Distribution within Action Area

- 58 occurrences in nine counties in Michigan: Charlevoix (4), Cheboygan (6), Chippewa (7), Crawford (2), Emmett (5), Kalkaska (1), Mackinac (23), Presque Isle (6), Schoolcraft (4)
- ECOS also lists Alpena, Delta, and Leelanau Counties (USFWS, 2021)
- Disjunct populations occur in Crawford and Kalkaska Counties and are not located along the lakeshore (USFWS, 1997)

Critical Habitat
No critical habitat has been designated for Houghton's Goldenrod.

Life History
Flowering occurs from August to early September but can begin as early as late July. Houghton's Goldenrod is insect pollinated. Fruiting and seed dispersal begins in August and lasts through November. Seeds remain viable within the seed bank for no more than one year (USFWS, 1997).

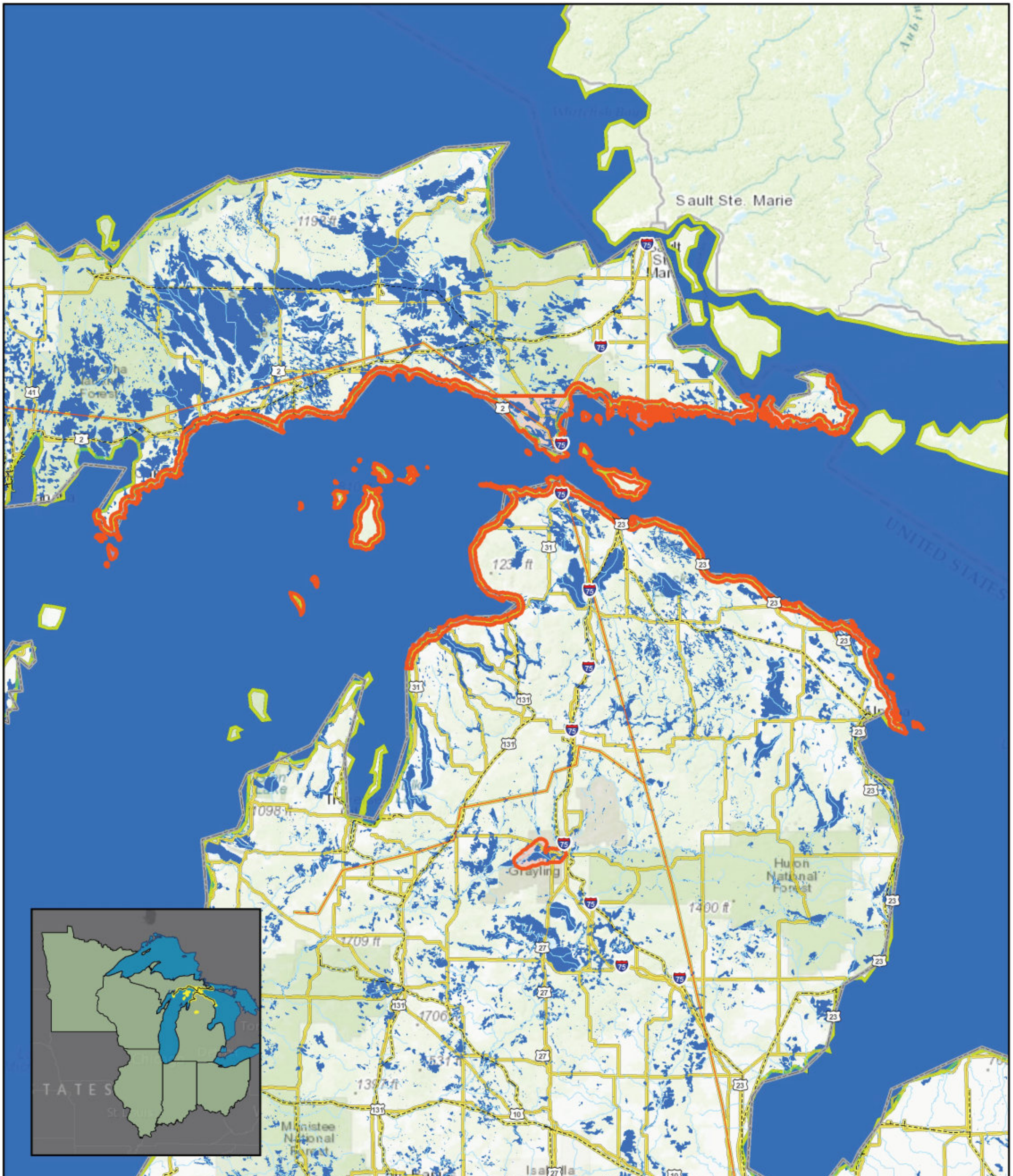
Current Stressors and Threats

- Residential development along narrow shoreline habitats of the Great Lakes
- Construction of beach retaining walls
  Construction of retaining walls may alter hydrology and prevent dune formation.
- Excessive foot and off-road vehicle traffic
- Marina construction
- Road construction
- Sand mining
- Changes in hydrology
- Invasive species

List of References

U.S. Fish & Wildlife Service (USFWS). (1997). Recovery plan for Houghton's Goldenrod (*Solidago houghtonii* A. Gray). Ft. Snelling, Minnesota. 58pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Houghton's Goldenrod (*Solidago houghtonii*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2J5



0 5 10 20 30
Miles
0 5 10 20 30 40
Kilometers

HOUGHTON'S GOLDENROD (*SOLIDAGO HOUGHTONII*)
ACTION AREA OVERVIEW MAP

SCALE 1:2,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Houghton's Goldenrod (*Solidago houghtonii*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Lakeside Daisy (*Hymenoxys herbacea*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois, Michigan, and Ohio

Also listed as *Tetraneuris herbacea* under the Integrated Taxonomic Information System (ITIS).

Species Description
Lakeside Daisy is an herbaceous spring-blooming perennial with a short, thick taproot and stout branching caudex. Basal rosette leaves are entire and range 0.6 to 16.7cm long and are 0.35 to 1.3cm wide. Stems are short and stout with whiteish hairs reaching a maximum height between 8.4 to 40cm and support a solitary inflorescence flower head. Both disc and ray florets are bright yellow and produce five-angled, hairy achenes.

Species Distribution
Lakeside Daisy historically occurred in dry prairies, on outcrops of dolomite or limestone bedrock, or on sand and gravel terraces of major river valleys. Nearly all original habitat has been destroyed and only in Ohio has the variety recolonized abandoned quarry habitat where nearly 98% of the essential habitat is in private ownership (USFWS, 1990).

The recovery plan lists Illinois, Ohio and southern Ontario as the only states supporting populations of the Lakeside Daisy (USFWS, 1990). A naturally-occurring population of Lakeside Daisy is known from the Marblehead Peninsula in Ohio, where there is now a state park: Lakeside Daisy State Park (ODNR, 2021). Additional Ohio populations have been established on Kelleys Island and at Castalia Quarry Metropark (both in Erie County). Two populations are known in Michigan, with an additional reserve population established and an introduced population established at an abandoned quarry. Lakeside Daisy was historically recorded in Tazewell and Will Counties in Illinois and populations have been re-established at three sites in these counties. In addition, new populations have been introduced into Cook and DuPage Counties, Illinois (USFWS, 2021a).

Distribution within Action Area

- Cook, DuPage, Tazewell, and Will Counties in Illinois
- Mackinac County in Michigan – 2 occurrences (MNFI, 2021)
- Erie and Ottawa County in Ohio (USFWS, 2021a, b), specifically on Marblehead Peninsula in Ottawa County, Kelleys Island in Erie County, and Castalia Quarry Metropark in Erie County

Critical Habitat
No critical habitat has been designated for Lakeside Daisy.

Life History
Inflorescence buds typically form in the fall and overwinter at the base of the rosette. Flowering occurs from late April to early June. Pollinators include bumble bees, small carpenter bees, and halictid bees. Achenes develop quicky and are wind-dispersed three to four weeks following fertilization (late May to early July) (USFWS, 1990).

Current Stressors and Threats

- Habitat destruction
  The primary threat to the Lakeside Daisy is habitat destruction. Past quarrying activities have eliminated natural habitat; however abandoned quarries provide the only remaining suitable habitat (USFWS, 1990).
- Overgrowth by woody species through natural succession

- Trampling and soil compaction
- Over-collection and raiding of wild populations for gardens (ODNR, 2021).

List of References

Michigan National Features Inventory (MNFI). (2021). *Tetraneuris herbacea* (Lakeside Daisy). Retrieved from https://mnfi.anr.msu.edu/species/description/13678/Tetraneuris-herbacea

Ohio Department of Natural Resources (ODNR). (2021). Lakeside Daisy (*Tetraneuris herbacea*). Retrieved from https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/plants-trees/flowering-plants/lakeside-daisy

U.S. Fish & Wildlife Service (USFWS). (1990). Recovery plan for the Lakeside Daisy (*Hymenoxys acaulis var. glabra*). Twin Cities, Minnesota. 80pp + appendices.

U.S. Fish & Wildlife Service (USFWS). (2021a). Lakeside Daisy (*Tetraneuris herbacea*) 5-year review: summary and evaluation. Columbus, Ohio. 38pp.

U.S. Fish & Wildlife Service (USFWS). (2021b). Lakeside Daisy (*Hymenoxys herbacea*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2U6

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Leafy Prairie-Clover (*Dalea foliosa*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois

Species Description
Leafy Prairie-Clover is a member of the legume family (Fabaceae). One to several stems 20cm to 80cm long arise from a hardened root crown. Alternate leaves are compound, oddly pinnate and are primarily distinguished from other members of the genus on the basis of leaflet number, which ranges from 9 to 31 but typically is between 20 to 27 leaflets. Flowering heads are between 0.4 and 8.9cm long and 0.6 to 1.0cm wide on short peduncles, 0 to 2mm long. Florets are lavender-purple in color with a calyx that has five petals and five strongly exerted anthers with orange pollen (USFWS, 1996).

Species Distribution
The species occurs in thin-soiled (less than 45cm [18in] deep) mesic and wet-mesic dolomite prairie, limestone cedar glades, and limestone barrens. It can persist in successional plant communities following disturbance or woody succession but will decline in advanced stages of woody succession. The natural communities supporting Leafy Prairie-Clover must be maintained by periodic burning (USFWS, 1996). This plant is found in prairie remnants along the Des Plains River in Illinois, in thin soils over limestone substrate. In Alabama and Tennessee, it lives in prairie-like areas on the edges of cedar glades. It favors sites with a wet spring and fall and a dry summer (USFWS, 1997).

Historically, five sites from four counties (Kane, Kankakee, La Salle, and Will) were known in Illinois with unconfirmed records in Boone, Ogle, and Winnebago Counties. The species was thought to be extirpated from Illinois until a large population was discovered west of the Des Plaines River in 1974 in what is now the Lockport Prairie Nature Preserve. Tennessee likely had the most extensive and widespread pre-settlement *Dalea foliosa* populations. The recovery plan lists 33 occurrences in seven counties. There are historic collections from Davidson, Rutherford, and Sumner Counties in middle Tennessee and from Knox County in eastern Tennessee, but the latter record was discounted as a transplant that did not survive. Four county records (Franklin and Jefferson Counties) with two confirmed extant populations (Lawrence and Morgan Counties) were identified in Alabama listed in the recovery plan.

Distribution within Action Area

- 14 known populations in three counties: Cook (1), DuPage (4), and Will (9) (USFWS, 2015)
- Specific locations: Keepataw Forest Preserve, Romeoville Prairie, Midewin National Tall Grass Prairie, Lockport Prairie Nature Preserve, Dellwood Park West – all located in Will County
- Reintroduced at the Waterfall Glen Forest preserve in DuPage County
- Specific location not provided for Cook County

Critical Habitat
No critical habitat has been designated for Leafy Prairie-Clover.

Life History
Dalea foliosa is a short-lived herbaceous perennial that has no capacity for vegetative spread. In March, new ramets (stems) begin to grow from buds on the root crown just below the soil surface. By July, these ramets are 40 to 65cm tall. Nonflowering plants have from 1 to 4 ramets, and flowering plants have from 1 to 20 ramets. A single ramet will develop one or more inflorescence buds in late June. Flowering begins in late July, peaks in mid-August, and can continue until late August. The number of flowers per inflorescence varies from 40 to 495. Bumblebees, small bees, and syrphid flies have been observed visiting flowers. Leafy Prairie-Clover seeds ripen by early October and disperse from the erect dead ramets from late fall to early spring. Potential dispersal vectors include wind, gravity, birds, and small mammals. Dormant seeds are capable of forming a persistent seed bank (USFWS, 1996).

Current Stressors and Threats

- Residential and commercial development (particularly roadway construction)
- Power line maintenance
  The population located in Romeoville, Illinois is located within a maintained utility power transmission line and has the potential to be affected by powerline maintenance.
- Herbicide use
- Severe drought events
- Herbivory
- Succession to woody habitat (USFWS, 1996).

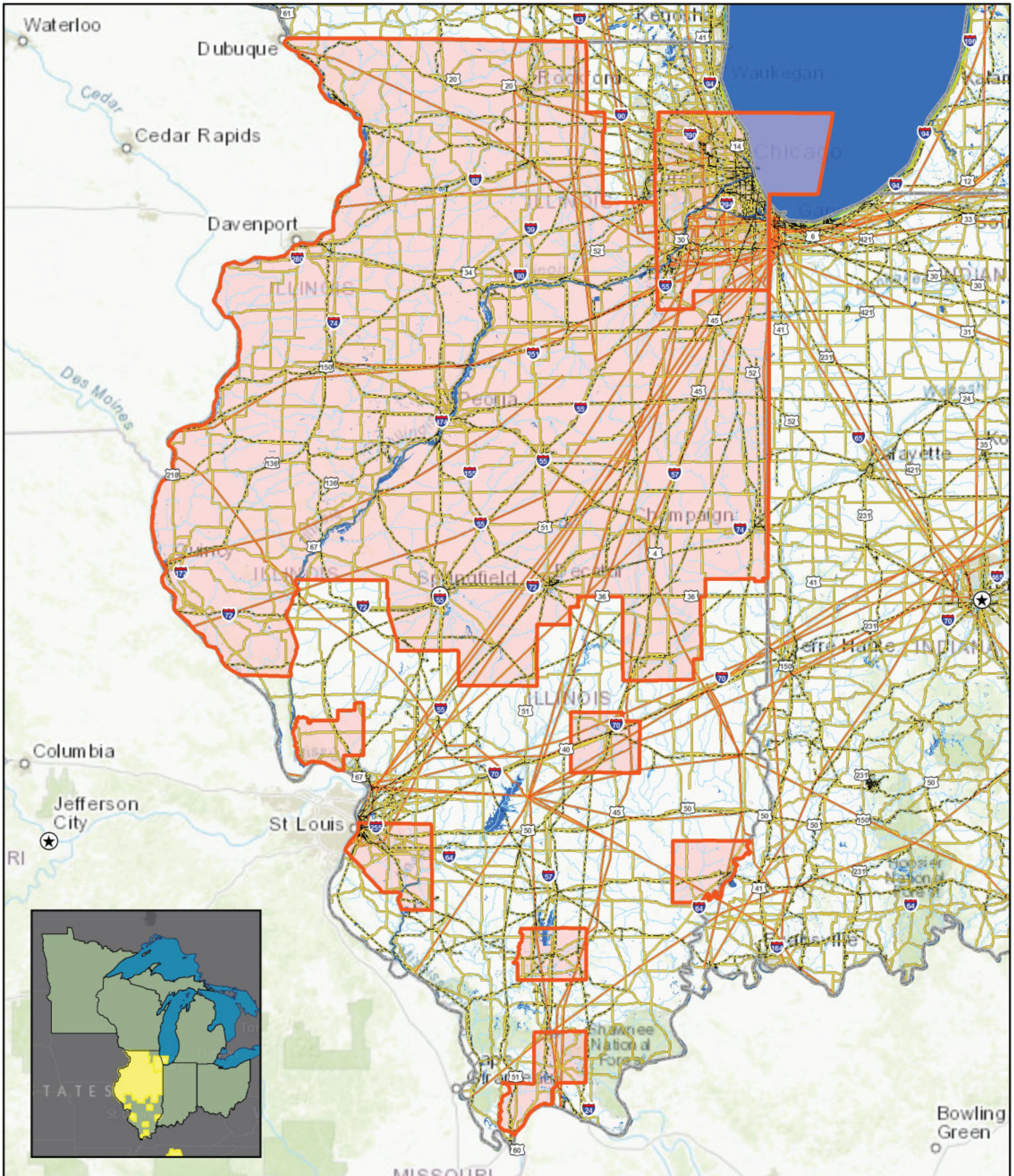
List of References

U.S. Fish & Wildlife Service (USFWS). (1996). Leafy Prairie-Clover Recovery Plan. Atlanta, Georgia. 74pp.

U.S. Fish & Wildlife Service (USFWS) (1997). Leafy Prairie-Clover (*Dalea foliosa*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/plants/leafypra.html

U.S. Fish & Wildlife Service (USFWS) (2015). Leafy Prairie-Clover (*Dalea foliosa*) 5-year review: summary and evaluation. Cookeville, Tennessee. 28pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Leafy Prairie-Clover (*Dalea foliosa*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/5498



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

LEAFY PRAIRIE-CLOVER (*DALEA FOLIOSA*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,800,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Leafy Prairie-clover (*Dalea foliosa*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Leedy's Roseroot (*Rhodiola integrifolia* ssp. *leedyi*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Minnesota

Species Description
Leedy's Roseroot is a perennial member of the stonecrop (orpine) family, which have waxy leaves that enable them tolerate periods of water stress. Leedy's Roseroot has a relatively elongate, leafy stem. The closely-packed leaves arise directly from the main stem and are smooth, with irregularly toothed to toothless edges. Although they are succulent, they can appear quite limp in dry weather. Male and female flowers are borne on separate plants. The small 4- to 5-petaled flowers are arranged in dense heads at the end of the leafy stem. They vary in color from dark red to occasional yellow or oranges (USFWS, 2021).

Species Distribution
The Minnesota populations of *R. integrifolia* ssp. *leedyi* are found on shallow ledges on north-facing dolomite cliffs up to 30m (98ft) in height. Plants are restricted to crevices in maderate cliffs, a very specialized habitat of specific strata where groundwater seeps through the rock and is cooled by air coming from underground air passages in karst topography. This results in a constantly wet, dripping condition, an unusual product of a long geologic history (MNDNR, 2021).

In New York, this species occurs on cliffs along the western shore of Seneca Lake. And, similarly to the Minnesota populations, the one known population in South Dakota grows from rock fissures with seepage on a north-facing cliff (MNDNR, 2021).

Historically four populations from two counties were identified in Minnesota and include: Bear Creek Cliff and Deer Creek Cliff in Fillmore County and Simpson Cliff and Whitewater Wildlife Management Area in Olmsted County. Three populations in two counties were identified in New York and include: Glenora Cliff and Gelnora Falls in Yates County and Watkins Glen in Schuyler County (USFWS, 1998).

Currently Leedy's Roseroot is a cliffside wildflower, found today in only seven locations in three states. Four populations are found in Fillmore and Olmsted Counties, Minnesota. Two are in upstate New York, a large population on the shores of Seneca Lake and a single plant at Watkins Glen. In South Dakota the subspecies occurs on Black Hills National Forest on a cliff at approximately 7,000 feet above sea level (Custer and Pennington Counties) (USFWS, 2021).

Distribution within Action Area

- No new populations identified or reintroduced in Minnesota
- Fillmore County: Cliff Creek and Deer Creek
- Olmsted County: Simpson Cliff and Whitewater Wildlife Management Area

Critical Habitat
No critical habitat has been designated for Leedy's Roseroot.

Life History
Flowering occurs in early June with bees and syrphus flies as primary pollinators. Seeds are winged and wind dispersed. Occasionally, seeds will germinate in their follicles and produce seedlings on the parent plant (USFWS, 1998).

Current Stressors and Threats
Leedy's Roseroot is a species whose rarity is caused more by its history, the special conditions of its unique cliffside habitat, and the infrequency of that habitat in the landscape than by direct habitat destruction (USFWS, 1993).

- Increased human activities
  Despite the fact that Leedy's Roseroot has probably been rare for thousands of years, increased human activities could degrade its habitat. Unlike species with a wider range of preferred living conditions, it has nowhere else to go if its cliffside habitat is destroyed. Although the steepness of the cliffs protects Leedy's Roseroot from most direct impacts, surface runoff from disturbed lands can dislodge plants or bury them during heavy rains and spring thaws. This impact is enhanced in areas where soil disturbance occurs at the top of the cliffs (USFWS, 1993). At one Minnesota site, erosion of a nearby trail has created a gully several feet deep. New York populations occur downhill from a number of lakeside homes. Tree cutting uphill of the plants, staircases and pipes to the lakeshore, and clearance of vegetation on the cliffs could have a negative impact on the plants (USFWS, 1993).
- Groundwater contamination and hydrologic changes
  In Minnesota ground water contamination or changes in ground water hydrology are the greatest threats to Leedy's Roseroot. Such changes could occur through misapplication of pesticides or synthetic fertilizers to nearby uplands or by use of sinkholes as dump sites. Groundwater flow regimes are poorly understood and it is unclear how close these activities would need to be to adversely affect the plants.

List of References

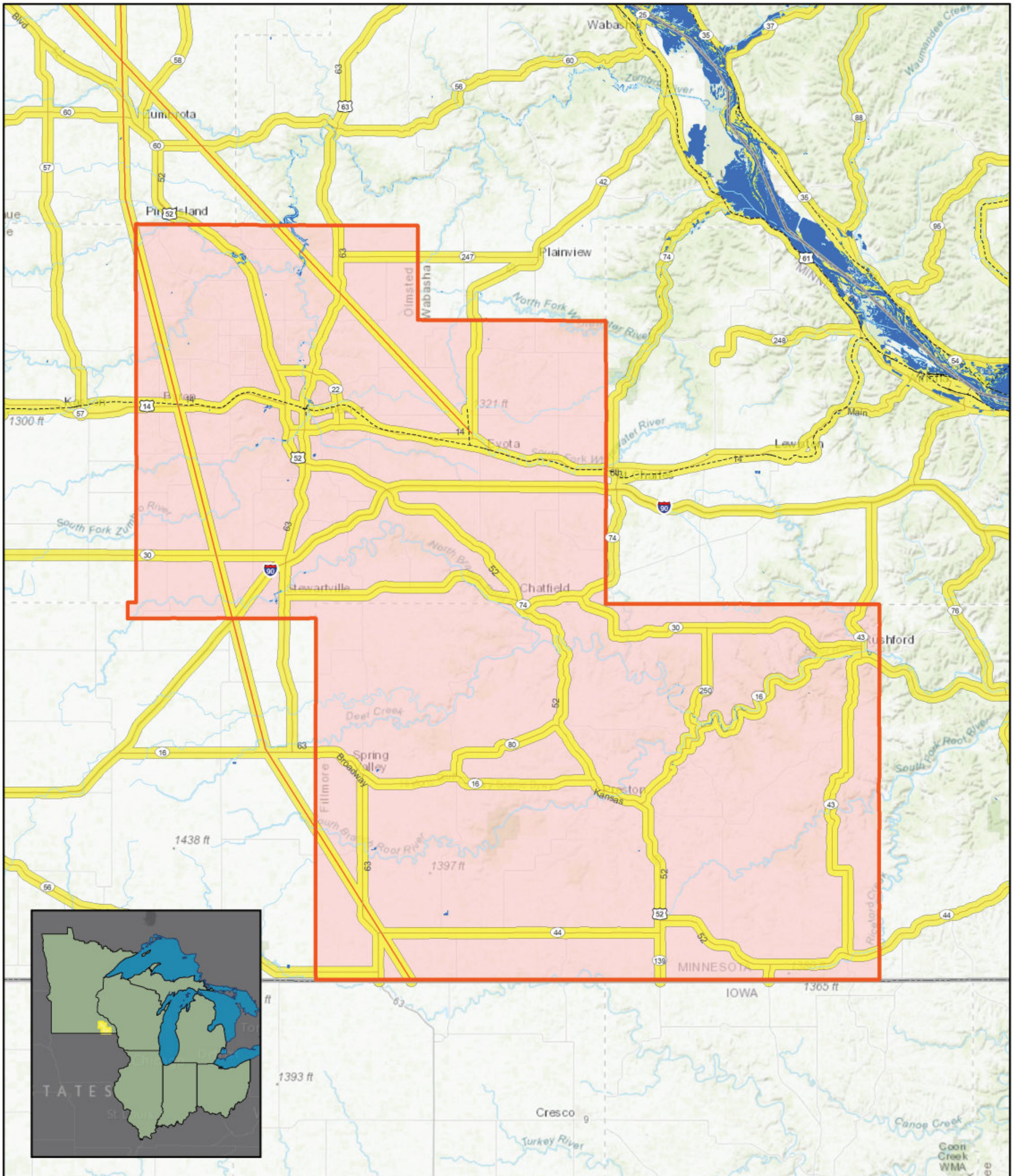
Minnesota Department of Natural Resources (MNDNR). (2021). *Rhodiola integrifolia ssp. leedyi* (Leedy's Roseroot). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDCRA0A0H2

U.S. Fish & Wildlife Service (USFWS). (1993). Leedy's Roseroot (*Rhodiola integrifolia ssp. leedyi*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/plants/leedys/leedysro.html

U.S. Fish & Wildlife Service (USFWS). (1998). *Sedum integrifolium ssp. leedyi* (Leedy's Roseroot) recovery plan. Ft. Snelling, Minnesota. 31pp.

U.S. Fish & Wildlife Service (USFWS). (2015). Leedy's Roseroot (*Rhodiola integrifolia ssp. leedyi*) 5-year review: summary and evaluation. Bloomington, Minnesota. 23pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Leedy's Roseroot (*Rhodiola integrifolia ssp. leedyi*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q392



0 2 4 8 12
Miles

0 2 4 8 12 16
Kilometers

LEEDY'S ROSEROOT (*RHODIOLA INTEGRIFOLIA SSP. LEEDYI*)
ACTION AREA OVERVIEW MAP

SCALE 1:750,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Leedy's Roseroot (*Rhodiola integrifolia ssp. leedyi*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Mead’s Milkweed (*Asclepias meadii*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois, Indiana, and Wisconsin

Species Description
Mead's Milkweed is readily distinguished from these and other species by a combination of smooth “stalkless” opposite leaves with a herringbone venation and a single nodding umbel consisting of large fragrant greenish-cream flowers. Immature plants may resemble those of other milkweeds or species in the related dogbane (Apocynaceae) family. Juvenile or seedling plants are often difficult to locate and identify due to their small stature and slender linear leaves (USFWS, 2003).

Mead’s Milkweed usually begins its seasonal growth in mid to late April. It has a single slender unbranched stalk, 20 to 40cm high, without hairs but with a whitish waxy covering. The hairless leaves are opposite, broadly ovate, 2 to 3in (5 to 7.5cm) long, 3/8 to 2in (1 to 5cm) wide, with a whitish waxy covering. A solitary umbel at the top of the stalk has 6 to 15 greenish ivory/cream-colored flowers, which appear in late May and early June (USFWS, 2003).

Species Distribution
The primary habitat of Mead's Milkweed is mesic to dry mesic, upland tallgrass prairie, characterized by vegetation adapted for drought and fire. Mead’s Milkweed populations are generally restricted to full sun in late-successional or virgin grassland; however, plants may also persist vegetatively in partial shade, such as in edges of glades or barrens that are being encroached upon by woody vegetation. Mead’s Milkweed has also been found on glades or barrens. Populations in Kansas, Iowa, and Illinois have been classified as dry-mesic to mesic prairie. Populations in Missouri, however, have been classified as sandstone, chert, limestone/dolomite, or shale prairie with the exception of igneous glades in Iron and Reynolds counties. Southern Illinois sites are classified as sandstone barrens (USFWS, 2003).

The historical range includes Illinois, Indiana, Iowa, Kansas, Missouri and Wisconsin (USFWS, 2021). In 2003 Mead's Milkweed currently was known from 171 sites in 34 counties in eastern Kansas, Missouri, south-central Iowa, and southern Illinois. The majority of counties with extant populations were clustered within a 125 square mile area of eastern Kansas and southwest Missouri. Outside this area, populations are widely dispersed across 11 counties of northern Missouri, southeast Missouri, southwest Iowa and southern Illinois (USFWS, 2003).

Currently Mead’s Milkweed has 330 known extant populations occurring in Illinois, Indiana, Iowa, Kansas, and Missouri, with the majority occurring in Kansas and Missouri. No extant populations were identified in Wisconsin (USFWS, 2013).

Distribution within Action Area

- Illinois: Shawnee Hills Region; 4 extant populations in Saline County. Three populations were introduced within the Grand Prairie Region, three within the Northeastern Morainal Region, and one within the Western Forest-Prairie Region.
- Indiana and Illinois: Grand Prairie Region; no extant populations identified. One population was introduced in the Northwestern Morainal Region.
- Wisconsin: Driftless Region; no extant populations identified; one historic record exists but population has not been relocated. Eleven populations have been introduced in the Till Plains Region (USFWS, 2013).

Critical Habitat
No critical habitat has been designated for Mead’s Milkweed.

Life History
Mead's Milkweed is a long-lived perennial rhizomatous herb that may persist indefinitely or until destroyed by chance impacts from animals or pathogens. Mead's Milkweed persists in stable habitat of late-successional prairie. This species has low reproductive rates. Flowering occurs in late May in the south through early to mid-June in the north. Severe drought can cause loss of flowers or wilting and dying back of an entire plant. Pollinators include small bumblebees, and miner bees. Young green fruit pods appear by late June and reach their maximum length of 4 to 8cm by late August or early September. As these pods mature, they darken, and the hairy seeds borne within are mature by mid-October. Seeds are wind-dispersed (USFWS, 2003).

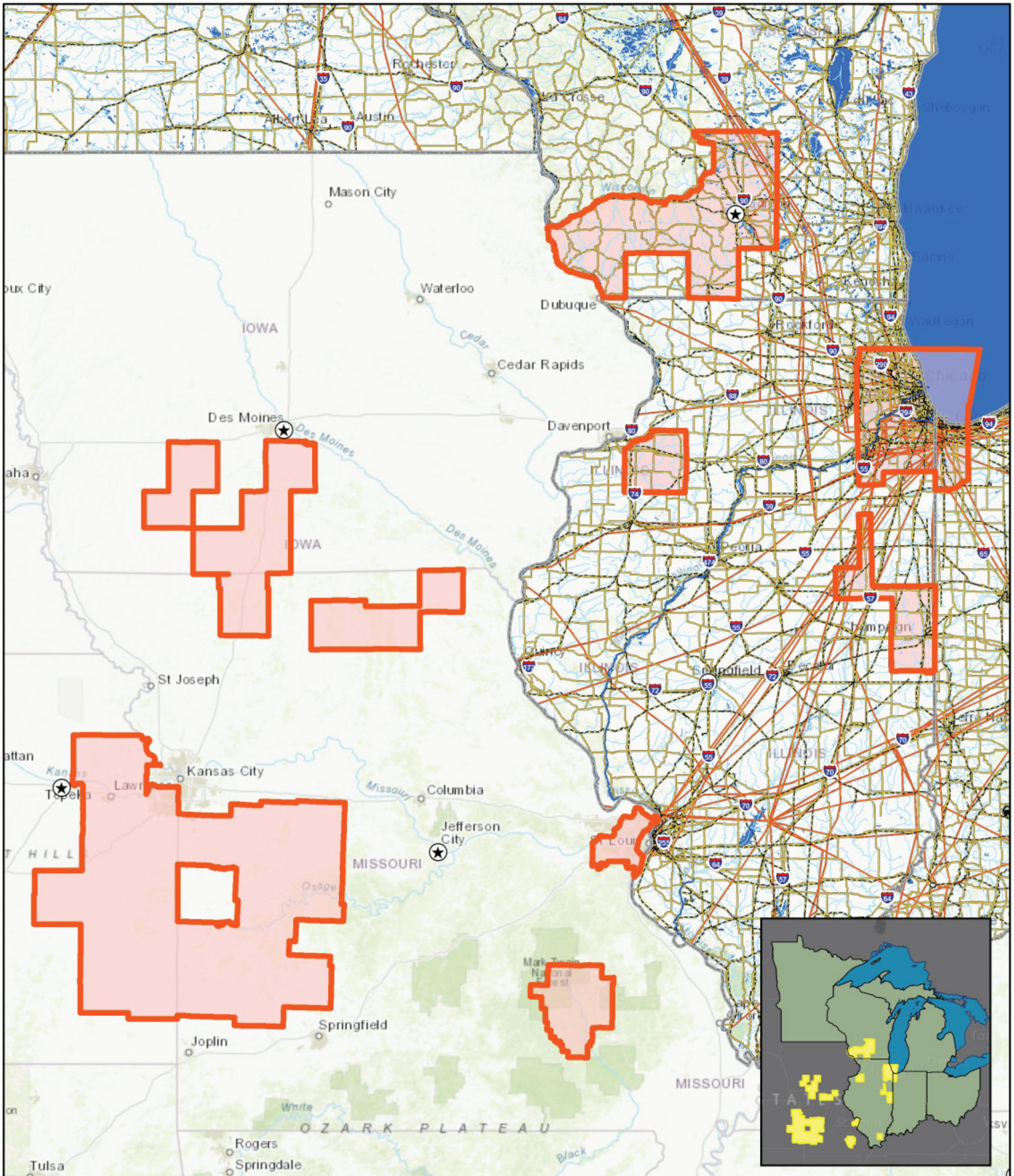
Current Stressors and Threats
- Habitat destruction
  The primary threat to Mead's Milkweed is habitat destruction and alteration of tallgrass prairie due to intense agricultural use, urban growth, and urban residential, industrial, and commercial development, recreational use of sites, and hay mowing (USFWS, 2003).

List of References

U.S. Fish & Wildlife Service (USFWS). (2003). Mead's Milkweed (*Asclepias meadii*) recovery plan. Ft. Snelling, Minnesota. 120pp.

U.S. Fish & Wildlife Service (USFWS). (2013). Mead's Milkweed (*Asclepias meadii*) 5-year review: summary and evaluation. Barrington, Illinois. 49pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Mead's Milkweed (*Asclepias meadii*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/8204



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

MEAD'S MILKWEED (*ASCLEPIAS MEADII*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Mead's Milkweed (*Asclepias meadii*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Michigan Monkey-Flower (*Mimulus michiganensis*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Michigan

Species Description
Michigan Monkey-Flower is a member of the Scrophulariaceae (snapdragon family) and is an endemic variety of a widespread and diverse complex of yellow monkey-flowers. Michigan Monkey-Flower is an aquatic to semi-aquatic perennial plant characterized by its mat-forming, clonal growth habit. The stems, which range to about 40cm (15.7in) or more in length, are lax and reclining at their base, rooting freely at lower leaf nodes to produce numerous additional shoots via stolons. Propagation in this manner often results in the production of clones of up to several hundred stems or more. The broadly ovate to roundish, opposite leaves are inconspicuously to coarsely sharp-toothed and have leafstalks that are usually shorter than the blades. Upward the leaves become somewhat reduced and shorter stalked. Bright yellow, snapdragon-like, tubular flowers are produced from the upper leaf axils, borne on slender pedicels that may be longer than the leaves (USFWS, 1997).

Species Distribution
Michigan Monkey-Flower is restricted to cold, alkaline spring seepages and streams, usually in association with northern white cedar (*Thuja occidentalis*) swamps occurring along current or post-glacial Great Lakes shorelines. It frequently occurs in northern white cedar swamps formed in drainages found at the base of relatively steep morainic slopes and bluffs (USFWS, 1997).

Historically, Michigan Monkey-Flower was known from only 15 extant occurrences and is distributed principally within Michigan's Mackinac Straits region in Charlevoix, Cheboygan, Emmet, and Mackinac Counties, with outlying localities to the south in Benzie and Leelanau Counties (USFWS, 1997). The five-year review in 2011 identified three additional occurrences for a total of 19 (USFWS, 2011), and four new occurrences were discovered subsequent to the 2011 status review (USFWS, 2018).

Distribution within Action Area

- Michigan Counties listed in ECOS (USFWS, 2021): Benzie, Charlevoix, Cheboygan, Emmet, Leelanau, Mackinac
- Benzie: 1 occurrence
- Charlevoix: 4 occurrences
- Cheboygan: 5 occurrences
- Emmett: 4 occurrences
- Leelanau: 3 occurrences
- Mackinac: 5 occurrences
- One occurrence occurs within both Cheboygan and Emmett Counties (USFWS, 2018)
- Reintroductions since 2011 Review: Harbor Springs and Oden Fish Hatchery (Emmett County); Martin Point North and Point La Par South (Charlevoix County)

Critical Habitat
No critical habitat has been designated for Michigan Monkey-Flower.

Life History
Flowering occurs primarily from approximately mid-June to August, extending occasionally into October. It flowers most abundantly when growing in full sunlight, although it appears to persist as mostly sterile colonies when growing under heavy tree canopy cover. The two-lipped flowers range from 16 to 27mm (0.6 to 1.1in) in length and have an irregularly red-spotted lower lip and tube. The three-lobed, heavily-bearded lower lip forms a wide landing platform for insect pollinators. Fruit, which is seldom produced, consists of

an oblong, pointed capsule, 8 to 10mm long, containing numerous oval seeds with longitudinal striations (USFWS, 1997).

Current Stressors and Threats

- Habitat destruction/modification
  The greatest threat to Michigan Monkey-Flower is direct destruction and modification of the species' essential habitat. Development, both inland and along Great Lakes shores, has probably resulted in local extinctions such as at Mullet Lake and portions of Burt Lake.
- Hydrological disruptions
- Overcollection (USFWS, 1997)
- Competition from invasive species

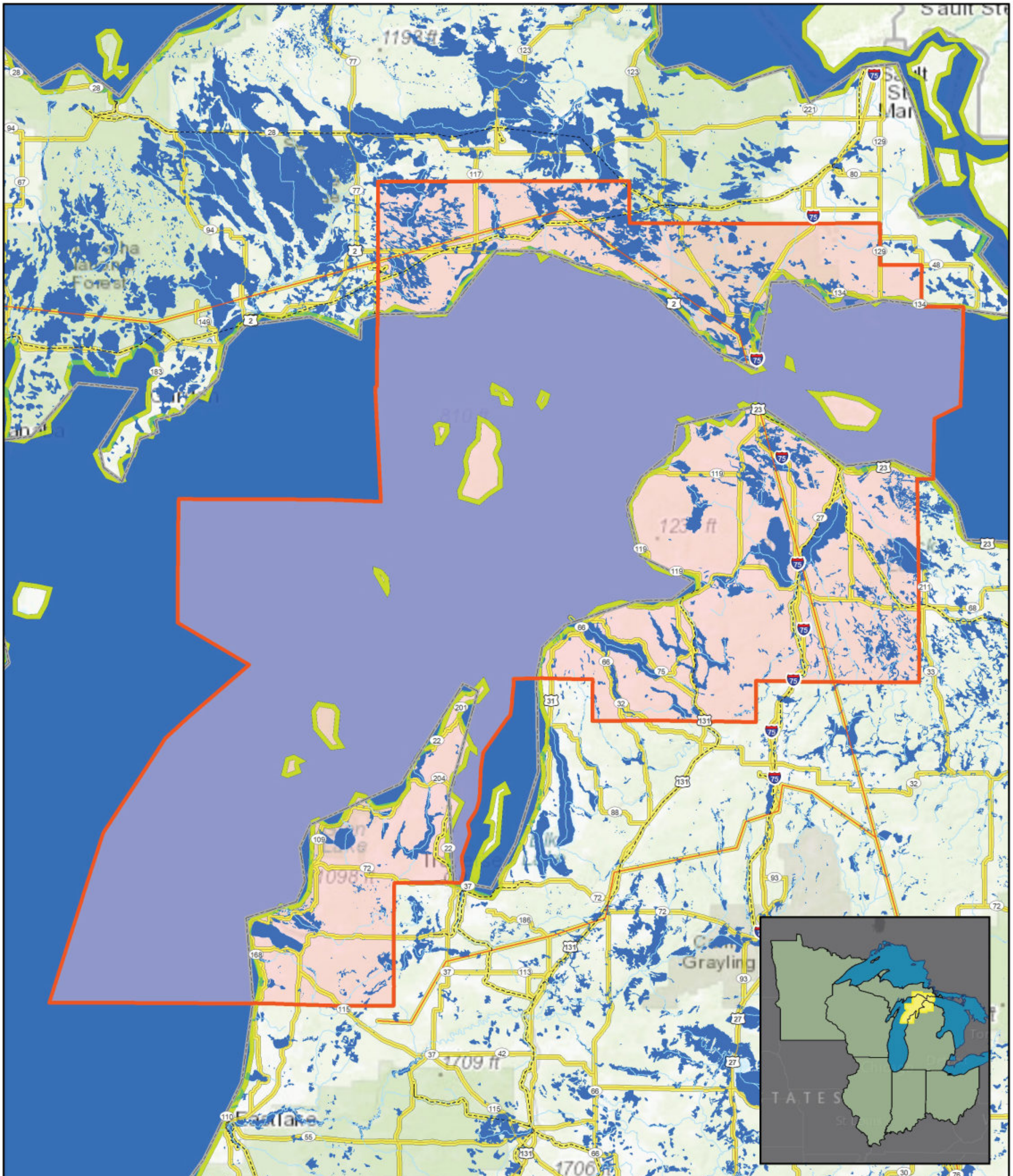
List of References

U.S. Fish & Wildlife Service (USFWS). (1997). Recovery plan for Michigan Monkey-Flower (*Mimulus glabratus var. michiganensis*). Ft. Snelling, Minnesota. 37pp.

U.S. Fish & Wildlife Service (USFWS). (2011). Michigan Monkey-Flower (*Mimulus michiganensis*) 5-year review: summary and evaluation. East Lansing, Michigan. 18pp.

U.S. Fish & Wildlife Service (USFWS). (2018). Michigan Monkey-Flower (*Erythranthe michiganensis*) 5-year review: summary and evaluation. East Lansing, Michigan. 15pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Michigan Monkey-Flower (*Mimulus michiganensis*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2DN



MICHIGAN MONKEY FLOWER (*MIMULUS MICHIGANENSIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:1,756,588

0 5 10 20 30
Miles
0 4.75 9.5 19 28.5 38
Kilometers

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Michigan Monkey Flower (*Mimulus michiganensis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Minnesota Dwarf Trout Lily (*Eythronium propullans*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Minnesota

Species Description
The Minnesota Dwarf Trout Lily is an herbaceous, spring blooming, perennial member of the lily family (Liliaceae). Leaves are slightly mottled and are paired in flowering plants but single in vegetative plants (Recovery Plan). The blooming plant is readily identified by the very small size of its flowers. Flowers of the Dwarf Trout Lily are about the size of a dime or less, pale pink, with a variable number of perianth parts ("petals"). Most members of the lily family have 6 "petals", but Dwarf Trout Lilies may have four, five or six (USFWS, 2021).

Species Distribution
The Minnesota Dwarf Trout Lily occurs mostly on the lower parts of wooded north-facing slopes 15 to 27m high, and on adjacent floodplains. Sites are associated either with streams or abandoned stream channels. This species appears to grow best in habitats with a surface layer of rich, black, well-aerated soil (USFWS, 1987).

The Minnesota Dwarf Trout Lily is a forest wildflower found in Rice and Goodhue Counties, Minnesota. Because it is known only from this small area the Dwarf Trout Lily is considered a Minnesota "endemic" - i.e. a species that grows in Minnesota and nowhere else on earth (USFWS, 2021). Historically, the Minnesota Dwarf Trout Lily occurred in colonies that range in size from one or two scattered plants to more than 500 individuals. Plants mainly occur at elevations between 960 and 1000 feet above sea level (USFWS, 1987).

Distribution within Action Area

- Restricted to portions of the Straight River, Cannon River, Little Cannon River, Zumbro River, and Prairie Creek watersheds in Minnesota.
- In 2011 Minnesota DNR recognized 40 occurrences of the Minnesota Dwarf Trout Lily
- Counties include: Rice, Goodhue, and Steele (USFWS, 2011)

Critical Habitat
No critical habitat has been designated for Minnesota Dwarf Trout Lily.

Life History
The Minnesota Dwarf Trout Lily is a spring ephemeral, flowering from late April to mid-May. Below-ground perennial bulbs are sustained by the annual formation of new bulbs. Vegetative production of a new individual is accomplished by the formation of a new bulb at the tip of a runner that arises from the underground stem of flower plants. This can result in a new plant being produced at distances as great as 3.5cm from the parent plant. Flowers are available for pollination for 6 to 7 hours per day and are principally visited by a small bee (*Andrena carlini*). Other species of bees, flies, and beetles infrequently visit the Minnesota Dwarf Trout Lily. The Minnesota Dwarf Trout Lily does not readily self-pollinate, and typically only produces seeds when cross pollinated with the white trout lily (*E. albidum*). Sexual reproduction is possible but is a likely rare, periodic event (USFWS, 1987).

Current Stressors and Threats

- Habitat destruction/modification
  The primary threat to the Minnesota Dwarf Trout Lily is destruction, modification or curtailment of its habitat or range. High populations of white-tailed deer tend to graze on Minnesota Dwarf Trout Lily reducing the number of individuals at that occurrence. Increased flooding and erosion, especially due to development activities, may have significant impacts on population size.

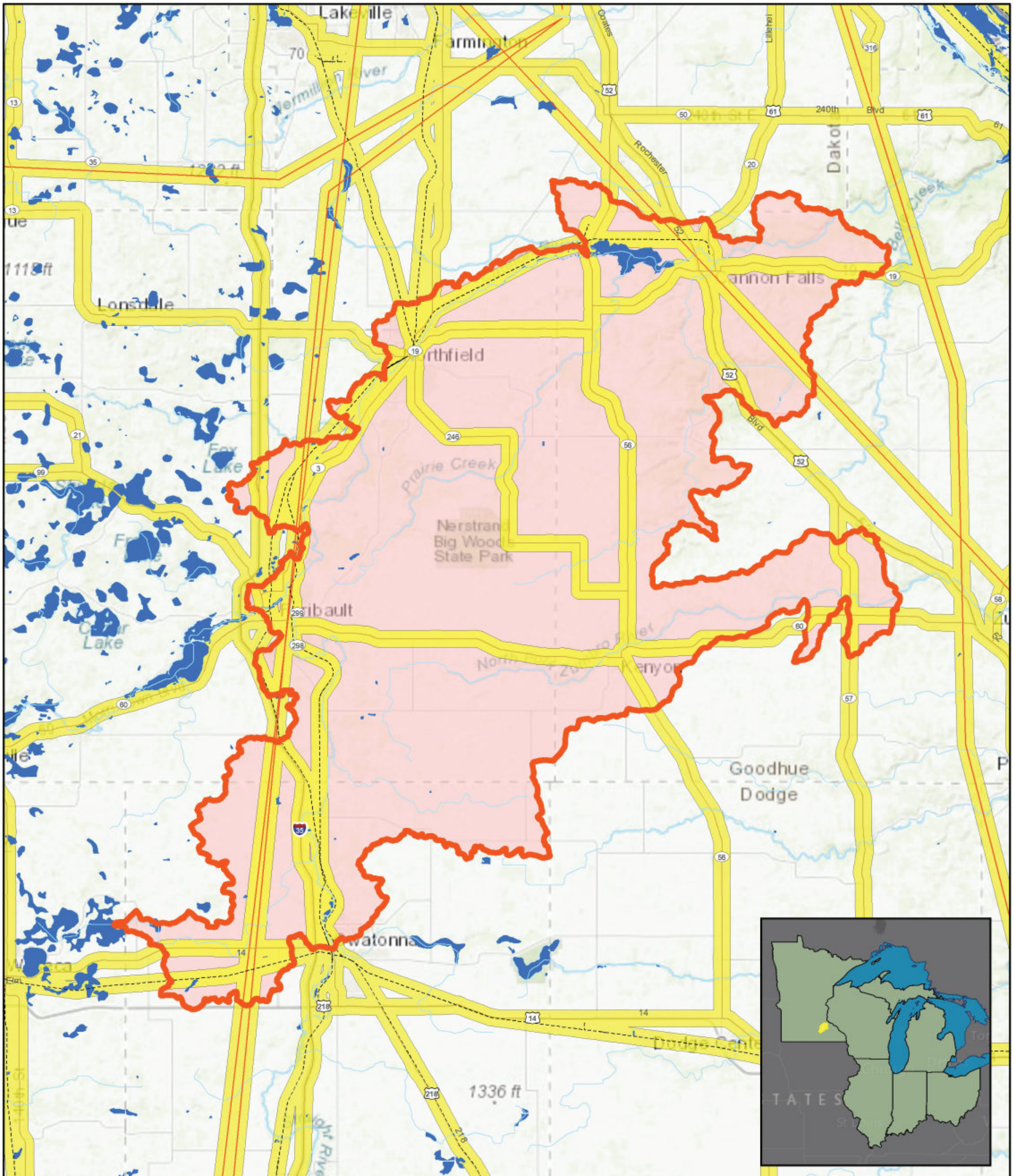
- Invasive species control
- Woody shrub succession
- Non-native earthworms

List of References

U.S. Fish & Wildlife Service (USFWS). (1987). *Erythronium propullans* recovery plan. Twin Cities, Minnesota. 31pp.

U.S. Fish & Wildlife Service (USFWS). (2011). Minnesota Dwarf Trout Lily (*Erythronium propullans*) 5-year review: summary and evaluation. Bloomington, Minnesota. 29pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Minnesota Dwarf Trout Lily (*Erythronium propullans*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/597



0 1.25 2.5 5 7.5
Miles
0 1.25 2.5 5 7.5 10
Kilometers

MINNESOTA DWARF TROUT LILY (*ERYTHRONIUM PROPULLANS*)
ACTION AREA OVERVIEW MAP

SCALE 1:500,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Minnesota Dwarf Trout Lily (*Erythronium propullans*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Northern Wild Monkshood (*Aconitum noveboracense*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Ohio; Threatened in Wisconsin

Species Description
Northern Wild Monkshood is a perennial herb arising from short tuberous roots with basal cauline leaves that are palmately cleft or dissected with usually blue to whiteish flowers that are borne in a terminal raceme or panicle (USFWS, 1983). The flowers are about 1in in length, and a single stem may have many flowers. Stems range from about 1 to 4ft in length. The leaves are broad with coarse, toothed lobes (USFWS, 2007).

Species Distribution
Northern Wild Monkshood is typically found on shaded to partially shaded cliffs, algific talus slopes, or on cool, streamside sites. These areas have cool soil conditions, cold air drainage, or cold groundwater flowage. On algific talus slopes, these conditions are caused by the outflow of cool air and water from ice contained in underground fissures. These fissures are connected to sinkholes and are a conduit for the air flows (USFWS, 2007). In New York, Northern Wild Monkshood can also be found in semi-shaded seepage springs at high elevation headwaters in the stream-side crevices downstream (USFWS, 1983).

Historical ranges spanned northeastern Iowa and southwestern Wisconsin to northeastern Ohio and the Catskill Mountains of New York. In 1983 Northern Wild Monkshood was restricted to 20 extant sites in three distinct regions: in and adjacent to the unglaciated (Wisconsin epoch) portion of Iowa (Allamakee, Clayton, Dubuque, Jackson, and Delaware Counties) and Wisconsin (Grant, Richland, Sauk, and Vernon Counties), the northeastern Ohio glaciated area (Summit and Portage Counties) and the glaciated area of the Catskill Mountains of New York (Chenango and Ulster County) (USFWS, 1983).

Distribution within Action Area
ECOS lists the following counties with occurrences (USFWS, 2021):

- Ohio: Hocking, Portage, Summit
- Wisconsin: Grant, Monroe, Richland, Sauk, Vernon

Critical Habitat
No critical habitat has been designated for Northern Wild Monkshood.

Life History
Northern Wild Monkshood is a perennial and reproduces from both seed and small tubers. The flowers bloom between June and September and are pollinated when bumblebees pry open the blossom to collect nectar and pollen (USFWS, 2007). Fruiting occurs August through late September in Wisconsin (WIDNR, 2021) and late October in Ohio (ODNR, 2021).

Current Stressors and Threats

- Dam and reservoir construction (hydrologic alteration)
- Road construction maintenance (de-icing agents, herbicide use)
- Power line construction and maintenance
- Logging and quarrying
- Grazing
- Development of recreational foot trails
- Urban and residential development
- Overcollection for scientific use (USFWS, 1983).

List of References

Ohio Department of Natural Resources (ODNR). (2021). Northern Monkshood. Retrieved from https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/plants-trees/flowering-plants/northern-monkshood

U.S. Fish & Wildlife Service (USFWS). (1983). Northern Monkshood recovery plan. Twin Cities, Minnesota. 81pp.

U.S. Fish & Wildlife Service (USFWS). (2007). Northern Wild Monkshood (*Aconitum noveboracense*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/plants/monkshoo.html

U.S. Fish & Wildlife Service (USFWS). (2021). Northern Wild Monkshood (*Aconitum noveboracense*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/1450

Wisconsin Department of Natural Resources (WIDNR). (2021). Northern Monkshood (*Aconitum noveboracense*). Retrieved from https://dnr.wi.gov/topic/EndangeredResources/Plants.asp?mode=detail&SpecCode=PDRAN01070

0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

NORTHERN WILD MONKSHOOD (*ACONITUN NOVEBORACENSE*)
ACTION AREA OVERVIEW MAP

SCALE 1:6,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Northern Wild Monkshood (*Aconitun noveboracense*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Pitcher's Thistle (*Cirsium pitcheri*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Indiana; Threatened in Illinois, Michigan, and Wisconsin

Species Description
Pitcher's Thistle is a monocarpic (flowers and sets seed only once), perennial, herbaceous plant, generally flowering after a 5- to 8-year juvenile stage. The stems and leaves of juveniles and adults are woolly-white, and the leaves are deeply pinnatifid with the lobes less than 1cm wide and up to 4cm long. Minute spines are concentrated along the edge of the leaf at its base, with a few spines between the lobes of the distal leaf margins. The flowering stems are up to 1m tall and have several to a dozen widely scattered leaves. Individuals typically have a single branching flowering stem with terminal and axillary flowering heads of a cream or pinkish color. Juveniles and adults have a taproot that may reach 2m in length (USFWS, 2002).

Species Distribution
Pitcher's Thistle is endemic to the beaches and grassland dunes of Lakes Michigan, Superior, and Huron. It is found most frequently in the near-shore plant communities, although it occurs in all non-forested areas of Great Lakes dune systems. Pitcher's Thistle colonizes patches of open, windblown areas of the landscape, and gradually declines locally as the density of vegetation and ground litter increases through plant succession. This species is dependent on continually colonizing the mosaic of open habitats within the Great Lakes dunes, and it is patchily distributed with varying population sizes in all open zones of the dunes vegetation (USFWS, 2002).

The majority of known sites of Pitcher's Thistle occur along the shores of Lake Michigan. The species ranges from the north shore of Lake Superior south to Indiana, and formerly occurred in northern Illinois, where it is has been experimentally reintroduced. Distribution of the species extends along the Lake Michigan shoreline in Wisconsin. In the east it ranges through northern Lake Huron to the Manitoulin Island archipelago and southern Georgian Bay in Ontario. Pitcher's Thistle extends as far south as Lambton County, Ontario, Canada on Lake Huron, as indicated by pre-1964 collections for two localities (USFWS, 2002).

Distribution within Action Area
Of the 193 extant occurrences (EO) in the U.S., 169 EO (including PO) occur in Michigan (9 are historic) (MNFI, 2021). Among the remaining 24 extant EO outside of Michigan, 10, including 1 reintroduced population, occur in Wisconsin; 13, including 2 reintroduced populations are in Indiana; and 1 reintroduced population occurs in Illinois. Aside from the reintroduced populations and new occurrences in Michigan (4 in the Upper Peninsula and 2 in the northern Lower Peninsula), spatial distribution of Pitcher's Thistle has not changed since 2002 (USFWS, 2010). The overall species distribution remains similar to the 2010 five-year review (USFWS, 2018).

ECOS lists the following counties with occurrences (USFWS, 2021):
- Illinois: Lake
- Indiana: Lake and Porter
- Michigan: Alcona, Alger, Allegan, Alpena, Antrim, Arenac, Benzie, Berrien, Charlevoix, Cheboygan, Chippewa, Delta, Emmet, Grand Traverse, Huron, Iosco, Leelanau, Mackinac, Manistee, Mason, Muskegon, Oceana, Ottawa, Presque Isle, Schoolcraft, and Vanburen
- Wisconsin: Door, Manitowoc, and Sheboygan

Critical Habitat
No critical habitat has been designated for Pitcher's Thistle.

Life History

Seed dormancy is broken by cold, moist stratification, with seed germination occurring in May and June. Seedlings produce 1 to 6 leaves in the first season. Juveniles typically consist of one rosette, unless they are grazed, trampled or buried where they may develop multiple rosettes. Juveniles may remain dormant for one or two years as a result of drought. The chances of juvenile mortality decrease as they increase in size. Age of reproduction ranges from 5 to 8 years and appears to be correlated with habitat. Pitcher's Thistle blooms from May to September, with the date of peak anthesis occurring later with increasing latitude (mid-July at Sleeping Bear Dunes). Flowering is determinant and commences from the terminal head and proceeds downward. Smaller axillary flowering head buds located below the flowering inflorescence may bloom late in the season or if distal heads are damaged or removed. The primary pollinators are bees (USFWS, 2002).

Seed dispersal commences in late July at the northern limits of its range but can occur from June to August. Seeds have a long (up to 25mm) loosely attached pappus. Primary seed dispersal is through individual seeds blowing from the inflorescence head or by the whole plant and heads falling to the ground at the end of the flowering season. Maximum observed primary dispersal distances range from 1.83 to 4.00m based on seed locations and on seedling distributions around previous year's adult plants. Secondary dispersal is effected by wind blowing seed and seed heads across the sand, snow or water surface (USFWS, 2002).

Current Stressors and Threats

- Habitat destruction
  Around ten percent of Pitcher's Thistle populations have been lost, modified or curtailed through habitat destruction, overuse and repeated disturbance. Some populations have also been lost or negatively impacted through the alteration of local dune geomorphic processes, which prevents the creation and maintenance of Pitcher's Thistle habitat. In addition, shoreline stabilization projects such as sea walls, rip rap, and planting of beach grass, northern white cedar, and some exotic species also alters dune building processes and may decrease habitat available to Pitcher's Thistle (USFWS, 2010).
- Non-native species
  Additionally, the introduction of non-native species for biological control may pose a substantial risk. Several moth species feed on native thistles and are also the adopted host of common bull thistle. Increased populations of bull thistle in the vicinity of Pitcher's Thistle could lead to feeding damage. The flowerhead weevil was released in Walworth and Waukesha Counties in Wisconsin to control musk thistles. If this weevil spreads to the Pitcher's Thistle range, it may pose a serious threat to seed production and regeneration (USFWS, 2010).

List of References

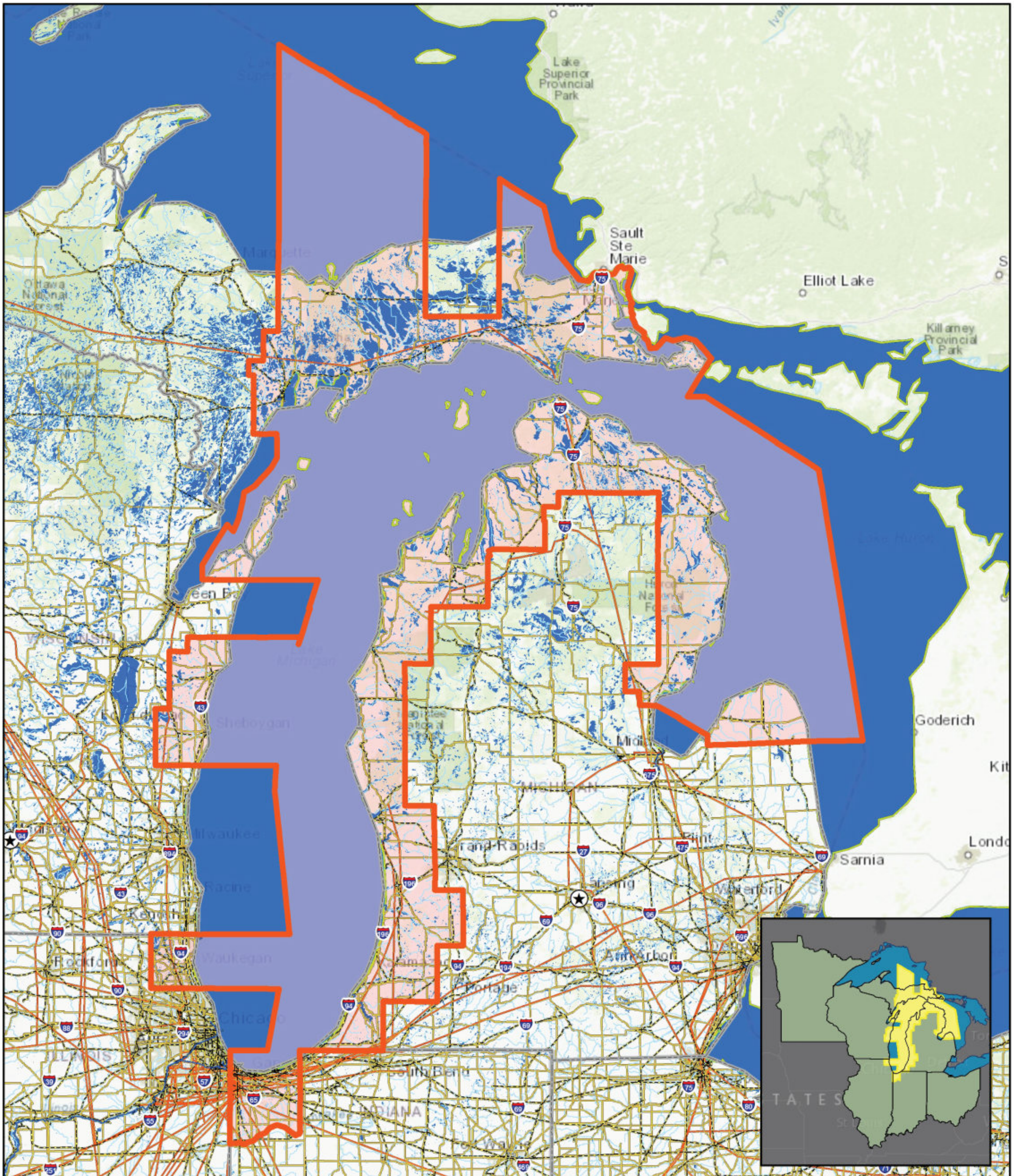
Michigan Natural Features Inventory (MNFI). (2021). *Cirsium pitcheri* (Pitcher's Thistle). Retrieved from https://mnfi.anr.msu.edu/species/description/13485/Cirsium-pitcheri

U.S. Fish & Wildlife Service (USFWS). (2002). Pitcher's Thistle (*Cirsium pitcheri*) recovery plan. Ft. Snelling, Minnesota. 92pp.

U.S. Fish & Wildlife Service (USFWS). (2010). Pitcher's Thistle (*Cirsium pitcheri*) 5-year review: summary and evaluation. East Lansing, Michigan. 29pp.

U.S. Fish & Wildlife Service (USFWS). (2018). 5-year review: Pitcher's Thistle (*Cirsium pitcheri*). East Lansing, Michigan. 8pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Pitcher's Thistle (*Cirsium pitcheri*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/8153



0 12.5 25 50 75
Miles
0 12.525 50 75 100
Kilometers

PITCHER'S THISTLE (*CIRSIUM PITCHERI*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Pitcher's thistle (*Cirsium pitcheri*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Prairie Bush-Clover (*Lespedeza leptostachya*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois and Wisconsin; Threatened in Minnesota

Species Description
Also known as slender-leaved bush clover, Prairie Bush-Clover has a clover-like leaf comprised of three leaflets about an inch long and a quarter inch wide. Flowering plants are generally between nine and eighteen inches tall with the flowers loosely arranged on an open spike. The pale pink or cream-colored flowers bloom in mid-July. The entire plant has a grayish-silver sheen. The showy pink flowers of Prairie Bush-Clover are less often seen than the silvery-green pods because of the plant's short blooming season and its ability to produce pods directly from flowers that never open (USFWS, 2021).

Species Distribution
Prairie Bush-Clover is endemic to midwestern prairies. Habitats are usually north-facing slopes of 10-15° and with fine silty loam, fine sandy loam or clay loam. Specifically, the Des Moines River basin and the Little Sioux basin seem to be the “core” area for this species and are the location of nine of the thirteen Iowa populations and nine of the twelve Minnesota populations. Additionally, Prairie Bush-Clover has been identified on margins of bedrock outcrops specifically in Cottonwood and Morton Counties, Minnesota (USFWS, 1988).

Historic records include 27 counties in Illinois, Iowa, Minnesota, and Illinois. The history of subsequent collections and sightings of the species suggests that the Prairie Bush-Clover has always been found more often in Iowa than the other three states (USFWS, 1988).

In 1988 Prairie Bush-Clover was known from 36 sites in 24 counties in northern Illinois, Iowa, southern and western Wisconsin, and southern Minnesota (USFWS, 1988).

Distribution within Action Area
The majority of Minnesota populations of Prairie Bush-Clover occur in prairies that have been or are presently used as pasture (MNDNR, 2021).

ECOS lists the following counties with occurrences (USFWS, 2021):
- Illinois: Cass, Champaign, Cook, DuPage, Fayette, Jo Daviess, Lee, McHenry, Ogle, and Winnebago
- Minnesota: Brown, Cottonwood, Dakota, Dodge, Goodhue, Jackson, Martin, Mower, Nobles, Olmsted, Redwood, Renville, Rice, and Rock
- Wisconsin: Dane, Grant, Green, Pierce, Rock, and Sauk

Critical Habitat
No critical habitat has been designated for Prairie Bush-Clover.

Life History
Prairie Bush-Clover is a perennial species. Plants reach maturity in approximately 5 years or more, and mature plants have been observed to flower repeatedly over four seasons. It is estimated that individual plants fequently live 10 years or more. Established plants typically send up a single stem from each root, though they may occasionally produce 2 or 3 stems. Flowering begins in mid-July and continues into early September. Two flower types are produced chasmogamous (potentially outcrossing) and cleistogamous (obligately self-pollinating). Both flower types can be produced on a single plant, or a plant may bear all cleistogamous flowers. Pollinators are unknown. Each plant produces as many as 560 pods with an average of 235 pods per plant. Seed production begins in late August through early October. Seed

production is much lower compared to pod production. It is possible seeds persist in the seed bank for a few years, and seed germination typically begins in May and continues through July (USFWS, 1988).

Current Stressors and Threats

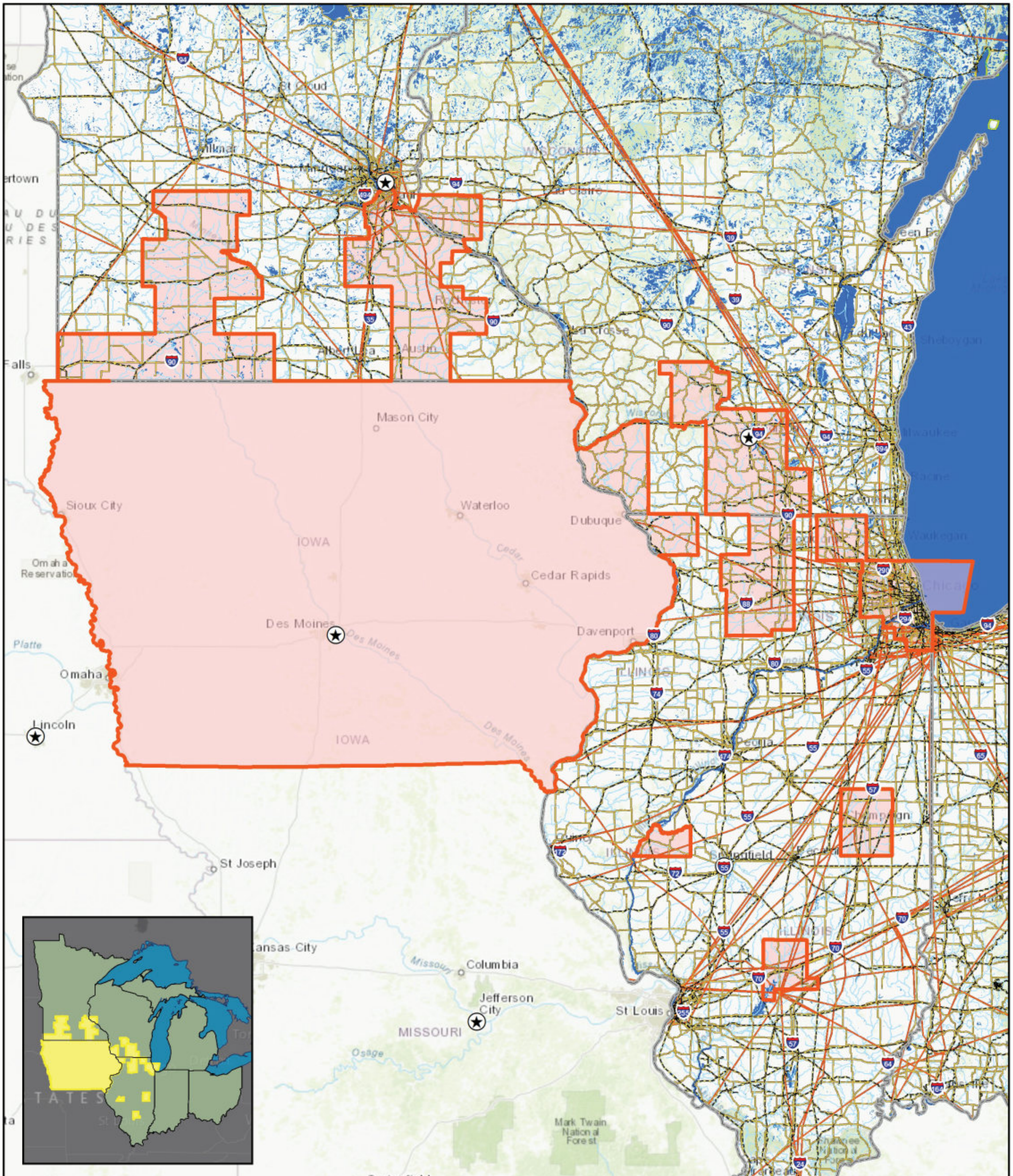
- Habitat loss and degradation (MNDNR, 2021)
- Agriculture (row crop conversion, livestock grazing, herbicides)
- Rural residential development
- Insect and mammal herbivory
- Woody succession (USFWS, 1988)

List of References

Minnesota Department of Natural Resources (MNDNR). (2021). *Lespedeza leptostachya* (Prairie Bush Clover). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PDFAB27090

U.S. Fish & Wildlife Service (USFWS). (1988). *Lespedeza leptostachya* recovery plan. Twin Cities, Minnesota. 41pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Prairie Bush-Clover (*Lespedeza leptostachya*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2CB



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

PRAIRIE BUSH-CLOVER (*LESPEDEZA LEPTOSTACHYA*)
ACTION AREA OVERVIEW MAP

SCALE 1:6,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Prairie Bush-clover (*Lespedeza leptostachya*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Short's Bladderpod (*Physaria globosa*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Indiana

Species Description
Short's Bladderpod is an upright biennial or perennial (lives for 2 years or longer) with several stems, some branched at the base, reaching heights up to 50cm (20in), and which are leafy to the base of the inflorescence (a group or cluster of flowers arranged on a stem that is composed of a main branch or a complicated arrangement of branches). The basal leaves, borne on short petioles (stalks) are 2.5 to 5cm (1 to 2in) in length and 0.5 to 1.5cm (0.2 to 0.6in) wide, obovate (egg-shaped and flat, with the narrow end attached to the stalk) or oblanceolate (with the widest portion of the leaf blade beyond the middle) in shape, with a smooth or slightly wavy margin, and gray-green in color due to a layer of dense hairs. Leaves are gradually reduced in size and petiole length higher up the stem. Numerous flowers are borne on a raceme (elongate, spike-shaped inflorescence to which individual flowers are attached by slender pedicels, or stalks, which in Short's Bladderpod are longer than the flowers). The yellow flowers are composed of four spoon-shaped petals, 0.4 to 0.7cm (0.16 to 0.28in) long, with a nectary at the base of each petal. The fruit is globose in shape and lightly beset with stellate (star-shaped) hairs, but becoming smooth with time, and typically contains one to four seeds, less often five (USFWS, 2017a).

Species Distribution
Short's Bladderpod typically grows on steep, rocky, wooded slopes and talus areas. It also occurs along tops, bases, and ledges of bluffs and infrequently on sites with little topographic relief. The species usually is found in these habitats on south- to west-facing slopes near rivers or streams, and most populations are closely associated with calcareous outcrops. The most vigorous and stable occurrences are found in sites with a relatively open overstory canopy. The remaining populations of Short's Bladderpod are in many cases small, isolated, and have limited potential for recolonization should they be extirpated (USFWS, 2017b).

Historically, Short's Bladderpod is known from 55 occurrences that had been verified and tracked in NHP databases (USFWS, 2017a). As of 2016 there were 10 extant occurrences in Kentucky, 20 in Tennessee, and 1 in Posey County, Indiana, for a total of 31 extant occurrences range-wide (USFWS, 2017a, 2017c).

Distribution within Action Area
Posey County in southwestern Indiana is the only reported occurrence of Short's Bladderpod (USFWS, 2021). Less than 1,000 individuals are known at this location along Bonebank Road (USFWS, 2017a).

Critical Habitat
There is final critical habitat for Short's Bladderpod (79 FR 50989).

The Endangered Species Act and its implementing regulations require identification of the physical or biological features essential to the conservation of Short's Bladderpod in areas occupied at the time of listing, focusing on the features' primary constituent elements (PCEs). PCEs are those specific elements of the physical or biological features that provide for a species' life-history processes and are essential to the conservation of the species. Based on our current knowledge of the physical or biological features and habitat characteristics required to sustain the species' life-history processes, the PCEs for Short's Bladderpod are:
(1) Bedrock formations and outcrops of calcareous limestone, sometimes with interbedded shale or siltstone, in close proximity to the mainstem or tributaries of the Kentucky and Cumberland rivers. These outcrop sites or areas of suitable bedrock geology should be located on steeply sloped hillsides or bluffs, typically on south- to west-facing aspects.

(2) Shallow or rocky, well-drained soils formed from the weathering of underlying calcareous bedrock formations, which are undisturbed or subjected to minimal disturbance, so as to retain habitat for ground-nesting pollinators and potential for maintenance of a soil seed bank.
(3) Forest communities with low levels of canopy closure or openings in the canopy to provide adequate sunlight for individual and population growth. Invasive, nonnative plants must be absent or present in sufficiently low numbers to not inhibit growth or reproduction of Short's Bladderpod.

The Service designates critical habitat based on availability of the PCEs for a given species, delineating those areas determined to be essential for the species' conservation. The Service designated approximately 373 hectares (ha) (925.5 acres (ac)) of critical habitat for Short's Bladderpod, distributed among 20 units in Posey County, Indiana; Clark, Franklin, and Woodford Counties, Kentucky; and Cheatham, Davidson, Dickson, Jackson, Montgomery, Smith, and Trousdale Counties, Tennessee (79 FR 50989). There are 20 critical habitat areas that constitute our best assessment of areas that meet the definition of critical habitat for Short's Bladderpod, which included all locations that the species was known to occupy at the time it was listed endangered (USFWS, 2017a).

Life History

Short's Bladderpod is a biennial or perennial that typically flowers and produces seed during the months of March through June. Observed pollinators include mining bees (*Andrena* sp.), two species of dipterans (*Nemotelus bruesii*, *Toxomerus geminatus*) and four species of hymenopterans (bees; *Lasioglossum illinoense*, *L. versatus*, *Halictus ligatus*, *Augochlorella striata*). Timing of seed germination is not currently known, but it is possible that seeds could germinate in the fall and form rosettes over winter, germinate in spring when conditions become favorable, or exhibit either phenology depending upon the dormancy status of individual seeds and variation in seasonal climatic conditions (USFWS, 2017a).

Current Stressors and Threats

- Habitat loss/degradation
  The main causes for habitat degradation or loss include future construction and ongoing maintenance of transportation rights-of-way; prolonged inundation and soil erosion due to flooding and water level manipulation, overstory shading due to forest succession, and competition from invasive plant species (USFWS, 2017b).
- Dynamics of small populations

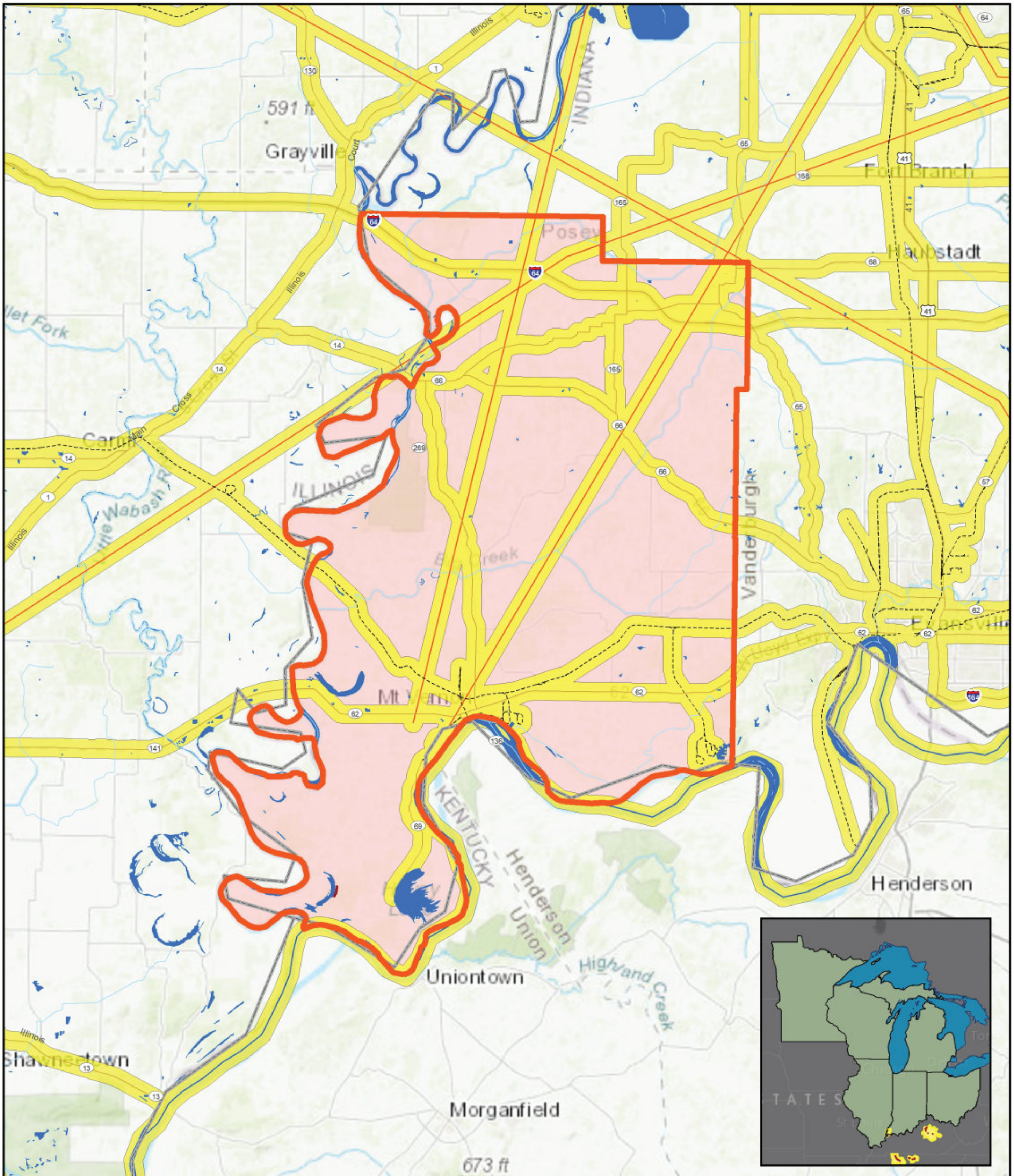
List of References

U.S. Fish & Wildlife Service (USFWS). (2017a). Species status assessment: Short's Bladderpod (*Physaria globosa*). Atlanta, Georgia. 51pp.

U.S. Fish & Wildlife Service (USFWS). (2017b). Draft recovery plan for Short's Bladderpod (*Physaria globosa*). Atlanta, Georgia. 5pp.

U.S. Fish & Wildlife Service (USFWS). (2017c). Recovery implementation strategy for Short's Bladderpod (*Physaria globosa*). Atlanta, Georgia. 16pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Short's Bladderpod (*Physaria globosa*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q139



0 1.25 2.5 5 7.5
Miles
0 1.25 2.5 5 7.5 10
Kilometers

SHORT'S BLADDERPOD (*PHYSARIA GLOBOSA*)
ACTION AREA OVERVIEW MAP

SCALE 1:450,000

Petroleum Pipeline	Commercial Navigable Waterway	Action Area
Major Road	Rivers & Streams	Short's Bladderpod (*Physaria globosa*) Critical Habitat
Railroad	Lakes & Ponds	Short's Bladderpod (*Physaria globosa*) Counties of Occurrence
	1-Mile Coastal Inland Buffer	

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Short’s Goldenrod (*Solidago shortii*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Indiana

Species Description
Short’s Goldenrod is a perennial herb with one to several erect or ascending stems 0.5 to 1.3m tall, arising from a creeping rhizome. Stems are terete in cross section, slightly ribbed, and minutely scabrid-puberulent at least above the middle. Leaves are alternate, crowded, 5 to 10cm long and 0.6 to 1.5cm wide. Individual leaves are firm, oblong-lanceolate to narrowly elliptic, remotely serrulate and glabrous on both sides. The leaves are largest near the middle of the stem and become progressively smaller towards the inflorescence. Lower leaves are reduced and usually absent during flowering time. The inflorescence is terminal and ranges from racemose to paniculate with divergent, secund branches. Heads are 10 to 14 flowered on puberulent stalks usually 5mm or less in length. The involucre is 4 to 6mm long and 3mm wide with imbricate, coriacious and glabrous phyllaries. Ray florets number 4 to 8 and are 2.5 to 3.0mm long. The corollas are elliptic-linear with bright yellow ligules about 2mm long. The disc florets are also bright yellow with a short tube, funnelform throat and five linear spreading lobes about equaling the throat length. The white pappus is capillary and about 2mm long. Achenes are cuneate-cylindric, about 2mm long, and pale brown with appressed, silky pubescence (USFWS, 1988).

Species Distribution
Short's Goldenrod is a species of full sun or partial shade and occurs in a variety of dry, mostly open habitats. These include limestone cedar glades, open eroded areas, edges of dry, open oak-hickory woods, cedar thickets, pastures, old fields, power line rights-of-way, and rock ledges along highway rights-of-way. Cedar glades, open eroded areas and woodland edges appear to be the natural habitats for Short's Goldenrod and support the largest and healthiest populations. Short’s Goldenrod is considered to be a cedar glade endemic or near--endemic. This species also occurs in large glady clearings or in open woodlands composed of various oaks and hickories. The glade habitat within Blue Licks Nature Preserve in Blue Licks Battlefield State Park occupies two areas. One area is approximately 1,300m^2 and is characterized by a sparse covering of grasses and forbs with scattered individuals or "islands" of woody species. The substrate consists mainly of shallow clay soils with much limestone cobble and shale intermixed. The other glade-like area of the nature preserve occupies approximately 1,200m^2 and is located along both sides of an old buffalo trace. Vegetation and substrate are very similar to the adjacent cedar glade except more weed species occur (USFWS, 1988).

The known historic distribution of Short’s Goldenrod consisted of only two widely separated population areas in Kentucky. The population in the vicinity of Blue Licks was previously described under present distribution. The Blue Licks population was first discovered in 1939 and has remained extant in that area till the present (USFWS, 1988).

The second area of historic distribution was at the Falls of the Ohio, Jefferson County, Kentucky. This population of Short’s Goldenrod was first discovered in 1840 and last reported in the 1860's. The "Falis" is a large outcrop of Devonian limestone in the Ohio River lying between Louisville, Kentucky, and New Albany, Indiana. In the past, prior to construction of locks and dams, the Falls consisted of a series of rapids and chutes with scattered, large rock outcrops and several rocky islands. The extent of the historic population at the Falls is not known since the original collection data is very general and only mentions, "Rock Island," "Rocky Islands," or "Falls of the Ohio" as locations. The Falls have been greatly altered due to the construction of locks and dams and most of the islands have been destroyed or inundated (USFWS, 1988).

Distribution within Action Area

An Indiana occurrence was discovered in 2001 along the Blue River in Harrison County and appears to be stable. Approximately 139 clumps of Short's Goldenrod were counted in 2001 when the occurrence was first discovered. Additional counts in 2005 revealed 191 clumps (USFWS, 2007). Harrison County in southern Indiana is the only reported occurrence of Short's Goldenrod (USFWS, 2021).

Critical Habitat

No critical habitat has been designated for Short's Goldenrod.

Life History

Little is known about the reproductive status of Short's Goldenrod. Short's Goldenrod produces flowers from mid-August to early November. Specific pollinators are not known, but sweat bees (likely Halictidae) and the common black blister beetle (*Epicauta pennsylvanica*) have been observed in large numbers, likely feeding on the flowers. Achenes (fruits) mature several weeks after the flowers wither. Short's Goldenrod seeds are wind dispersed, but there is no evidence to suggest that this species expands its range by this method. It is possible that historically, bison may have been a dispersal vector, and that the historic distribution may have been correlated with movement patterns and disturbance caused by bison (USFWS, 1988).

Current Stressors and Threats

- Anthropogenic impacts
  Occurrences of Short's Goldenrod located within Blue Licks Battlefield State Resort Park, Kentucky, are protected from general habitat disturbance due to their location on park property and their location within an area that has been dedicated by KSNPC as a state nature preserve (Blue Licks State Park Nature Preserve). These occurrences could be adversely affected, however, through accidental trampling by park workers/visitors and inadvertent destruction resulting from park activities. Occurrences on private property are more severely threatened by direct habitat disturbance. These occurrences could be adversely affected by construction activities (land-clearing, grading, bulldozing); agricultural practices (improvement of pastures through grading and planting of fescue, trampling by livestock); fire (at wrong time of year); highway maintenance (right-of-way disturbance, spraying of herbicides); and power line maintenance (spraying of herbicides; USFWS, 2017). The Indiana occurrence is threatened by competition from exotics and the potential raising of the Ohio River's pool level. At present, trampling by visitors does not seem to be a serious threat; recreational use of the area does occur, but the plants do not seem to have been affected. The raising of the Ohio River's pool level (and subsequently the Blue River) is unlikely but could change the hydrologic dynamics of the site and cause a vegetative shift surrounding the Short's Goldenrod occurrence (USFWS, 2017).
- Secondary succession
  Natural (secondary) succession can eliminate potential habitat for Short's Goldenrod through changes in vegetational composition. As old-field habitats and closed canopy woodlands develop, potential habitat is lost (USFWS, 2017).

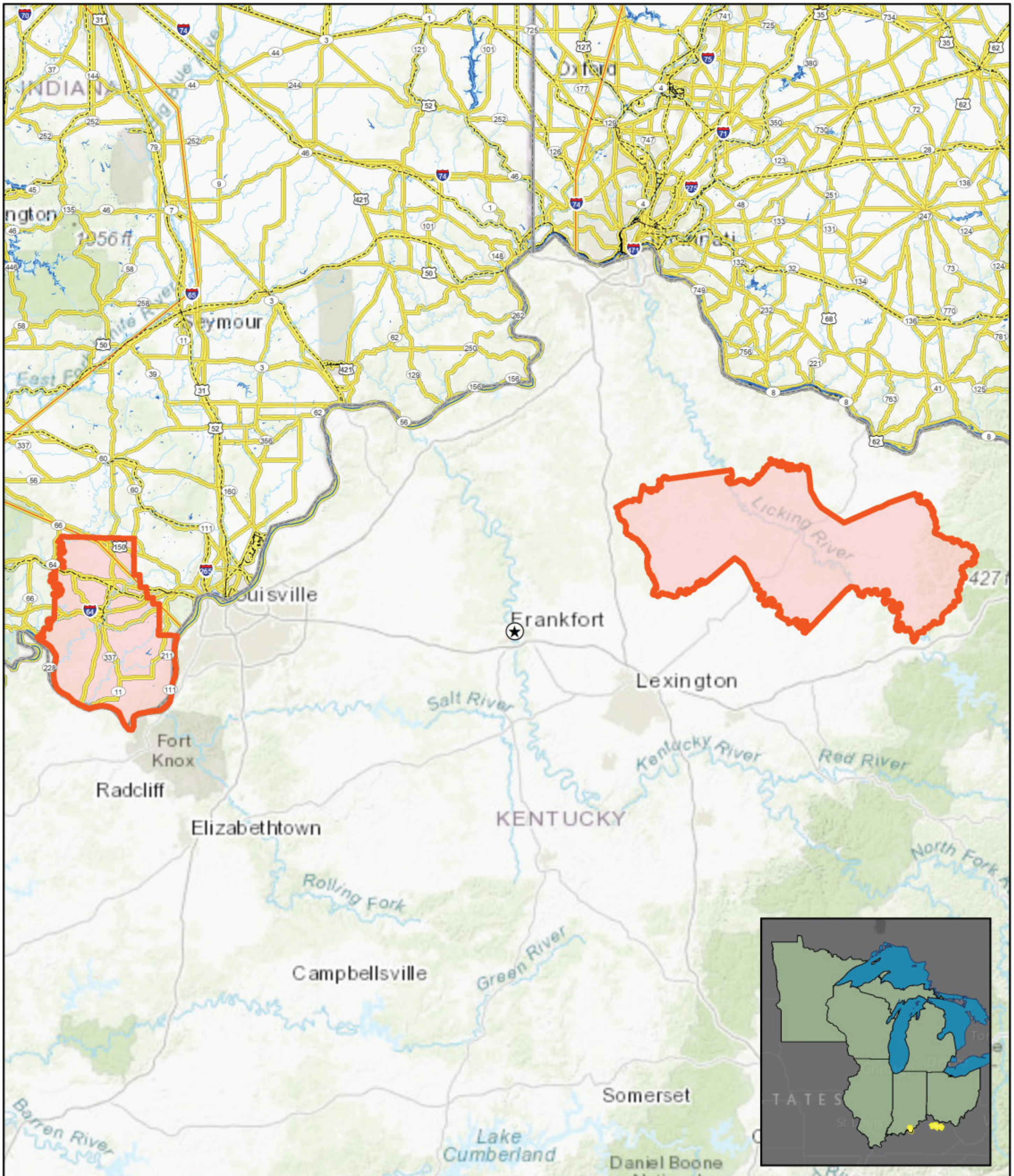
List of References

U.S. Fish & Wildlife Service (USFWS). (1988). Short's Goldenrod recovery plan. Atlanta, Georgia. 27pp.

U.S. Fish & Wildlife Service (USFWS). (2007). Short's Goldenrod (*Solidago shortii*) 5-year review: summary and evaluation. Frankfort, Kentucky. 19pp.

U.S. Fish & Wildlife Service (USFWS). (2017). Short's Goldenrod (*Solidago shortii*) 5-year review: summary and evaluation. Frankfort, Kentucky. 26pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Short's Goldenrod (*Solidago shortii*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q21U



0 5 10 20 30
Miles
0 5 10 20 30 40
Kilometers

SHORT'S GOLDENROD (*SOLIDAGO SHORTII*)
ACTION AREA OVERVIEW MAP

SCALE 1:1,800,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Short's Goldenrod (*Solidago shortii*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Small Whorled Pogonia (*Isotria medeoloides*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois and Ohio; Threatened (but presumed extirpated) in Michigan

Species Description

Isotria is a genus with only two species: *I. medeoloides* and *I. verticillata*, the Large Whorled Pogonia. Both species are herbaceous perennials with slender, hairy, fibrous roots that radiate from a crown or rootstock. In the genus *Isotria*, over-wintering buds for the next year' s shoot form on the rootstock at ground level in robust plants and beneath the soil surface on most smaller plants. The five or six leaves of *Isotria* plants (or four leaves in some vegetative plants) display themselves in a circular arrangement (false whorl) at the apex of a robust, smooth, hollow stem. Small Whorled Pogonia has a number of key characteristics that differentiate it from Large Whorled Pogonia. Particularly important are the color of the stem and flower, the relative lengths of the sepals and petals, and the length of the stem (peduncle) of the fruit capsule in relation to the length of the capsule itself. An individual Small Whorled Pogonia is usually single-stemmed, although occasionally a plant produces two or more stems in a cluster. The stem ranges from 6 to 35cm tall in a flowering plant and is similar in color, with the same degree of glaucousness, as white seedless grapes; the elliptic to elliptic—obovate leaves are also a pale milky-green or grayish-green. The flower is yellowish-green with a greenish-white lip. The sepals vary from linear-oblanceolate to narrowly spatula-like in shape, and spread outward when in full flower. The lateral petals are oblanceolate to oblong-elliptic and point forward above the lip. The sepals are approximately 1.5 to 2.5cm long and either equal in length to the lateral petals or up to 1.5 times as long (USFWS, 1992).

Species Distribution

The Small Whorled Pogonia occurs on upland sites in mixed-deciduous or mixed- deciduous/coniferous forests that are generally in second- or third-growth successional stages. Characteristics common to most Small Whorled Pogonia sites include sparse to moderate ground cover in the species' microhabitat, a relatively open understory canopy, and proximity to features that create long persisting breaks in the forest canopy. Soils at most sites are highly acidic and nutrient poor, with moderately high soil moisture values. Light availability could be a limiting factor for this species. (USFWS, 1992).

Small Whorled Pogonia was listed as endangered on October 12, 1982. At the time of listing, records for the species were known from 48 counties in 16 states and Canada. However, only 17 sites (in ten states and Ontario, Canada) were known to be extant, and these sites contained a total of fewer than 500 plants. Subsequent searches have resulted in the discovery of several new sites: the 1991 census totaled approximately 2,600 stems at 86 sites in 15 states and Canada. (USFWS, 1992).

States in which Small Whorled Pogonia is known or believed to occur include Connecticut (5 counties), Delaware (2 counties), Georgia (7 counties), Illinois (1 county), Maine (5 counties), Maryland (1 county), Massachusetts (5 counties), Michigan (1 county), Missouri (1 county), New Hampshire (7 counties), New Jersey (6 counties), New York (2 counties), North Carolina (11 counties), Ohio (2 counties), Pennsylvania (6 counties), Rhode Island (1 county), South Carolina (2 counties), Tennessee (13 counties), Virginia (39 counties), and West Virginia (4 counties; USFWS, 2021).

Distribution within Action Area

ECOS lists the following counties (USFWS, 2021):

- Illinois: Randolph
- Michigan: Berrien
- Ohio: Hocking and Scioto

The single Illinois site (one colony) was discovered in 1973. In 1991, only one plant was observed. This site is located on land owned by the Nature Conservancy and is protected (USFWS, 1992). The population was last recorded in 1996; however, it was not identified in 2007 (USFWS, 2008).

The population identified in Berrien County, Michigan was last observed in 1981 and is believed to be extirpated from the state (MNFI, 2021).

The Ohio populations have been permanently protected through land acquisitions and conservation easements (USFWS, 2008).

Critical Habitat
No critical habitat has been designated for Small Whorled Pogonia.

Life History
Populations of Small Whorled Pogonia consist of plants that may be in any of four different states: vegetative, with an abortive flower bud, flowering, or dormant. On the average, a flowering plant is taller and has a wider whorl diameter than one with an abortive bud; likewise, the latter is bigger than a vegetative plant. In the northern part of its range, plants with flowering buds emerge from the leaf litter in May and flower in June. Farther south (e.g., in Virginia), such plants typically emerge in April, with flowering beginning in very late April to mid-May. An individual plant may stay in flower from four days to nearly two weeks. Small Whorled Pogonia is scentless, apparently lacks nectar, and is primarily self-pollinating. The effects of inbreeding, if any, on the long-term viability of this species are not known. Insect pollination may take place on occasion; however, this has not been documented. The Small Whorled Pogonia only occasionally reproduces vegetatively, as indicated by rare occurrences of two or more stems originating from a single root stock. As soon as pollination occurs, the ovary begins to plumpen. The fruit capsule does not fully ripen until fall and may not dehisce until late fall. Many plants form a visible over-wintering vegetative bud at the base of the stem in August or September. Small Whorled Pogonia can also enter dormancy; however, dormancy length is largely unknown and suspected to be anywhere between 1 year to 4 years (USFWS, 1992).

Current Stressors and Threats

- Habitat loss/conversion
  The primary threat to Small Whorled Pogonia is conversion of forested habitat into roads and/or residential development, and individual sites may be degraded or eliminated as a result of development within or adjacent to its habitat.
- Herbivory
  Herbivory, specifically deer and rabbit, continues to be documented for numerous populations throughout this species range. Ohio's population is fenced for herbivory protection from deer.
- Illegal plant collection
  Although no current observations of illicit collecting have been reported recently, illegal plant collection may still threaten population of Small Whorled Pogonia (USFWS, 2008).

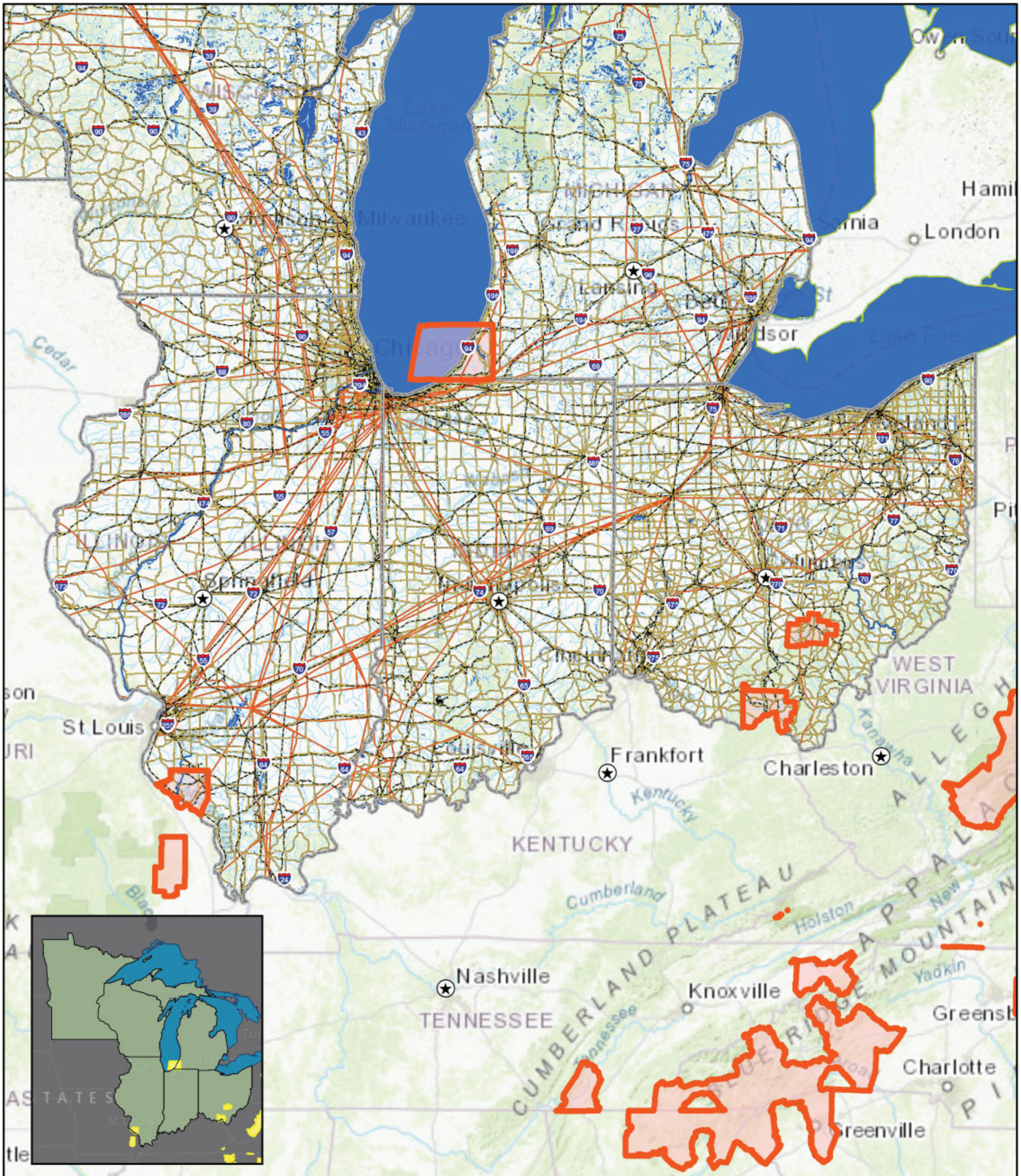
List of References

Michigan Natural Features Inventory (MNFI). (2021). *Isotria medeoloides* (Small Whorled Pogonia). Retrieved from https://mnfi.anr.msu.edu/species/description/15516/Isotria-medeoloides

U.S. Fish & Wildlife Service (USFWS). (1992). Small Whorled Pogonia (*Isotria medeoloides*) recovery plan, first revision. Newton Corner, Massachusetts. 75pp.

U.S. Fish & Wildlife Service (USFWS). (2008). Small Whorled Pogonia 5-year review: summary and evaluation. Concord, New Hampshire. 25pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Small Whorled Pogonia (*Isotria medeoloides*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q1XL



SMALL WHORLED POGONIA (*ISOTRIA MEDEOLOIDES*)
ACTION AREA OVERVIEW MAP

SCALE 1:7,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Small Whorled Pogonia (*Isotria medeoloides*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Tennessee Pondweed (*Potamogeton tennesseensis*)

Federal Listing: Under Review between 2021 and 2025 for potential protection under ESA
State Listing within the AA: Potentially Threatened in Ohio

Species Description
Tennessee Pondweed is a perennial herbaceous aquatic plant. It has rhizomes with cauline stems terete, without spots, 10 to 35cm. Leaves both submersed and floating or floating absent and are more or less spirally arranged. Submersed leaves sessile with stipules persistent and inconspicuous that are light brown to dark green, ligulate, 0.5 to 1.5cm. Floating leaves are borne on petioles that are continuous in color to apex and are 2.5 to 6cm long. Leaf blades are greenish brown adaxially, lance-oblong, 2 to 4cm long and 5 to 13mm at the base with 9 to 23 veins. Inflorescences are greenish in color, unbranched, emersed and 10-22 mm wide. Fruits are sessile, greenish brown, quadrate-orbicular, slightly compressed, abaxially keeled, laterally ridged and 2 to 3mm long with an erect beak present (0.5mm long; Flora of North America, 2021).

Species Distribution
A regional endemic, Tennessee Pondweed is dependent of aquatic habitats within a relatively narrow Appalachian range (NatureServe, 2021). Tennessee Pondweed is known to occur in Kentucky (no data), Ohio (15 occurrences), Pennsylvania (3 occurrences), Tennessee (8 occurrences), Virginia (3 counties) and West Virginia (7 counties; NatureServe, 2021).

Distribution within Action Area
No specific data found for Ohio. Vinton and Jackson Counties are identified to have occurrences (USDA, 2021).

Critical Habitat
No critical habitat was identified for Tennessee Pondweed.

Life History
No specific data regarding life history was identified.

Current Stressors and Threats
- Altered water quality/quantity
  Aquatic habitat highly threatened by agricultural run-off and other pollutants or alterations (including dams and water diversions).
- Mining and oil/gas activities
- Land use conversion
- Habitat fragmentation (NatureServe, 2021)

List of References

Flora of North America. (2021). *Potamogeton tennesseensis*. Retrieved from http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=222000311

NatureServe. (2021). NatureServe Explorer – *Potamogeton tennesseensis* (Tennessee Pondweed). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.149368/Potamogeton_tennesseensis

Ohio Department of Natural Resources (ODNR). (2020). Rare native Ohio plants 2020-21 status list. Retrieved from https://ohiodnr.gov/static/documents/natural-areas/2020-21+Ohio+Rare+Native+Plants+Status+List+FINAL.pdf

U.S. Department of Agriculture (USDA). (2021). Plant profile for *Potamogeton tennesseensis* (Tennessee Pondweed). Retrieved from https://plants.usda.gov/core/profile?symbol=POTE4

0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

TENNESSEE PONDWEED (*POTAMOGETON TENNESSEENSIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Tennessee Pondweed (*Potamogeton tennesseensis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Virginia Sneezeweed (*Helenium virginicum*)

Federal Listing: Threatened
State Listing within the AA: Threatened in Indiana

Species Description
Virginia Sneezeweed (*Helenium virginicum,* Blake) was first described in 1936 by S.F. Blake based on a collection made by E.T. Wherry from a site discovered by Lloyd Carr in Augusta County, Virginia. Virginia Sneezeweed is a 1 dm high herb with a stem simple below the inflorescence, branched above, and winged (0.3 to 2.5mm wide) throughout by the decurrent leaf bases. Basal leaves, gland-dotted, toothed or untoothed, widest in the upper half and tapering at both ends, are clustered in a rosette. The relatively few, mostly untoothed stem leaves, the middle and upper ones being narrowly linear or lance-linear, are progressively reduced up the stem. Rosette leaves, the lower stem, and some lower stem leaves are coarsely hairy. The inflorescence, loosely cymose (an inflorescence in which the terminal flower or terminal flower of a branch blooms first), consists of 2 to 20 heads, each 2.5 to 3cm wide. The central flower disk is nearly ball-shaped. Ray flowers are golden yellow, wedge -shaped and three-toothed, and disk corollas are yellow, turning purplish at the base with age. The fruit is an achene with hairs on its nerves. The pappus, consisting of 6 to 7 awn-tipped white scales that crown the achene, is 1.5mm long. The achene readily loses its corolla, resulting in a silvery appearance due to the long pappus scales (USFWS, 2000).

Species Distribution
Virginia Sneezeweed is limited to the seasonal wetlands commonly referred to as sinkhole ponds. In Virginia, these natural wetlands are located along a 90-km (56-mi) band in the alluvial fan deposits at the foot of the west side of the Blue Ridge Mountains. The pond basins have formed by the local solution of underlying carbonate formations (dolomite and limestone) but are overlain by acidic alluvial material that has eroded from the Blue Ridge Mountains to the east and south. The wetlands are subject to fluctuating water levels that may vary from year to year, but in general the pond sites are inundated in winter and spring and drier during the summer months. However, drought and high rainfall can modify this pattern, and extended periods of inundation of up to 20 months have been documented at one site. Ponds supporting Virginia Sneezeweed vary in size, basin depth and shape, and length of hydroperiod. While many of the wetlands appear pond-like, consisting of more or less circular water-filled depressions with concentric vegetation zones, others within shallow basins are more meadow-like in physiognomy with little well-defined vegetation zonation. The level of disturbance present at the sinkhole ponds includes relatively undisturbed ponds surrounded by forest, more meadow-like habitats around farm ponds actively used by cattle, a backyard seasonal wetland maintained in a open state by the landowner, a seasonally wet mowed lawn, and a seasonal wetland degraded by severe cattle trampling and ongoing attempt to fill the site (USFWS, 2000).

First found in Augusta County, Virginia in 1935, the range of Virginia Sneezeweed was expanded to Rockingham County in 1967. Up until the late 1970's fewer than ten occurrences were known, but six more occurrences were documented in the 1970's. Surveys in 1987, 1990, 1991, and 1995 resulted in the discovery of 15 additional occurrences. As of 2000, 30 populations have been documented with 23 in Augusta County and 7 in Rockingham County.

States in which Virginia Sneezeweed is known or believed to occur include Indiana (1 county), Missouri (8 counties), and Virginia (4 counties; USFWS, 2021). The 5 Year Review lists 19 occurrences in Virginia, 56 occurrences in Missouri, and one occurrence in Indiana.

Distribution within Action Area
Hamilton County in Indiana is the only county with known occurrences of Virginia Sneezeweed (USFWS, 2021).

Virgnia Sneezeweed was discovered in Hamilton County, Indiana on August 14, 2018. On November 29, 2018 a DNA analysis conducted by Dr. John Knox confirmed that the species was Virginia Sneezeweed. Upon the initial observation of this occurrence, Fishers Parks and Recreation personnel estimated the number of plants to be less than 100 and this population was placed under permanent protection (USFWS, 2020).

Critical Habitat
No critical habitat has been identified for Virginia Sneezeweed

Life History
A fibrous rooted perennial herb, Virginia Sneezeweed blooms from early July through October with a peak in late July to early August. Seed dispersal occurs in late fall, and dormancy is broken gradually with most germination delayed until the next growing season after water has drawn down. Virginia Sneezeweed appears as a basal rosette in the first year and then in its second year usually bolts, producing a single flowering stem. A single flowering stem can include 1 to 15 flowering heads. The production of new basal leaves continues year-round, and leaves that have been growing under water are more slender than those that have grown above water. Nothing is known about the pollinators of Virginia Sneezeweed; however, casual observations of insect visitors suggest that it is not a single pollinator (USFWS, 2000).

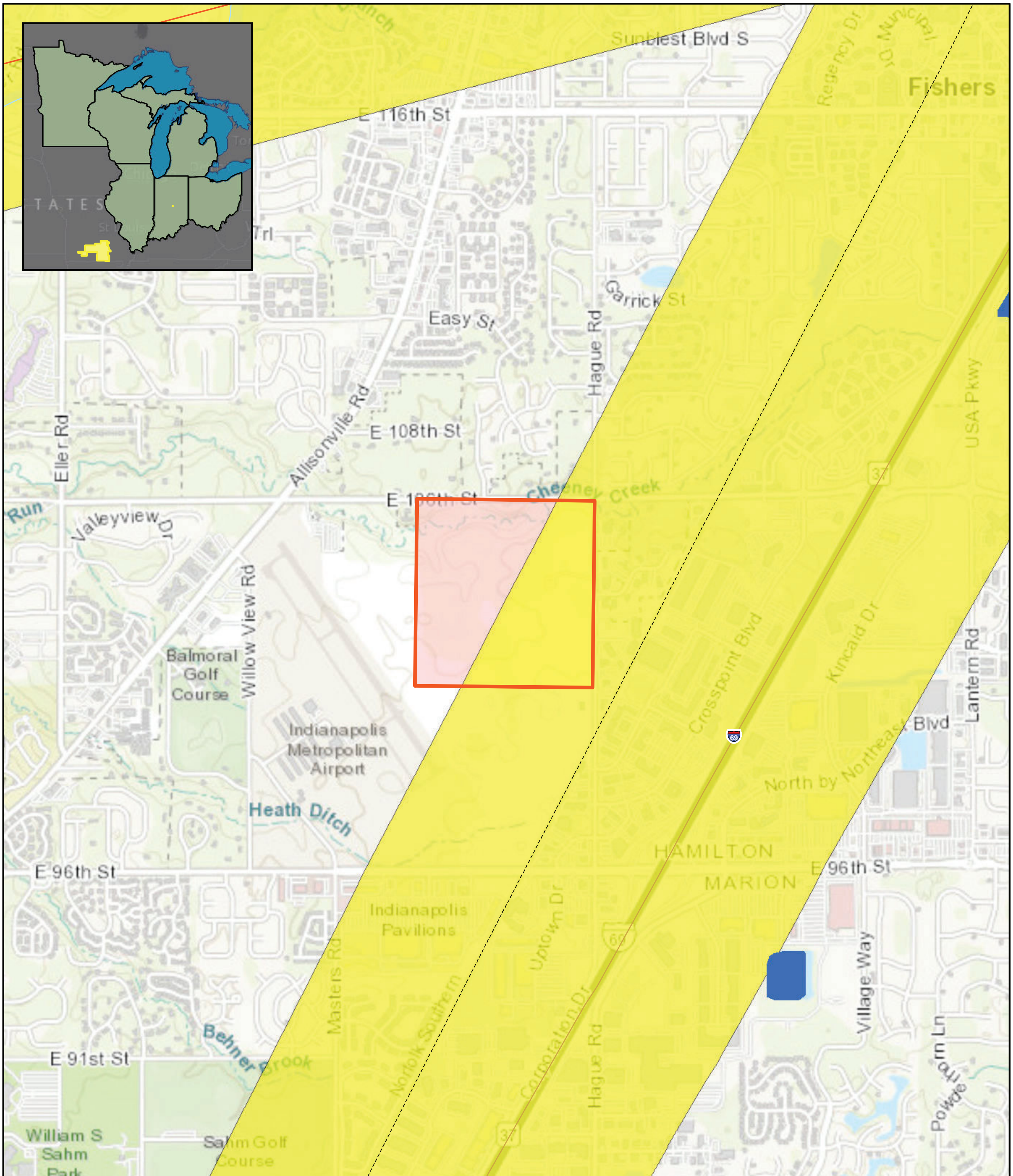
Current Stressors and Threats

- Hydrologic alteration
  Primary habitat-related threats identified for Virginia Sneezeweed include changes to hydrology, such as drought or flooding as a result of changing climate, ditching or pond deepening on private lands, or groundwater withdrawal associated with development.
- ATV or other vehicle use
- Competition and encroachment by other plant species including invasives (USFWS, 2020).

List of References
U.S. Fish & Wildlife Service (USFWS). (2000). Virginia Sneezeweed (*Helenium virginicum*) recovery plan. Technical/agency draft. Hadley, Massachusetts. 54pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Virginia Sneezeweed (*Helenium virginicum*) 5-year review: summary and evaluation. Abingdon, Virginia. 35pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Virginia Sneezeweed (*Helenium virginicum*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2P9



0 500 1,000 2,000 3,000
Feet
0 112.5 225 450 675 900
Meters

VIRGINIA SNEEZEWEED (*HELENIUM VIRGINICUM*)
ACTION AREA OVERVIEW MAP

SCALE 1:30,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Virginia Sneezeweed (*Helenium virginicum*) Counties of Occurrence

N

Basemap courtesy of Esri.　Date: 6/14/2021　Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS, EIA　Projection: WGS 1984 Web Mercator

Virginia Spiraea (*Spiraea virginiana*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Ohio

Species Description
Virginia Spiraea is a perennial shrub that has a modular growth form. The species is clonal, with a root system and vegetative characteristics that allow it to thrive under appropriate disturbance regimes. Virginia Spiraea is a large shrub 1 to 3m tall with profuse branching. Leaves are entire to completely serrate, ovate to lanceolate in shape and are 3 to 15cm long and 2 to 5cm wide. Flowers are yellow/greenish to pale white and are approximately 5 to 22cm wide. (USFWS, 1992).

Species Distribution
Virginia Spiraea is found along the banks of high gradient sections of second and third order streams, or on meander scrolls and point bars, natural levees, and other braided features of lower reaches (often near the stream mouth). They are also found in disturbed rights-of-way (USFWS, 1992).

All localities are within the southern Blue Ridge or the Appalachian (Cumberland) plateau physiographic provinces on the headwaters, or just over the divide, of streams that flow to the Ohio drainage basin. This distribution is probably relictual from a more widespread distribution during late glacial time (USFWS, 1992). Virginia Spiraea has historic records in Pennsylvania; however, this species no longer occurs in that state (USFWS, 2021a).

States in which Virginia sneezeweed is known or believed to occur include Georgia (2 counties), Kentucky (6 counties); North Carolina (8 counties), Ohio (1 county), Tennessee (11 counties), Virginia (6 counties), and West Virginia (14 counties; USFWS, 2021b).

Distribution within Action Area
Scioto County in Ohio is the only county with known occurrences of Virginia Spiraea (USFWS, 2021b). Virginia Spiraea was first discovered in Ohio in 1991 on Scioto Brush Creek and it is presently known from a small stretch of this creek. Ohio populations are small with 10 or less clones (ODNR, 2021; USFWS, 2021c).

Critical Habitat
No critical habitat has been identified for Virginia Spiraea.

Life History
Sexual reproduction is very rare and suggests poor genetic variability. Reproduction is primarily from vegetative propagules. Range-wide, fewer than 30 different genotypes are currently known (ODNR, 2021). Flowering occurs late May through late July. Flowering in the first year is rare or sparse until an individual is established. The species' flowers are visited by a host of insects, most commonly beetles. Identified insects, which are common and widespread, include flower long-horn beetles, a flower beetle, and a soldier beetle. Most flowers abort without producing follicles, particularly if the water supply is inadequate, but follicles are sporadically produced in most populations. Seeds, however, seem to be rarely produced. The seeds are very small (> 2mm long x ca. 0.5mm wide) and could be dispersed by wind or water. The follicles begin to dehisce in late August-September and continue through late winter. The follicles are at the end of a long, flexible stem that would "shake out" the small seed as a result of wind or high water. The coryrnbs often become waterlogged, collect debris, and become heavy. As one would expect, quality of seed varies greatly among corymbs and plants. Often, only one portion of a corymb will produce seed. (USFWS, 1992).

Current Stressors and Threats

- Human activity
  The only documented cause of extirpation of Virginia Spiraea has been human activity, and it appears to be extirpated in six out of thirty-three watersheds.
- Impoundments
  Impoundments are a double threat to this species: clones are not only destroyed by rising water, but the impoundment may also serve as a “death trap” for propagules washed downstream.
- Various insect pests (including aphids, ants, and the copper underwing moth caterpillar)
- Introduction of invasive vegetation such as Japanese knotweed (*Reynoutria japonica*), Chinese privet (*Ligustrum sinense*), Japanese Spiraea (*Spiraea japonica*), and rambler rose (Multiflora rose; USFWS, 1992).

List of References

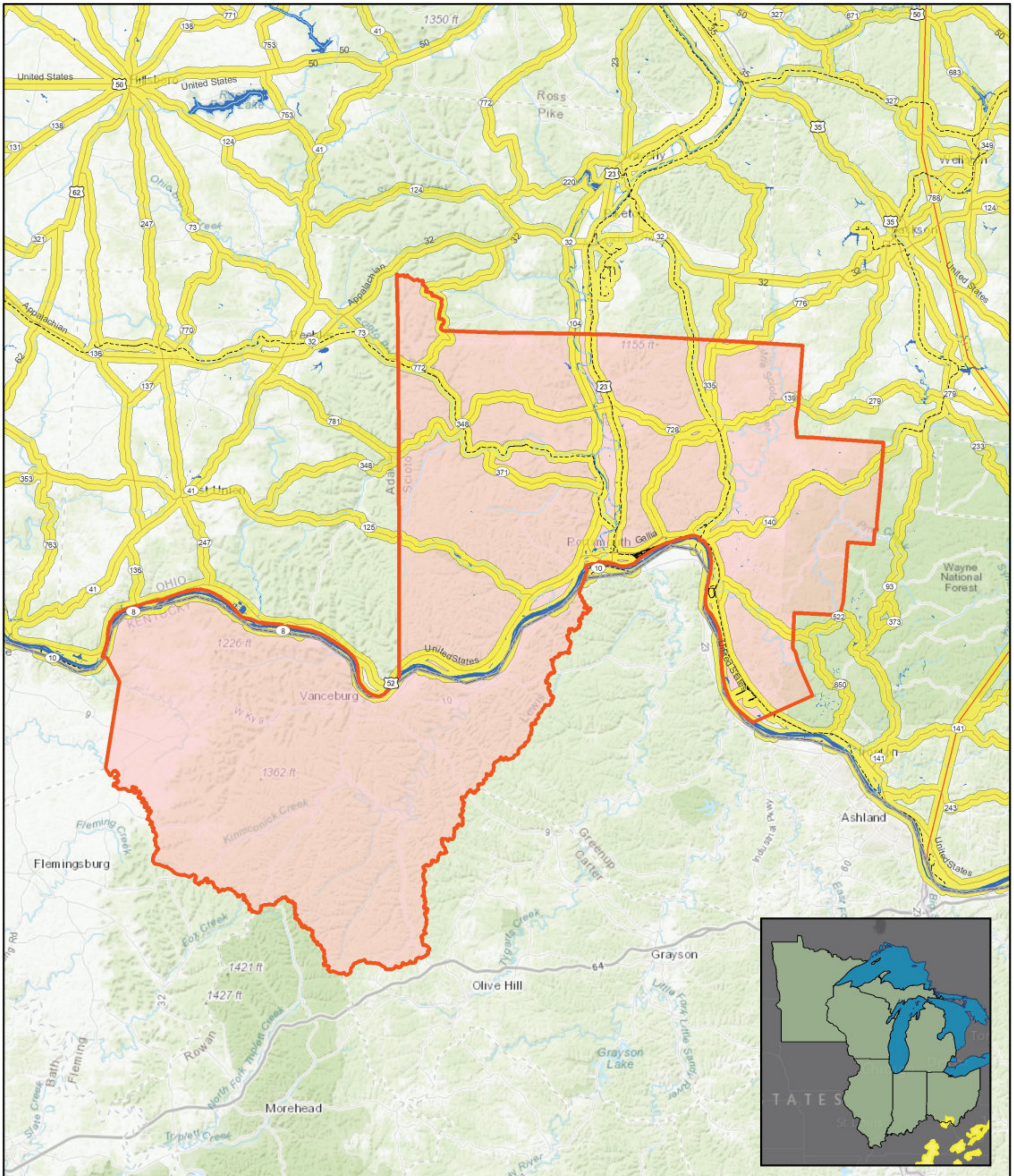
Ohio Department of Natural Resources (ODNR). (2021). Virginia Spiraea. Retrieved from https://ohiodnr.gov/wps/portal/gov/odnr/discover-and-learn/plants-trees/flowering-plants/virginia-spiraea

U.S. Fish & Wildlife Service (USFWS). (1992). Virginia Spiraea (*Spiraea virginiana* Britton) recovery plan. Newton Corner, Massachusetts. 47pp.

U.S. Fish & Wildlife Service (USFWS). (2021a). Virginia Spiraea (*Spiraea virginiana*). Retrieved from https://www.fws.gov/southeast/wildlife/plants/virginia-spiraea/

U.S. Fish & Wildlife Service (USFWS). (2021b). Virginia Spiraea (*Spiraea virginiana*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2P9

U.S. Fish & Wildlife Service (USFWS). (2021c). Virginia Spiraea (*Spiraea virginiana* Britton) 5-year review: summary and evaluation. Gloucester, Virginia. 49pp.



0 2 4 8 12
Miles
0 2 4 8 12 16
Kilometers

VIRGINIA SPIRAEA (*SPIREA VIRGINIANA*)
ACTION AREA OVERVIEW MAP

SCALE 1:750,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Virginia Spiraea (*Spirea virginiana*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Western Prairie Fringed Orchid (*Platanthera praeclara*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Minnesota

Species Description
Western Prairie Fringed Orchid is a smooth, erect, perennial herb that grows to 1.2m (4ft) tall. Plants have two to five fairly thick, elongate, hairless leaves each. The open, spikelike flowering stalk bears up to 24 showy, 2.5cm (1in) wide, white flowers. The lower petal of each flower is deeply 3-lobed and fringed, hence the common name. The seedpods, which contain many tiny seeds, are about 2.5cm (1in) long and tapered on both ends (USFWS, 1996).

Eastern Prairie Fringed Orchid and Western Prairie Fringed Orchid, a species pair similar in gross morphology, can be distinguished by flower color, fragrance, and size; column structure; petal shape; and sepal width. The lateral lobes of the lip of Western Prairie Fringed Orchid are often, but not always, narrower than those of Eastern Prairie Fringed Orchid. The basic distinguishing characteristics of Western Prairie Fringed Orchid are its slightly larger flowers and less elongated inflorescence (USFWS, 1996).

Species Distribution
Preferred habitat is unplowed, calcareous prairies and sedge meadows; plants have also been observed in successional communities such as borrow pits, old fields, and roadside ditches (USFWS, 1996). In Minnesota this species is found almost exclusively in remnant native plant communities. In northern Minnesota, these are typically northern wet prairie, northern mesic prairie, and occasionally prairie wet meadows. In southern Minnesota, most populations are found in southern mesic prairies, and occasionally southern wet prairies. The majority of the sites occur in full sunlight on moist calcareous till or sandy soils. None of the sites have had a significant history of cattle grazing, though a few have a history of intermittent mowing for hay (MNDNR, 2021).

Historically, Western Prairie Fringed Orchid was distributed throughout much of the western Central Lowlands and eastern Great Plains physiographic provinces of the central United States and Interior Plains in extreme south-central Canada. Historical observations or collections (last observed prior to 1970 and/or confirmed destroyed) are known from 81 counties in 8 states. Comparison of the historical and extant ranges shows the species apparently has been lost from South Dakota and Oklahoma, with significant reductions in counties of occurrence in Iowa, southeastern Kansas, Missouri, and eastern Nebraska (USFWS, 1996).

States in which Virginia sneezeweed is known or believed to occur include Colorado (32 counties), Iowa (99 counties); Kansas (4 counties), Minnesota (12 counties), Missouri (11 counties), Nebraska (66 counties), North Dakota (2 counties), South Dakota (16 counties), and Wyoming (11 counties; USFWS, 2021).

Distribution within Action Area
In 1996, Western Prairie Fringed Orchid reportedly occurred in 8 counties in Minnesota (USFWS, 1996). Currently, the following counties are listed to support known or possible populations of Western Prairie Fringed Orchid: Clay, Dodge, Douglas, Faribault, Fillmore, Freeborn, Goodhue, Hennepin, Houston, Kandiyohi, Kittson, Martin, Mower, Nicollet, Nobles, Norman, Pennington, Pipestone, Polk, Red Lake, and Rock (MNDNR, 2021).

Critical Habitat
No critical habitat has been identified for the Western Prairie Fringed Orchid.

Life History

Plants bloom from mid-June in the southern portion of the range to late July in the northern portion. Individual flowers last up to 10 days, and inflorescence produce flowers for up to 3 weeks. Pollination is required for seed production in Western Prairie Fringed Orchid. The white flowers lack nectar guides, bear long nectariferous spurs, and are fragrant at night, a suite of features typical of sphingophyllous (sphinx moth-pollinated) plants (USFWS, 1996).

Seeds mature on the plant and are released in early fall, the capsules opening at the onset of dormancy. A single capsule may produce thousands of seeds. Therefore, under ideal circumstances for germination and survivorship, the reproductive potential of a small population could be very large. Seeds are wind-dispersed and may also be adapted for dissemination through the soil profile by water. Orchid seeds are extremely small, and each bears a minute, morphologically undifferentiated embryo that often consists of only a few cells. Orchid seeds contain very limited food reserves and exhibit limited development. Continued growth of the seedling in natural conditions requires association with a compatible soil-inhabiting mycorrhizal fungus. After infection with this symbiont fungus, orchids may persist in an underground saprophytic stage until or beyond the second year before the first green foliage leaves appear. Seedling establishment may also be linked to the availability of suitable microhabitats, edaphic factors controlling soil mycorrhizae, and interspecific competition (USFWS, 1996).

Current Stressors and Threats

- Agriculture
  Agricultural threats to the Western Prairie Fringed Orchid include conversion of habitat to cropland, overgrazing, and intensive mowing that may reduce primary productivity and seed dispersal or facilitate invasion of exotic cool season grasses.
- Drainage of water sources
- Lack of prairie management/woody succession
- Herbicides and pesticides
- Collection of plants from small populations (USFWS, 2009)

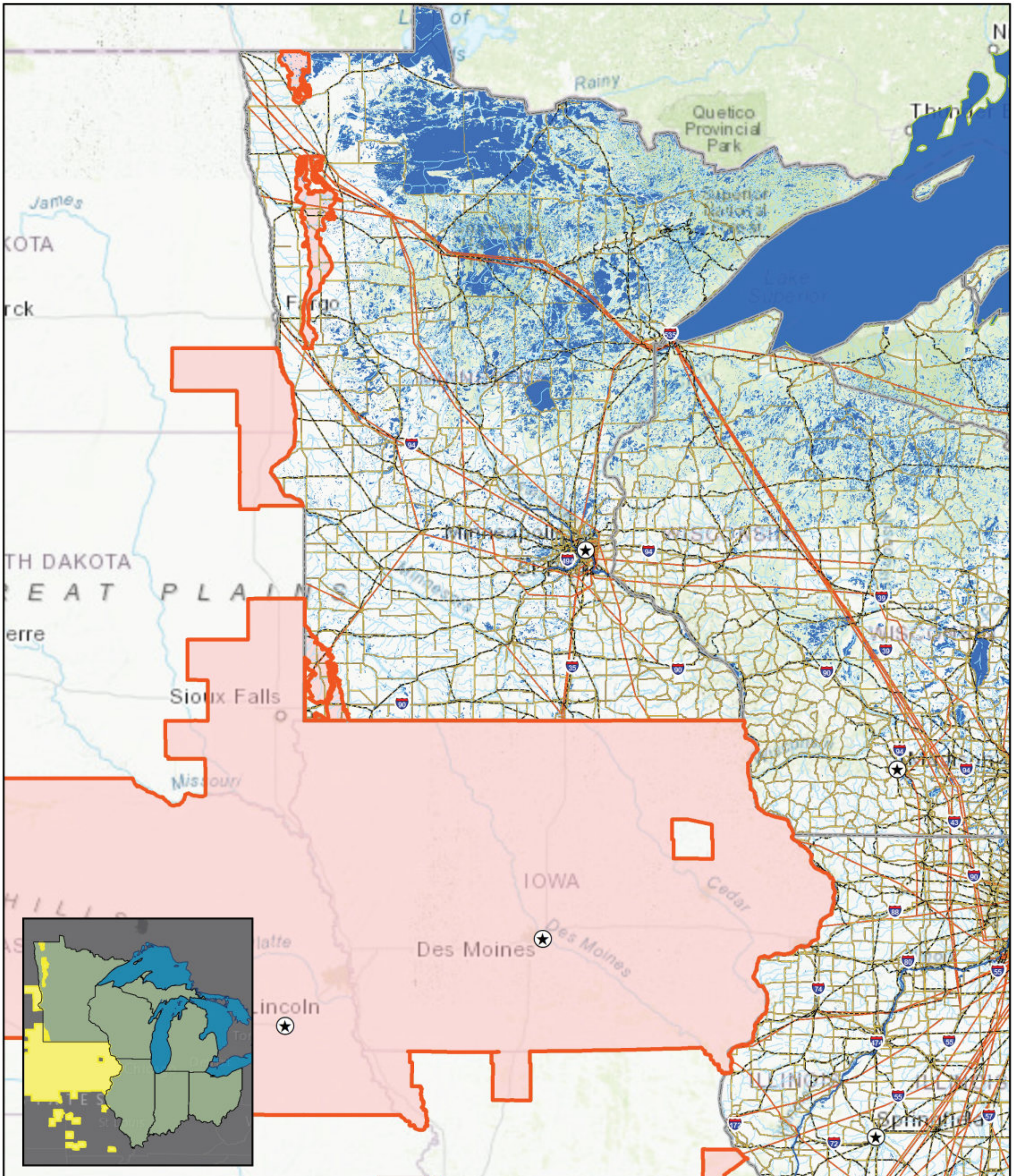
List of References

Minnesota Department of Natural Resources (MNDNR). (2021). *Platanthera praeclara* (Western Prairie Fringed Orchid). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMORC1Y0S0

U.S. Fish & Wildlife Service (USFWS). (1996). *Platanthera praeclara* (Western Prairie Fringed Orchid) recovery plan. Fort Snelling, Minnesota. 101pp.

U.S. Fish & Wildlife Service (USFWS). (2009). Western Prairie Fringed Orchid (*Platanthera praeclara*) 5-year review: summary and evaluation. Bloomington, Minnesota. 37pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Western Prairie Fringed Orchid (*Platanthera praeclara*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=Q2YD



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

WESTERN PRAIRIE FRINGED ORCHID (*PLATANTHERA PRAECLARA*) ACTION AREA OVERVIEW MAP

SCALE 1:7,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Western Prairie Fringed Orchid (*Platanthera praeclara*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

SNAILS

Iowa Pleistocene Snail (*Discus macclintocki*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois

Species Description
The Iowa Pleistocene Snail is a small terrestrial snail with an adult width of 6 to 8mm. The shell is moderately high-spired, almost dome shaped, and tightly coiled; adults typically have six whorls. Ribs are relatively fine and confined to the upper half of each whorl. The shell color is either brown or greenish-white. The species has a moderate-sized umbilicus and lacks a parietal callus (USFWS, 1984).

Species Distribution
The Iowa Pleistocene Snail occurs exclusively on algific talus slopes. These slopes are developed over the entrances to small fissures and caves. Air flows through fractured bedrock, over frozen groundwater, and out-vents on steep slopes to create a cool, moist microclimate (USFWS, 1984; USFWS, 2009). Ground temperature rarely exceeds 10°C (50°F) or falls below -10°C (14°F), and average humidity often exceeds 60 percent (USFWS, 1984). This habitat is only known to occur in the Driftless Area that overlaps the states of Illinois, Iowa, Minnesota, and Wisconsin (USFWS, 2009). It is known from fossil records that the Iowa Pleistocene Snail was distributed throughout the Midwest during the Pleistocene era (400,000 years ago; USFWS, 2009). Its historic range included parts of southern Iowa and adjacent Nebraska, northern Missouri, west and central Illinois, Indiana, and Ohio (USFWS, 1984). As the glaciers receded, the snail survived in small pockets of suitable habitat on algific talus slopes. The Iowa Pleistocene Snail is currently only known to occur in the Driftless Area in portions of Clayton, Clinton, Delaware, Dubuque, Fayette, and Jackson Counties, Iowa and Jo Daviess County, Illinois (USFWS, 2009). The original recovery plan identified 19 known Iowa Pleistocene Snail locations within this range. With additional studies conducted since the recovery plan was issued, the number of known locations has increased to 38 sites on 31 geographically isolated algific talus slopes (USFWS, 2013).

Distribution within Action Area

- Only known to occur on one algific talus slope in Jo Daviess County, Illinois.
- ECOS indicates the species is known or believed to occur in Grant County, Wisconsin; however, no populations of Iowa Pleistocene Snail are currently known to occur in Wisconsin (USFWS, 2013).

Critical Habitat
No critical habitat has been designated for the Iowa Pleistocene Snail.

Life History
The Iowa Pleistocene Snail occurs only in small areas on algific talus slopes, described above. Abundance on occupied slopes may range from 50 up to 205,000 individuals per colony or slope, and high spatial and/or temporal variation in population size has been noted in some locations (USFWS, 2013). Individuals are typically active during the warmer months and hibernate through the winter (USFWS, 1984). The Iowa Pleistocene Snail feeds primarily on decaying birch and maple leaves in the forest floor litter but may also feed on dogwood and willow leaves (USFWS, 1984; USFWS, 2013). The species matures during its third year and lays clutches of up to six eggs multiple times per year under logs or bark or just beneath the soil surface. Individuals are hermaphroditic and may be able to self-fertilize (USFWS, 2013). Average lifespan is less than seven years. Predators include the short-tailed shrew (*Blarina brevicauda*) and predatory beetles (USFWS, 2013).

Current Stressors and Threats
Primary threats to the Iowa Pleistocene Snail include human disturbance, natural calamities, and climate change (USFWS, 1984; USFWS, 2009).

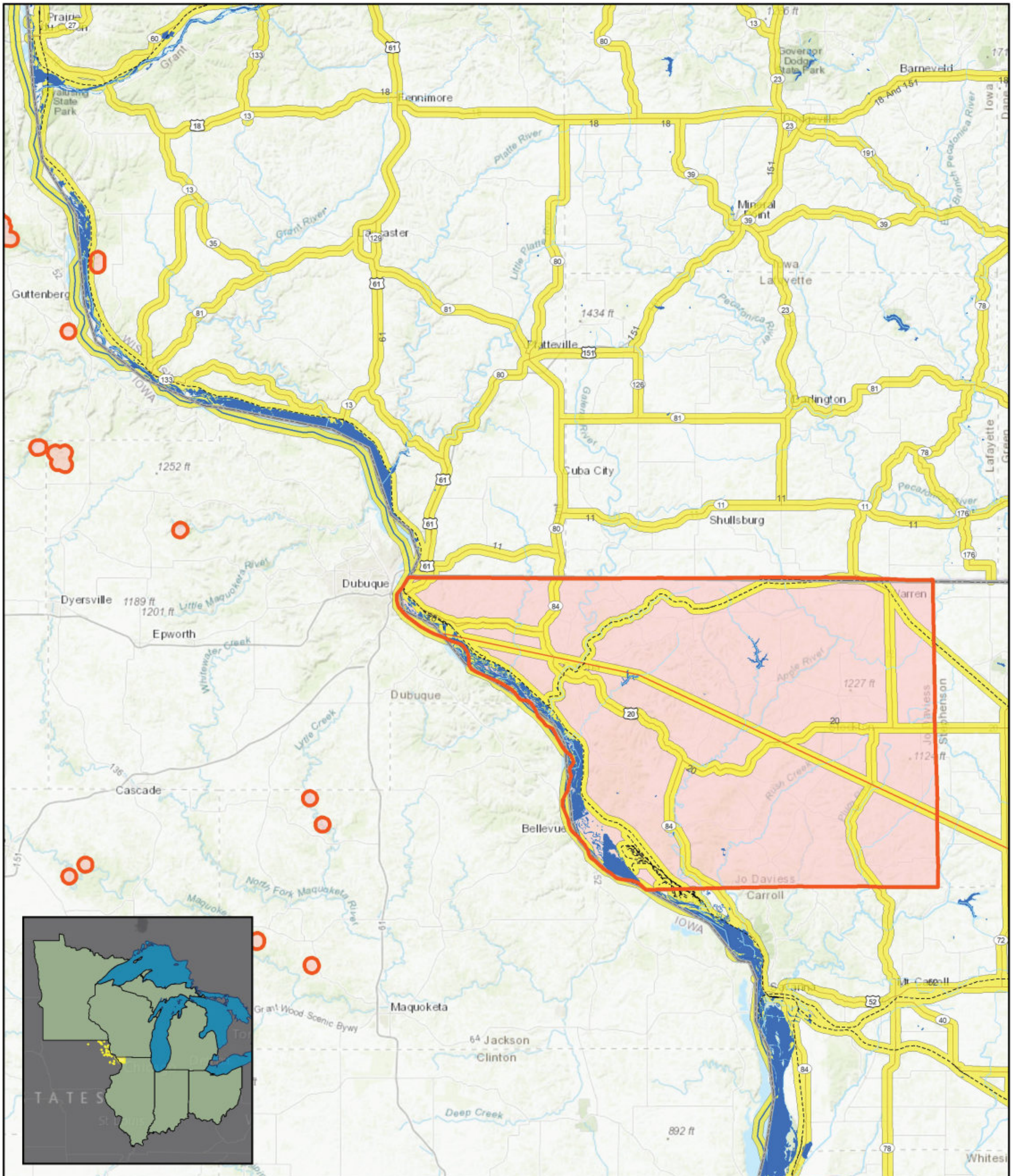
- Human disturbance
  Anthropogenic activities such as slope clearing, pasturing of domestic animals, and road building, destroy major food sources, lessens litter accumulation, increases soil erosion, and leaves the slopes more exposed to seasonal temperature extremes (USFWS, 1984). Most grazing threats have been alleviated by working with landowners to fence their sites (USFWS, 2009). However, increased development (primarily rural house building) in northern Iowa could threaten some sites as there tend to be scenic ridges above the algific slopes (USFWS, 2009). Sinkhole filling is also a concern when they occur in crop fields or pastures. Some sinkholes are not intentionally filled, but are impacted by runoff from crop fields, causing soil and probably agricultural chemicals to enter (USFWS, 2009). Human traffic is also a major cause of damage to many algific slopes. Recreational hiking, hunting, scientific investigations, and educational programs have the potential to overutilize algific slopes, resulting in trampling from foot traffic and dislodging of the fragile bryophyte cover over the thin soil and rock surfaces (USFWS, 1984; USFWS, 2013).
- Natural calamities
  Natural calamities may also damage algific slopes, thereby affecting the Iowa Pleistocene Snail. Small-scale geographic processes, such as rockfalls and stream undercutting, have damaged algific slopes by burying critical portions or physically removing small areas. Trampling by deer and other traffic may cause minor damage, and tree falls in critical areas can cause severe but highly localized damage. Weather-related factors, such as unusually severe summers or winters, tornadoes, lightning strikes, and forest fires, may affect Iowa Pleistocene Snail populations or their habitat (USFWS, 1984).
- Climate change
  Climate change may also affect Iowa Pleistocene Snail populations. While predicted climate changes may not necessarily change the cold microclimate conditions on the algific talus slopes that support this species, it is possible that warming may render the algific talus slopes in the southern portion of the species' range less suitable. Because populations are fragmented, dispersion or colonization into new suitable habitat (e.g., further north) may not occur without intervention (USFWS, 2013).

List of References

U.S. Fish & Wildlife Service (USFWS). (1984). National recovery plan for Iowa Pleistocene Snail (*Discus macclintocki*). 26pp + appendices.

U.S. Fish & Wildlife Service (USFWS). (2009). Iowa Pleistocene Snail (*Discus macclintocki*) 5-year review: summary and evaluation. Moline, Illinois. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2013). Iowa Pleistocene Snail (*Discus macclintocki*) 5-year review: summary and evaluation 2013. Moline, Illinois. 20pp + appendix.



0	2.75	5.5	11	16.5

Miles

0	2.5	5	10	15	20

Kilometers

IOWA PLEISTOCENE SNAIL (*DISCUS MACCLINTOCKI*)
ACTION AREA OVERVIEW MAP

SCALE 1:800,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Iowa Pleistocene Snail (*Discus macclintocki*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

FRESHWATER MUSSELS

Clubshell (*Pleurobema clava*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, and Ohio

Species Description

The Clubshell is a small mussel, averaging 1 to 1.5in in length, though it may reach lengths up to about 3in. The shell is triangular, elongate, and relatively thick. The umbos are low and projected far forward. Beak sculpture, if visible, consists of a few weak ridges on the umbo. The periostracum is yellow to light brown, with broken green rays present near the umbo. On older individuals, the periostracum may be dark brown or black and the green rays may be obscured. Pseudocardinal teeth are small but well developed, and lateral teeth are long and slightly arched. The beak cavity is shallow to moderately deep and the nacre is white, becoming iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 1994).

Species Distribution

The Clubshell is frequently described as a small-stream species, although historic records suggest it occurred in larger rivers as well. The Clubshell is generally found in clean, coarse sand and gravel runs, often just downstream of a riffle, and individuals typically burrow completely beneath the substrate (USFWS, 1994). The Clubshell is primarily an upper Ohio River system species. The species was historically widespread and was reported from Ohio River tributary streams in Kentucky, Illinois, Indiana, and Ohio, as well as from more isolated systems in Michigan, Pennsylvania, and West Virginia (USFWS, 1994). Historic record of Clubshell exist for nearly 100 streams in the Lake Erie (Michigan), Maumee River (Indiana, Michigan, Ohio), Wabash River (Illinois, Indiana), Blue River (Indiana), Tennessee River (Alabama, Tennessee), Cumberland River (Tennessee), Green River (Kentucky), Salt River (Kentucky), Kentucky River (Kentucky), Licking River (Kentucky), Great Miami River (Ohio), Little Miami River (Ohio), Ohio Brush Creek (Ohio), Scioto River (Ohio), Hocking River (Ohio), Muskingum River (Ohio), Kanawha River (West Virginia), Middle Island Creek (West Virginia), Little Kanawha River (West Virginia), Hughes River (West Virginia), Monongahela River (Pennsylvania, West Virginia), Allegheny River (Pennsylvania), and Ohio River (Pennsylvania, Ohio) drainages, including the Ohio River mainstem (USFWS, 1994). However, at the time of listing, Clubshell was thought to be extant in only 12 streams (USFWS, 2019). Recent reviews of the species distribution suggest that its distribution remains similar; Clubshell appears to be restricted to 13 populations in the Ohio River and Lake Erie basins, and portions of 21 streams support, or might still support, the species (USFWS, 2019).

Distribution within Action Area

- Reintroduced in Champaign and Vermilion Counties, Illinois (Middle Fork Vermilion River and Salt Fork Vermilion River)
- Known from 9 Counties in Indiana: Kosciusko, Marshall, Fulton, Pulaski, Starke, White, Tippecanoe, and Carroll Counties (Tippecanoe River); DeKalb County (Fish Creek)
- Occurs in Hillsdale County, Michigan (West Branch of the St. Josephs River)
- In Ohio, Clubshell is known or believed to occur in Williams and Defiance Counties (West Branch of the St. Josephs River, Fish Creek); Hancock, Hardin, Union, Madison, Franklin, Greene, Pickaway, Ross, Pike, and Scioto Counties (Big Darby Creek, Little Darby Creek), Coshocton County (Walhonding River); Trumbull and Ashtabula Counties (Lake Erie drainage).

Critical Habitat

No critical habitat has been designated for the Clubshell.

Life History

The Clubshell is tachytictic (short-term brooder), with gravid individuals found in May through July (USFWS, 1994). Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Although some mussel species have particular displays or behaviors to attract host fish, female Clubshells do not have any known mechanisms to lure fish (USFWS, 1994). Several studies have been conducted to identify suitable host fish for Clubshell. Clubshell glochidia have successfully transformed on a variety of cyprinid fish species (minnows and shiners) in the lab. Several centrarchid and percid fish species have also been tested, but yielded no transformation (Freshwater Mussel Host Database, 2017).

Current Stressors and Threats

The Clubshell Recovery Plan (USFWS, 1994) identified 4 major stressors/threats contributing to the decline of Clubshell throughout its range: siltation, impoundment, in-stream sand and gravel mining, and pollutants. Since the initial listing of the species, these and other factors remain ongoing threats to Clubshell, primarily in the form of habitat loss and degradation.

- Water quality degradation
  Water quality degradation from point and non-point sources, particularly in small tributaries that have limited capability to dilute and assimilate pollutants, is an ongoing threat to Clubshell and other native mussels. Since listing, development has resulted in an increased number of sewage treatment plants in drainages that support the Clubshell as well as an increase in the amount of sewage discharged from existing plants. Mounting evidence indicates that freshwater mussels are more sensitive to several components of treated sewage effluent (e.g., ammonia, chlorine, and copper) than are the typical organisms used to establish criteria protective of aquatic life. Small streams are particularly vulnerable to sewage effluent, which can constitute a significant portion of the total stream flow (USFWS, 2019).
- Impoundments
  Clubshell is also affected by hydrologic and water quality alterations from the operation of impoundments. The presence of impoundments may have ameliorated the effects of downstream siltation, but these structures also control river discharges (and the many environmental parameters influenced by discharge), which may profoundly affect the ability of these populations to occupy or successfully reproduce in downstream habitats (USFWS, 2019). In addition, dams represent distributional barriers to fish hosts, as fish may not be able to move upstream past the dams, potentially limiting mussel distribution as well (USFWS, 1994).
- In-stream activities
  In-stream activities, including sand and gravel dredging, gravel bar removal, bridge construction, and pipeline construction, also threaten Clubshell populations. In-stream activities may harm mussels by direct physical disturbance, such as removing material via dredging or construction of permanent structures in the river, and by indirect changes to streamflow patterns resulting from altering the streambed configuration (USFWS, 2019). Land-based development near streams of occurrence, including residential development and agriculture, often results in loss of riparian habitat, increased storm water runoff due to increased impervious surfaces, increased sedimentation due to loss of streamside vegetation, and subsequent degradation of streambanks. Because Clubshells often live below the gravel surface, this species may be exceptionally sensitive to the increased siltation generated by these activities (USFWS, 2019).
- Resource extraction activities
  Coal, oil, and natural gas resources are present in a number of the watersheds that are known to support Clubshell. Exploration and extraction of these energy resources can result in increased siltation, a changed hydrograph, and altered water quality even at a distance from the mine or well field. Clubshell populations in smaller streams are more vulnerable to the effects of these resource extraction activities, which can account for a much larger percentage of a small watershed. However, Clubshell habitat in larger streams can also be threatened by the cumulative effects of a large number of mines and well fields (USFWS, 2019).
- Invasive species
  Invasive zebra mussels (*Dreissena polymorpha*) have continued to spread throughout the Great Lakes, Ohio, and Mississippi River basins since their accidental introduction in the 1980s. Zebra mussels may affect native freshwater mussels both directly, by physically attaching to the shells of native mussels, and indirectly, through competition or changes in water quality. Direct attachment of zebra mussels

may inhibit locomotion, feeding, respiration, or excretion by preventing native mussels from opening or closing. As filter feeders, zebra mussels may strip the water of food and nutrients, and excretion by zebra mussels may increase ambient ammonia concentrations. Zebra mussels have been documented in headwater lakes and reservoirs of a number of streams supporting Clubshell populations, and nearly all remaining reproducing Clubshell populations are downstream of lakes or reservoirs that support, or could support, zebra mussels (USFWS, 2019).

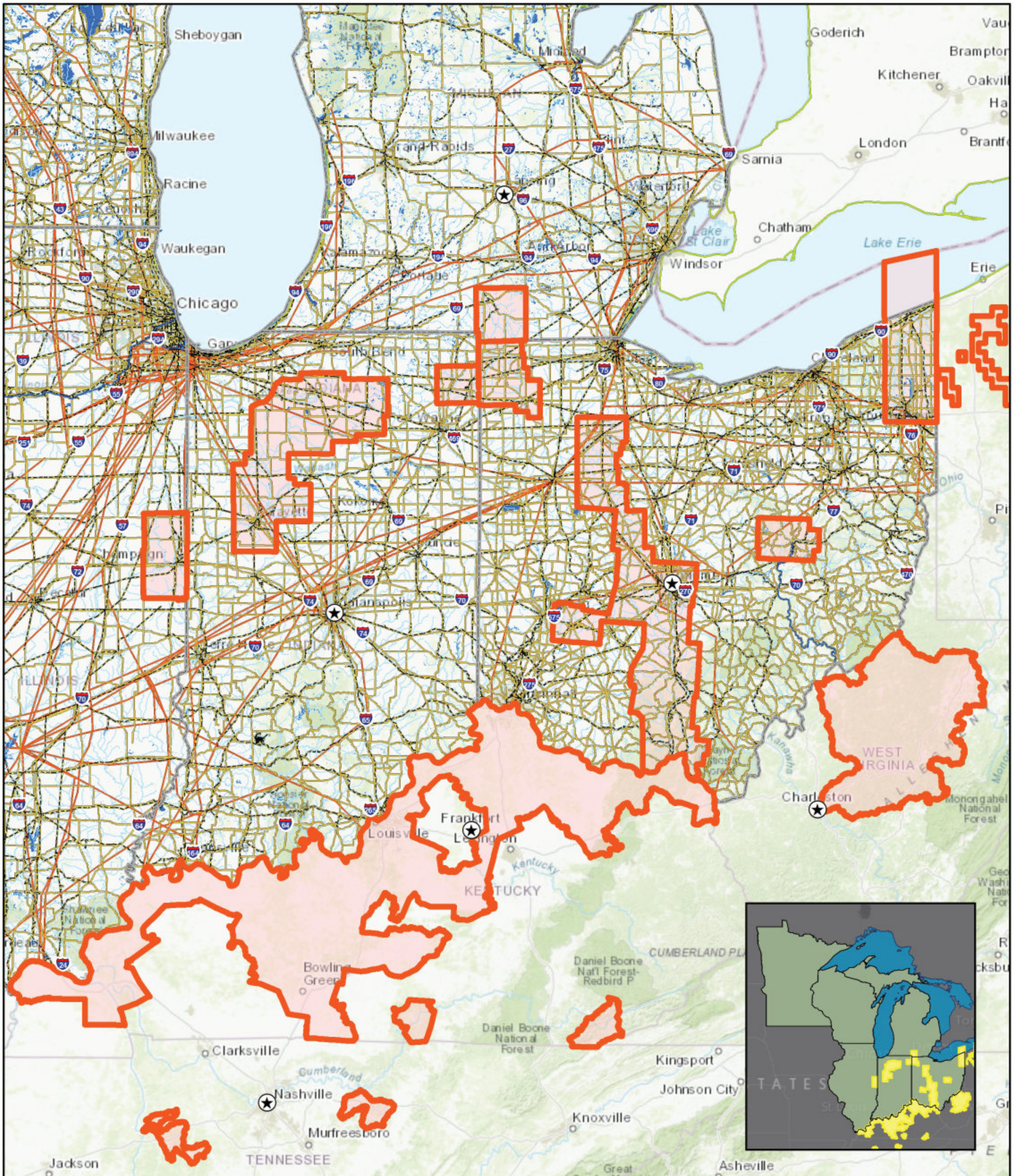
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

Freshwater Mussel Host Database. (2017). The freshwater mussel host database, Illinois Natural History Survey & Ohio State University Museum of Biological Diversity, 2017. Retrieved from http://wwx.inhs.illinois.edu/collections/mollusk/data/freshwater-mussel-host-database

U.S. Fish & Wildlife Service (USFWS). (1994). Clubshell (*Pleurobema clava*) and Northern Riffleshell (*Epioblasma torulosa rangiana*) recovery plan. Hadley, Massachusetts. 68pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Clubshell (*Pleurobema clava*) 5-year review: summary and evaluation. State College, Pennsylvania. 33pp.



0 20 40 80 120 Miles	**CLUBSHELL (*PLEUROBEMA CLAVA*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:5,500,000**
0 20 40 80 120 160 Kilometers		

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action
Clubshell (*Pleurobema clava*) Counties of Occurence

N

Fanshell (*Cyprogenia stegaria*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, and Ohio

Species Description
The Fanshell is a medium-sized mussel, reaching approximately 3in in length. The shell has a circular outline and is solid and moderately inflated. Growth lines on the shell appear as distinct elevated ridges. Numerous pustules are present on the shell surface, usually concentrated in the center of the shell but sometimes covering the entire shell surface. The periostracum is typically yellow or light green with dark green mottled rays. The pseudocardinal teeth are relatively large and serrated, and the lateral teeth are heavy, short, and straight to slightly curved. The beak cavity is shallow to moderately deep. The nacre is usually silvery white and iridescent posteriorly (USFWS, 1991; Cummings & Mayer, 1992).

Species Distribution
The Fanshell typically inhabits medium to large rivers with gravel substrate (Cummings & Mayer, 1992; USFWS, 1991). It was historically widely distributed in the Ohio, Wabash, Cumberland, and Tennessee Rivers and their larger tributaries in Pennsylvania, Ohio, West Virginia, Illinois, Indiana, Kentucky, Tennessee, Alabama, and Virginia (USFWS, 1991). However, the Recovery Plan indicated that reproducing populations were only believed to occur in three rivers: the Clinch River (Tennessee and Virginia), the Green River (Kentucky), and the Licking River (Kentucky). Remnant populations were thought to persist in the Muskingum River (Ohio), Walhonding River (Ohio), Wabash River (Illinois and Indiana), East Fork White River (Indiana), Tippecanoe River (Indiana), Kanawha River (West Virginia), Tygarts Creek (Kentucky), Barren River (Kentucky), Cumberland River (Tennessee), and Tennessee River (Tennessee) (USFWS, 1991). Recent review of Fanshell distributional data suggests that the species' distribution has not changed substantially since the recovery plan was completed. Fanshell populations in some locations, including the Tennessee River, Ohio River (Greenup Pool), Kanawha River, and Muskingum River have been augmented with translocated adult Fanshell mussels over the past 10 years (USFWS, 2019).

Distribution within Action Area
- Illinois: White County (Wabash River)
- Indiana: Carroll, Daviess, Dubois, Gibson, Lawrence, Martin, Pike, Posey, Wabash, and White Counties (Wabash River, White River, East Fork White River)
- Ohio: Coshocton, Morgan, Muskingum, and Washington Counties (Muskingum River, Walhonding River, Killbuck Creek)

Critical Habitat
No critical habitat has been designated for the Fanshell.

Life History
Life history of the Fanshell is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Gravid females have been observed from late October to late May in Tennessee (USFWS, 2019). Glochidia are released in spiral conglutinates; the worm-like shape mimics fish food items and presumably aids in attracting host fish (USFWS, 1991). Ten host fish, including various darter species, sculpin, and logperch, have been identified as suitable hosts for Fanshell glochidia (USFWS, 2019).

Current Stressors and Threats
Like other native freshwater mussels, threats to Fanshell mussels include habitat alteration due to impoundments, navigation projects, pollution, and sand and gravel dredging (USFWS, 1991).
- Water quality degradation

Ongoing threats to the Fanshell include water quality degradation from point and non-point sources, particularly in tributaries that have limited capability to dilute and assimilate sewage, agricultural runoff, and other pollutants.

- Impoundments
  In addition, the species is affected by hydrologic and water quality alterations resulting from the operation of impoundments. The presence of impoundments may have ameliorated the effects of downstream siltation on Fanshells, but these structures also control river discharges and the many environmental parameters influenced by discharge, which may profoundly affect the ability of these populations to occupy or successfully reduce in downstream habitats (USFWS, 2019).
- In-stream activities
  A variety of instream activities (e.g. sand and gravel dredging, road construction, etc.) continue to threaten Fanshell populations. Protecting these populations from the direct physical disturbance of such activities depends on accurately identifying the location of the populations. The indirect effects of altering the streambed configuration may cause changes in previously suitable habitat (USFWS, 2019).
- Resource extraction activities
  Coal, oil, and natural gas resources are present in some of the watersheds known to support Fanshell mussels. Exploration and extraction of these resources can result in increased siltation, an altered hydrograph, and degraded water quality. Although these resource extraction activities generally occur away from the river, extensive road and pipeline networks are required to access sites. These road networks frequently cross or occur near tributaries, contributing sediment to the receiving waterway. In addition, the construction and operation of wells may result in the discharge of brine (USFWS, 2019).
- Development
  Land-based development including residential and agricultural activities near streams often results in loss of riparian habitat, increased stormwater runoff due to increased impervious surfaces, increased sedimentation due to loss of streamside vegetation, and subsequent degradation of streambanks (USFWS, 2019).
- Invasive species
  Zebra mussels may affect native freshwater mussels both directly, by physically attaching to the shells of native mussels, and indirectly, through competition or changes in water quality. Direct attachment of zebra mussels may inhibit locomotion, feeding, respiration, or excretion by preventing native mussels from opening or closing. As filter feeders, zebra mussels may strip the water of food and nutrients, and excretion by zebra mussels may increase ambient ammonia concentrations. Zebra mussel populations in the Ohio River could be negatively influencing Fanshell populations, and could also influence recovery actions to benefit Fanshell by limiting locations in which to establish new populations and/or impacting newly established populations (USFWS, 2019).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1991). Fanshell (*Cyprogenia stegaria* (=*C. irrorata*)) recovery plan. Atlanta, Georgia. 37pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Fanshell (*Cyprogenia stegaria*) 5-year review: summary and evaluation. Frankfort, Kentucky. 22pp.

FANSHELL (*CYPROGENIA STEGARIA*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Fanshell (*Cyprogenia stegaria*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Fat Pocketbook (*Potamilus capax*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois and Indiana

Species Description
The shell of Fat Pocketbook is relatively large, thin (in young individuals) to moderately thick (in adults), and highly inflated. The anterior and posterior ends of the shell are rounded. The beaks are very inflated, elevated above the hinge line, and curved inward. Beak sculpture consists of a few faint ridges, generally only visible in young shells. Young individuals may also have a small posterior wing on the shell. The shell surface is smooth, and the periostracum is yellow, tan, or olive, rayless, and usually very shiny. The pseudocardinal teeth are thin and compressed, and the lateral teeth are thin and curved. The hinge line is distinctly S-shaped. The beak cavity is very deep. The nacre is bluish white, sometimes tinged with pink or salmon (USFWS, 1989; Cummings & Mayer, 1992).

Species Distribution
The Fat Pocketbook typically occurs in large rivers and occupies slow-flowing areas with mud, sand, or fine gravel substrate (Cummings & Mayer, 1992; USFWS, 1997). The Fat Pocketbook was historically widely distributed in the Mississippi River drainage from the confluence of the Minnesota and St. Croix Rivers downstream to the White River system. The species was documented in Minnesota, Wisconsin, Iowa, Illinois, Indiana, Missouri, Kentucky, and Arkansas. Most historical records for this species are from the upper Mississippi River (above St. Louis), the Wabash River in Indiana, and the St. Francis River in Arkansas. When listed, only the St. Francis River and White River populations of Fat Pocketbook were believed to be extant and viable (USFWS, 2019). More recently, the range of Fat Pocketbook in the St. Francis and Ohio River drainages has increased over the historically documented extent. While the species appears to remain extirpated from the upper Mississippi River, it has expanded its range into the lower Mississippi River. Since 1985, Fat Pocketbook has been reported from 33 streams in the St. Francis River, Ohio River, and Mississippi River basins, including the Ohio and lower Mississippi River mainstems, and recruitment has been documented in several streams (USFWS, 2019).

Distribution within Action Area
- Illinois: Alexander, Crawford, Gallatin, Hardin, Johnson, Lawrence, Massac, Pope, Pulaski, Wabash, White Counties (Ohio River, Wabash River, Little Wabash River)
- Indiana: Daviess, Gibson, Knox, Pike, Posey Counties (Ohio River, Wabash River, White River, East Fork White River)

Critical Habitat
No critical habitat has been designated for the Fat Pocketbook.

Life History
Life history of the Fat Pocketbook is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Like other mussels in the lampsiline subfamily, Fat Pocketbook is likely bradytictic (a long-term brooder), and gravid females have been observed from June to October (USFWS, 1989). Of nearly 30 fish species tested, Freshwater Drum (*Aplodinotus grunniens*) remains the only known suitable host for Fat Pocketbook glochidia (USFWS, 2019).

Current Stressors and Threats
Primary threats or stressors identified for the Fat Pocketbook in the original Recovery Plan included habitat modification due to navigation and flood control activities (e.g. impoundment, channelization, channel maintenance, dredging), as well as siltation and pollution. More recent reviews have also identified

hydropower/hydrokinetic development, channel dredging, and illegal discharges and spills as additional threats to the species.

- Impoundments
  Among the extant Fat Pocketbook populations, the Ohio River is the only one currently directly affected by impoundments; however, since listing, this species has expanded its range or been discovered in reaches of the lower river affected by navigation impoundments. The Fat Pocketbook continues to survive and recruit in dam tailwaters as well as in riverine sections and the upper pools of impounded reaches through an approximately 160-mile reach of the lower Ohio River. In addition, Fat Pocketbook continues to survive and reproduce both upstream and downstream of the recently constructed Olmsted Dam (completed in 2018; USFWS, 2019).
- Hydropower development
  Construction of a hydropower generation facility at Smithland Lock and Dam was considered a threat to the Fat Pocketbook. Mussels occurring near the project area could be directly harmed by construction activities or indirectly affected by altered flows, dissolved oxygen levels, and availability of fish hosts (USFWS, 2012). Monitoring during and after construction demonstrated a decline in overall freshwater mussel abundance, possibly due to changes in substrate as a result of the project. However, persistence and recruitment of Fat Pocketbook during and after construction of the hydropower project has been demonstrated (USFWS, 2019).
- Channelization and dredging
  Channel dredging may have many direct and indirect effects on freshwater mussels, including direct mortality, accelerated channel erosion, decreased habitat diversity, increased bedload, and/or increased habitat instability. Maintenance dredging is periodically required for navigation and barge fleeting areas in the Mississippi and Ohio Rivers, and for flood control and drainage efficiency in tributaries and ditches of the St. Francis River drainage. Much of the dredging in the Mississippi and Ohio River basins occurs in depositional areas where Fat Pocketbook is unlikely to occur, and several studies in the St. Francis River basin suggest that Fat Pocketbook populations not only survive channel clean out operations, but rapidly reoccupy post-work channel habitats (USFWS, 2019).
- Pollution
  Fat Pocketbook mussels may be locally vulnerable to spills or illegal discharges. However, such episodes are rare, and impacts are relatively localized. Non-point source pollution (stormwater or agricultural runoff) may have negative effects on mussel populations and has been identified as a concern in the Wabash and St. Francis River drainages. However, the increase in Fat Pocketbook abundance and range over the past two decades within areas that are highly impacted by non-point agricultural runoff and sediments suggests non-point source pollutants are not currently a major impediment to Fat Pocketbook survival (USFWS, 2019).

List of References

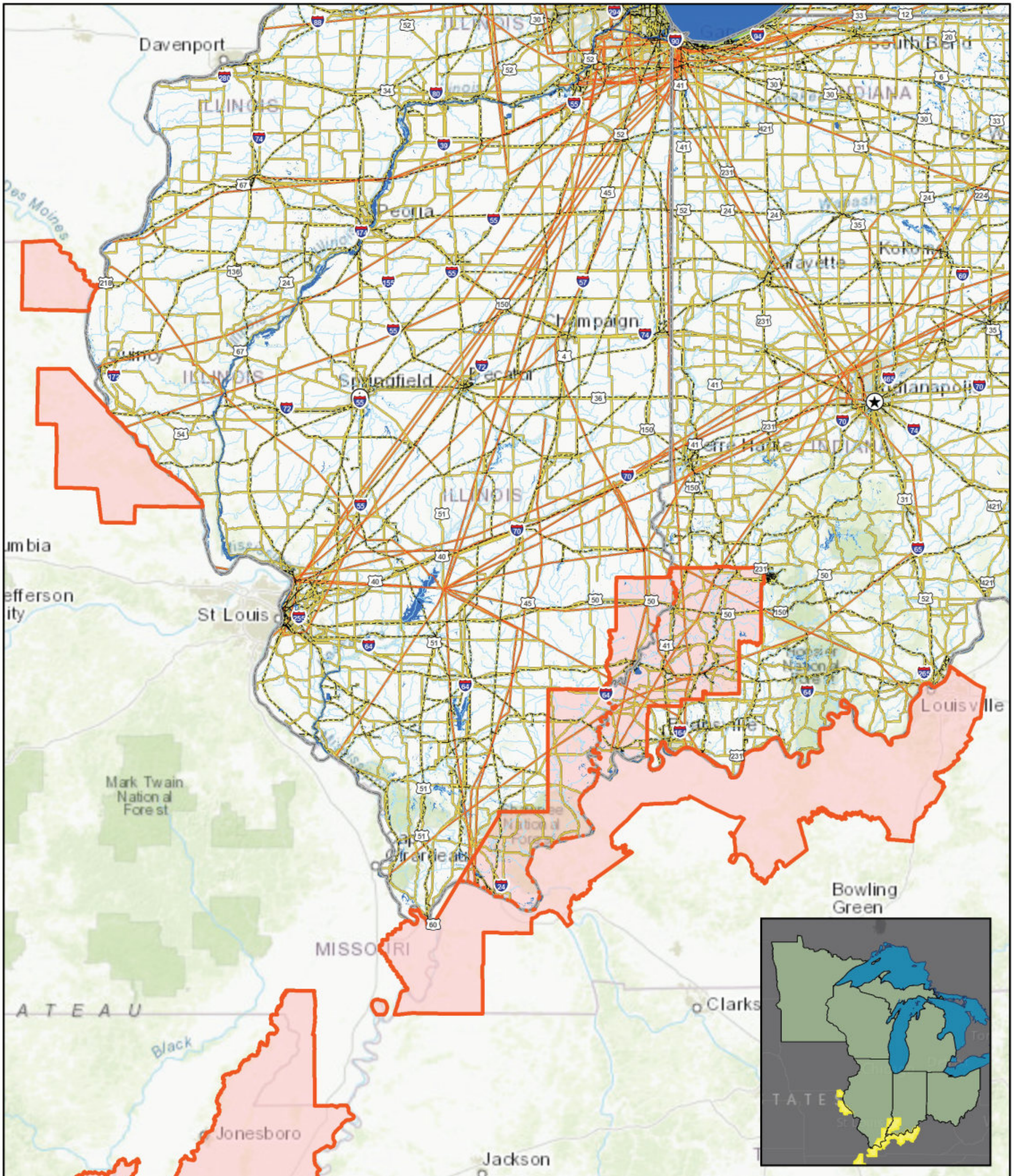
Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1989). A recovery plan for the Fat Pocketbook pearly mussel *Potamilus capax* (Green 1832). Atlanta, Georgia. 22pp.

U.S. Fish & Wildlife Service (USFWS). (1997). Fat Pocketbook (*Potamilus capax*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/clams/fatpo_fc.html

U.S. Fish & Wildlife Service (USFWS). (2012). Fat Pocketbook pearly mussel (*Potamilus capax*) 5-year review: summary and evaluation. Jackson, Mississippi. 21pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Fat Pocketbook pearly mussel (*Potamilus capax*) 5-year review: summary and evaluation. Jackson, Mississippi. 31pp.



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

FAT POCKETBOOK (*POTAMILUS CAPAX*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Fat Pocketbook (*Potamilus capax*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Higgins Eye Pearlymussel (*Lampsilis higginsii*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Minnesota, and Wisconsin

Species Description
The Higgins Eye Pearlymussel is a medium-sized mussel, reaching lengths up to 4in (10.2cm). The shell is rounded or oval, solid, and moderately inflated. The species is sexually dimorphic; the posterior end of the shell is bluntly pointed in males and truncated in females. The beaks are turned forward and elevated above the hinge line, and beak sculpture, if visible, consists of a few double-looped ridges. The shell is smooth and yellowish-green to brown, sometimes with green rays. The pseudocardinal teeth are thick and triangular, with two in the left valve and one in the right, and the lateral teeth are thick and straight to moderately curved. The beak cavity is deep. The nacre is white, may be tinged with pink near the beak cavity, and iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 2004).

Species Distribution
Higgins Eye Pearlymussel has generally been characterized as a large river species. It has been found in a variety of substrate types, but typically does not occur where substrate is comprised of hard clay, flocculent silt, organic material, bedrock or concrete, or unstable shifting sand (USFWS, 2004). Historically, the range of Higgins Eye Pearlymussel included the Mississippi River mainstem from just north of St. Louis, Missouri to just South of St. Paul, Minnesota, and tributaries in Illinois (Illinois, Sangamon, and Rock Rivers), Iowa (Iowa, Cedar, and Wapsipinicon Rivers), Wisconsin (Wisconsin and St. Croix Rivers), and Minnesota (Minnesota River; USFWS, 2004). However, its current range is limited to approximately 50% of the historic range; species observations since 1980 have been limited to the Mississippi River upstream of Lock and Dam 19, the St. Croix River, the Wisconsin River, and the lower Rock River (USFWS, 2012). USFWS and partner agencies have undertaken efforts to reintroduce Higgins Eye Pearlymussel into portions of its historic range, including several Mississippi River navigation pools, the lower Rock River, and the Iowa, Cedar, and Wapsipinicon Rivers (USFWS, 2004).

Distribution within Action Area

- Illinois: Adams, Carroll, Hancock, Henderson, Henry, Jo Daviess, Mercer, Pike, Rock Island, Whiteside Counties (Mississippi River, Rock River)
- Minnesota: Chisago, Dakota, Goodhue, Hennepin, Houston, Ramsey, Wabasha, Washington, Winona Counties (Mississippi River, St. Croix River)
- Wisconsin: Buffalo, Columbia, Crawford, Dane, Grant, Iowa, La Crosse, Pepin, Pierce, Polk, Richland, Sauk, St. Croix, Vernon Counties (Mississippi River, St. Croix River, Wisconsin River)

Critical Habitat
No critical habitat has been designated for the Higgins Eye Pearlymussel. However, USFWS has designated several Essential Habitat Areas – primary habitat locations capable of supporting reproducing populations of Higgins Eye Pearlymussel – throughout its range. There are currently 13 Essential Habitat Areas and an additional 6 potential Essential Habitat Areas identified in the Mississippi, St. Croix, and Wisconsin Rivers (USFWS, 2008).

Life History
The Higgins Eye Pearlymussel is bradytictic (long-term brooder). Individuals spawn in the summer and larvae, known as glochidia, are held in the marsupia over the winter before being released the following spring/summer. Once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The edge of the female mussel’s mantle is developed into a flap that resembles a small fish, presumably luring host fish to the mussel. Fish species identified as suitable hosts for Higgins Eye Pearlymussel include sauger (*Sander canadensis*), walleye (*Sander vitreus*), freshwater drum (*Aplodinotus grunniens*), largemouth bass (*Micropterus*

salmoides), smallmouth bass (*Micropterus dolomieu*), yellow perch (*Perca flavescens*), and black crappie (*Pomoxis nigromaculatus*; USFWS, 2004).

Current Stressors and Threats

The Higgins Eye Pearlymussel Recovery Plan (First Revision; USFWS, 2004) identified zebra mussels and other invasive species, habitat alteration, water quality, and commercial harvest as present threats to the species. The 2020 5-year review also identified toxic chemical spills as a potential threat.

- Zebra mussels
  Zebra mussels were introduced to North America via ballast water in commercial shipping vessels in the 1980s and have since spread throughout the Great Lakes, Mississippi River, and Ohio River basins. Zebra mussels may affect native freshwater mussels both directly, by physically attaching to the shells of native mussels, and indirectly, through competition or changes in water quality. Direct attachment of zebra mussels may inhibit locomotion, feeding, respiration, or excretion by preventing native mussels from opening or closing. As filter feeders, zebra mussels may strip the water of food and nutrients, and excretion by zebra mussels may increase ambient ammonia concentrations. Various studies have documented profound effects of zebra mussels on areas occupied by Higgins Eye Pearlymussel (USFWS, 2004).
- Impoundments and dredging
  Habitat alteration poses another threat to Higgins Eye Pearlymussel. Modifications to the Upper Mississippi River for navigation, including construction of wing dams, dredging, and the current lock and dam system, replaced the once free-flowing system with a stepped gradient river and may have altered substrate composition, sedimentation, and current velocity. Although most of these changes have already occurred, future changes in channel operation and maintenance could affect the species.
- In-stream development
  Smaller-scale habitat alteration from in-stream development projects, such as barge loading facilities or highway bridges, continues to be a threat.
- Water quality degradation
  Changes in water quality due to point and non-point contaminants and pollutants, and chronic and episodic events, may also threaten Higgins Eye Pearlymussel and other native mussel species. Several toxic chemical spills have been reported throughout the range of Higgins Eye Pearlymussel, particularly in the Mississippi River, and have killed mussels and fish in affected areas. Such spills likely continue to threaten Higgins Eye Pearlymussel and other native mussels (USFWS, 2020).

List of References

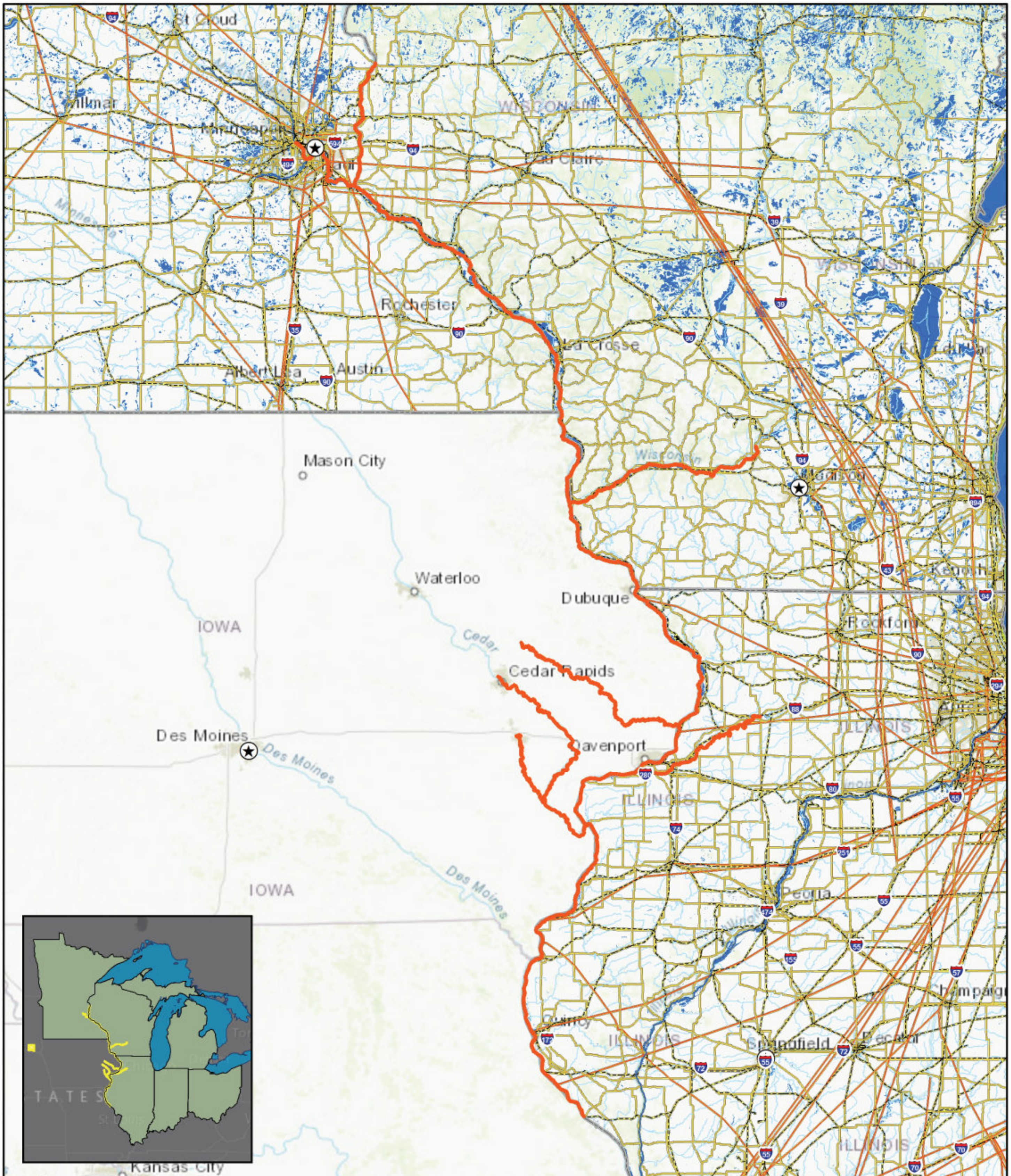
Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2004). Higgins Eye Pearlymussel (*Lampsilis higginsii*) recovery plan: first revision. Ft. Snelling, Minnesota. 126pp.

U.S. Fish & Wildlife Service (USFWS). (2008). Higgins Eye (*Lampsilis higginsii*) Essential Habitat Areas: 2008 review and addition of new EHAs. Retrieved from https://www.fws.gov/midwest/endangered/clams/pdf/hepmEHA.pdf

U.S. Fish & Wildlife Service (USFWS). (2012). Higgins Eye Pearlymussel (*Lampsilis higginsii*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/clams/higginseye/higgins_fs.html

U.S. Fish & Wildlife Service (USFWS). (2020). Higgins Eye (Pearlymussel) (*Lampsilis higginsii*) 5-year review: summary and evaluation. Bloomington, Minnesota. 28pp.



0 12.5 25 50 75
Miles
0 10 20 40 60 80
Kilometers

HIGGINS' EYE PEARLYMUSSEL (*LAMPSILIS HIGGINSII*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Higgins' Eye Pearlymussel (*Lampsilis higginsii*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Longsolid (*Fusconaia subrotunda*)

Federal Listing: Proposed Threatened. The Longsolid was petitioned for Federal listing under the Endangered Species Act in 2010. The U.S. Fish & Wildlife Service proposed listing the species as Threatened in 2020 (85 FR 61384).
State Listing within the AA: Endangered in Ohio

Species Description
The Longsolid is a medium-sized, thick-shelled mussel. The shell is oval or elliptical, becoming more elongate with age, and moderately inflated, though there is variability in the inflation depending on population and location (Cummings & Mayer, 1992; USFWS, 2018). The beaks are low and directed forward. The shell is smooth, and the periostracum is light brown, becoming darker brown or black in adults. Fine broken green rays are present on the umbo (Cummings & Mayer, 1992; USFWS, 2018). The pseudocardinal teeth are large and well developed, and the lateral teeth are large and straight. The beak cavity is wide, compressed, and very deep. The nacre is white, iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 2018).

Species Distribution
The Longsolid occurs in small to large rivers in substrates ranging from sand and gravel to coarse gravel and cobble. The species has been associated with slower, deeper microhabitats, suggesting it has a greater tolerance for pool and run habitats (USFWS, 2018). The Longsolid was historically known from 162 populations in the Great Lakes, Ohio, Cumberland, and Tennessee River basins in Alabama, Georgia, Illinois, Indiana, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia (USFWS, 2018). However, many populations have since been extirpated, and the Longsolid is currently only known from 60 populations in Alabama, Kentucky, New York, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. The species is considered extirpated from Georgia, Illinois, and Indiana and from the entire Great Lakes basin (USFWS, 2018).

Distribution within Action Area
- Illinois: Alexander, Massac, Pope, and Pulaski Counties (Ohio River)
- Indiana: Crawford, Dearborn, Ohio, Perry, Posey, Spencer, Switzerland, Vanderburgh, and Warrick Counties (Ohio River)
- Ohio: Gallia, Lawrence, Monroe, and Washington Counties (Ohio River); Coshocton, Holmes, Morgan, Muskingum, and Noble Counties (Walhonding River, Muskingum River); Stark and Tuscarawas Counties (Tuscarawas River); Trumbull County (Shenango River)

Critical Habitat
No critical habitat has been designated for the Longsolid.

Life History
Life history of the Longsolid is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Longsolid is a short-term brooder and is typically gravid from May to July (USFWS, 2018). Longsolid glochidia are released in packets called conglutinates, which drift in the water column and are targeted by sight-feeding fish, facilitating attachment of glochidia to the fish host (USFWS, 2018). Host fish species for Longsolid are unknown, but based on other species of *Fusconaia*, likely hosts are minnows of the family Cyprinidae and genera *Campostoma*, *Cyprinella*, *Notropis*, and *Luxilus*, as well as potentially sculpins of family Cottidae, genus *Cottus* (USFWS, 2018).

Current Stressors and Threats
Like other rare native mussels, habitat degradation or loss, genetic isolation and displacement, and invasive species are potential threats to the Longsolid.

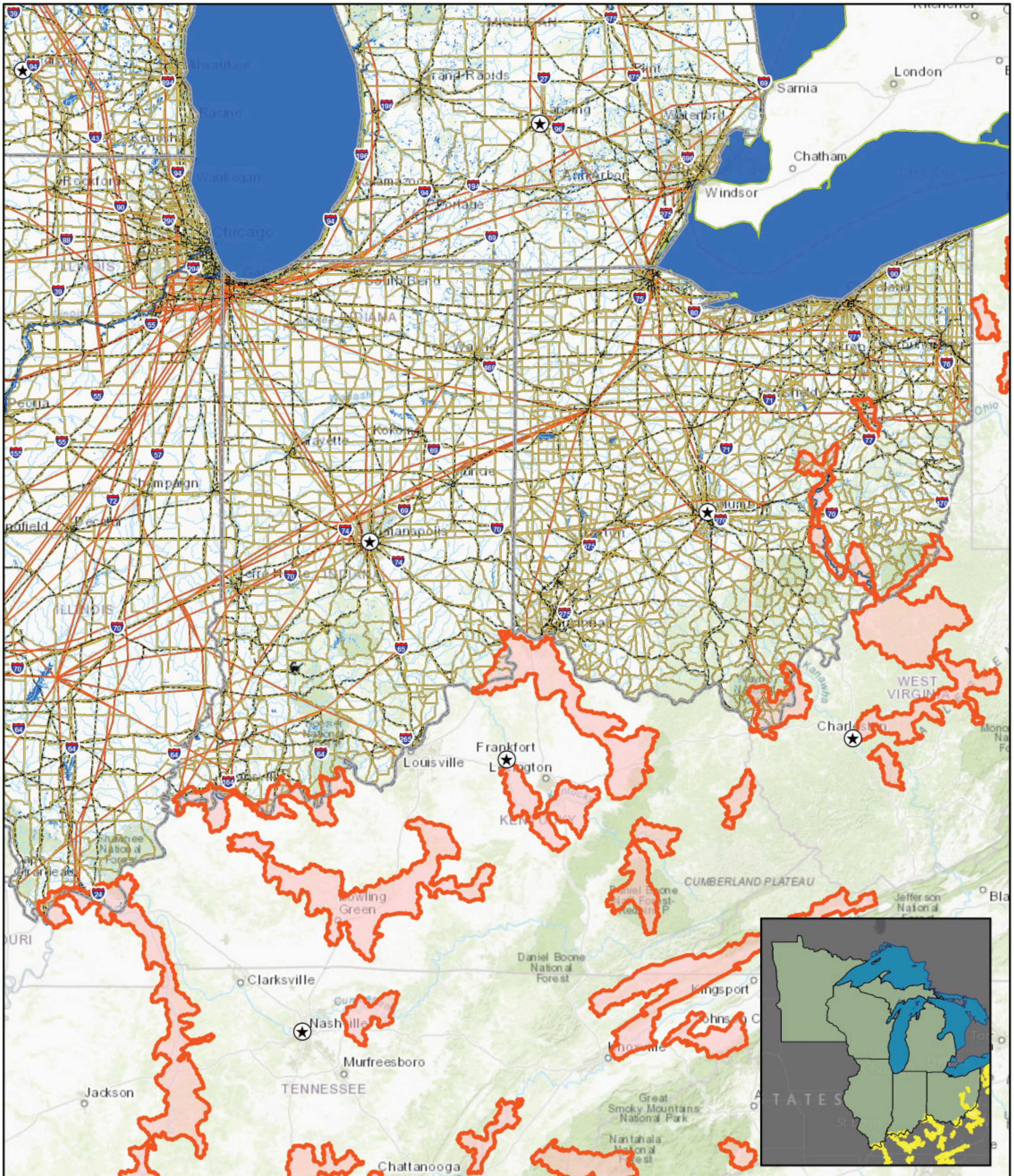
- Development and urbanization
  Development and/or urbanization may affect mussels by altering water quality, water quantity, and habitat, and roads in particular are generally associated with negative effects on the biotic integrity of aquatic ecosystems (USFWS, 2018).
- Dredging, channelization, and impoundments
  Dredging and channelization to maintain waterways for commercial navigation have also profoundly altered riverine habitats nationwide. Extensive construction of dams and impoundments throughout the range of Longsolid may affect mussels both upstream of the dam (change from flowing to impounded waters, increased depths, increased buildup of sediments, decreased dissolved oxygen, and the drastic alteration in resident fish populations) and downstream of the dam (fluctuations in flow regimes, minimal releases and scouring flows, seasonal depletion of dissolved oxygen, reduced or increased water temperatures, and changes in fish assemblages; USFWS, 2018).
- Contaminants
  Contaminants contained in point and non-point discharges can degrade water and substrate quality and adversely impact mussel populations. Although chemical spills and other point sources of contaminants may directly result in mussel mortality, widespread decreases in density and diversity may result in part from the subtle, pervasive effects of chronic, low-level contamination (USFWS, 2018). In addition, chemical control methods used in agriculture, including herbicides, fungicides, insecticides, and their surfactants and adjuvants, are highly toxic to juvenile and adult freshwater mussels (USFWS, 2018).
- Resource extraction activities
  Resource extraction activities may also threaten Longsolid populations. Across the Longsolid's range, the most significant resource extraction impacts are from coal mining and oil and gas exploration. Activities associated with coal mining and oil and gas drilling can contribute chemical pollutants to streams, and natural gas extraction has been associated with increased sedimentation due to increases in impervious surface and tree removal for drill pads and pipelines (USFWS, 2018). Instream sand and alluvial gravel mining has been implicated in the loss of mussel populations. Negative impacts associated with gravel mining include stream channel modifications such as altered habitat, disrupted flow patterns, and sediment transport, and water quality modifications, including increased turbidity, temperature, and sedimentation (USFWS, 2018).
- Invasive species
  Several invasive species are established throughout the range of Longsolid and may threaten the species. Mussels are adversely affected by zebra mussels (*Dreissena polymorpha*) through direct colonization, reduction of available habitat, changes in the biotic environment, or a reduction in food sources. The Asian Clam (*Corbicula fluminea*) alters benthic substrates, may filter mussel sperm or glochidia, competes with native species for limited resources, and causes ammonia spikes in surrounding water when they die off en masse (USFWS, 2018). The Black Carp (*Mylopharyngodon piceus*), a molluscivorous fish, may negatively impact native aquatic communities by direct predation, thus reducing populations of native mussels and snails, many of which are considered endangered or threatened. The presence of non-native species is a substantial threat to the Longsolid throughout its range, but the concentration of non-native species in the lower Ohio and Tennessee Rivers is most problematic (USFWS, 2018).
- Inherent factors
  The Longsolid exhibits several inherent traits that influence population viability, including relatively small population size and low fecundity at many locations compared to other mussels. Small population size puts the species at greater risk of extirpation from stochastic events (e.g., drought) or anthropomorphic changes and management activities that affect habitat. In addition, small, isolated Longsolid

populations may have reduced genetic diversity, be less genetically fit, and more susceptible to disease during extreme environmental conditions (USFWS, 2018).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2018). Draft species status assessment report for the Longsolid mussel (*Fusconaia subrotunda*), version 1.X3. Asheville, North Carolina. 184pp.



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

LONGSOLID (*FUSCONAIA SUBROTUNDA*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,500,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Longsolid (*Fusconaia subrotunda*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Northern Riffleshell (*Epioblasma torulosa rangiana*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, and Ohio

Species Description
The Northern Riffleshell is a small mussel with an elongate, moderately thick shell. Individuals are sexually dimorphic. Male shells are bluntly pointed posteriorly, with a distinct sulcus and indented posterior-ventral margin. The area anterior to the sulcus is raised and may have weak undulations or tubercules. Female shells are rounded and greatly expanded posteriorly. The periostracum may extend past the shell margins in the expanded area and is frequently thin and easily broken (Cummings & Mayer, 1992; USFWS, 1994). In both sexes, the umbos are low and slightly turned forward. Beak sculpture consists of a series of double loops, usually eroded away except in the youngest specimens. The periostracum is yellow, light brown, or green, with fine green rays. The pseudocardinal teeth are short and chunky, and the lateral teeth are short and slightly arched (USFWS, 1994). The beak cavity is shallow. The nacre is white, iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 1994).

Species Distribution
The Northern Riffleshell occurs in medium to large rivers, occupying packed sand and gravel substrate in riffles and runs (Cummings & Mayer, 1992; USFWS, 1994). The Northern Riffleshell is primarily an upper Ohio River system species, though it has also been documented in Great Lakes drainages. Historic records are known from approximately 50 streams in the Lake Erie (Michigan, Ohio, Ontario), Sydenham River (Ontario), River Raisin (Michigan), Huron River (Michigan), Detroit River (Michigan, Ontario), River Rouge (Michigan), Clinton River (Michigan), Black River (Michigan), Sandusky River (Ohio), Maumee River (Indiana, Michigan, Ohio), Wabash River (Illinois, Indiana), Ohio River (Kentucky, Ohio, West Virginia), Tennessee River (Alabama, Tennessee), Green River (Kentucky), Salt River (Kentucky), Kentucky River (Kentucky), Scioto River (Ohio), Kanawha River (West Virginia), Muskingum River (Ohio), and Allegheny River (Pennsylvania) drainages, including the Ohio River mainstem (USFWS, 1994). However, at the time of listing, Northern Riffleshell was only believed to be extant in short reaches of six streams: the Green River (Kentucky), Detroit River (Michigan), Big Darby Creek (Ohio), and French Creek, LeBoeuf Creek, and the Allegheny River (Pennsylvania; USFWS, 2019).

Recent data suggests that Northern Riffleshells are limited to four successfully recruiting populations in the Ohio and Great Lakes basins (Sydenham River, Allegheny River, French Creek, and Ausable River). However, populations in several other streams have undergone severe declines, including some of the streams with known extant populations at the time of listing. Northern Riffleshells have been moved from the Allegheny River to several streams in the species' historic range to augment existing populations or reintroduce the species to increase redundancy and species recovery. Receiving streams for relocated/reintroduced individuals include the Licking River (Kentucky), Big Darby Creek (Ohio), Tippecanoe River (Indiana), Vermilion River (Illinois), Allegheny River (New York), Kanawha River (West Virginia), Ohio River (West Virginia), and Beaver River (Pennsylvania; USFWS, 2019).

Distribution within Action Area
- Illinois: Vermilion County (reintroduced into the Vermilion River)
- Indiana: DeKalb and Pulaski Counties (reintroduced into the Tippecanoe River)
- Michigan: Monroe, Sanilac, and Wayne Counties (Great Lakes drainage)
- Ohio: Champaign, Franklin, Madison, Pickaway, Pike, Ross, Scioto, and Union Counties (Big Darby Creek, Scioto River); Defiance and Williams Counties (Maumee River)

Critical Habitat
No critical habitat has been designated for the Northern Riffleshell.

Life History

Life history of the Northern Riffleshell is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Northern Riffleshells are long-term brooders (bradytictic); glochidia overwinter in the female's gills and are released the following summer. Gravid females move to the substrate surface and gape widely, displaying a white mantle "pad" to attract host fish. When a host fish approaches, the female mussel captures the host fish between the valves of the shell, trapping the fish while the mussel expels glochidia onto the fish's gills and other tissues (USFWS, 2009). Suitable host fish for Northern Riffleshells include several darter and sculpin species; additional species of *Etheostoma* and *Percina* may also serve as suitable hosts (USFWS, 2009).

Current Stressors and Threats

The Northern Riffleshell Recovery Plan (USFWS, 1994) identified four major stressors/threats contributing to the decline of Northern Riffleshell throughout its range: siltation, impoundment, in-stream sand and gravel mining, and pollutants. Since the initial listing of the species, these and other factors remain ongoing threats to Northern Riffleshell, primarily in the form of habitat loss and degradation.

- Water quality degradation
  Water quality degradation from point and non-point sources, particularly in tributaries that have limited capability to dilute and assimilate sewage, agricultural runoff, and other pollutants, remains an ongoing threat.
- Impoundments
  This species is affected by hydrologic and water quality alterations resulting from the operation of impoundments. The presence of impoundments may have ameliorated the effects of downstream siltation on Northern Riffleshell, but these structures also control river discharges (and the many environmental parameters influenced by discharge), which may profoundly affect the ability of these populations to occupy or successfully reproduce in downstream habitats (USFWS, 2019).
- In-stream activities
  A variety of instream activities continue to threaten Northern Riffleshell populations, including sand and gravel dredging, gravel bar removal, bridge construction, and pipeline construction. These activities can directly affect the species through crushing, burying in silt/sediment, etc. In addition, the indirect effects of altering the streambed configuration following instream disturbance can result in long-lasting alteration of streamflow patterns that may cause headcutting and channel reconfiguration, thereby eliminating previously suitable habitat some distance from the disturbance (USFWS, 2019).
- Resource extraction activities
  Coal, oil, and natural gas resources are present in some of the watersheds known to support the Northern Riffleshell, including the Allegheny and Elk Rivers. Exploration and extraction of these resources can result in increased siltation, a changed hydrograph, and altered water quality, even at a distance from the mine or well field. Northern Riffleshell habitat in larger streams can be further affected by the cumulative effects of multiple mines and well fields (USFWS, 2019).
- Development
  Land-based development near streams of occurrence, including residential development and agriculture, often results in loss of riparian habitat, increased storm water runoff due to increased impervious surfaces, increased sedimentation due to loss of streamside vegetation, and subsequent degradation of streambanks. *Epioblasma*, including Northern Riffleshell, appear to be exceptionally sensitive to the increased siltation and associated turbidity caused by changing land use. Development has also increased the number of sewage treatment plants in drainages that support the Northern Riffleshell and increased the amount of sewage discharged from existing plants. Freshwater mussels are more sensitive to several components of treated sewage effluent (*e.g.,* ammonia, chlorine and copper) than are the typical organisms used to establish water quality criteria protective of aquatic life (USFWS, 2019).

- Disease and predation
  Little is known about diseases in freshwater mussels. However, mussel die-offs have been documented in Northern Riffleshell streams, and some researchers believe that disease may be a factor contributing to the die-offs. Due to the relatively small size of Northern Riffleshell, several animals prey on this mussel, including muskrats, raccoons, otters, molluscivous fish, and some invertebrates. Such predation could locally reduce populations of Northern Riffleshell. This effect may be negligible in larger populations such as those in the Allegheny River, but it could represent a significant threat to small, isolated Northern Riffleshell populations located elsewhere.
- Invasive species
  Invasive zebra mussels (*Dreissena polymorpha*) may directly or indirectly affect Northern Riffleshells and other native mussels by directly attaching to the native mussels' shells or by competing for food and other resources, and two invasive fish species, Round Goby (*Neogobius melanostomus*) and Black Carp (*Mylopharyngodon piceus*), have been documented in Northern Riffleshell's range and are known to be molluscivorous.
- Climate change
  Changes in precipitation and temperature due to climate change may have negative effects on native mussels, though it is unclear what the long-term effects may be (USFWS, 2019).

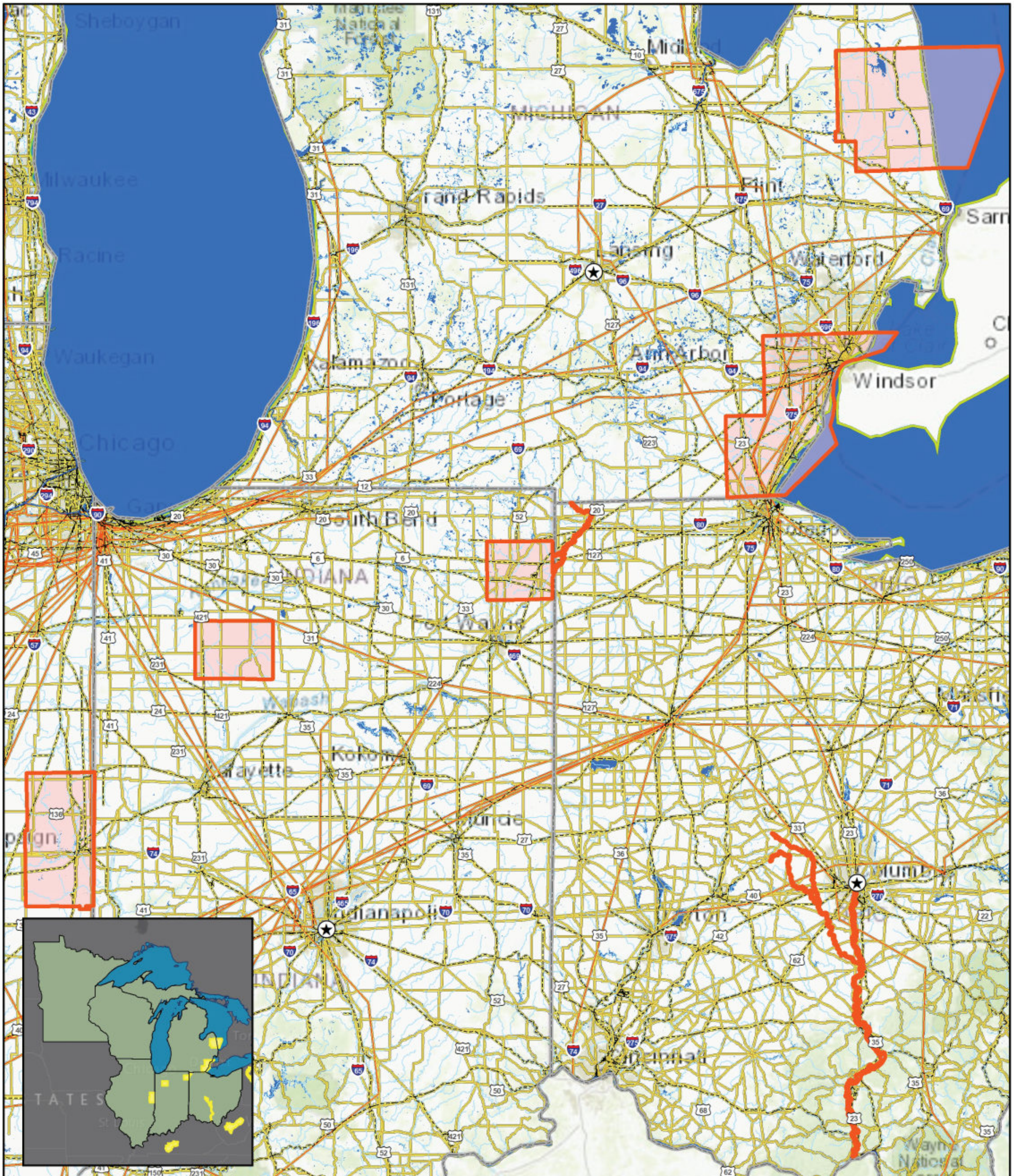
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1994). Clubshell (*Pleurobema clava*) and Northern Riffleshell (*Epioblasma torulosa rangiana*) recovery plan. Hadley, Massachusetts. 68pp.

U.S. Fish & Wildlife Service (USFWS). (2009). Northern Riffleshell (*Epioblasma torulosa rangiana*) 5-year review: summary and evaluation. State College, Pennsylvania. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Northern Riffleshell (*Epioblasma torulosa rangiana*) 5-year review: summary and evaluation. State College, Pennsylvania. 32pp.



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

NORTHERN RIFFLESHELL (*EPIOBLASMA TORULOSA RANGIANA*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,500,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Northern Riffleshell (*Epioblasma torulosa rangiana*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Orangefoot Pimpleback (*Plethobasus cooperianus*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois

Species Description
The shell of Orange Pimpleback is thick, heavy, moderately inflated, and nearly circular in outline. The umbos are directed forward and only slightly elevated above the hinge line. The posterior two-thirds to three-fourths of the shell is covered with numerous pustules or tubercles. The periostracum is light brown in younger individuals, becoming chestnut or dark brown in older individuals. Faint greenish rays may be present on young specimens (USFWS, 1984; Cummings & Mayer, 1992). The pseudocardinal teeth are well developed, and the lateral teeth are short and straight or slightly curved. The beak cavity is very deep and compressed. The nacre is white and is often tinged with pink or salmon near the beak cavity (USFWS, 1984; Cummings & Mayer, 1992). Notably, the foot of live mussels is orange (Cummings & Mayer, 1992).

Species Distribution
The Orangefoot Pimpleback occurs in medium to large rivers in sand and gravel substrate. The species has reportedly been collected in both deep water and shallower riffle and shoal areas (USFWS, 1984). The Orangefoot Pimpleback historically occurred in Ohioan or Interior Basin streams, with known records from the Ohio River, Kanawha River, Wabash River, Rough River, Tennessee River, Duck River, French Broad River, Holston River, Clinch River, and Cumberland River (USFWS, 1984). However, at the time of listing, the species was only known to occur in the Tennessee, Cumberland, and lower Ohio Rivers. Since listing, the species' range has apparently decreased even more, with only two known extant populations: one in the Tennessee River downstream of Pickwick Landing Dam, and one in the lower Tennessee River below Kentucky Lake Lock & Dam and the lower Ohio River downstream of the mouth of the Tennessee River; the lower Tennessee River is considered to be part of the lower Ohio River population due to the proximity and connection of the two rivers. It is not known whether the Orangefoot Pimpleback persists in the Cumberland River (USFWS, 2018).

Distribution within Action Area

- Only occurs in Massac and Pulaski Counties, Illinois (Ohio River)

Critical Habitat
No critical habitat has been designated for the Orangefoot Pimpleback.

Life History
Life history of the Orangefoot Pimpleback is thought to be similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The host fish for the Orangefoot Pimpleback is still unknown (USFWS, 2018).

Current Stressors and Threats
Impoundment, sedimentation, and pollution were identified as threats to the Orangefoot Pimpleback in the original recovery plan (USFWS, 1984).

- Water quality degradation
  Ongoing threats include water quality degradation from point and non-point sources, particularly in tributaries that have limited capability to dilute and assimilate sewage, agricultural runoff, and other pollutants. Regulated point sources may adversely affect the Orangefoot Pimpleback mussel. Freshwater mussels appear to exhibit more sensitivity to some pollutants than organisms typically used in toxicity testing. As a result, some of the water quality criteria established by the U.S. Environmental Protection Agency to protect aquatic life may not be protective of mussels; for example, the current EPA numeric criteria for ammonia may not protect mussels. Consequently, sewage treatment plants

that comply with their ammonia effluent limits may still be discharging water that is toxic to mussels. Few substances have been tested for their toxicity to mussels and no tests have been conducted on Orangefoot Pimpleback mussels. “Safe” concentrations of regulated pollutants for this species are not yet known (USFWS, 2018).

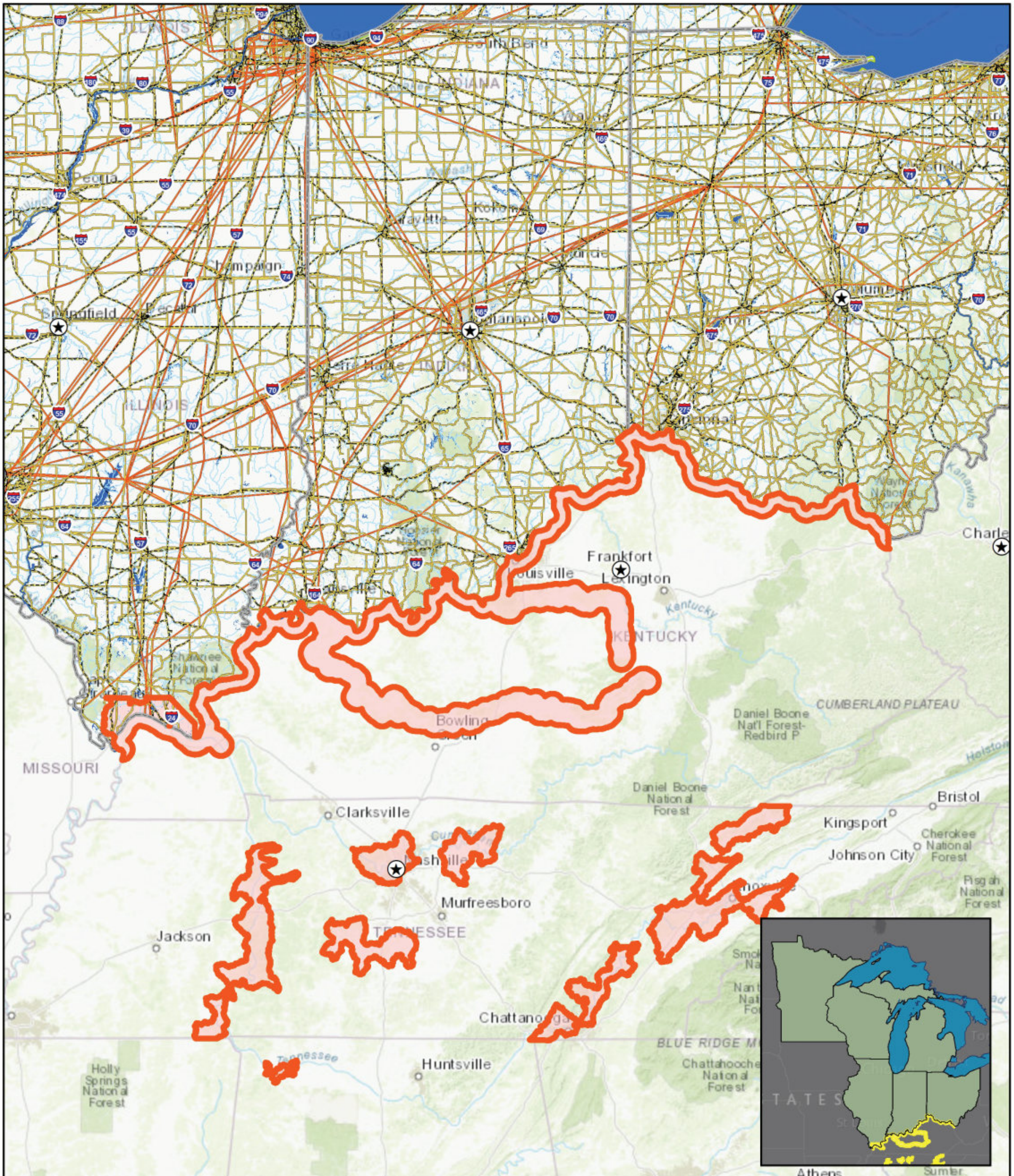
- Impoundments
  In addition, the species is affected by hydrologic and water quality alterations resulting from the operation of impoundments. The presence of impoundments may have ameliorated the effects of downstream siltation on Orangefoot Pimpleback mussels in some situations, but these structures also control river discharges and the many environmental parameters influenced by discharge, which may limit the ability of these populations to occupy potential habitat or reproduce successfully (USFWS, 2018).
- Instream activities
  A variety of instream activities (e.g., sand and gravel dredging, navigation, fleeting, etc.) continue to threaten Orangefoot Pimpleback populations. Protecting these populations from the direct physical disturbance of such activities depends on accurately identifying the location of the populations. These instream activities may also alter the streambed configuration resulting in adverse changes to previously suitable habitat (USFWS, 2018). Other potential threats include land-based development including residential and agriculture activities near streams, which often results in loss of riparian habitat, increased stormwater runoff due to increased impervious surfaces, increased sedimentation due to loss of streamside vegetation, and subsequent degradation of stream banks (USFWS, 2018).
- Invasive species
  Invasive zebra mussels (*Dreissena polymorpha*) have continued to spread in North American waterways since their accidental introduction in the 1980s. Zebra mussel densities in the Tennessee River system downstream of Wilson and Pickwick Landing dams increased significantly in recent years, and the species currently persists in numbers as high as 12,000 individuals per square meter, posing an increased threat to Orangefoot Pimpleback persistence in this reach. Zebra mussels could also influence recovery actions to benefit this species by limiting the number of suitable locations where new populations could be established and/or impacting newly established populations (USFWS, 2018).
- Low recruitment
  Low recruitment of the Orangefoot Pimpleback is likely contributing to declining populations. Since the Orangefoot Pimpleback is a relatively long-lived species, the rate of decline may not be evident given the uncertainty of finding this species in the wild. Reasons for low recruitment are not known; however, it may involve single or multiple factors, such as difficulty of females being fertilized by sperm, lack of fish host(s), degraded water quality, and other factors. Small isolated populations also represent a threat to the species from lack of gene flow resulting in decreased diversity and greater susceptibility to extirpation from stochastic or catastrophic events (USFWS, 2018).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1984). Orange-footed pearly mussel recovery plan. Atlanta, Georgia. 44pp.

U.S. Fish & Wildlife Service (USFWS). (2018). Orangefoot Pimpleback (*Plethobasus cooperianus*) 5-year review: summary and evaluation. Frankfort, Kentucky. 18pp.



0 15 30 60 90 Miles 0 15 30 60 90 120 Kilometers	**ORANGEFOOT PIMPLEBACK (*PLETHOBASUS COOPERIANUS*) ACTION AREA OVERVIEW MAP**	**SCALE 1:5,000,000**

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action
- Orangefoot Pimpleback (*Plethobasus cooperianus*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Pink Mucket (*Lampsilis abrupta [=Lampsilis orbiculata]*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois and Ohio

Species Description
The shell of Pink Mucket is moderately large, round to elliptical, heavy, and inflated. The species is sexually dimorphic; the posterior end of the shell is bluntly pointed in males and truncated in females. The beaks are turned forward and elevated above the hinge line and beak sculpture consists of a series of double-looped ridges, often only visible in young shells. The periostracum is yellow to greenish brown and may have faint green rays. The pseudocardinal teeth are thick and triangular and the lateral teeth are short, heavy, and slightly curved. The beak cavity is deep. The nacre may be white, pink, or salmon, becoming iridescent posteriorly (USFWS, 1985; Cummings & Mayer, 1992).

Species Distribution
The Pink Mucket occurs in medium to large rivers in habitat ranging from silt to boulders, rubble, gravel, and sand with moderate to swift current. It is an Ohioan or Interior Basin species, occurring in the lower Mississippi and Ohio Rivers and their larger tributaries (USFWS, 1985; Cummings & Mayer, 1992). Pink Mucket was historically widespread throughout this range. The recovery plan listed records from 25 streams, but recent sampling efforts and a more thorough search of historical data indicate the species was known from nearly 50 streams (USFWS, 2018). At the time of listing, Pink Mucket was considered extant in 16 streams (USFWS, 1985). Recent data indicates that extant populations of Pink Mucket occur in 29 streams in the upper Mississippi River, Missouri River, Ohio River, Cumberland River, Tennessee River, lower Mississippi River, White River, and Red River drainages in Alabama, Arkansas, Illinois, Kentucky, Louisiana, Missouri, Ohio, Tennessee, and West Virginia (USFWS, 2018).

Distribution within Action Area
- Illinois: Massac County (Ohio River)
- Ohio: Adams, Athens, Brown, Clermont, Gallia, Hamilton, Lawrence, Meigs, Morgan, Scioto, and Washington Counties (Ohio River, Muskingum River)

Critical Habitat
No critical habitat has been designated for the Pink Mucket.

Life History
Life history of the Pink Mucket is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Pink Mucket is a long-term brooder (bradytictic). Females become gravid in August and brood glochidia over the winter before releasing the glochidia the following summer. The edge of the mantle is modified to resemble a small fish, presumably luring potential host fish to the female mussel (USFWS, 1985). Suitable host fish identified in laboratory studies include Largemouth Bass (*Micropterus salmoides*), Smallmouth Bass (*Micropterus dolomieu*), Spotted Bass (*Micropterus puctulatus*), Walleye (*Sander vitreus*), White Crappie (*Pomoxis annularis*), and Sauger (*Sander canadensis*; USFWS, 2018).

Current Stressors and Threats
Impoundment, sedimentation, and pollution were identified as threats to the Pink Mucket in the original recovery plan (USFWS, 1985).

- Impoundments
  Impoundments may result in reduced flows, altered temperature regimes, and anoxic conditions, potentially eliminating previously suitable mussel habitat (USFWS, 1985). In addition, hypolimnetic dam releases may lead to altered temperature regimes, extreme water level fluctuations, reduced turbidity,

seasonal oxygen deficits, and high concentrations of certain heavy metals (USFWS, 1985). Recent research suggests that such tailwater conditions may affect mussel communities for many miles downstream of dam sites (USFWS, 2018). Changes in dam operations, such as implementation of minimum flows, have in some cases improved conditions in tailwaters. However, some older dams in the Pink Mucket's range have been identified as being at high risk for failure; a failure of one of these major dams could result in catastrophic habitat alterations (USFWS, 2018).

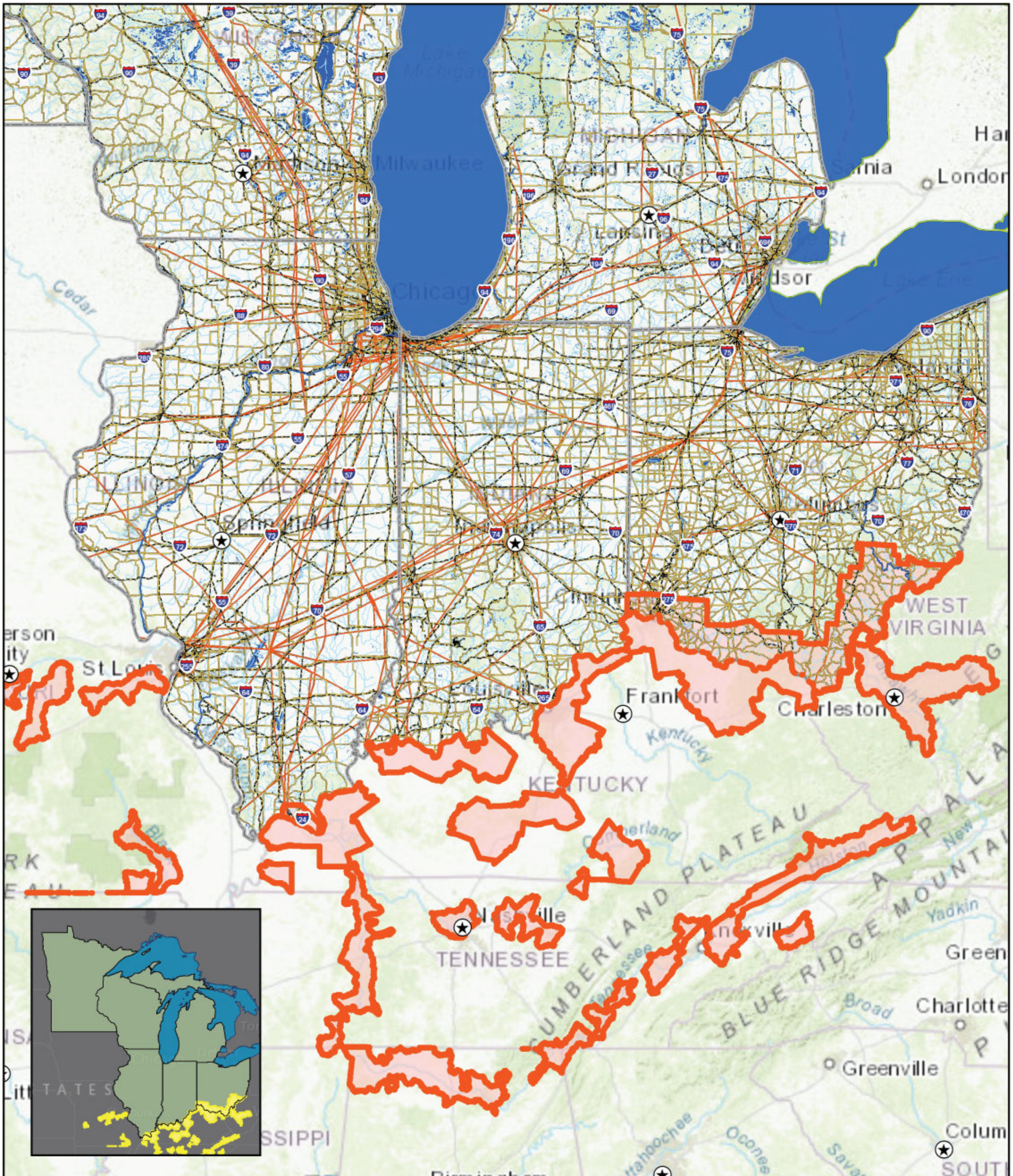
- Sedimentation
  Increased sedimentation from land use and development activities, such as mining, dredging, farming, logging, and road construction, may also affect Pink Mucket and other native mussels. High levels of suspended solids may clog mussels' gills and reduce or inhibit filter feeding, causing nutritional stress and mortality (USFWS, 1985). In addition, land use practices may contribute to stream instability. Channel and bank degradation have been noted in the Meramec and Gasconade Rivers in Missouri; such habitat degradation has been attributed to instream aggregate mining, riparian buffer alterations, and accelerated runoff from impervious surfaces in developed areas (USFWS, 2018).
- Pollutants
  Pink Mucket populations may be affected by various pollutants. An increasing number of streams throughout the United States receive municipal, agricultural, and industrial water discharges. Historical studies in the Tennessee River drainage reported loss of mussels downstream of industrial plants, including paper mills and wood extracting plants (USFWS, 1985). Point source discharges have been reduced since inception of the Clean Water Act (1972), but recent toxicological studies demonstrated that the U.S. Environmental Protection Agency (EPA) water quality criteria for copper and ammonia were not protective of all mussel life stages. EPA water quality criteria have recently been revised to include mussel data in toxicity databases, but delays in implementing revised criteria may occur (USFWS, 2018).
- Resource extraction activities
  Metal mining, instream aggregate mining, and fossil fuel extraction occurs in various streams throughout the range of Pink Mucket and may threaten mussel populations; take from aggregate mining is a perpetual concern for the species in these streams despite regulatory oversight (USFWS, 2018).
- Invasive species
  Invasive zebra mussels (*Dreissena polymorpha*) have invaded streams throughout most of the range of Pink Mucket, and may affect native mussels both directly, by attaching to native mussels' shells, or indirectly, by competing for food or resources. Zebra mussels are most prevalent in navigation channels, where their spread is facilitated by commercial navigation traffic. However, zebra mussel density in the Ohio River has declined markedly in recent years, and density remains low in most other Pink Mucket streams, suggesting that the threat of zebra mussels has abated (USFWS, 2018).
- Climate change
  Climate change may affect Pink Mucket and other native mussel species. Although the ultimate results of climate change remain unknown, changes in precipitation and water temperatures may have sub-lethal effects on Pink Mucket populations (USFWS, 2018).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1985). Recovery plan for the Pink Mucket pearly mussel *Lampsilis orbiculata* (Hildreth, 1828). Atlanta, Georgia. 47pp.

U.S. Fish & Wildlife Service (USFWS). (2018). Pink Mucket (*Lampsilis abrupta*) 5-year review: summary and evaluation. Asheville, North Carolina. 68pp.



0 20 40 80 120
Miles
0 20 40 80 120 160
Kilometers

PINK MUCKET (*LAMPSILIS ABRUPTA*)
ACTION AREA OVERVIEW MAP

SCALE 1:7,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Pink Mucket (*Lampsilis abrupta*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Ohio

Species Description

The Purple Cat's Paw Pearlymussel shell is small and subquadrate to oval in shape. The species is sexually dimorphic. Males are larger than females, the posterior end of the shell is bluntly pointed, and a wide sulcus or depression is present between the posterior ridges. The female shell is truncated, ribbed, and notched at the posterior end, and the posterior-ventral portion of the shell is inflated with fine grooves radiating from the umbo to the margin of the shell (Cummings & Mayer, 1992). The umbos are even with the hinge line and directed forward. The periostracum is yellow, yellowish-green, or brown with numerous fine, wavy green rays (Cummings & Mayer, 1992; USFWS, 1992). The pseudocardinal teeth are wide and serrated and the lateral teeth are short and straight to slightly curved (Cummings & Mayer, 1992). The nacre is purplish to deep purple (USFWS, 1992).

Species Distribution

The Purple Cat's Paw Pearlymussel has been characterized as a large river species. It has been reported in boulder and sand substrates in moderate to swift current (USFWS, 1992). The Purple Cat's Paw Pearlymussel was historically distributed in the Ohio, Cumberland, and Tennessee River systems in Ohio, Illinois, Indiana, Kentucky, Tennessee, and Alabama (USFWS, 1992). However, at the time of listing, only two known populations remained: one in the Green River, Kentucky, and one in the Cumberland River, Tennessee. The state of Indiana had no current records of the Purple Cat's Paw Pearlymussel, the species had not been collected in Illinois in over 100 years, the historic collection site in Alabama had been impounded, and the species was apparently extirpated from Ohio (USFWS, 1992). A new reproducing population of Purple Cat's Paw Pearlymussel was identified in Killbuck Creek, Ohio in the 1990s, but later survey efforts in 2006 – 2009 suggested the population had drastically declined (USFWS, 2010). Despite the decline, the Killbuck Creek population persists. In addition, Purple Cat's Paw Pearlymussel individuals were reintroduced into the Ohio River, Walhonding River, Green River, Licking River, and Duck River in 2017, although natural reproduction has not yet been documented in these populations (USFWS, 2020). The species is presumed extirpated from the Cumberland River (USFWS, 2020).

Distribution within Action Area

ECOS only indicates the species may occur in Coshocton County, Ohio (Killbuck Creek). It is unclear whether this county also includes the reintroduced Walhonding River population.

Critical Habitat

No critical habitat has been designated for the Purple Cat's Paw Pearlymussel.

Life History

Life history of the Purple Cat's Paw Pearlymussel is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Rock Bass (*Amploplites rupestris*), Mottled Sculpin (*Cottus bairdii*), Stonecat (*Noturus flavus*), Blackside Darter (*Percina maculata*), and Logperch (*Percina caprodes*) have been identified as suitable hosts for Purple Cat's Paw Pearlymussel (USFWS, 2020).

Current Stressors and Threats

- Impoundments

  The Purple Cat's Paw Pearlymussel recovery plan noted that many of the historic populations were apparently lost when the river sections they inhabited were impounded; the impoundments reduced the availability of riverine habitat and likely affected the distribution and availability of host fish (USFWS, 1992). These impoundments are still present throughout the species' historic range. One dam removal project occurred on the Green River (Kentucky) in 2017, with a second dam removal on the Green River and a dam removal on the Walhonding River also planned for the near future. These dam removal projects are anticipated to help restore sections of these rivers to habitat suitable for the Purple Cat's Paw Pearlymussel (USFWS, 2020).

- Water quality degradation
  Water quality issues may pose a threat to Purple Cat's Paw Pearlymussel. The Green River (Kentucky) has experienced water quality problems related to impacts from oil and gas production in the watershed (USFWS, 1992). The Killbuck Creek watershed also contains many operating oil and gas wells, though it is unknown if these wells are impacting the creek (USFWS, 2020). Researchers noted that mussel habitat in Killbuck Creek was "severely degraded" with the creek entrenched among steep eroding banks. Deadfalls and debris piles were common in the creek and point bar formations were evidence of massive bed-load movement during high surface flows. Researchers also noted high sediment load in the creek, which inhibited mussel sampling efforts (USFWS, 2020).
- Invasive species
  Invasive Asian clams (*Corbicula fluminea*) are known to occur in Killbuck Creek and may affect Purple Cat's Paw Pearlymussel populations. Asian clams appeared to have a massive die-off in 2011 but have appeared to rebound and are currently relatively common in the stream. It is interesting to note that the 2011 die-off correlates with the timing of the recent recruitment of Purple Cat's Paw Pearlymussel in Killbuck Creek. When Asian clam numbers were very low the Purple Cat's Paw Pearlymussel had successful recruitment. It is not known if these two events are related. However, it has been suggested that Asian clams may adversely impact native mussels by consuming a significant portion of their sperm and that they may compete with native mussels for food and space (USFWS, 2020).
- Climate change
  Climate change likely constitutes a threat to Purple Cat's Paw Pearlymussel. Although the specific effects of climate change on the species are unknown, altered hydrology in rivers, increased frequency of extreme weather events, and a changing abundance and distribution of fish species have the potential to adversely affect this species (USFWS, 2020).
- Small population size
  Perhaps the greatest threat to Purple Cat's Paw Pearlymussel is small population size. Only a few known populations of the species exist, most of which consist of a few recently reintroduced individuals. These small populations with limited distributions are highly vulnerable to stochastic events.

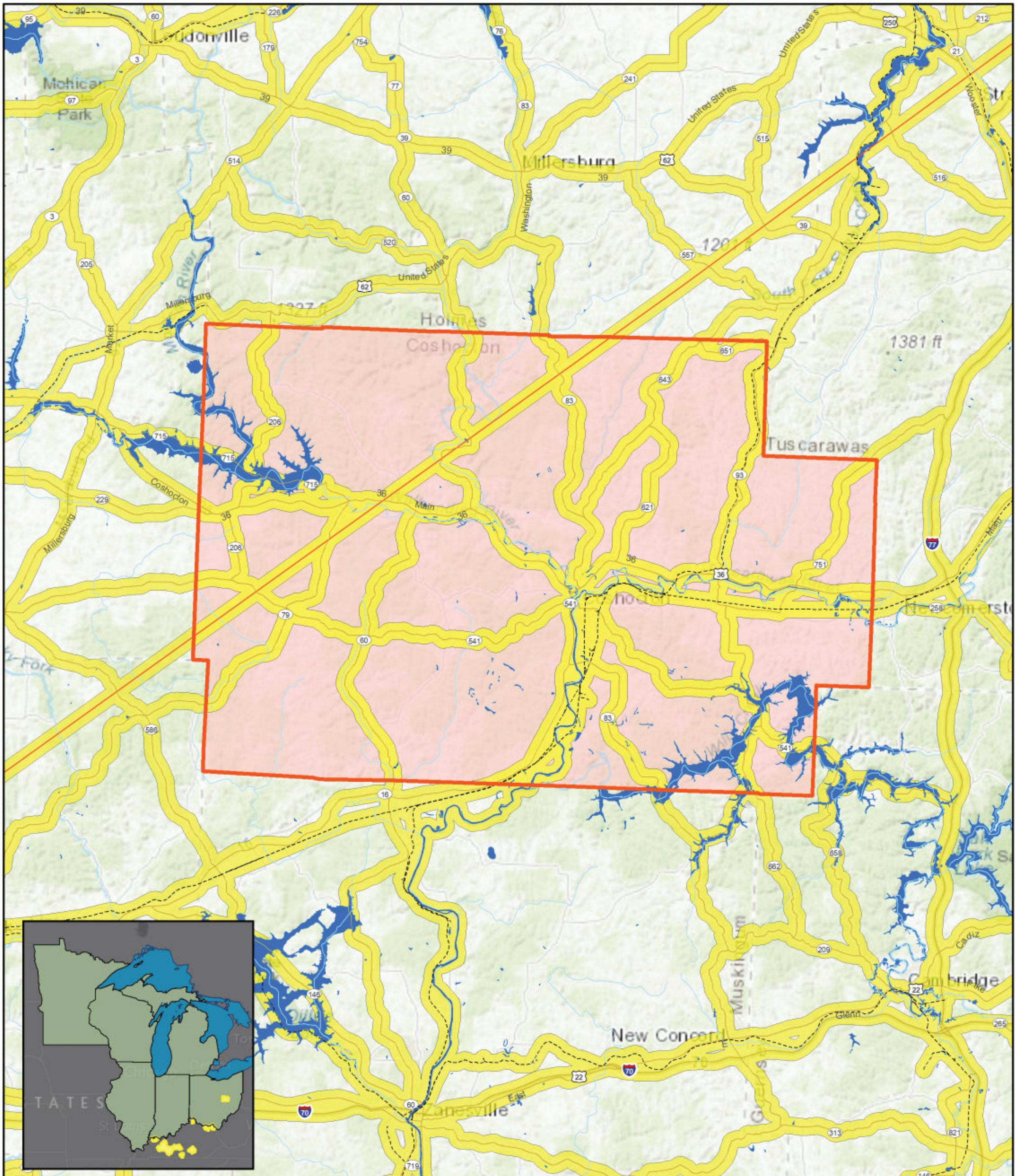
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1992). Purple Cat's Paw Pearlymussel recovery plan. Atlanta, Georgia. 26pp.

U.S. Fish & Wildlife Service (USFWS). (2010). Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) 5-year review: summary and evaluation. Columbus, Ohio. 14pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) 5-year review: summary and evaluation. Columbus, Ohio. 20pp.



PURPLE CAT'S PAW PEARLYMUSSEL (*EPIOBLASMA OBLIQUATA OBLIQUATA*) ACTION AREA OVERVIEW MAP

SCALE 1:500,000

0 1.25 2.5 5 7.5 Miles

0 1.25 2.5 5 7.5 10 Kilometers

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Pyramid (Pink) Pigtoe (*Pleurobema rubrum*)

Federal Listing: Under Review. The Pyramid Pigtoe was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 59836).
State Listing within the AA: Endangered in Ohio

Species Description
The shell of the Pyramid Pigtoe is triangular and elongate, thick, and moderately inflated. The anterior margin of the shell is rounded and the posterior end is bluntly pointed. The beaks are high and project anterior to the rest of the shell (Cummings & Mayer, 1992; Roe, 2002). A prominent but shallow sulcus runs from the beak toward the ventral margin (Roe, 2002). The periostracum is brown or chestnut, often with a satiny appearance, and may have faint green rays on the beaks (Cummings & Mayer, 1992; Roe, 2002). The pseudocardinal teeth are well developed, and the lateral teeth are heavy and straight to slightly curved. The beak cavity is deep. The nacre may be pink, rose-colored, or white (Cummings & Mayer, 1992; Roe, 2002).

Species Distribution
The Pyramid Pigtoe occurs in medium to large rivers in riffles and shoals with moderate to swift current (Roe, 2002). Historically the species was distributed throughout the Mississippi, Wabash, Tennessee, and Ohio River systems and was reported from Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Nebraska, Ohio, Oklahoma, Pennsylvania, Tennessee, Virginia, and West Virginia (NatureServe, 2021). It is now presumed extirpated in Iowa, Illinois, and Indiana, and possibly extirpated from Pennsylvania, West Virginia, and Virginia (NatureServe, 2021). The best extant populations appear to be in a few sections of the Green River drainage in Kentucky and in the Little Missouri, Ouachita, White, St. Francis, and Saline Rivers in Arkansas (CBD, 2010; NatureServe, 2021).

Distribution within Action Area
ECOS does not list this species as occurring in the Action Area. However, it is still believed to be extant in the lowermost portion of the Muskingum River (downstream of Devola Lock & Dam) in Washington County, Ohio (USFWS, pers. comm., 2022).

Critical Habitat
No critical habitat has been designated for the Pyramid Pigtoe.

Life History
Life history of the Pyramid Pigtoe is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Like other mussels in the genus *Pleurobema*, the Pyramid Pigtoe is thought to be a short-term brooder (tachytictic; Roe, 2002; Culp et al., 2009). Females may release glochidia in conglutinates (Culp et al., 2009). Host fish for the Pyramid Pigtoe include Spotfin Shiner (*Cyprinella spiloptera*), Streamline Chub (*Erimystax dissimilis*), Scarlet Shiner (*Lythrurus fasciolaris*), and Silver Shiner (*Notropis photogenis*; Culp et al., 2009).

Current Stressors and Threats
Many factors have been implicated in the decline of native freshwater mussels, including destruction of habitat caused by impoundment construction, siltation, gravel mining, and channel modification, as well as pollution and the introduction of non-native species (Roe, 2002; CBD, 2010; NatureServe, 2021).

- Impoundments
  Impoundments can dramatically alter the habitat of freshwater mussels by changing flow, temperature, dissolved oxygen, and substrate composition. Construction of the Norris Reservoir on the Clinch River in Tennessee reportedly resulted in the extirpation of the majority of mussel species below the dam,

including the Pyramid Pigtoe (NatureServe, 2021). In addition, dams can isolate mussels from their host fish, interfering with reproduction (Roe, 2002).

- Siltation
  Siltation has long been implicated in the decline of native mussels. Fine sediments can interfere with mussel respiration and feeding, and heavy sediment loads may smother juvenile mussels. Sediment can also affect mussels by affecting their host species (Roe, 2002).
- Pollution
  Pollution from point (industrial and residential discharge) and non-point (siltation, herbicide, surface runoff) sources is also a great threat to mussels. Many types of industrial and domestic substances have been shown to be toxic to mussels (Roe, 2002). Recent toxicology research suggests mussels are among the most sensitive organisms to some contaminants, such as ammonia and copper.
- Invasive species
  The introduction of zebra mussels (*Dreissena polymorpha*) in the 1980s has severely impacted native mussel populations (Roe, 2002). Zebra mussels may directly affect native mussels by attaching to the native mussels' shells. Attached zebra mussels can interfere with feeding, respiration, excretion, and locomotion (Roe, 2002). While it is unclear how susceptible the Pyramid Pigtoe may be to zebra mussels, zebra mussels have become widespread throughout the Ohio River system and have the potential to seriously impact the native mussels in that system (Roe, 2002).

List of References

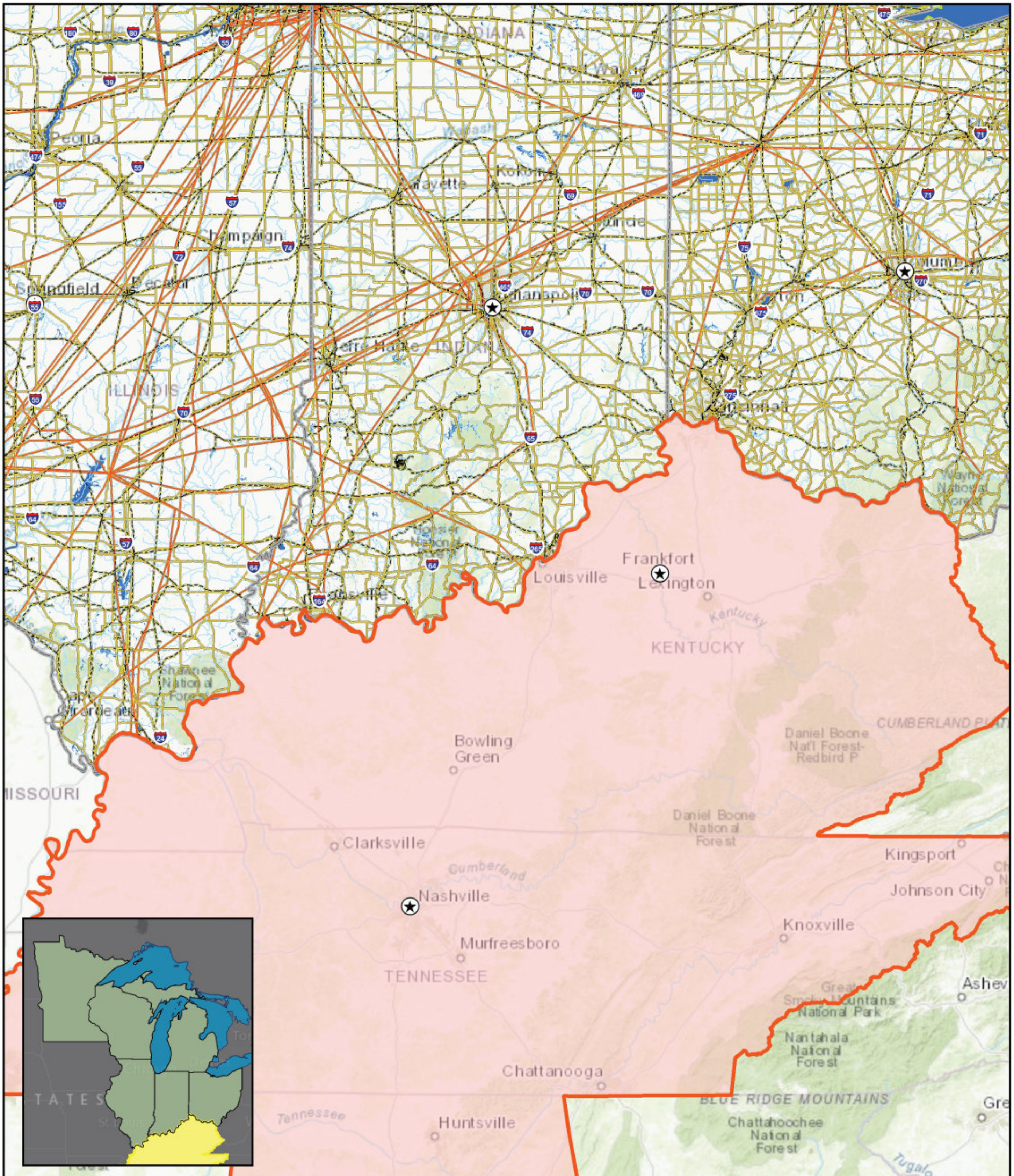
Center for Biological Diversity (CBD). (2010). Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act. 1145pp.

Culp, J.J., Shepard, A.C., & McGregor, M.A. (2009). Fish hosts and conglutinates of the Pyramid Pigtoe (*Pleurobema rubrum*). Southeastern Naturalist 8(1): 19-22.

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

NatureServe. (2021). NatureServe Explorer – *Pleurobema rubrum*. Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.107905/Pleurobema_rubrum

Roe, K.J. (2002). Conservation assessment for the Pyramid Pigtoe (*Pleurobema rubrum*). USDA Forest Service, Eastern Region. 10pp.



0 12.5 25 50 75
Miles
0 10 20 40 60 80
Kilometers

PYRIMID (PINK) PIGTOE (*PLEUROBEMA RUBRUM*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Pyrimid (Pink) Pigtoe (*Pleurobema rubrum*) Counties of Occurrence

N

Rabbitsfoot (*Quadrula cylindrica cylindrica*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois, Indiana, and Ohio

Species Description
The Rabbitsfoot is a medium to large mussel that may reach 6in (12cm) in length (USFWS, 2021). The shell is elongate and rectangular and the posterior end is truncated or squared. The beaks are low and only slightly elevated above the hinge line. Beak sculpture consists of two rows of knobs or ridges that continue down the surface of the shell. Shell sculpture consists of a few large, rounded, low tubercles on the posterior slope and smaller pustules or tubercles on the anterior portion of the shell. The periostracum is greenish or yellowish brown and is typically marked with dark green or black chevrons or triangles (Cummings & Mayer, 1992; USFWS, 2021). The pseudocardinal teeth are serrated and well developed and the lateral teeth are very long and straight. The beak cavity is deep. The nacre is white, sometimes tinged with gray or green in the beak cavity, and iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 2021).

Species Distribution
Suitable habitat for the Rabbitsfoot occurs in small- to medium-sized streams and some larger rivers, primarily in mixed sand and gravel substrate (USFWS, 2020). At the time of listing, Rabbitsfoot had been documented from nearly 140 rivers and streams in Alabama, Arkansas, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. However, only 51 of the historically known populations were considered extant at the time of listing, and the species was believed to be extirpated in Georgia and West Virginia (USFWS, 2020). Additional Rabbitsfoot occurrences were documented in several streams after the species was listed. The Rabbitsfoot is currently considered extant in 63 rivers and streams in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee; it is still considered extirpated from Georgia and West Virginia (USFWS, 2020).

Distribution within Action Area

- Illinois: Alexander, Clark, Crawford, Hardin, Jasper, Lawrence, Massac, Pope, Pulaski, Vermilion, Wabash, and White Counties (Ohio River, Wabash River, North Fork Vermilion River)
- Indiana: Carroll, Cass, Fulton, Miami, Perry, Posey, Pulaski, Spencer, Starke, Tippecanoe, Vanderburgh, Warrick, and White Counties (Ohio River, Wabash River, Tippecanoe River, Eel River, Fish Creek)
- Ohio: Adams, Champaign, Coshocton, Franklin, Hamilton, Lawrence, Madison, Morgan, Muskingum, Pickaway, Scioto, Union, Washington, and Williams Counties (Ohio River, Muskingum River, Walhonding River, Big Darby Creek, Little Darby Creek, Fish Creek)

Critical Habitat
Thirty-one critical habitat units have been designated for Rabbitsfoot, encompassing approximately 2,300 river kilometers in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee (80 FR 24692). Critical habitat was designated based on five primary constituent elements: geomorphically stable river channels, hydrologic flow regime necessary to maintain benthic habitats for Rabbitsfoot and its host fish, suitable water and sediment quality, occurrence of natural fish assemblages, and low abundance of competitive or predaceous species (80 FR 24692). Critical habitat units within USCG Region 5 include segments of the Ohio River (Illinois), Tippecanoe River (Indiana), Walhonding River (Ohio), Little Darby Creek (Ohio), North Fork Vermilion River and Middle Branch North Fork Vermilion River (Illinois), and Fish Creek (Ohio; 80 FR 24692).

Life History
Life history of the Rabbitsfoot is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically

a fish, to complete the transformation from the larval stage to a juvenile mussel. The Rabbitsfoot is a short-term brooder (tachytictic), with females brooding between May and late August (USFWS, 2020). Females display a mantle lure, consisting of an orange excurrent aperture encircled by white mantle tissue, and release glochidia in conglutinates when a host fish approaches and/or touches the excurrent aperture. Rabbitsfoot primarily utilizes cyprinid fish as hosts, with successful transformation of glochidia observed on various shiner species (USFWS, 2020).

Current Stressors and Threats

Threats to the Rabbitsfoot include habitat alterations due to impoundments, sedimentation, chemical contaminants, and mining, as well as population fragmentation, invasive species, temperature, and climate change (USFWS, 2020).

- Impoundments
  Dams eliminate and alter river flow within impounded areas, trap silt leading to increased sediment deposition, alter water quality, change hydrology and channel geomorphology, decrease habitat heterogeneity, affect normal flood patterns, and block upstream and downstream movement of mussels and their fish hosts. Impoundments have contributed more to losses of populations of the Rabbitsfoot than any other factor (e.g. Tennessee and Ohio River basins). Impoundments have fragmented riverine habitat throughout the range of the Rabbitsfoot often resulting in short, isolated patches of habitat, where fish hosts necessary for reproduction and dispersal may not be available. Because these isolated populations are unable to naturally recolonize suitable habitat upstream/downstream they become more prone to extirpation from stochastic events, such as severe drought, chemical spills, or unauthorized discharges (USFWS, 2020).
- Siltation
  Excessive sediments adversely affect riverine mussel populations that require clean, stable streams. Sedimentation remains a threat to the Rabbitsfoot. Specific biological effects include reduced feeding and respiratory efficiency from clogged gills, disrupted metabolic processes, reduced growth rates, limited burrowing activity, physical smothering, and disrupted host fish attraction mechanisms. Increased sedimentation may explain in part why the Rabbitsfoot is experiencing recruitment failure in some streams. Interstitial spaces in the substrate provide crucial shelter and nutrient uptake for juvenile mussel survival. When interstitial spaces are clogged, interstitial flow rates and spaces are reduced, decreasing habitat for juvenile mussels (USFWS, 2020).
- Chemical contaminants
  Chemical contaminants are ubiquitous in the environment and a major threat in the decline of mussel species. Studies conducted in accordance with standard mussel testing methods demonstrated that mussels are among the most sensitive freshwater species to a variety of contaminants, including copper, nickel, chloride, sulfate, potassium, and ammonia. Although the Clean Water Act has regulated and reduced some point source discharges, it may not provide adequate protection for filter-feeding organisms that are sensitive to extremely low levels of contaminants, and it may not adequately protect Rabbitsfoot habitat from nonpoint source pollution resulting from activities such as timber clear-cutting, clearing of riparian vegetation, urbanization, road construction, and other practices that allow sediment to enter streams (USFWS, 2020).
- Population fragmentation
  Population fragmentation and isolation prohibit the natural interchange of genetic material between populations. Most of the remaining the Rabbitsfoot populations are small and geographically isolated, and, thus, are susceptible to genetic drift, inbreeding depression, and stochastic changes to the environment, such as toxic chemical spills. Although changes in the environment may cause populations to fluctuate naturally, small and low-density populations are more likely to fluctuate below a minimum viable population size, which is the minimum or threshold number of individuals needed in a population to persist in a viable state for a given interval. Because of the restricted distribution of the Rabbitsfoot and the number of populations represented by a few individuals, the probability that some populations of this mussel species are below effective population size (EPS), the number of individuals in a population contributing offspring to the next generation, is great. Even in the absence of existing

or new anthropogenic threats, low EPS may reduce population viability and presents conservation challenges.

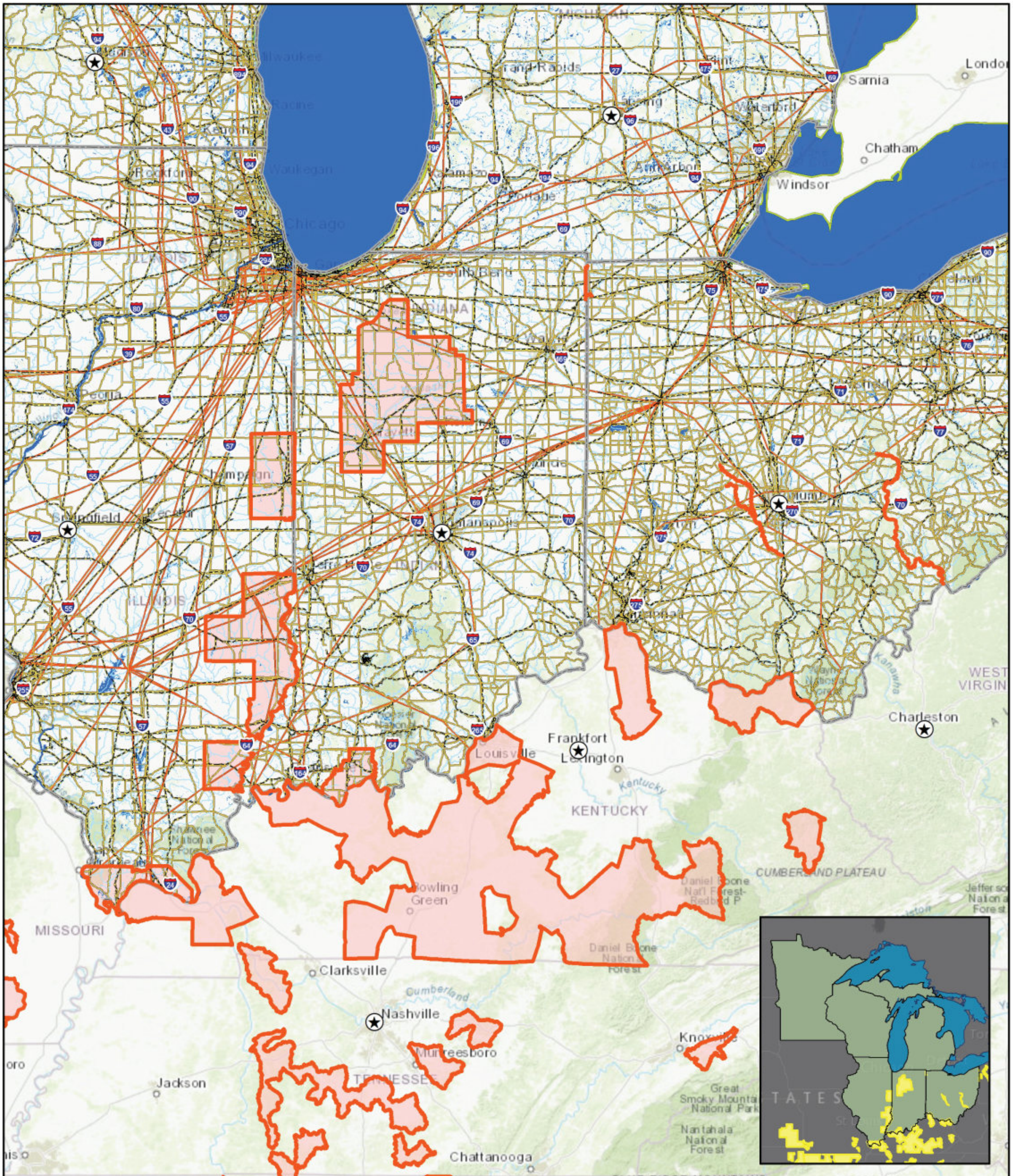
- Invasive species
  Invasive species, such as zebra mussels (*Dreissena polymorpha*) and Asian clams (*Corbicula fluminea*) pose significant threats to the Rabbitsfoot. Zebra mussels may directly affect Rabbitsfoot mussels by attaching to the Rabbitsfoot's shell, and both zebra mussels and Asian clams may compete with native mussels for resources such as food, nutrients, and space. Introduced fish species, including Black Carp (*Mylopharyngodon piceus*) and Round Goby (*Neogobius melanostomus*), feed on mollusks and may pose a threat to Rabbitsfoot reproduction (USFWS, 2020).
- Climate change
  Finally, temperature and climate change may threaten Rabbitsfoot populations. Impoundments, tail water releases from dams, industrial and municipal effluents, changes in riparian habitat, and droughts may alter natural temperature regimes. In addition, long-term climate changes, such as widespread changes in precipitation and aspects of extreme weather including droughts, heavy precipitation, and heat waves, may affect distribution of both native mussels and their host fish (USFWS, 2020).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2020). Rabbitsfoot (*Quadrula cylindrica cylindrica*) 5-year review: summary and evaluation. Conway, Arkansas. 95pp + appendices.

U.S. Fish & Wildlife Service (USFWS). (2021). Rabbitsfoot (*Quadrula cylindrica cylindrica*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/5165



0 15 30 60 90 Miles 0 15 30 60 90 120 Kilometers	**RABBITSFOOT (*QUADRULA CYLINDRICA CYLINDRICAI*) ACTION AREA OVERVIEW MAP**	**SCALE 1:5,500,000**

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Rabbitsfoot (*Quadrula cylindrica cylindrical*) Critical Habitat
Rabbitsfoot (*Quadrula cylindrica cylindrical*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Rayed Bean (*Villosa fabalis*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Indiana, Michigan, and Ohio

Species Description
The Rayed Bean is a small mussel, usually less than 1.5in (3.8cm) in length. The shell outline is elongate or ovate in males and elliptical in females, and moderately inflated in both sexes, but more so in females (USFWS, 2021). The valves are thick and solid. The anterior end is rounded in females and bluntly pointed in males (Cummings & Mayer, 1992). The beaks are slightly elevated above the hinge line, with sculpture consisting of double loops with some nodules (USFWS, 2021). The shell surface is smooth and the periostracum is green, yellowish-green, or brown in color, with numerous, wavy, dark-green rays of various widths (sometimes obscure in older, blackened specimens) (Cummings & Mayer, 1992; USFWS, 2021). The pseudocardinal teeth are triangular and relatively heavy, and the lateral teeth are short and heavy (Cummings & Mayer, 1992). The nacre is silvery white or bluish and iridescent posteriorly (USFWS, 2021).

Species Distribution
The Rayed Bean is generally known from smaller headwater creeks but has been documented in larger rivers and one lake. It is typically found in or near shoal or riffle areas in sand and gravel substrate (USFWS, 2018). The Rayed Bean was historically distributed in at least 115 streams, lakes, and some human-made canals in the Great Lakes (29 populations), Ohio River (74 populations), and Tennessee River (12 populations) systems in 10 states (Illinois, Indiana, Kentucky, Michigan, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia) and Ontario, Canada. At the time of listing in 2012, the species was known to be extant in only 31 streams and 1 lake in 7 states (Indiana, Michigan, New York, Ohio, Pennsylvania, Tennessee, and West Virginia) and Ontario, Canada. Three new extant populations have been discovered since the species was listed, two in New York and one in Michigan. Thirteen populations of Rayed Bean are currently known from the lower Great Lakes sub-basin, 21 populations are known from the Ohio River system, and only one population is extant in the Tennessee River system; this population was reintroduced in 2008 (USFWS, 2018).

Distribution within Action Area

- Indiana: Allen and DeKalb Counties (St. Joseph River, Fish Creek); Carroll, Fulton, Kosciusko, Marshall, Pulaski, Starke, Tippecanoe, and White Counties (Tippecanoe River, Lake Maxinkuckee); Johnson County (Sugar Creek); Dearborn, Ohio, and Switzerland Counties (Ohio River)
- Michigan: Lenawee, Monroe, Oakland, and St. Clair Counties (Great Lakes basin)
- Ohio: 31 counties (Ohio River and Great Lakes basins)

Critical Habitat
No critical habitat has been designated for the Rayed Bean.

Life History
Life history of the Rayed Bean is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Rayed Bean is thought to be a long-term brooder (bradytictic), with gravid females found in May through October (77 FR 8632). The only verified host fish for Rayed Bean are Tippecanoe Darter (*Etheostoma tippecanoe*) and Spotted Darter (*Etheostoma maculatum*; USFWS, 2018). Other darter and sculpin species may also be suitable host fish for Rayed Bean but have not been verified (77 FR 8632).

Current Stressors and Threats

At the time of listing, destruction, modification, and curtailment of the Rayed Bean's range was considered to be a threat to the species. The Rayed Bean has experienced significant curtailment of its occupied range and has been eliminated from about 70 percent of the streams in which it historically occurred. The primary cause of range curtailment is modification and destruction of river and stream habitats, primarily by the construction of impoundments. Other factors contributing to the reduction in range include dredging and channelization, chemical contamination, oil and gas production, sand and gravel mining, and siltation.

- Impoundments

  Impoundments result in the dramatic modification of riffle and shoal habitats and a resulting loss of mussel resources, especially in larger rivers. Stream habitat throughout major portions of the range of Rayed Bean has been impounded. Dams interrupt a river's ecological processes by modifying flood pulses; controlling impounded water elevations; altering water flow, sediments, nutrients, and energy inputs and outputs; increasing depth; decreasing habitat heterogeneity; decreasing stability due to subsequent sedimentation; blocking host fish passage; and isolating mussel populations from fish hosts. Even small, low-head dams can have some of these effects on mussels (77 FR 8632).
- Dredging and channelization

  Dredging and channelization activities have profoundly altered riverine habitats nationwide. Channelization impacts a stream's physical (accelerated erosion, reduced depth, decreased habitat diversity, geomorphic instability, and riparian canopy loss) and biological (decreased fish and mussel diversity, changed species composition and abundance, decreased biomass, and reduced growth rates) characteristics, and channel maintenance may result in profound impacts downstream, such as increases in turbidity and sedimentation, which may smother benthic (bottom-dwelling) organisms. Activities associated with navigation channels may have contributed to the elimination of the Rayed Bean from the Ohio, lower Allegheny, and Muskingum Rivers, and potentially others (77 FR 8632).
- Chemical contaminants

  Chemical contaminants are ubiquitous throughout the environment and are considered a major threat in the decline of freshwater mussel species. Chemicals enter the environment through both point and nonpoint discharges, including spills, industrial sources, municipal effluents, and agricultural runoff. These sources contribute organic compounds, heavy metals, pesticides, and a wide variety of newly emerging contaminants to the aquatic environment. As a result, water and sediment quality can be degraded to the extent that mussel populations are adversely impacted. Although point source discharges within the range of the Rayed Bean have been reduced since the inception of the Clean Water Act, it is unclear if these regulatory mechanisms provide adequate protection for filter-feeding organisms that can be impacted by extremely low levels of contaminants.
- Resource extraction activities

  Sand and gravel dredging continues to occur in some reaches occupied by the Rayed Bean (such as the Allegheny River), and a recent study found evidence that habitat alteration and loss from sand and gravel dredging has had an adverse effect on the mussel fauna in the navigation pools of the Allegheny River. Adverse impacts from heavy-metal-rich drainage from coal mining and associated sedimentation have been documented in portions of historical Rayed Bean habitat in the upper Ohio basin. Oil and gas resources extraction has increased dramatically in recent years, particularly in Pennsylvania and West Virginia. Although oil and gas extraction generally occurs away from the river, extensive road networks are required to construct and maintain wells. These road networks frequently cross or occur near tributaries, contributing sediment to the receiving waterway. In addition, the construction and operation of wells may result in the discharge of brine (salt water), which can cause acute toxicity and mortality of mussels if mussel tolerance levels are exceeded (77 FR 8632).
- Sedimentation

  Sedimentation has been implicated in the decline of mussel populations nationwide and is a threat to Rayed Bean. Physical habitat effects include altered suspended and bed material loads, and bed sediment composition associated with increased sediment production and run-off; clogged interstitial habitats and reduced interstitial flow rates and dissolved oxygen levels; changed channels in form, position, and degree of stability; altered depth or width-depth ratio that affects light penetration and flow regime; aggraded (filling) or degraded (scouring) channels; and changed channel positions that dewater mussel beds. In addition, sediment can clog interstitial spaces in the substrate, which serve as essential habitat for juvenile mussels (77 FR 8632).

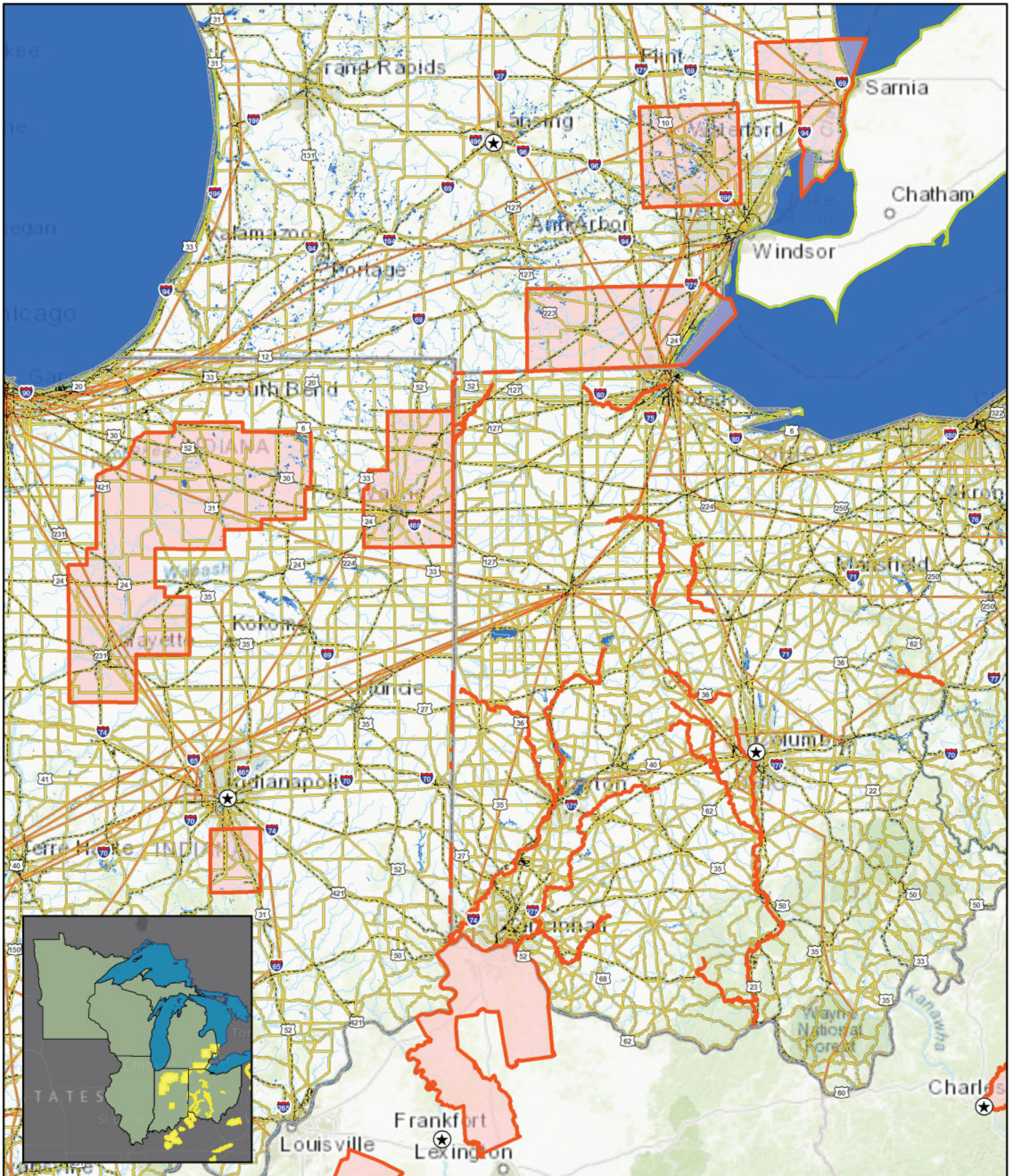
- Climate change
  Factors associated with climate change likely to affect regional mussel populations include changes in stream temperature regimes and precipitation levels that may indirectly result in reduced habitat and declines in host fish stocks.
- Invasive species
  Various exotic species are well established with the range of the Rayed Bean. Exotic species, including the zebra mussel (*Dreissena polymorpha*), Asian clam (*Corbicula fluminea*), Round Goby (*Neogobius melanostomus*), and Black Carp (*Mylopharyngodon piceus*), threaten the Rayed Bean, or its host fish, or both, through mechanisms such as habitat modification, competition, and predation (USFWS, 2018).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2018). Rayed Bean (*Villosa fabalis*) 5-year review: summary and evaluation. Columbus, Ohio. 26pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Rayed Bean (Villosa fabalis) species profile. Retrieved from https://ecos.fws.gov/ecp/species/5862



RAYED BEAN (*VILLOSA FABALIS*) ACTION AREA OVERVIEW MAP

SCALE 1:3,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Rayed Bean (*Villosa fabalis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Rough Pigtoe (*Pleurobema plenum*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Indiana

Species Description
The shell of Rough Pigtoe is subtriangular, moderately thick, and inflated. The shell has a prominent posterior ridge and most older specimens have a slight sulcus. The umbos are inflated, elevated above the hinge line, and turned forward. Beak sculpture consists of a few elevated ridges. The periostracum is textured with a cloth-like or satin-like appearance and ranges from yellowish brown in young individuals to reddish or dark brown in adults. Some shells may have faint green rays visible near the beaks (USFWS, 1984; Cummings & Mayer, 1992). The pseudocardinal teeth are solid, heavy, and thick, and the lateral teeth are short and straight. The beak cavity is deep and compressed. The nacre is usually white but may be pink or orange (USFWS, 1984; Cummings & Mayer, 1992).

Species Distribution
The Rough Pigtoe occurs in medium to large rivers in sand and gravel substrates (USFWS, 1984; Cummings & Mayer, 1992). The Rough Pigtoe was historically widespread, with records from 15 streams in the Ohio River basin in Alabama, Indiana, Kentucky, Pennsylvania, Tennessee, and Virginia (USFWS, 1984; USFWS, 2021). At the time of listing, Rough Pigtoe was only known to occur in the Tennessee River, Cumberland River, Clinch River, Green River, and Barren River in Alabama, Kentucky, and Tennessee (USFWS, 1984). The species' distribution appears to have remained relatively unchanged since listing. A single Rough Pigtoe individual was collected live in the East Fork White River, Indiana, in 1992. Although Rough Pigtoe has not been observed in the East Fork White River since, the species may persist in this river system as well (USFWS, 2014).

Distribution within Action Area
Only believed to occur in Lawrence and Martin Counties, Indiana (East Fork White River), though it has not been collected live in this system since 1992.

Critical Habitat
No critical habitat has been designated for the Rough Pigtoe.

Life History
Specific life history details of the Rough Pigtoe are unknown but are likely similar to other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Gravid females have been observed in late spring or early summer, suggesting Rough Pigtoe is a short-term brooder (tachytictic; USFWS, 1984; USFWS, 2014). The host fish(es) for Rough Pigtoe are not known (USFWS, 1984).

Current Stressors and Threats
The Rough Pigtoe recovery plan identified three primary factors responsible for the decline of Rough Pigtoe populations: siltation, impoundments, and pollution (USFWS, 1984).

- Water quality degradation
  Ongoing threats to the Rough Pigtoe include water quality degradation from point and non-point sources, particularly in tributaries that have limited capability to dilute and assimilate sewage, agricultural runoff, and other pollutants. Freshwater mussels appear to exhibit more sensitivity to some pollutants than do the organisms typically used in toxicity testing. As a result, some of the water quality criteria established by the U.S. Environmental Protection Agency to protect aquatic life may not be protective of mussels. Agriculture and suburban and urban land uses continue to expand in many watersheds within the current range of the Rough Pigtoe. These land use changes alter runoff patterns

and flow in this species' habitat, and the consequences of such changes to these remaining populations are not known (USFWS, 2014).

- Impoundments
  Rough Pigtoe is affected by hydrologic and water quality alterations resulting from the operation of impoundments. Over 50 impoundments had been constructed throughout the Tennessee and Cumberland River systems from the 1930s to the time of listing (USFWS, 1984). The presence of impoundments may have ameliorated the effects of downstream siltation on Rough Pigtoe, but these structures also control river discharges and the many environmental parameters influenced by discharge, which may profoundly affect the ability of these populations to occupy or successfully reduce in downstream habitats (USFWS, 2014).
- Instream activities
  A variety of instream activities (e.g. sand and gravel dredging, road construction, etc.) continue to threaten Rough Pigtoe populations. Protecting these populations from the direct physical disturbance of such activities depends on accurately identifying the location of the populations. The indirect effects of altering the streambed configuration may cause changes in previously suitable habitat (USFWS, 2019).
- Resource extraction activities
  Coal, oil, and natural gas resources are present in some of the watersheds known to support Rough Pigtoe mussels, especially the Green, Barren, and Clinch Rivers. Exploration and extraction of these resources can result in increased siltation, an altered hydrograph, and degraded water quality. Although these resource extraction activities generally occur away from the river, extensive road and pipeline networks are required to access sites. These road networks frequently cross or occur near tributaries, contributing sediment to the receiving waterway. In addition, the construction and operation of wells may result in the discharge of brine (USFWS, 2014).
- Development and urbanization
  Land-based development including residential and agricultural activities near streams often results in loss of riparian habitat, increased stormwater runoff due to increased impervious surfaces, increased sedimentation due to loss of streamside vegetation, and subsequent degradation of streambanks (USFWS, 2019). High levels of suspended solids may clog gills or feeding structures of mollusks, causing nutritional stress and mortality (USFWS, 1984).
- Invasive species
  Invasive zebra mussels (*Dreissena polymorpha*) may affect native freshwater mussels both directly, by physically attaching to the shells of native mussels, and indirectly, through competition or changes in water quality. Direct attachment of zebra mussels may inhibit locomotion, feeding, respiration, or excretion by preventing native mussels from opening or closing. As filter feeders, zebra mussels may strip the water of food and nutrients, and excretion by zebra mussels may increase ambient ammonia concentrations. Although zebra mussels have continued to spread in North American waterways since their accidental introduction in the 1980s, zebra mussels presently do not appear to be having any negative impact on known Rough Pigtoe populations (USFWS, 2014).

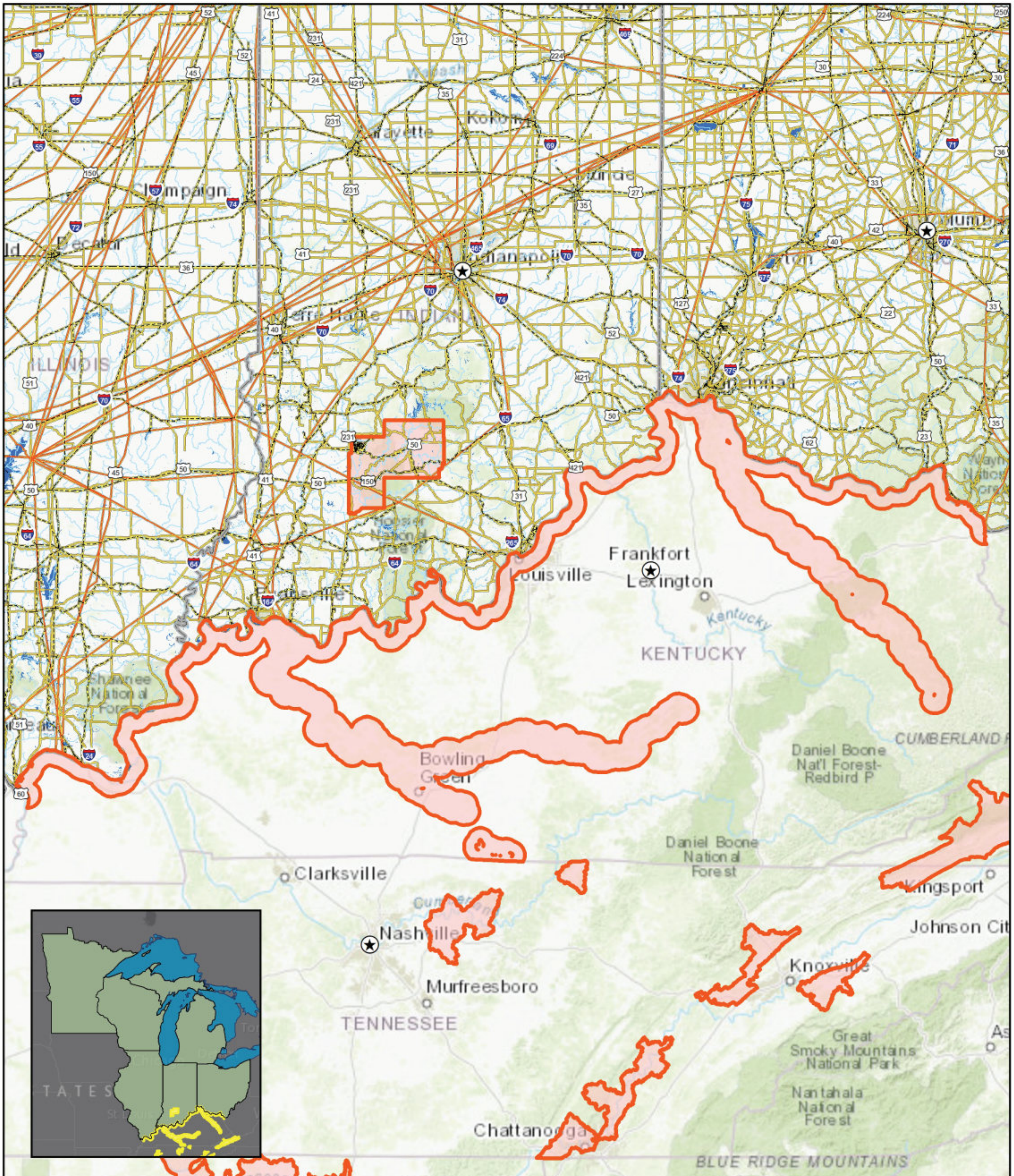
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1984). Rough Pigtoe pearly mussel (*Pleurobema plenum*) recovery plan. Atlanta, Georgia. 51pp.

U.S. Fish & Wildlife Service (USFWS). (2014). Rough Pigtoe (*Pleurobema plenum*) 5-year review: summary and evaluation. Frankfort, Kentucky. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Rough Pigtoe (*Pleurobema plenum*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/6894



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

ROUGH PIGTOE (*PLEUROBEMA PLENUM*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Rough Pigtoe (*Pleurobema plenum*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Round Hickorynut (*Obovaria subrotunda*)

Federal Listing: Proposed Threatened. The Round Hickorynut was petitioned for Federal listing under the Endangered Species Act in 2010. The U.S. Fish & Wildlife Service proposed listing the species as Threatened in 2020 (85 FR 61384).
State Listing within the AA: Endangered in Indiana and Michigan

Species Description
The Round Hickorynut is a small to medium-sized mussel that may reach a length of 3in (7.6cm) but is usually less than 2.4in (6.0cm; Cummings & Mayer, 1992; USFWS, 2019). The shell is round or circular, thick, and moderately inflated. The beaks are low and centrally located and beak sculpture consists of a few indistinct concentric ridges, usually only visible in young individuals. The periostracum is greenish-olive to dark or chestnut brown, sometimes blackish in older individuals, and may have a yellowish band dorsally (USFWS, 2019). The pseudocardinal teeth are moderately small and serrated and the lateral teeth are fairly short and slightly curved (Cummings & Mayer, 1992). The beak cavity is moderately deep and wide. The nacre is silvery white, iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 2019).

Species Distribution
The Round Hickorynut generally inhabits medium-sized streams and is found in sand and gravel in riffle, run, and pool habitats in streams and rivers, but also may be found in sandy mud (USFWS, 2019). The Round Hickorynut is wide-ranging, with records from the Lower Mississippi, Tennessee, Cumberland, Ohio River, and Great Lakes basins. The species is historically known from 297 populations in 12 states, including Alabama, Georgia, Illinois, Indiana, Kentucky, Michigan, Mississippi, New York, Ohio, Pennsylvania, Tennessee, and West Virginia (USFWS, 2019). Results of surveys conducted since 2000 indicate the currently occupied range of the Round Hickorynut in the U.S. includes 65 rivers and streams. The species is still extant in each of the drainage basins listed above, though the Cumberland basin is only represented by two populations and the Lower Mississippi basin is only represented by one population. Many of the historically known populations are considered extirpated, and the species is considered extirpated from Georgia, Illinois, and New York (USFWS, 2019).

Distribution within Action Area

- Indiana: 15 counties (Tippecanoe River and Wabash River basins)
- Michigan: Lapeer, Macomb, Oakland, Sanilac, St. Clair, and Wayne Counties (Lake St. Clair & Lake Erie basins)
- Ohio: 28 counties (Great Lakes and Ohio River basins)

Critical Habitat
No critical habitat has been designated for the Round Hickorynut.

Life History
Life history of the Round Hickorynut is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Round Hickorynut is a long-term brooder, gravid year-round in some southern populations in the Tennessee River basin, but with gravid period potentially more contracted in the northernmost portions of its range (USFWS, 2019). The Round Hickorynut releases glochidia in conglutinates, which are targeted by sight-feeding darters and burst when bitten by the fish, facilitating attachment of the glochidia to the gills and fins of the fish (USFWS, 2019). Several host fish species have been documented for the Round Hickorynut, but the dominant host fishes appear to be darters of the genera *Ammocrypta*, *Etheostoma*, and *Percina* (USFWS, 2019).

Current Stressors and Threats

Like other rare native mussels, habitat degradation or loss, genetic isolation and displacement, and invasive species are potential threats to the Round Hickorynut.

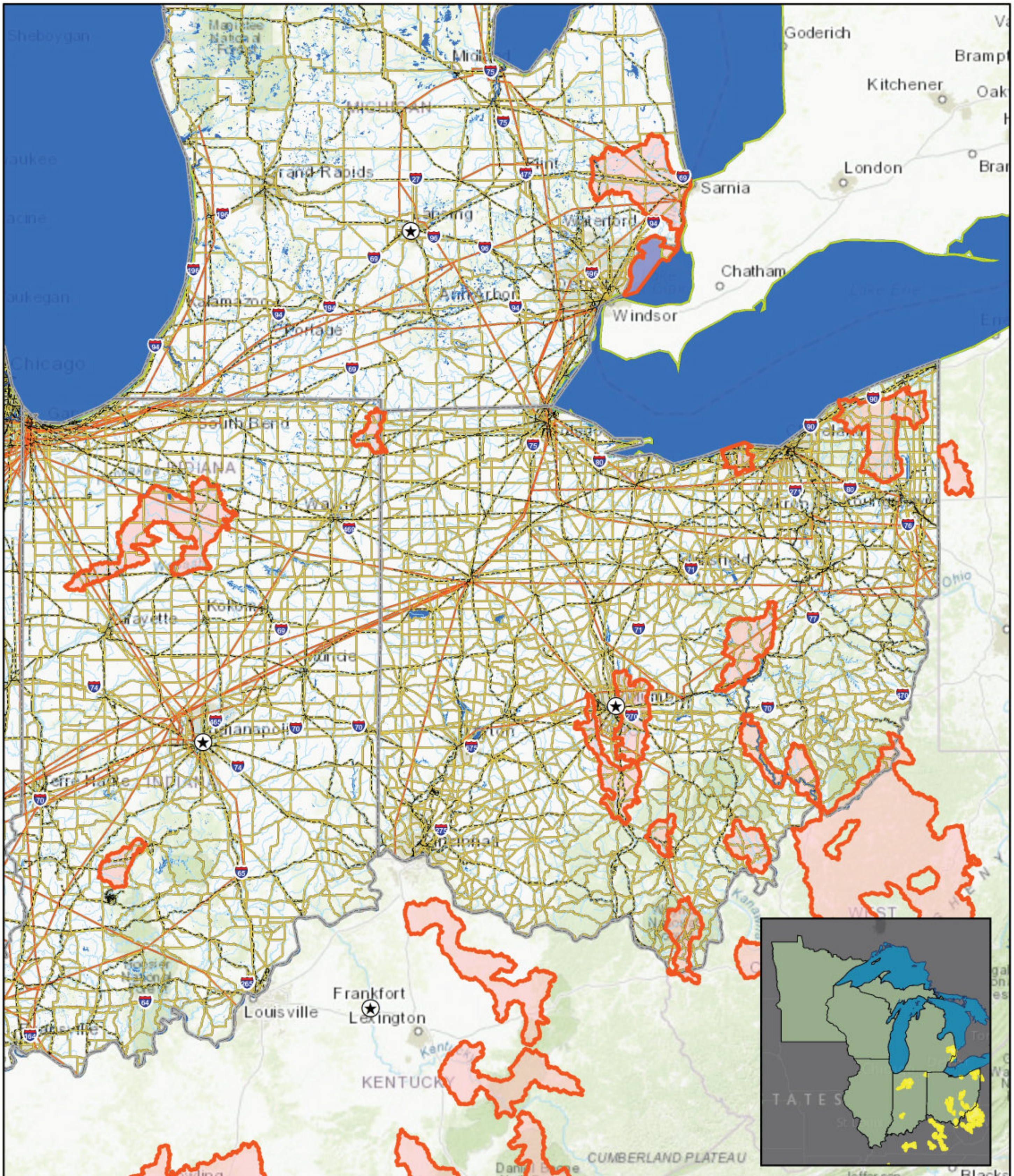
- Development and urbanization
  Development and/or urbanization may affect mussels by altering water quality, water quantity, and habitat, and roads in particular are generally associated with negative effects on the biotic integrity of aquatic ecosystems (USFWS, 2019).
- Dredging and channelization
  Dredging and channelization to maintain waterways for commercial navigation have also profoundly altered riverine habitats nationwide.
- Impoundments
  Extensive construction of dams and impoundments throughout the range of Round Hickorynut may affect mussels both upstream of the dam (change from flowing to impounded waters, increased depths, increased buildup of sediments, decreased dissolved oxygen, and the drastic alteration in resident fish populations) and downstream of the dam (fluctuations in flow regimes, minimal releases and scouring flows, seasonal depletion of dissolved oxygen, reduced or increased water temperatures, and changes in fish assemblages; USFWS, 2019).
- Contaminants
  Contaminants contained in point and non-point discharges can degrade water and substrate quality and adversely impact mussel populations. Although chemical spills and other point sources of contaminants may directly result in mussel mortality, widespread decreases in density and diversity may result in part from the subtle, pervasive effects of chronic, low-level contamination (USFWS, 2019). In addition, chemical control methods used in agriculture, including herbicides, fungicides, insecticides, and their surfactants and adjuvants, are highly toxic to juvenile and adult freshwater mussels (USFWS, 2019).
- Resource extraction activities
  Resource extraction activities may also threaten Round Hickorynut populations. Across the Round Hickorynut's range, the most significant resource extraction impacts are from coal mining and oil and gas exploration. Activities associated with coal mining and oil and gas drilling can contribute chemical pollutants to streams, and natural gas extraction has been associated with increased sedimentation due to increases in impervious surface and tree removal for drill pads and pipelines (USFWS, 2019). Instream sand and alluvial gravel mining has been implicated in the loss of mussel populations, including the Round Hickorynut, in the Tennessee, Cumberland, Ohio, and Lower Mississippi basins. Negative impacts associated with gravel mining include stream channel modifications such as altered habitat, disrupted flow patterns, and sediment transport, and water quality modifications, including increased turbidity, temperature, and sedimentation (USFWS, 2019).
- Invasive species
  Several invasive species are established throughout the range of Round Hickorynut and may threaten the species. Mussels are adversely affected by zebra mussels (*Dreissena polymorpha*) through direct colonization, reduction of available habitat, changes in the biotic environment, or a reduction in food sources. The Asian Clam (*Corbicula fluminea*) alters benthic substrates, may filter mussel sperm or glochidia, competes with native species for limited resources, and causes ammonia spikes in surrounding water when they die off en masse (USFWS, 2019). The Round Goby (*Neogobius melanostomus*) can out-compete native benthic fishes (such as darters and sculpin) for food and other resources, and may also prey especially heavily on juvenile native mussels such as Round Hickorynut. The Black Carp (Mylopharyngodon piceus), a molluscivorous fish, may negatively impact native aquatic communities by direct predation, thus reducing populations of native mussels and snails, many of which are considered endangered or threatened (USFWS, 2019).

- Inherent factors
  The Round Hickorynut exhibits several inherent traits that influence population viability, including relatively small population size and limited recruitment at many locations compared to other mussels. Small population size puts the species at greater risk of extirpation from stochastic events (e.g., drought) or anthropomorphic changes and management activities that affect habitat. In addition, small, isolated Round Hickorynut populations may have reduced genetic diversity, be less genetically fit, and more susceptible to disease during extreme environmental conditions compared to large populations (USFWS, 2019).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2019). Species status assessment report for the Round Hickorynut mussel (*Obovaria subrotunda*), version 1.0. Asheville, North Carolina. 235pp.



0 12.5 25 50 75
Miles
0 10 20 40 60 80
Kilometers

ROUND HICKORYNUT (*OBOVARIA SUBROTUNDA*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Round Hickorynut (*Obovaria subrotunda*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Salamander Mussel (*Simpsonaias ambigua*)

Federal Listing: Under Review. The Salamander Mussel was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 59836).
State Listing within the AA: Endangered in Illinois, Michigan, and Minnesota; Threatened in Wisconsin; Species of Special Concern in Indiana

Species Description
The shell of the Salamander Mussel is small, thin, and elliptical or oval. The anterior and posterior ends are rounded and the dorsal and ventral margins are parallel. Beaks are raised slightly above the hinge line and directed anteriorly. Beak sculpture consists of several double-looped bars. The periostracum is smooth, yellowish tan to dark brown, and lacks rays. One small, thin pseudocardinal tooth is present in each valve and lateral teeth are indistinct or absent. The beak cavity is shallow. The nacre is bluish white and iridescent posteriorly (Cummings & Mayer, 1992; Carman, 2002; WIDNR, 2021).

Species Distribution
The Salamander Mussel is found in medium to large rivers. It is a habitat specialist, typically occurring under flat rocks or ledges of rock walls, though it has also been reported from mud and gravel bars (Carman, 2002; Roe, 2003; MNDNR, 2021). The Salamander Mussel is known from the Lake St. Clair, Lake Huron, and Lake Erie drainages, and from the Ohio River, Cumberland River, and upper Mississippi River basins (Roe, 2003). It is considered imperiled or highly imperiled in Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, West Virginia, Wisconsin, and Ontario, Canada, and is presumed extirpated or possibly extirpated from Iowa, New York, and Tennessee (Carman, 2002; Roe, 2003). In many of these states, extant populations are only known from one or two rivers (Carman, 2002; CBD, 2010; MNDNR, 2021).

Distribution within Action Area
ECOS does not provide a county list for this species. Salamander Mussel may occur in:
- Illinois: Upper Mississippi River basin
- Indiana: Ohio River basin
- Michigan: Great Lakes basin
- Minnesota: Upper Mississippi River basin
- Ohio: Lake Erie and Ohio River basins
- Wisconsin: Upper Mississippi River basin

Critical Habitat
No critical habitat has been designated for the Salamander Mussel.

Life History
Life history of the Salamander Mussel is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. However, the Salamander Mussel is the only North American unionid known to parasitize a non-fish host; glochidia of this species are only known to use the Mudpuppy (*Necturus maculosus*) as a host (Roe, 2003). The Salamander Mussel is believed to be a long-term brooder (bradytictic). Gravid females have been collected in April, and Mudpuppies infested with glochidia have been observed in mid-October (Roe, 2003).

Current Stressors and Threats
Many factors have been implicated in the decline of native freshwater mussels, including destruction of habitat caused by impoundment construction, siltation, gravel mining, and channel modification, as well as pollution and the introduction of non-native species (Carman, 2002; Roe, 2003, MNDNR, 2021).

- Impoundments
  Impoundments can dramatically alter the habitat of freshwater mussels by changing flow, temperature, dissolved oxygen, and substrate composition. Salamander Mussels in Minnesota may be threatened by high stream-flow variations on the St. Croix River, caused by seasonal peaking operation of a hydroelectric dam (MNDNR, 2021). In addition, dams can isolate mussels from their host fish, interfering with reproduction (Roe, 2003).
- Siltation
  Siltation has long been implicated in the decline of native mussels. Fine sediments can interfere with mussel respiration and feeding, and heavy sediment loads may smother juvenile mussels. Sediment can also affect mussels by affecting their host species.
- Pollution
  Pollution from point (industrial and residential discharge) and non-point (siltation, herbicide, surface runoff) sources is also a great threat to mussels. Many types of industrial and domestic substances have been shown to be toxic to mussels. Recent toxicology research suggests mussels are among the most sensitive organisms to some contaminants, such as ammonia and copper (Roe, 2003).
- Invasive species
  The introduction of zebra mussels (*Dreissena polymorpha*) in the 1980s has severely impacted native mussel populations (Roe, 2003). Zebra mussels may directly affect native mussels by attaching to the native mussels' shells. Attached zebra mussels can interfere with feeding, respiration, excretion, and locomotion, and may eventually cause death by suffocation (Roe, 2003; MNDNR, 2021). While it is unclear how susceptible the Salamander Mussel may be to zebra mussel colonization, its preference for remaining under large flat rocks might reduce its exposure (Roe, 2003).

List of References

Carman, S.M. (2002). Special animal abstract for *Simpsonaias ambigua* (Salamander Mussel). Michigan Natural Features Inventory, Lansing, MI. 2pp.

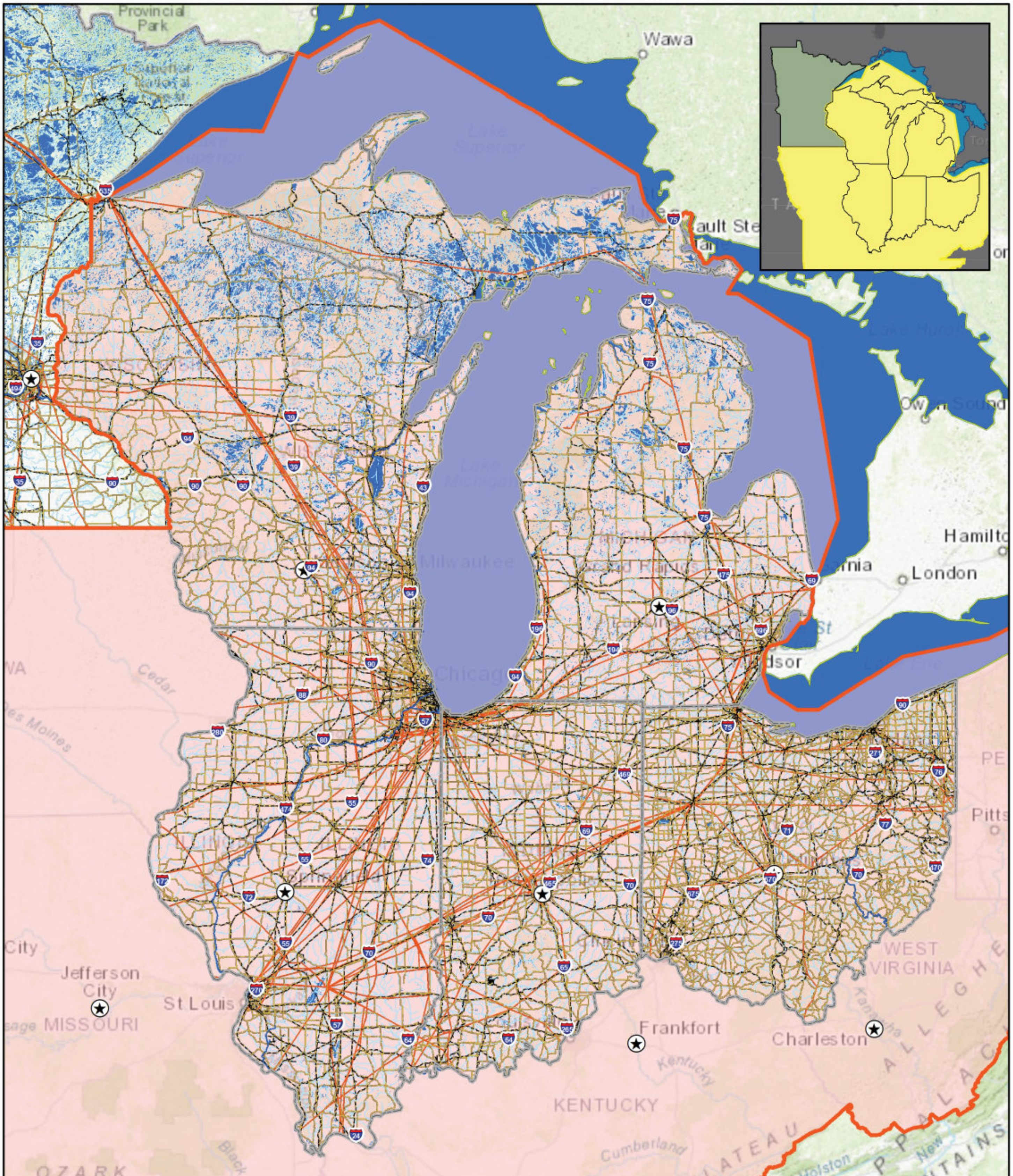
Center for Biological Diversity (CBD). (2010). Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act. 1145pp.

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

Minnesota Department of Natural Resources (MNDNR). (2021). *Simpsonaias ambigua.* Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IMBIV41010

Roe, K.J. (2003). Conservation assessment for the Salamander Mussel (*Simpsonaias ambigua*) Say, 1825. USDA Forest Service, Eastern Region. 11pp.

Wisconsin Department of Natural Resources (WIDNR). (2021). Salamander Mussel (*Simpsonaias ambigua*). Retrieved from https://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=IMBIV41010



0 20 40 80 120
Miles
0 20 40 80 120 160
Kilometers

SALAMANDER MUSSEL (*SIMPSONAIAS AMBIGUA*)
ACTION AREA OVERVIEW MAP

SCALE 1:8,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Salamander Mussel (*Simpsonaias ambigua*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Scaleshell (*Leptodea leptodon*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois and Michigan

Species Description
The Scaleshell is a medium-sized mussel that may reach a length of 10 to 12cm. The shell is elongate, very thin, compressed, and rhomboidal. Individuals are sexually dimorphic. The posterior end of the shell is bluntly pointed in males. In females, the periostracum forms a broad, ruffled extension of the posterior end of the shell (USFWS, 2010). The beaks are small, low, and nearly even with the hinge line. Beak sculpture, if visible, consists of four or five double-looped ridges. The periostracum is smooth, yellowish green or brown, with numerous faint green rays (USFWS, 2010). The pseudocardinal teeth are reduced to a small, thickened ridge, and the lateral teeth are moderately long and fine. The beak cavity is very shallow. The nacre is pinkish white or light purple and highly iridescent (Cummings & Mayer, 1992; USFWS, 2010).

Species Distribution
The Scaleshell occurs in medium to large rivers and is primarily found in stable riffles and runs with slow to moderate current velocity. The Scaleshell historically occurred in 56 rivers in 13 states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kentucky, Ohio, Oklahoma, Minnesota, Missouri, South Dakota, Tennessee, and Wisconsin) within the Mississippi River drainage but was considered rare throughout this range (USFWS, 2010). At the time of listing, the Scaleshell was considered extirpated in Iowa, Minnesota, Wisconsin, and all states east of the Mississippi River, and considered extant in only 14 streams in Missouri, Arkansas, and Oklahoma (USFWS, 2010, 2011). Since 2011, the species has been reported from several additional streams within its historic range, including the Illinois River, from which the Scaleshell had been considered extirpated. Currently, the Meramec, Bourbeuse, and Gasconade Rivers are considered the stronghold populations for the species, and records from other streams over the last 25 years consist of only a few sporadic live individuals (USFWS, 2021).

Distribution within Action Area
Only known to occur in Grundy County, Illinois (Illinois River).

Critical Habitat
No critical habitat has been designated for the Scaleshell.

Life History
Life history of the Scaleshell is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Scaleshell is a long-term brooder (bradytictic); in Missouri, observations of gravid females suggest females begin brooding in early August and release glochidia the following June (USFWS, 2010). The Scaleshell appears to utilize the Freshwater Drum (*Aplodinotus grunniens*) exclusively as a host for its larvae (USFWS, 2010).

Current Stressors and Threats
The Scaleshell recovery plan identified several threats to the species, including water quality degradation, sedimentation, channelization, sand and gravel mining, dredging, impoundments, and invasive species (USFWS, 2010).

- Water quality degradtaion
  Nonpoint and point source pollution is a concern in most streams, but is particularly a problem in the Meramec, Bourbeuse, and Gasconade rivers in Missouri, Spring River in Arkansas (Gordon and the Little River in Oklahoma. Mussels appear to be among the most sensitive organisms to heavy metals. Lead and barite mining in the Big River basin, Missouri, may have contributed to mussel declines in this river. Although most mining operations have ceased, numerous dams retaining mine waste remain

in the Big River basin, and the poor condition of the dams has led to large influxes of mine waste into the Big River from dam collapse. Mussels are also sensitive to ammonia, which is a common pollutant in streams associated with animal feedlots, nitrogenous fertilizers, and the effluents of municipal wastewater treatment plants (USFWS, 2010).

- Sedimentation
  Sedimentation threatens Scaleshell populations throughout the species' range. Although sedimentation is a natural process, intensive agricultural practices, channelization, impoundments, timber harvesting within riparian zones, heavy recreational use, urbanization, and other land use activities can accelerate erosion. Heavy sediment loads can directly affect freshwater mussel survival by interfering with respiration and feeding and may also carry contaminants that are toxic to mussels (USFWS, 2010).
- Sand and gravel mining/dredging
  Sand and gravel mining and dredging are eliminating important pool habitat (for both the Scaleshell and potential fish hosts) in the Meramec, Bourbeuse, Big, and Gasconade Rivers in Missouri. Channelization, sand and gravel mining, and dredging operations physically remove mussels from the water and may also bury or crush mussels. More lasting effects of these activities involve the alteration or destruction of important unionid habitat that can extend upstream and downstream of the excavated area. For example, headcutting, the upstream progression of stream bed destabilization and accelerated bank erosion, can affect an area much larger than the dredging site (USFWS, 2010).
- Impoundments
  Impoundments negatively affect mussels both upstream and downstream by inducing bank and channel scouring, altering water temperature regimes, and altering habitat, food, and fish host availability. Impoundments permanently flood stream channels and eliminate flowing water that is essential habitat for most unionids, including the Scaleshell, and scouring is a major cause of mussel mortality below dams. In addition, impoundments interfere with movement of host fishes, alter fish host assemblages, and isolate mussel beds from each other and from host fish, resulting in diminished recruitment (USFWS, 2010).
- Invasive species
  The recent invasion of the exotic zebra mussel (*Dreissena polymorpha*) poses a substantial threat to native unionids, including Scaleshell. Zebra mussels starve and suffocate native mussels by attaching to their shells and the surrounding habitat in large numbers. Zebra mussels have spread throughout much of the Mississippi River Basin, but at this time, no large, established populations are known to occur in streams occupied by the Scaleshell. However, they are likely to invade these streams based on the proliferation and spread that has already occurred. The Asian clam (Corbicula fluminea) is another introduced freshwater bivalve that is believed to compete with native mussels for food, nutrients, and space. Black Carp (Mylopharyngodon piceus) poses a significant threat to Scaleshell in the near future. This molluscivorous fish was accidentally introduced into the United States in the 1970s and 1980s, and the number of reports of black carp captured in Arkansas, Illinois, Mississippi, and Missouri suggests that the species may be established and reproducing in the wild. Because Black Carp feed on freshwater mollusks extensively, it poses a major threat to the native freshwater mussel fauna if allowed to escape into the wild and establish reproducing populations (USFWS, 2010).

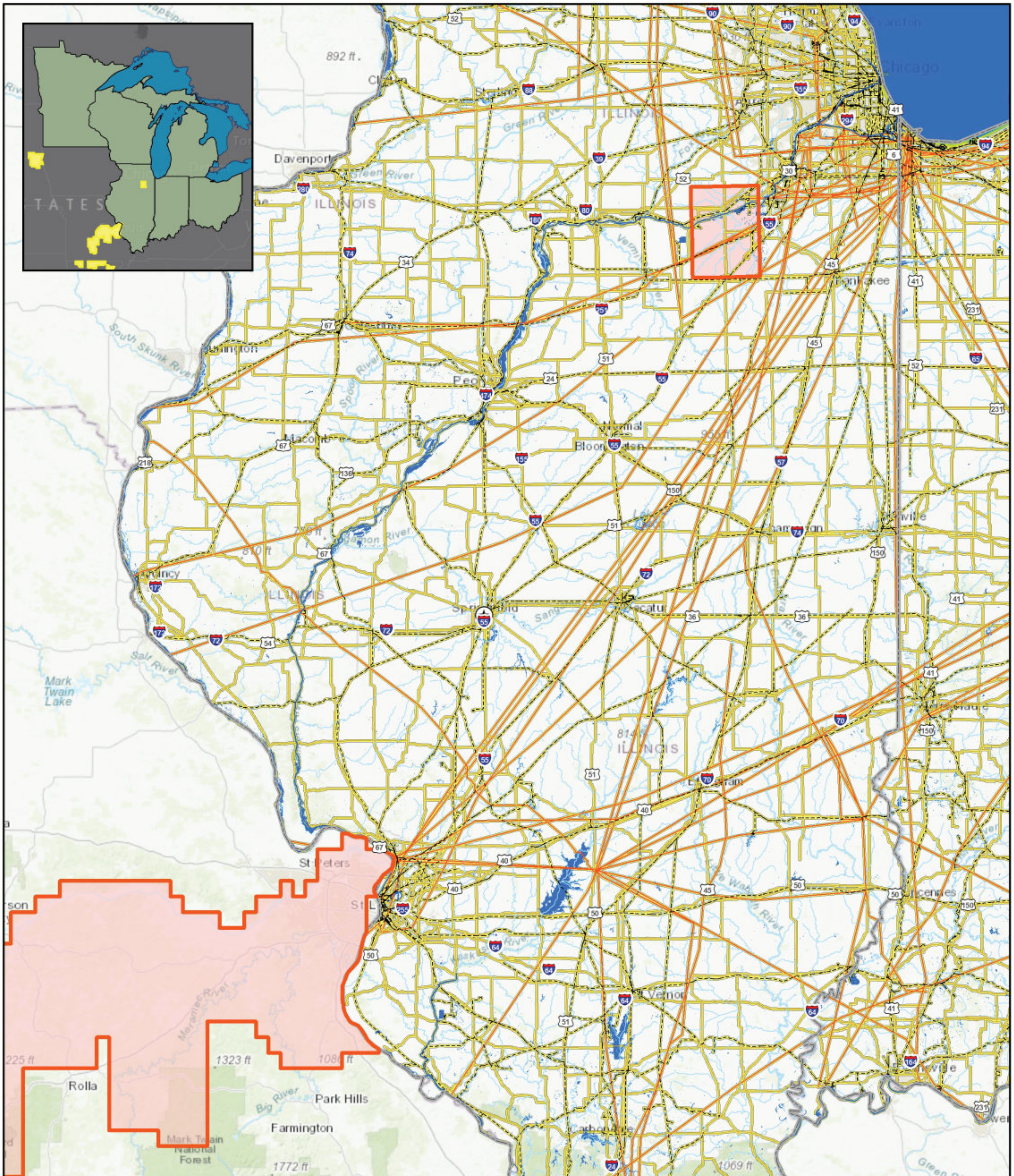
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2010). Scaleshell mussel recovery plan (*Leptodea leptodon*). Fort Snelling, Minnesota. 118pp.

U.S. Fish & Wildlife Service (USFWS). (2011). Scaleshell mussel (*Leptodea leptodon*) 5-year review: summary and evaluation. Columbia, Missouri. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2021). 5-year review: the Scaleshell mussel (*Leptodea leptodon*). Columbia, Missouri. 3pp + appendices.



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

SCALESHELL (*LEPTODEA LEPTODON*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,000,000

Legend		
Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action
Railroad	Lakes & Ponds	Scaleshell (*Leptodea leptodon*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Sheepnose (*Plethobasus cyphyus*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Minnesota, Ohio, and Wisconsin

Species Description
The shell of Sheepnose is ovate, somewhat elongated, moderately inflated, and thick. The anterior end is rounded and the posterior end is bluntly pointed. The beaks are elevated and placed near the anterior margin. Beak sculpture consists of a few concentric ridges, usually only visible in juvenile individuals. The shell is smooth except for a row of broad knobs or tubercles running from the beaks to the ventral margin. The periostracum is rayless, yellow or light brown in juveniles, becoming chestnut to dark brown in adults (Cummings & Mayer, 1992; 77 FR 14914). The pseudocardinal teeth are triangular and roughened, and the lateral teeth are long, heavy, and slightly curved. The beak cavity is shallow to moderately deep. The nacre is white, occasionally tinged with pink or salmon (Cummings & Mayer, 1992; 77 FR 14914).

Species Distribution
The Sheepnose is a larger-stream species occurring primarily in shallow shoal habitats with moderate to swift currents over coarse sand in gravel, although Sheepnose in larger rivers may occur in deeper water (77 FR 14914). Records indicate Sheepnose historically occurred in at least 76 streams in 14 states, including Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Mississippi, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin. Extant populations of Sheepnose are known from 25 streams in all 14 states of historical occurrence, primarily in the Upper Mississippi and Ohio Rivers and their tributaries (USFWS, 2020).

Distribution within Action Area

- Illinois: 13 counties (Mississippi River, Kankakee River, Rock River, Ohio River)
- Indiana: 24 counties (Ohio River, Tippecanoe River, Eel River)
- Ohio: 13 counties (Ohio River, Muskingum River, Walhonding River)
- Wisconsin: 13 counties (Mississippi River, Chippewa River, Flambeau River, Wisconsin River)
- ECOS does not provide a list of Minnesota counties in which Sheepnose may occur, but does indicate the species is known or believed to occur in Minnesota (Mississippi River).

Critical Habitat
No critical habitat has been designated for the Sheepnose.

Life History
Life history of the Sheepnose is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Sheepnose are thought to be short-term brooders, with gravid females observed from May through early August in Wisconsin (USFWS, 2020). Sheepnose glochidia are released in conglutinates, which resemble small pink worms, and glochidia infest the host fish when the fish attempts to eat the conglutinates. Laboratory studies have identified roughly 30 suitable host fish for Sheepnose, most of which are cyprinids (minnows and topminnows). Sauger has also been identified as a natural host for Sheepnose (USFWS, 2020).

Current Stressors and Threats
The Sheepnose final listing rule identified habitat loss and degradation, due to impoundments, channelization, chemical contaminants, mining, oil and gas development, and sedimentation, as the primary reason for the species' decline.

- Impoundments
  Dams eliminate or reduce river flow within impounded areas, trap silts and cause sediment deposition, alter water temperature and dissolved oxygen levels, change downstream water flow and quality, decrease habitat heterogeneity, affect normal flood patterns, and block upstream and downstream movement of species. Within impounded areas, mussel declines have been attributed to sedimentation, decreased dissolved oxygen, and alteration in resident fish populations. Mussel declines below dams are associated with changes and fluctuation in flow regime, scouring and erosion, reduced dissolved oxygen levels and water temperatures, and changes in resident fish assemblages. The decline and imperilment of freshwater mussels, including Sheepnose, in several streams in the Tennessee, Cumberland, Mississippi, Missouri, and Ohio River basins have been directly attributed to construction of numerous impoundments in those systems (77 FR 14914).
- Sedimentation
  Excessive sediments are believed to impact riverine mollusks requiring clean, stable streams. Sediments have been shown to affect respiration, growth, reproductive success, and behavior of freshwater mussels, and to affect fish growth, survival, and reproduction. Potential sediment sources within a watershed include virtually all activities that disturb the land surface, and most localities currently occupied by the Sheepnose are affected to varying degrees by sedimentation. Increased sedimentation and siltation may explain in part why Sheepnose mussels appear to be experiencing recruitment failure in some streams. Interstitial spaces in the substrate provide crucial habitat for juvenile mussels. When clogged, interstitial flow rates and spaces are reduced, thus reducing juvenile habitat (77 FR 14914).
- Dredging and channelization
  Dredging and channelization activities have profoundly altered riverine habitats nationwide. Channelization impacts streams physically (for example, accelerated erosion, reduced depth, decreased habitat diversity, geomorphic instability, and loss of riparian vegetation) and biologically (for example, decreased fish and mussel diversity, altered species composition and abundance, decreased biomass, and reduced growth rates). Channel maintenance operations for commercial navigation have impacted habitat for Sheepnose in many large rivers rangewide, and periodic channel maintenance may continue to adversely affect this species in the upper Mississippi, Ohio, Muskingum, and Tennessee Rivers (77 FR 14914).
- Resource extraction activities
  Instream gravel mining has been implicated in the destruction of mussel populations. Negative impacts associated with gravel mining include stream channel modifications, water quality modifications, macroinvertebrate population changes, and changes in fish populations. Gravel mining occurs in several streams known to harbor Sheepnose populations and may impact those populations. In addition, heavy metal-rich drainage from coal mining and associated sedimentation has adversely affected portions of river systems in which Sheepnose occurs, and coal mining related discharges may have local impacts on survival and recruitment (77 FR 14914). Coal, oil, and gas resources are present in a number of the basins where Sheepnose occur, and extraction of these resources has increased dramatically in recent years, particularly in Pennsylvania and West Virginia. Exploration and extraction of these energy resources can result in increased siltation, a changed hydrograph, and altered water quality even at a distance from the mine or well field. Sheepnose habitat in larger streams can be threatened by the cumulative effects of multiple mines and well fields (77 FR 14914).
- Chemical contaminants
  Chemical contaminants are ubiquitous throughout the environment and are considered a major threat in the decline of freshwater mussel species. Chemicals enter the environment through both point and nonpoint discharges including spills, industrial sources, municipal effluents, and agricultural runoff. These sources contribute organic compounds, heavy metals, pesticides, and a wide variety of newly emerging contaminants to the aquatic environment. As a result, water and sediment quality can be degraded to the extent that mussel populations are adversely affected. Freshwater mussels, including Sheepnose, have been shown to be particularly sensitive to many contaminants, such as ammonia and

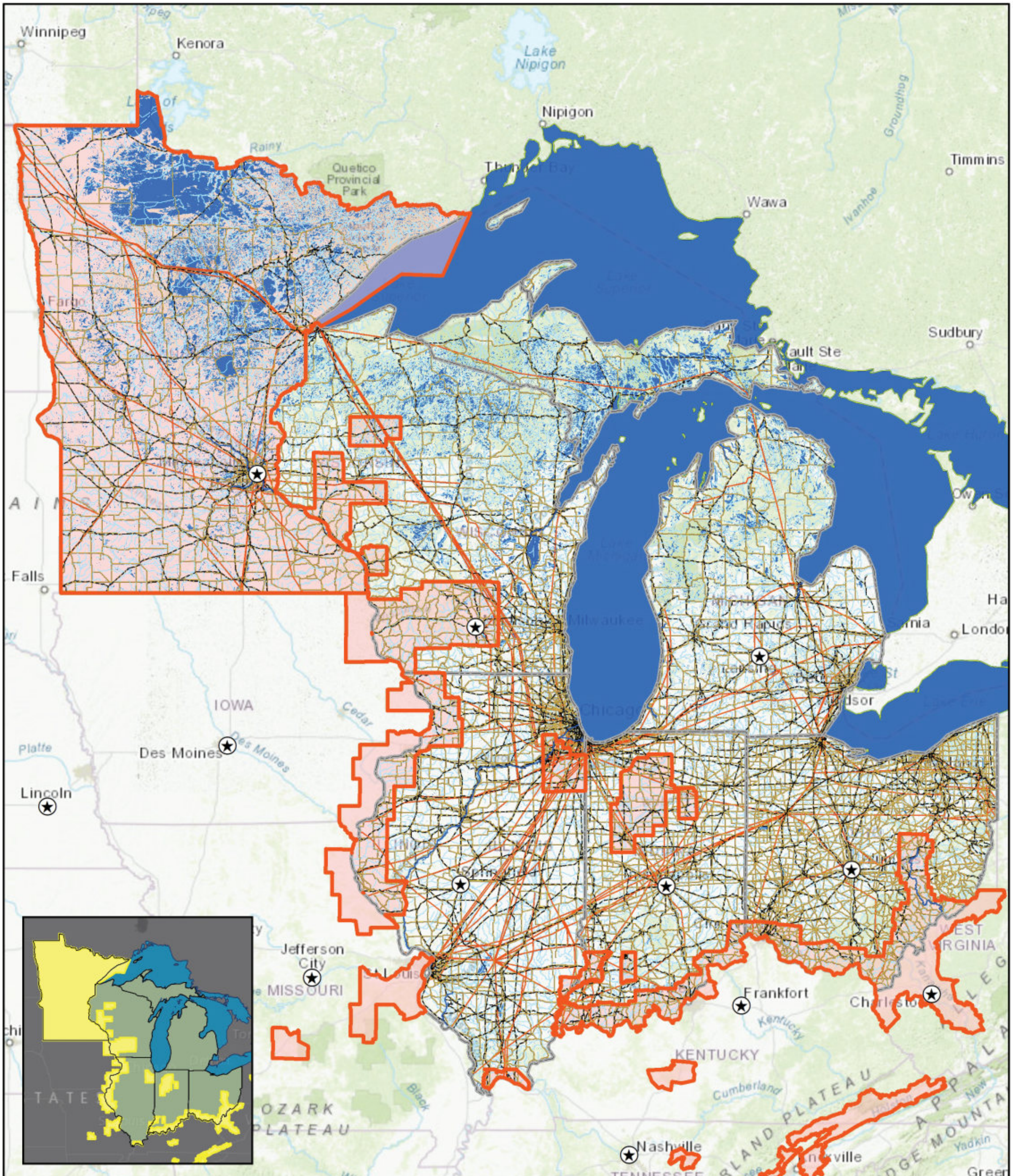
heavy metals, and introduction of these contaminants into Sheepnose habitats may threaten the species (77 FR 14914).

- Invasive species
  The recent invasion of the exotic zebra mussel (*Dreissena polymorpha*) poses a substantial threat to native unionids, including Scaleshell. Zebra mussels starve and suffocate native mussels by attaching to their shells and the surrounding habitat in large numbers. Zebra mussels are established throughout the upper Mississippi, Ohio, and Tennessee Rivers, overlapping much of the current range of Sheepnose. The Asian clam (*Corbicula fluminea*) is another introduced freshwater bivalve that is believed to compete with native mussels for food, nutrients, and space. Other invasive fish, including Black Carp (*Mylopharyngodon piceus*) and Round Goby (*Neogobius melanostomus*), have the potential to become established in streams within the Sheepnose's range and may affect Sheepnose by direct predation on mussels or by predation on potential host fish (77 FR 14914).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2020). Sheepnose (*Plethobasus cyphyus*) 5-year review: summary and evaluation. Rock Island, Illinois. 32pp.



0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

SHEEPNOSE (*PLETHOBASUS CYPHYUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Sheepnose (*Plethobasus cyphyus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Snuffbox (*Epioblasma triquetra*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

Species Description

The Snuffbox is a small- to medium-sized mussel, with males reaching up to 7.0cm in length and females reaching 4.5cm (Cummings & Mayer, 1992; USFWS, 2021). The shape of the shell is somewhat triangular (females), oblong, or ovate (males), with the valves solid, thick, and very inflated. The anterior end of the shell is rounded, and the posterior end is truncated, highly so in females. The posterior ridge and slope in females is covered with fine ridges and grooves, and the posterioventral shell edge is finely toothed. The beaks are swollen, turned forward and inward, and extended above the hingeline. Beak sculpture consists of three or four faint, double-looped bars. The periostracum is generally smooth and yellowish or yellowish-green in young individuals, becoming darker with age. Green, squarish, triangular, or chevron-shaped marks cover the dorsal portion of the shell but become poorly delineated stripes with age (Cummings & Mayer, 1992; USFWS, 2021). The pseudocardinal teeth are thin and triangular and the lateral teeth are short and slightly curved. The beak cavity is wide and deep. The nacre is white, often with a silvery luster, and a gray-blue or gray-green tinge in the beak cavity (Cummings & Mayer, 1992; USFWS, 2021).

Species Distribution

The Snuffbox occurs in small- to medium-sized creeks, larger rivers, and lakes. It is found in riffles and shoals with swift current and wave-washed shores of lakes over gravel and sand with occasional cobble and boulders (77 FR 8632). The Snuffbox historically occurred in 210 streams and lakes in 18 states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Mississippi, Missouri, New York, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin) and Ontario, Canada (77 FR 8632). The Snuffbox is currently considered to be extant in 82 streams in 14 states (Alabama, Arkansas, Illinois, Indiana, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and Wisconsin) and Ontario, Canada (USFWS, 2019). Populations in the Grand River (Michigan), Ausable River (Ontario), Sydenham River (Ontario), Bourbeuse River (Missouri), French Creek (Pennsylvania), Clinch River (Tennessee and Virginia), and Paint Rock River (Alabama) have been categorized as stronghold populations (USFWS, 2019).

Distribution within Action Area

- Illinois: 11 counties (Mississippi River and Ohio River basins)
- Indiana: 15 counties (Ohio River and Great Lakes basins)
- Michigan: 12 counties (Great Lakes basin)
- Minnesota: Chisago, Hennepin, Ramsey, and Washington Counties (Mississippi River, St. Croix River)
- Ohio: 25 counties (Lake Erie and Ohio River basins)
- Wisconsin: Outagamie, Pierce, Polk, Shawano, St. Croix, Waupaca, and Waushara counties (St. Croix River, Wolf River, Little Wolf River, Embarrass River)

Critical Habitat

No critical habitat has been designated for the Snuffbox.

Life History

Life history of the Snuffbox is similar to that of other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Snuffbox is thought to be a long-term brooder (bradytictic), with gravid females found in September through May (77 FR 8632). Female Snuffbox mussels display their mantle to attract host fish, and, when a host fish approaches, will often close their valves on the fish's head or snout, trapping the fish and ensuring that glochidia are released into the fish's gills (USFWS, 2012). Juvenile Snuffbox have successfully transformed on Logperch *(Percina caprodes),* Blackside Darter *(Percina maculata),* Rainbow Darter (*Etheostoma caeruleum*), Iowa Darter *(Etheostoma exile),* Blackspotted Topminnow *(Fundulus olivaceous),* Mottled Sculpin (*Cottus bairdi*), Banded Sculpin *(Cottus carolinae),* Ozark Sculpin *(Cottus hypselurus),* Largemouth Bass (*Micropterus salmoides*), and Brook Stickleback *(Culaea inconstans)* in laboratory tests (77 FR 8632).

Current Stressors and Threats

At the time of listing, destruction, modification, and curtailment of the Snuffbox's range was considered to be a threat to the species. The Snuffbox has experienced significant curtailment of its occupied range and has been eliminated from about 62 percent of the streams in which it historically occurred. The primary cause of range curtailment is modification and destruction of river and stream habitats, primarily by the construction of impoundments. Other factors contributing to the reduction in range include dredging and channelization, chemical contamination, oil and gas production, sand and gravel mining, and siltation.

- Impoundments
  Impoundments result in the dramatic modification of riffle and shoal habitats and a resulting loss of mussel resources, especially in larger rivers. Stream habitat throughout major portions of the range of Snuffbox has been impounded. Dams interrupt a river's ecological processes by modifying flood pulses; controlling impounded water elevations; altering water flow, sediments, nutrients, and energy inputs and outputs; increasing depth; decreasing habitat heterogeneity; decreasing stability due to subsequent sedimentation; blocking host fish passage; and isolating mussel populations from fish hosts. Even small, low-head dams can have some of these effects on mussels (77 FR 8632). Since the time of listing, five dam removals have occurred in Snuffbox streams, but an improvement to the status of the Snuffbox populations in these streams has not yet been documented (USFWS, 2019).
- Dredging and channelization
  Dredging and channelization activities have profoundly altered riverine habitats nationwide. Channelization impacts a stream's physical (accelerated erosion, reduced depth, decreased habitat diversity, geomorphic instability, and riparian canopy loss) and biological (decreased fish and mussel diversity, changed species composition and abundance, decreased biomass, and reduced growth rates) characteristics, and channel maintenance may result in profound impacts downstream, such as increases in turbidity and sedimentation, which may smother benthic (bottom-dwelling) organisms. Hundreds of miles of streams containing Snuffbox were dredged and channelized decades ago, and some populations have been eliminated from these streams (77 FR 8632).
- Chemical contaminants
  Chemical contaminants are ubiquitous throughout the environment and are considered a major threat in the decline of freshwater mussel species. Chemicals enter the environment through both point and nonpoint discharges, including spills, industrial sources, municipal effluents, and agricultural runoff. These sources contribute organic compounds, heavy metals, pesticides, and a wide variety of newly emerging contaminants to the aquatic environment. As a result, water and sediment quality can be degraded to the extent that mussel populations are adversely impacted. Although point source discharges within the range of the Snuffbox have been reduced since the inception of the Clean Water Act, it is unclear if these regulatory mechanisms provide adequate protection for filter-feeding organisms that can be impacted by extremely low levels of contaminants (77 FR 8632).
- Resource extraction activities
  Various mining and resource extraction activities threaten Snuffbox populations. Adverse impacts from heavy-metal-rich drainage from coal mining and associated sedimentation have been documented in portions of historical Snuffbox habitat in the upper Ohio basin. Oil and gas resources extraction has increased dramatically in recent years, particularly in Pennsylvania and West Virginia. Although oil and gas extraction generally occurs away from the river, extensive road networks are required to construct and maintain wells. These road networks frequently cross or occur near tributaries, contributing sediment to the receiving waterway. In addition, the construction and operation of wells may result in the discharge of brine (salt water), which can cause acute toxicity and mortality of mussels if mussel

tolerance levels are exceeded. Instream gravel mining and mining for metals may also continue to threaten Snuffbox populations in various locations (77 FR 8632).

- Sedimentation
  Sedimentation has been implicated in the decline of mussel populations nationwide and is a threat to the Snuffbox. Physical habitat effects include altered suspended and bed material loads, and bed sediment composition associated with increased sediment production and run-off; clogged interstitial habitats and reduced interstitial flow rates and dissolved oxygen levels; changed channels in form, position, and degree of stability; altered depth or width-depth ratio that affects light penetration and flow regime; aggraded (filling) or degraded (scouring) channels; and changed channel positions that dewater mussel beds. In addition, sediment can clog interstitial spaces in the substrate, which serve as essential habitat for juvenile mussels (77 FR 8632).
- Climate change
  Factors associated with climate change likely to affect regional mussel populations include changes in stream temperature regimes and precipitation levels that may indirectly result in reduced habitat and declines in host fish stocks.
- Invasive species
  Various exotic species are well established with the range of the Snuffbox. Exotic species, including the zebra mussel (*Dreissena polymorpha*), Asian clam (*Corbicula fluminea*), Round Goby (*Neogobius melanostomus*), and Black Carp (*Mylopharyngodon piceus*), threaten the Snuffbox, or its host fish, or both, through mechanisms such as habitat modification, competition, and predation (USFWS, 2019).

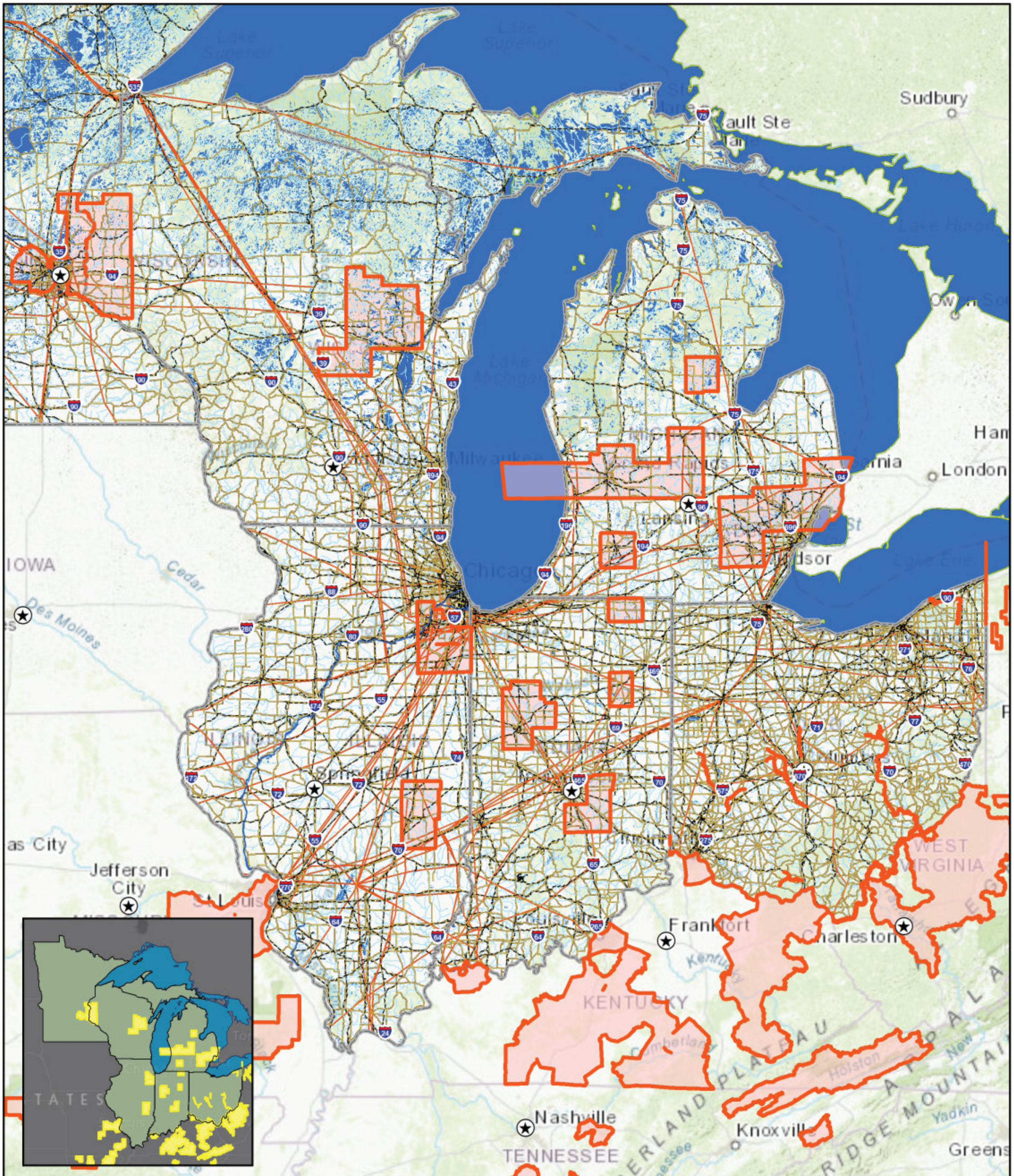
List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2012). Snuffbox (*Epioblasma triquetra*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/clams/snuffbox/snuffboxfactsheet.html

U.S. Fish & Wildlife Service (USFWS). (2019). Snuffbox (*Epioblasma triquetra*) 5-year review: summary and evaluation. Columbus, Ohio. 58pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Snuffbox (*Epioblasma triquetra*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/4135



0 20 40 80 120
Miles
0 20 40 80 120 160
Kilometers

SNUFFBOX (*EPIOBLASMA TRIQUETRA*)
ACTION AREA OVERVIEW MAP

SCALE 1:8,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Snuffbox (*Epioblasma triquetra*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Spectaclecase (*Cumberlandia monodonta*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Minnesota, and Wisconsin

Species Description

The Spectaclecase is a large mussel that reaches at least 23.5cm in length. The shape of the shell is greatly elongated, sometimes arcuate (curved), and moderately inflated, with the valves being solid and moderately thick, especially in older individuals. The beaks are only slightly elevated above the hinge line. Beak sculpture, if visible, consists of three or four heavy ridges. The periostracum is somewhat smooth, rayless, and light yellow, greenish-tan, or brown in young specimens, becoming rough and dark brown to black in old shells. The shell commonly will crack posteriorly when dried. The single pseudocardinal tooth is simple and peg-like in the right valve, fitting into a depression in the left. The lateral teeth are straight and single in the right valve, and double in the left valve, but become fused with age into an indistinct raised hinge line. The beak cavity is moderately shallow. The nacre is white, mostly iridescent in young specimens, but becoming iridescent posteriorly in older shells (Cummings & Mayer, 1992; USFWS, 2014).

Species Distribution

The Spectaclecase is a large river species that is most often found between large rocks but has also been found in mud and sand to gravel, cobble, and boulders in relatively shallow riffles and shoals with slow to swift current. Spectaclecase mussels are often found aggregated under slab boulders or bedrock shelves, where they are protected from the current (USFWS, 2014). The Spectaclecase historically occurred in at least 44 streams in the Mississippi, Ohio, and Missouri River basins and its distribution comprised portions of 14 states (Alabama, Arkansas, Illinois, Indiana, Iowa, Kansas, Kentucky, Minnesota, Missouri, Ohio, Tennessee, Virginia, West Virginia, and Wisconsin; USFWS, 2014). The species is now known from only 20 of the 44 historical streams in the Mississippi, Ohio, and lower Missouri River basins, and is considered extirpated from Indiana, Kansas, and Ohio. The only remaining populations that are considered relatively strong are in the Meramec and Gasconade Rivers in Missouri and the St. Croix River in Minnesota and Wisconsin (USFWS, 2014).

Distribution within Action Area

- Illinois: Adams, Hancock, Henderson, Madison, Massac, Mercer, Pike, and Rock Island Counties (Mississippi River, Ohio River)
- Minnesota: Chisago, Pine, and Washington Counties (Mississippi River, St. Croix River)
- Wisconsin: Burnett, Chippewa, Crawford, Grant, Pierce, Polk, and St. Croix Counties (Mississippi River, St. Croix River)

Critical Habitat

No critical habitat has been designated for the Spectaclecase.

Life History

Life history of the Spectaclecase is similar to other unionid mussel species. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Spectaclecase is thought to release glochidia from early April to late May in the Meramec and Gasconade Rivers in Missouri, and has been reported as producing two broods, one in spring or early summer and the other in the fall, in the Meramec River (USFWS, 2014). Mooneye (*Hiodon tergisus*) and Goldeye (*Hiodon alosoides*) have been identified as suitable host fish for Spectaclecase glochidia (USFWS, 2019).

Current Stressors and Threats

The Spectaclecase final listing rule identified habitat loss and degradation, due to impoundments, channelization, chemical contaminants, mining, oil and gas development, and sedimentation, as the primary reason for the species' decline.

- Impoundments
  Dams eliminate or reduce river flow within impounded areas, trap silts and cause sediment deposition, alter water temperature and dissolved oxygen levels, change downstream water flow and quality, decrease habitat heterogeneity, affect normal flood patterns, and block upstream and downstream movement of species. Within impounded areas, mussel declines have been attributed to sedimentation, decreased dissolved oxygen, and alteration in resident fish populations. Mussel declines below dams are associated with changes and fluctuation in flow regime, scouring and erosion, reduced dissolved oxygen levels and water temperatures, and changes in resident fish assemblages. The decline and imperilment of freshwater mussels, including Spectaclecase, in several streams in the Tennessee, Cumberland, Mississippi, Missouri, and Ohio River basins have been directly attributed to construction of numerous impoundments in those systems (77 FR 14914).
- Sedimentation
  Excessive sediments are believed to impact riverine mollusks requiring clean, stable streams. Sediments have been shown to affect respiration, growth, reproductive success, and behavior of freshwater mussels, and to affect fish growth, survival, and reproduction. Potential sediment sources within a watershed include virtually all activities that disturb the land surface, and most localities currently occupied by the Spectaclecase are affected to varying degrees by sedimentation. Increased sedimentation and siltation may explain in part why Spectaclecase mussels appear to be experiencing recruitment failure in some streams. Interstitial spaces in the substrate provide crucial habitat for juvenile mussels. When clogged, interstitial flow rates and spaces are reduced, thus reducing juvenile habitat (77 FR 14914).
- Dredging and channelization
  Dredging and channelization activities have profoundly altered riverine habitats nationwide. Channelization impacts streams physically (for example, accelerated erosion, reduced depth, decreased habitat diversity, geomorphic instability, and loss of riparian vegetation) and biologically (for example, decreased fish and mussel diversity, altered species composition and abundance, decreased biomass, and reduced growth rates). Channel maintenance operations for commercial navigation have impacted habitat for Spectaclecase in many large rivers rangewide, and periodic channel maintenance may continue to adversely affect this species in the upper Mississippi, Ohio, and Tennessee Rivers (77 FR 14914).
- Resource extraction activities
  Instream gravel mining has been implicated in the destruction of mussel populations. Negative impacts associated with gravel mining include stream channel modifications, water quality modifications, macroinvertebrate population changes, and changes in fish populations. Gravel mining occurs in several streams known to harbor Spectaclecase populations and may impact those populations. In addition, heavy metal-rich drainage from coal mining and associated sedimentation has adversely affected portions of river systems in which Spectaclecase occurs, and coal mining related discharges may have local impacts on survival and recruitment. Similarly, heavy metal contaminated sediments associated with lead mining have negatively affected mussel populations along several miles of the Big River, Missouri (77 FR 14914).
- Chemical contaminants
  Chemical contaminants are ubiquitous throughout the environment and are considered a major threat in the decline of freshwater mussel species. Chemicals enter the environment through both point and nonpoint discharges including spills, industrial sources, municipal effluents, and agricultural runoff. These sources contribute organic compounds, heavy metals, pesticides, and a wide variety of newly emerging contaminants to the aquatic environment. As a result, water and sediment quality can be degraded to the extent that mussel populations are adversely affected. Freshwater mussels have been shown to be particularly sensitive to many contaminants, such as ammonia and heavy metals, and

introduction of these contaminants into Spectaclecase habitats may threaten the species (77 FR 14914).

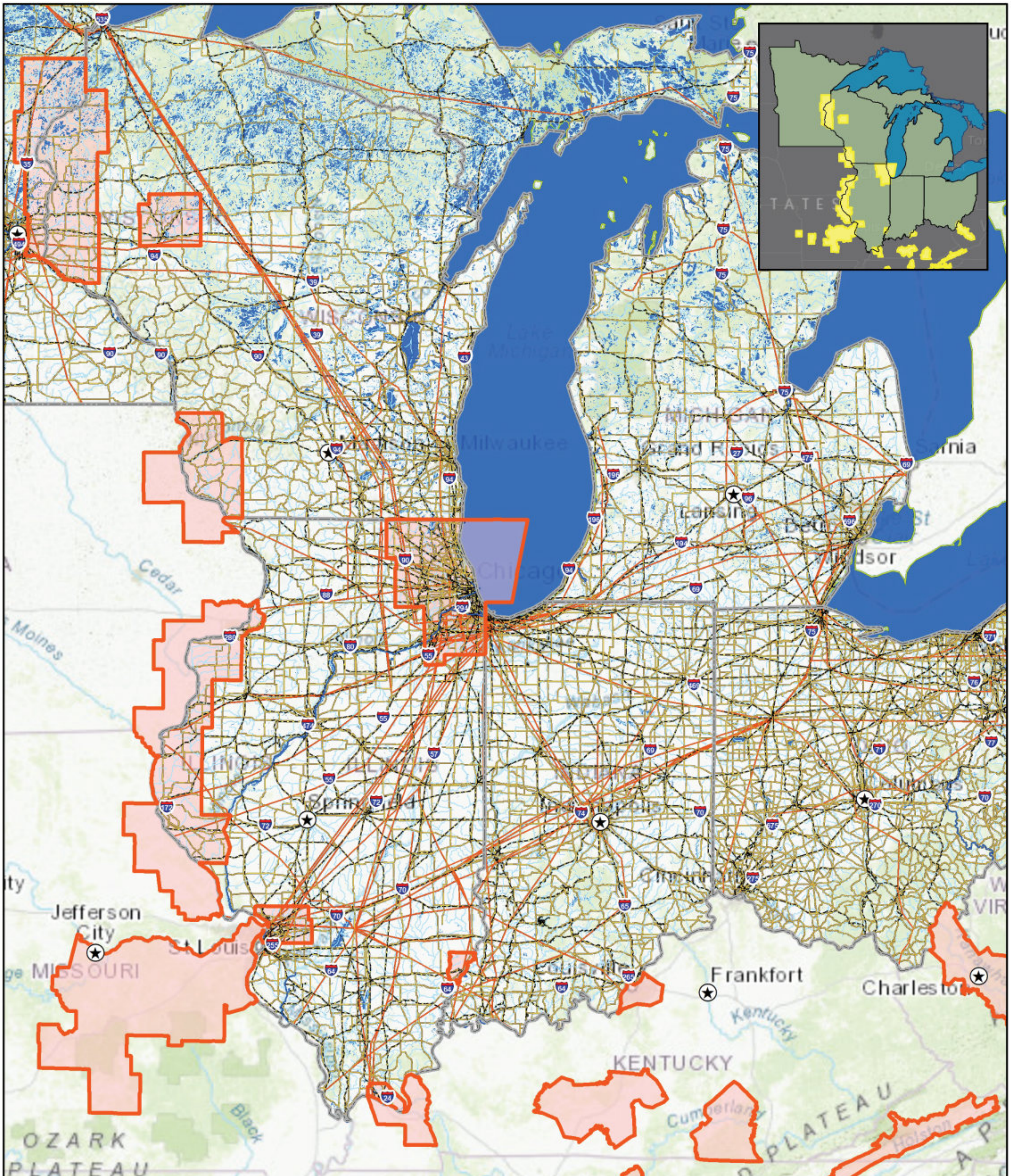
- Invasive species
  The invasion of the zebra mussel (*Dreissena polymorpha*) poses a serious threat to mussel faunas in many regions, and species extinctions are expected as a result of its continued spread in the eastern United States Zebra mussels impact native mussels primarily through direct fouling of the shells of live native mussels. Zebra mussels may also reduce food concentrations to levels too low to support reproduction, or even survival in extreme cases. The Spectaclecase's colonial tendency could allow for very large numbers to be affected by a single favorable year for zebra mussels. Zebra mussels are established throughout the upper Mississippi, lower St. Croix, Ohio, and Tennessee Rivers, overlapping much of the current range of the Spectaclecase. A molluscivore (mollusk eater), the black carp (*Mylopharyngodon piceus*) is a potential threat to the Spectaclecase; it has been introduced into North America since the 1970s. Black carp are known to eat clams (*Corbicula* spp.) and unionid mussels in China, in addition to snails. Several other Asian carp species, which may disrupt aquatic food chains, are also present in the some of the rivers with extant Spectaclecase populations (USFWS, 2014).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (2014). Recovery outline for the Spectaclecase mussel (*Cumberlandia monodonta*). Bloomington, Minnesota. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Spectaclecase (*Cumberlandia monodonta*) 5-year review: summary and evaluation. Bloomington, Minnesota. 19pp.



0 15 30 60 90 Miles

0 15 30 60 90 120 Kilometers

SPECTACLECASE (*CUMBERLANDIA MONODONTA*)
ACTION AREA OVERVIEW MAP

SCALE 1:7,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Spectaclecase (*Cumberlandia monodonta*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

White Cat's Paw Pearly Mussel (*Epioblasma obliquata perobliqua*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Indiana, Michigan, and Ohio

Species Description
The White Cat's Paw Pearly Mussel shell is small and subquadrate to oval in shape. The species is sexually dimorphic. Males are larger than females, the posterior end of the shell is bluntly pointed, and a wide sulcus or depression is present between the posterior ridges. The female shell is truncated, ribbed, and notched at the posterior end, with a narrow, slightly swollen postventral expansion bearing a comb-like row of small, sharp denticles on its margin. The umbos are moderately high and beak sculpture is double-looped. The periostracum is yellow, yellowish-green, or brown with numerous fine green rays (USFWS, 1990; Cummings & Mayer, 1992). The pseudocardinal teeth are small and triangular and the lateral teeth are moderately thick. The nacre is white (USFWS, 1990).

Species Distribution
The White Cat's Paw Pearly Mussel has been reported most frequently from riffle-run reaches of small to moderately large rivers (USFWS, 1990). The species historically occurred in the Wabash, White, Tippecanoe, Maumee, and St. Joseph Rivers in Indiana, and in the Maumee and St. Joseph Rivers and Fish Creek in Ohio. It may also have occurred in the Ohio River, though the museum record is questionable. However, since 1970, the White Cat's Paw Pearly Mussel has only been collected from Fish Creek in Ohio. It is currently known to exist in only a 3-mile portion of Fish Creek, and the last observation of a live individual was in 1999 (USFWS, 2021).

Distribution within Action Area
Only known to occur in Fish Creek in DeKalb and Steuben Counties, Indiana, and Williams County, Ohio.

Critical Habitat
No critical habitat has been designated for the White Cat's Paw Pearly Mussel.

Life History
Life history of the White Cat's Paw Pearly Mussel is presumably similar to that of other unionid mussel species, though specific life history details are not well known due to the scarcity of individuals. Females brood glochidia (larvae) in their gills, and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. Host fish for the White Cat's Paw Pearly Mussel are not known, but host fish for the closely related Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) include Rock Bass (*Amploplites rupestris*), Mottled Sculpin (*Cottus bairdii*), Stonecat (*Noturus flavus*), Blackside Darter (*Percina maculata*), and Logperch (*Percina caprodes*), and it is likely that the host fish for White Cat's Paw Pearly Mussel are also darter or sculpin species (USFWS, 1990; USFWS, 2020).

Current Stressors and Threats
The original White Cat's Paw Pearly Mussel recovery plan identified several threats to the species, including channelization and other substrate disturbance, siltation, and pollution.

- Channelization and substrate disturbance
  Channelization and other forms of substrate disturbance have contributed substantially to the decline of unionid mollusks. Deforestation, altered flow regimes, drainage of swamps and increases in tilled farmland have been cited as factors contributing to the decline of mussels in Indiana, and gravel dredging operations have been cited as contributing to the abundance of shifting, unstable sand substrate in the lower Wabash River. In addition, one of the largest known mussel beds in the St. Joseph River had declined in large part due to instream construction centered on the mussel bed (USFWS, 1990).

- Siltation
  Siltation is another factor that has contributed to the decline in unionid mussels. High silt loads have been found to reduce filter feeding efficiency and can irritate, damage, or clog the gills of mussels. The White Cat's Paw Pearly Mussel appears to live buried in gravel substrate, and silt deposited over the substrate would quickly cover individuals of this species (USFWS, 1990).
- Pollutants
  Mussels may also be affected by pollutants. Reduction or elimination of mussel beds has been observed downstream of industrial centers, municipal sewage outfalls, and mining operations, and may be the result of reduced water quality downstream from these sources of pollution. In some instances, the contaminants produced mussel die-offs by direct toxic effects, and in other instances reduced populations of mussels are the indirect result of the elimination of fish hosts or food items (USFWS, 1990).
- Climate change
  Global climate change likely constitutes a significant new threat for the species. Current climate change predictions areas in the Northern Hemisphere indicate warmer air temperatures and more intense precipitation events. The predicted impacts on streams include changes in the distribution of algae, plankton, and fish, as well as changes in water temperatures and oxygen levels. Warming of waters in rivers and streams may make these habitats less able to support their current fish and mussel fauna. Although the specific effects of climate change on the White Cat's Paw Pearly Mussel are unknown, altered hydrology in rivers, increased frequency of extreme weather events, and a changing abundance and distribution of fish species have the potential to adversely affect this species. The magnitude of the climate change threat to the White Cat's Paw Pearly Mussel may be severe since this species is only known to occur in a 3-mile reach of only one stream (USFWS, 2013).

List of References

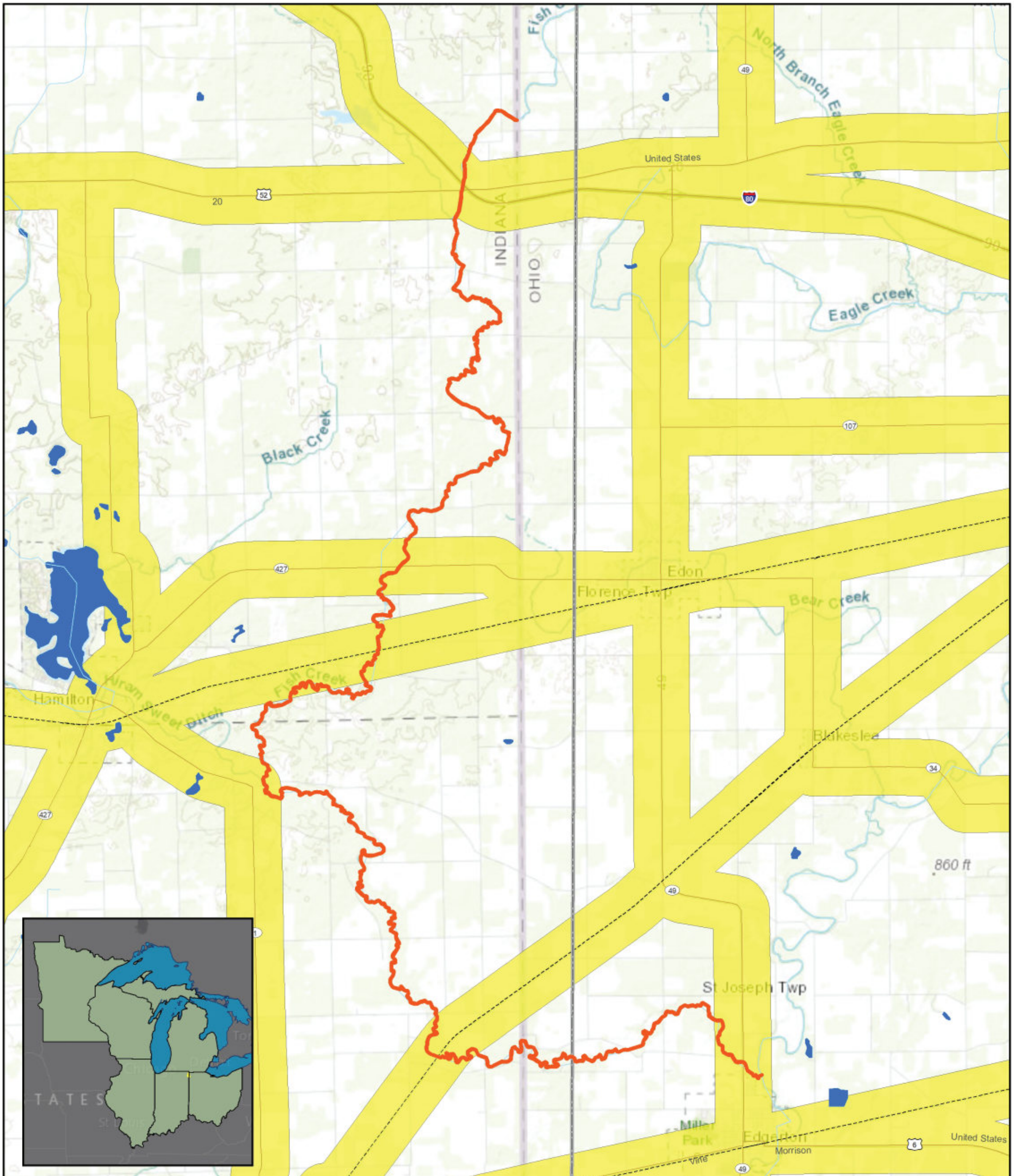
Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1990). White Cat's Paw Pearly Mussel recovery plan. Twin Cities, Minnesota. 42pp.

U.S. Fish & Wildlife Service (USFWS). (2013). White Cat's Paw Pearly Mussel (*Epioblasma obliquata perobliqua*) 5-year review: summary and evaluation. Columbus, Ohio. 12pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Purple Cat's Paw Pearlymussel (*Epioblasma obliquata obliquata*) 5-year review: summary and evaluation. Columbus, Ohio. 20pp.

U.S. Fish & Wildlife Service (USFWS). (2021). 5-year review: White Cat's Paw Pearly Mussel (*Epioblasma obliquata perobliqua*). Columbus, Ohio. 2pp.



0 0.5 1 2 3
Miles
0 0.5 1 2 3 4
Kilometers

WHITE CATSPAW (*EPIOBLASMA OBLIQUATA PEROBLIQUA*)
ACTION AREA OVERVIEW MAP

SCALE 1:150,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
White Catspaw (*Epioblasma obliquata perobliqua*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Winged Mapleleaf (*Quadrula fragosa*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Minnesota and Wisconsin

Species Description
The Winged Mapleleaf shell is quadrate or square, thick, and moderately inflated. The beaks are prominent and elevated above the hinge line. Beak sculpture consists of two rows of raised bumps or nodules. The sculpturing continues on the lateral surface of the shell as two prominent tuberculated ridges, separated by a sulcus, extending to the ventral margin of the shell. The shell has a prominent wing present posterior to the beak, with radiating rows of pustules or ridges. The periostracum ranges from tan or greenish in juveniles to chestnut or dark brown in adults, often with a few wide, broken green rays (Cummings & Mayer, 1992; USFWS, 1997). The pseudocardinal teeth are large and serrated and the lateral teeth are long and straight. The beak cavity is deep and compressed. The nacre is white, becoming iridescent posteriorly (Cummings & Mayer, 1992; USFWS, 1997).

Species Distribution
Winged Mapleleaf has been characterized as a large-stream species and has been reported from a variety of substrate types, including mud, sand, and gravel (USFWS, 1997). The species appears to consistently inhabit dense and diverse mussel beds (USFWS, 2015). Historically, the Winged Mapleleaf was reported from 34 rivers in 12 states (Alabama, Illinois, Indiana, Iowa, Kentucky, Minnesota, Missouri, Nebraska, Ohio, Oklahoma, Tennessee, and Wisconsin). Most records are from tributaries of the Mississippi River or the Mississippi River itself, though a few records exist for the Ohio River mainstem and tributaries (e.g., the Wabash and Tennessee Rivers; USFWS, 1997). At the time of listing, the only confirmed remaining population was in the St. Croix River between Minnesota and Wisconsin. Since listing, several new populations were identified. Extant populations of Winged Mapleleaf are now known to occur in the St. Croix River Minnesota, Wisconsin), Bourbeuse River (Missouri), Ouachita River (Arkansas), Saline River (Arkansas), and Little River (Arkansas, Oklahoma; USFWS, 2015).

Distribution within Action Area
Only known to occur in the St. Croix River in Chisago, Ramsey, and Washington Counties, Minnesota and Polk and St. Croix Counties, Wisconsin.

Critical Habitat
No critical habitat has been designated for the Winged Mapleleaf.

Life History
The life history of Winged Mapleleaf is similar to other unionid mussels. Females brood larvae, known as glochidia, in their gills and, once released, glochidia must attach to the gills or fins of a suitable host, typically a fish, to complete the transformation from the larval stage to a juvenile mussel. The Winged Mapleleaf is a short-term brooder (tachytictic), with gravid females found between late August and early October in the St. Croix River (USFWS, 2015). The appearance and behavior of brooding Winged Mapleleaf changes markedly when they are ready to infect their host. Brooding females emerge at the substrate surface and, for a few days during the brooding period, the posterior mantle around the excurrent aperture of brooding females becomes greatly expanded with swelling and development of black-ridged crenulations overlaying the mantle. Females brood glochidia in this “mantle magazine” and gape widely. The prominent display allows host fish to trigger rapid release of glochidia (USFWS, 2015). Channel Catfish (*Ictalurus punctatus*) and Blue Catfish (*Ictalurus furcatus*) are the only known suitable host fish for Winged Mapleleaf (USFWS, 2015).

Current Stressors and Threats

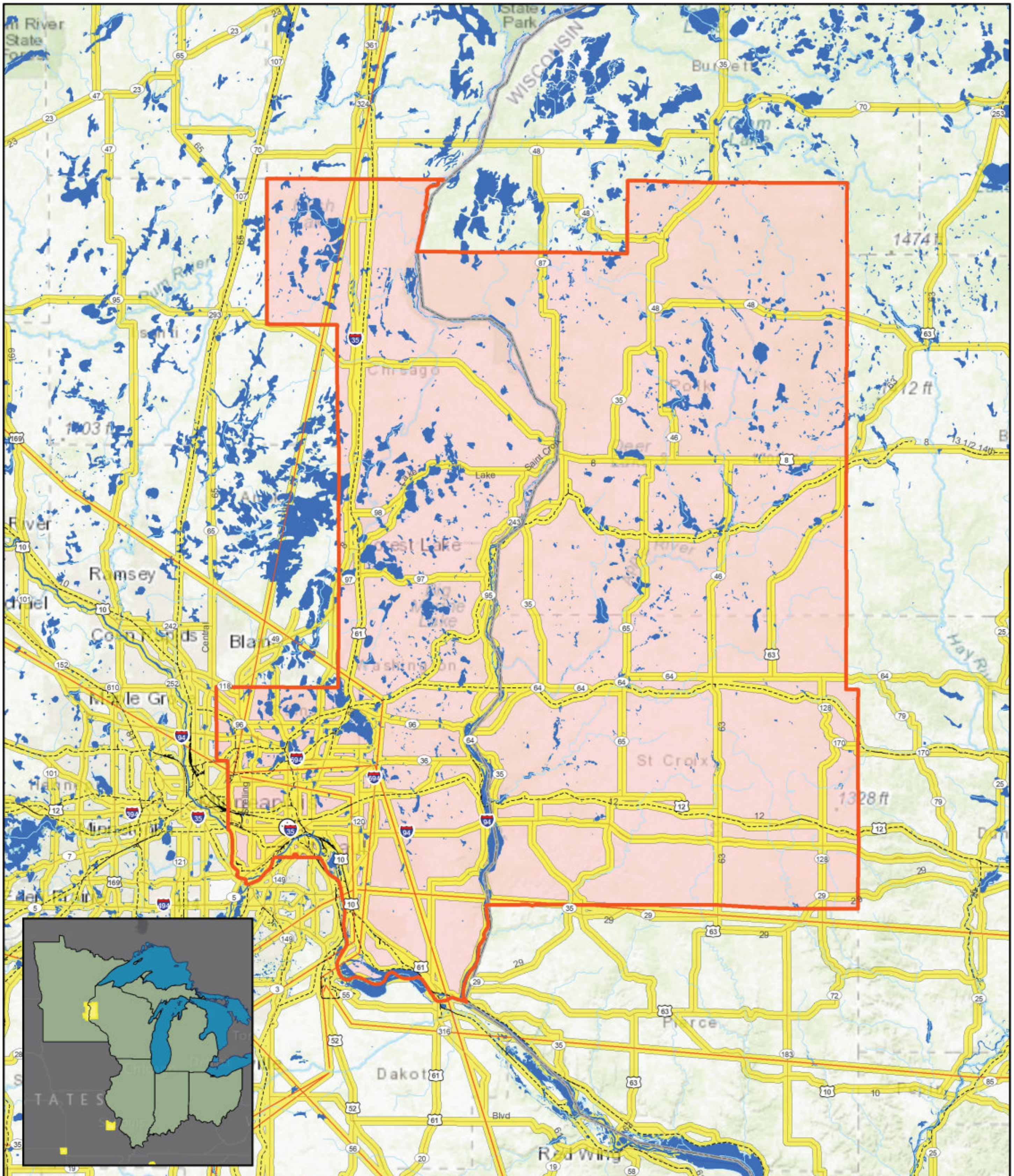
- Land use changes
  Changes in land use practices were identified as a potential threat to Winged Mapleleaf in the recovery plan. Increasing levels of fine sediments and increasing flow velocities may be developing threats to Winged Mapleleaf in the St. Croix River. In addition, plans to sell water from the Little River have been proposed. Water withdrawals are likely to negatively affect populations of freshwater mussels unless adequate minimum flows are maintained. Winged Mapleleaf in the Little River may already be threatened by severe droughts, which are projected to increase in frequency and severity throughout the 21st century in Oklahoma (USFWS, 2015).
- River channel modifications
  The species was usually found in well-preserved large to medium-sized clear-water streams in riffles or on gravel bars. These areas have been lost due to the development of impoundments, channelization, soil erosion, and sediment accumulation originating from land use practices. Peaking operation at the St. Croix Falls dam, upstream of the St. Croix River Winged Mapleleaf population, was identified as a potential threat, as winter dam operations apparently did not release enough water to cover the mussel beds at night (56 FR 28345). A memorandum of understanding with Wisconsin Department of Natural Resources was later signed to operate the dam in a run-of-river mode to avoid causing low flows and substantial changes in flow levels (USFWS, 2015).
- Chemical contaminants
  Toxic substance spills and point discharges of harmful chemicals have been identified as a threat to Winged Mapleleaf populations (56 FR 28345).
- Inherent factors
  The Winged Mapleleaf recovery plan also identified range reduction, small population size, potential lack of reproductive success as reasons for listing the species as endangered. At the time of listing, Winged Mapleleaf was only known to occur in a single reach of the St. Croix River. The population was thought to be small and therefore vulnerable to stochastic disturbances, such as toxic substance spills or low water levels. In addition, the small population size may jeopardize reproductive success, as no brooding females or young individuals had been recently collected, and small populations are vulnerable to various genetic constraints (USFWS, 1997). Since listing, four new populations of Winged Mapleleaf have been identified. Although the new populations represent a marked change from the presumed distribution in 1997, Winged Mapleleaf is still absent from a substantial portion of its historic range (USFWS, 2015). The St. Croix River population may still be vulnerable to stochastic disturbances, as it still only inhabits a short reach of the river. However, the Little River, Ouachita River, and Saline River populations are more broadly distributed and may be less vulnerable to stochastic events (USFWS, 2015).

List of References

Cummings, K.S., & Mayer, C.A. (1992). *Field guide to freshwater mussels of the Midwest*. Illinois Natural History Survey Manual 5.

U.S. Fish & Wildlife Service (USFWS). (1997). Winged Mapleleaf mussel (*Quadrula fragosa*) recovery plan. Ft. Snelling, Minnesota. 69pp + appendices.

U.S. Fish & Wildlife Service (USFWS). (2015). Winged Mapleleaf (*Quadrula fragosa*) 5-year review: summary and evaluation. Bloomington, Minnesota. 38pp + appendix.



0 3 6 12 18
Miles
0 3 6 12 18 24
Kilometers

WINGED MAPLELEAF (*QUADRULA FRAGOSA*)
ACTION AREA OVERVIEW MAP

SCALE 1:1,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Winged Mapleleaf (*Quadrula fragosa*) Counties of Occurrence

N

CRUSTRACEANS

Illinois Cave Amphipod (*Gammarus acherondytes*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois

Species Description

The Illinois Cave Amphipod is a small freshwater crustacean which has been found in cave streams in Monroe and St. Clair Counties in southwestern Illinois. Sexually mature males measure up to 20mm (0.8in) long; sexually mature females are 12 to 16mm (0.5 to 0.63in) long. They are usually light gray-blue and their eyes are small, sub-reniform, degenerate, with the pigment drawn away from the facets in an irregular black mass. The first antenna is long and slender, more than half the length of the body. The flagellum of the antenna has up to forty articles and the accessory flagellum has up to six. The second antenna is about three-fourths as long as the first antenna. The flagellum has up to 18 articles and lacks sensory organs in either sex. The palmar margin of the propodus of the first gnathopod of the male is very oblique, straight, and continuous with the posterior margin. The palmar margin of the second gnathopod of the male is only slightly oblique, straight or concave. The palmar margins of both gnathopoda of the female are strongly convex. The propodus of the second gnathopod is almost twice as long as it is wide in the male and is twice as it is long as wide in the female (USFWS, 2002).

The third uropod of the male has slightly curved rami, the inner ramus being about 0.75 times as long as the outer ramus. The outer margin of the outer ramus is armed with numerous fascicles of 1 to 10 setae. One seta in each fascicle is plumose, except in those fascicles which contain spines, in which case there are no plumose setae. The inner ramus and the inner margin of the outer ramus are armed with small fascicles of 1 to 4 setae, one of which is plumose. The second segment of the outer ramus is not armed with plumose setae. The third uropod of the female is similar to that of the male but smaller in proportion to the body. The telson exceeds the peduncle of the third uropod in length, is cleft to the base, and armed distally with 2 to 3 spines and several setae, and laterally with one spine and a variable number of setae (USFWS, 2002).

Species Distribution

The Illinois Cave Amphipod has never been widely distributed. It is endemic to the Illinois Sinkhole Plain in Monroe and St. Clair Counties in southwestern Illinois. Historically, the Illinois Cave Amphipod was known from six cave systems, all within a 10-mile radius of Waterloo, Illinois. These caves are each fed by separate watersheds, with no known connection among them. Therefore, scientists believe it is unlikely that the amphipod could be distributed to other cave systems via streams. Currently, the Illinois Cave Amphipod is found in only three of the original six cave sites. These caves are all in Monroe County, Illinois. Entrances to two caves are owned by the Illinois Department of Natural Resources, which allows public use of one of the sites. Three entrances to the third cave, which is privately owned, are dedicated a Nature Preserves and are protected (USFWS, 1998).

Distribution within Action Area

Currently, the Illinois Cave Amphipod is found in only three of the original six cave sites. These caves are all in Monroe County, Illinois (USFWS, 1998).

Critical Habitat

No critical habitat has been designated for the Illinois Cave Amphipod.

Life History

The Illinois Cave Amphipod lives in the “dark zone” of cave streams. Like other amphipods, this species needs cold water and does not tolerate a wide range in water temperatures. They are sensitive to touch and avoid light. The Illinois Cave Amphipod feeds on all kinds of dead animals and plants as well as the thin bacterial film covering submerged surfaces. Because of its sensitivity to contamination, the Illinois Cave Amphipod is an excellent indicator species of the water quality of cave systems it inhabits and the groundwater from the surrounding area (USFWS, 1998).

In *Gammarus minus*, pairs may remain in amplexus for around two weeks prior to fertilization, but duration of amplexus probably varies between cave and spring populations of this species. Eggs of *Gammarus minus* are released into the brood pouch of the female, and young are released about a month later. For at least some Gammaridae, the incubation period varies with temperature. Depressed oxygen levels can interfere with mate-guarding behavior in freshwater Gammarus (USFWS, 2002).

Amphipods are typically thought of as scavengers, shredding coarse organic debris. More recently, it has been recognized that amphipods may sometimes filter fine particulate matter from water and can be predators on other taxa. Densities of cave invertebrates have been found to be correlated with fungal populations, suggesting fungi as an important food source. One study noted greater weight gain by young *G. pseudolimnaeus* when offered leaves with fungal colonies present than on leaves with only bacteria or autoclaved leaves. Laboratory populations of *G. troglophilus* have successfully been maintained on elm leaves (USFWS, 2002).

Dissection of the gut from the Illinois Cave Amphipod and examination of the contents under low power magnification revealed an amorphous mass light brown in color. Placement of this material on a glass slide and examination with a compound microscope under high power revealed a mixture of brown, somewhat gelatinous material (clay particles plus mucous?), bacterial cells and occasional minute particles of sand. Observing *G. acherondytes* in a shallow (<3cm deep) gravel stream substrate in Fogelpole Cave suggested that the amphipods graze the substrate by slowly walking the bottom. The mouthparts are essentially a network of setose structures that are net or rake-like and can be used to gather material from the substrate and direct it at the animal’s mouth. Presumably the amphipods are harvesting a mixture of the inorganic substrate material along with the microbiota present and eating the entire mixture. The organic part is absorbed while the inorganic component is moved through the gut and eliminated (USFWS, 2002).

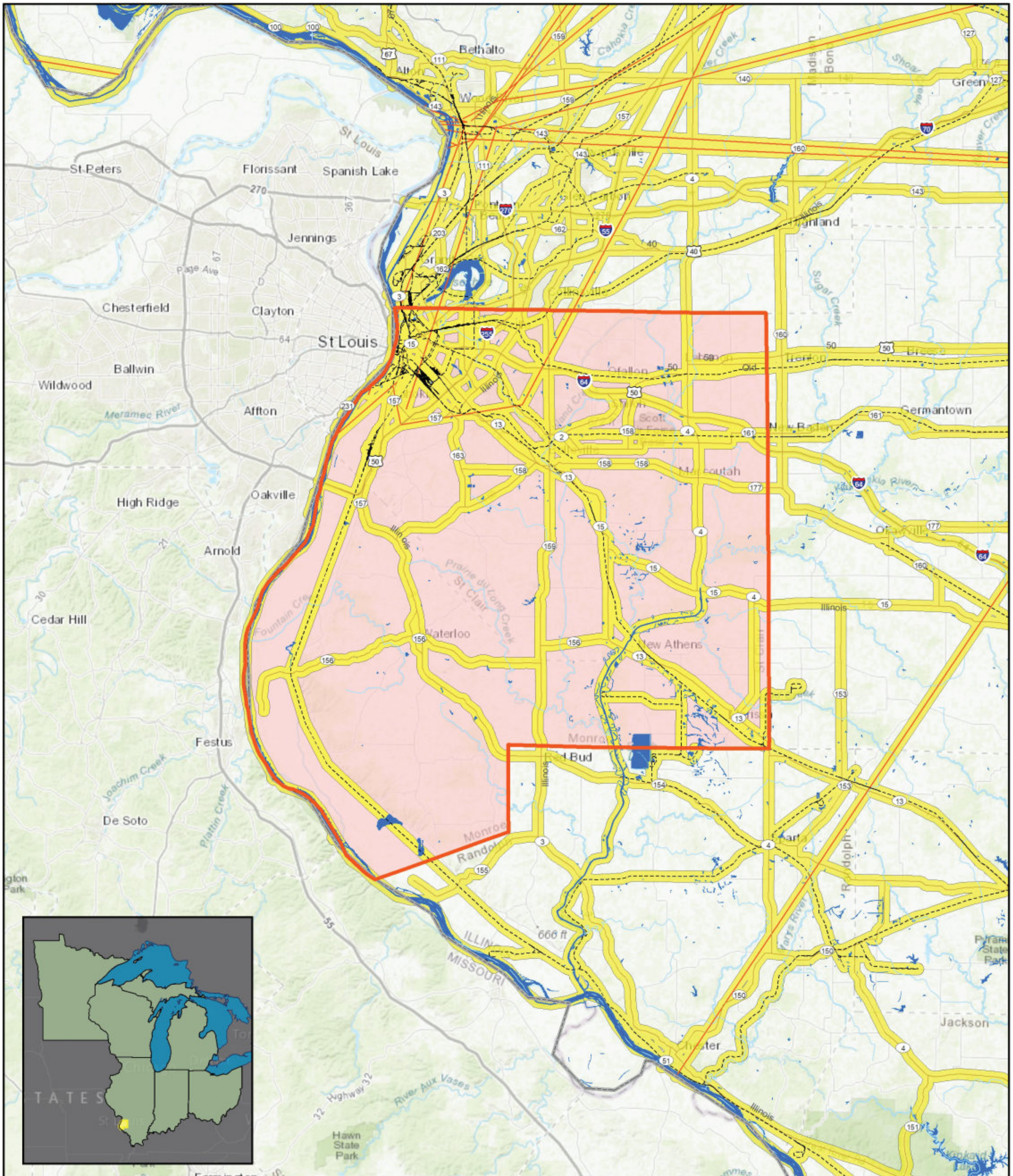
Current Stressors and Threats

- Urban sprawl
  The amphipod's current range is close to the growing St. Louis metropolitan area, and there is potential for increased impacts on the species.
- Water pollution (agriculture, septic, stormwater)
  The species’ survival is threatened by factors affecting shallow karst groundwater. These include agricultural and residential pesticides and fertilizers; human and animal wastes from residential sewage disposal systems and livestock; sedimentation from agricultural and residential runoff; oil well production; surface runoff from roads, storm sewers, and increased surface paving due to urban development; sinkhole dumping of solid waste; and disruption of groundwater flow paths from quarry operations.
- Cave use/species exploitation
  Excessive visitation to caves and over-collecting for scientific purposes may also threaten the species. Problems with many of these pollutants are increased by their rapid transport through sinkholes and other karst features, with little or no dilution, filtration or attenuation (USFWS, 1998, 2002).

List of References

U.S. Fish & Wildlife Service (USFWS). (1998). Illinois Cave Amphipod (*Gammarus acherondytes*). Retrieved from https://www.fws.gov/midwest/endangered/crustacn/pdf/ilca-fs.pdf

U.S. Fish & Wildlife Service (USFWS). (2002). Illinois Cave Amphipod (Gammarus acherondytes) recovery plan. Ft. Snelling, Minnesota. 63pp.



Miles	Kilometers
0 2.5 5 10 15	0 2.5 5 10 15 20

ILLINOIS CAVE AMPHIPOD (*GAMMARUS ACHERONDYTES*)
ACTION AREA OVERVIEW MAP

SCALE 1:750,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Illinois Cave Amphipod (*Gammarus acherondytes*) Counties of Occurrence

N

INSECTS

American Burying Beetle (*Nicrophorus americanus*)

Federal Listing: Threatened. The American Burying Beetle (ABB) was designated as an endangered species in 1989 (54 FR 29652). The species was reclassified from Endangered to Threatened in 2020 (85 FR 65241).
State Listing within the AA: Endangered in Michigan and Ohio

Species Description
The ABB is the largest silphid (carrion beetle) in North America, reaching 1.0 to 1.8in (25 to 35cm) in length. The beetles are black with orange-red markings. Their hardened elytra (wing coverings) are smooth, shiny black, and each elytron has two scallop shaped orange-red markings. The pronotum over the mid-section between the head and wings is circular in shape with flattened margins and a raised central portion (USFWS, 2019). The most diagnostic feature of the ABB is the large orange-red marking on the raised portion of the pronotum, a feature shared with no other members of the genus in North America (USFWS, 1991). The ABB also has an orange-red frons (the upper, anterior part of the head), and a single orange-red marking on the clypeus, which can be viewed/considered as the lower "face" located just above the mandibles. Antennae are large, with notable orange club-shaped tips for chemoreception (USFWS, 2019).

Species Distribution
The ABB is considered a generalist in terms of the vegetation types where it is found, as it has been successfully live-trapped in a wide range of habitats, including wet meadows, partially forested loess canyons, oak-hickory forests, shrub land and grasslands, lightly grazed pasture, riparian zones, coniferous forest, and deciduous forests with open understory (USFWS, 1991). Individuals do not appear to be limited by vegetation types as long as food, shelter, and moisture are available and have been recorded moving between and among these habitat types (USFWS, 2019).

The ABB occurs in various habitat types in portions of nine states: Arkansas, Kansas, Massachusetts, Missouri (recently reintroduced, experimental population), Nebraska, Oklahoma, Rhode Island, Texas (not documented since 2008), and South Dakota, based on the last 15 years of records. *Reintroduction efforts are also underway in Ohio, but survival of reintroduced ABBs into the next year (successful overwintering) has not yet been documented. A report of an ABB in Michigan in 2017 is being investigated to determine if the area supports ABBs populations.* Surveys in 2018 and 2019 failed to verify the report. Currently, there is not enough information on the Michigan report to confirm or assess the status of ABBs in this area (USFWS, 2019).

Historically, the known geographic range of the ABB included 35 states in the United States and the southern borders of three eastern Canadian provinces, covering most of temperate eastern North America. Historical records document ABBs occurrence from the east coast to Nebraska in the 1920s. However, documentation of records is not uniform throughout this broad historical range. More records exist from the Midwest into Canada and in the northeastern United States than from the southern Atlantic and Gulf of Mexico region and some portions of southeastern United States have few or no records. During the 20th century, the ABB disappeared from over 90 percent of its historical range. The last ABB specimens along the mainland of the Atlantic seaboard, from New England to Florida, were collected in the 1940s (USFWS, 1991). At the time of ESA listing in 1989, known populations were limited to one on Block Island, Rhode Island; and one in Latimer County, Oklahoma. After the species was listed, survey efforts increased and the ABB was discovered in more locations, particularly in South Dakota, Nebraska and Oklahoma. The ABB is now known to occur in portions of Arkansas, Kansas, Oklahoma, Nebraska, South Dakota, and Texas (not documented since 2008), on Block Island off the coast of Rhode Island, and reintroduced populations on Nantucket Island off the coast of Massachusetts and in southwest Missouri (USFWS, 2019).

Distribution within Action Area

- Reintroduction efforts are underway in Ohio, encompassing portions of Athens, Guernsey, Hocking, Morgan, Muskingum, Noble, Perry, and Washington counties.
- An ABB was reportedly observed in Michigan in 2017; however, there is currently not enough information on this report to confirm or assess the status of ABBs in this area.

Critical Habitat

No critical habitat has been designated for the American Burying Beetle.

Life History

ABB life history is similar to that of other burying beetles. The ABB is a nocturnal species that lives for only about one year. American Burying Beetles are active from late spring through early fall, occupying a variety of habitats and bury themselves in the soil to hibernate for the duration of the winter. Reproduction occurs in the spring-early summer. New adult beetles or offspring (called tenerals) usually emerge in summer, over-winter (hibernate) as adults, and comprise the breeding population the following summer. Adults and larvae depend on dead animals (carrion) for food, moisture, and reproduction (USFWS, 2019). Burying beetles are unusual in that both the male and female take part in raising the young. Male burying beetles often locate carcasses first and then attract a mate. Beetles often fight over the carcass, with usually the largest male and female individuals winning. The victors bury the carcass, the pair mates, and the female lays her eggs in an adjacent tunnel. Within a few days, the larvae develop and both parents feed and tend their young, an unusual activity among insects. Brood size usually ranges from one to 30 young, but 12 to 15 is the average size. The larvae spend about a week feeding off the carcass then crawl into the soil to pupate or develop. Mature American Burying Beetles emerge from the soil 45 to 60 days after their parents initially bury the carcass (USFWS, 1997). The SSA (2019) provides additional detail and activity periods, movement, and feeding and hydration.

Current Stressors and Threats

The American Burying Beetle Recovery Plan (USFWS, 1991) and the 5-year Status Review of the species (USFWS, 2008) identify the following factors as potential threats to ABB:

- Direct habitat loss and alteration

  The ABB needs properly functioning ecosystems that contain suitable soils sufficient to support diverse vegetative communities that sustain appropriate wildlife populations such that suitable carrion to facilitate reproduction is available. Suitable soils must contain the appropriate abiotic elements (soil temp, soil moisture, particle size, etc.) that are favorable for excavation and formation of brood chambers and contribute to proper growth and development of young. Soils that are too compact prevent ABBs from completing their reproductive cycle or if compaction occurs after the onset of reproduction, may affect ABB young emerging during the following spring. Additionally, soils that are unsuitable may prohibit ABBs from overwintering underground during periods of adverse weather conditions. If the ABB cannot bury themselves during these periods, considerable localized mortality may occur. These suitable areas must be of sufficient size to support the survival of adequate numbers of individual ABBs such that the opportunity to find a mate is not diminished and that the presence and abundance of carrion to support breeding and feeding are uninterrupted. The ABB is an annual species and is dependent upon annual reproduction to sustain extant populations. Sufficiently sized areas also contribute to opportunities for populations to at least remain stable over time. Ideally areas should be of sufficient size to support a positive growth rate and enable populations to expand over time. These suitable areas also must be connected with other suitable, occupied ABB habitats so that gene flow and genetic diversity are maintained, if not enhanced, and individuals have access to refugia, when needed, across the landscape. The Service does not currently have information on the minimum size of suitable areas (habitat patch size) needed to maintain a viable population of ABBs. The minimum area to support a viable population would be dependent on the habitat quality which could include climate, soils, vegetation, carrion availability, predators, and competition (USFWS, 2019).

- Increase in competition for prey, inter and intra-specific competition, increase in edge habitat, decrease in abundance of prey
- Loss of genetic diversity in isolated populations
  Smaller populations typically are more susceptible to random demographic and environmental events that negatively influence persistence over time.
- Disease/pathogens, DDT
- Agricultural and grazing practices, and
- Invasive species.

None of these factors alone adequately explain why ABBs declined over much of their historic range, while congeneric species remain relatively common range wide [there are eight sympatric congeners which are not in peril] (USFWS, 2019). The prevailing theory regarding the ABB's decline over a large portion of their historical range is habitat change (USFWS, 1991) which: (1) reduced the carrion prey base of the appropriate size for ABB reproduction, and (2) increased the vertebrate scavenger competition for this resource. Although much of the evidence suggesting the reduction of carrion resources as a primary mechanism of decline is circumstantial, this hypothesis fits the temporal and geographical pattern of the disappearance of ABBs and is sufficient to explain why ABBs declined while related species did not (USFWS, 2019).

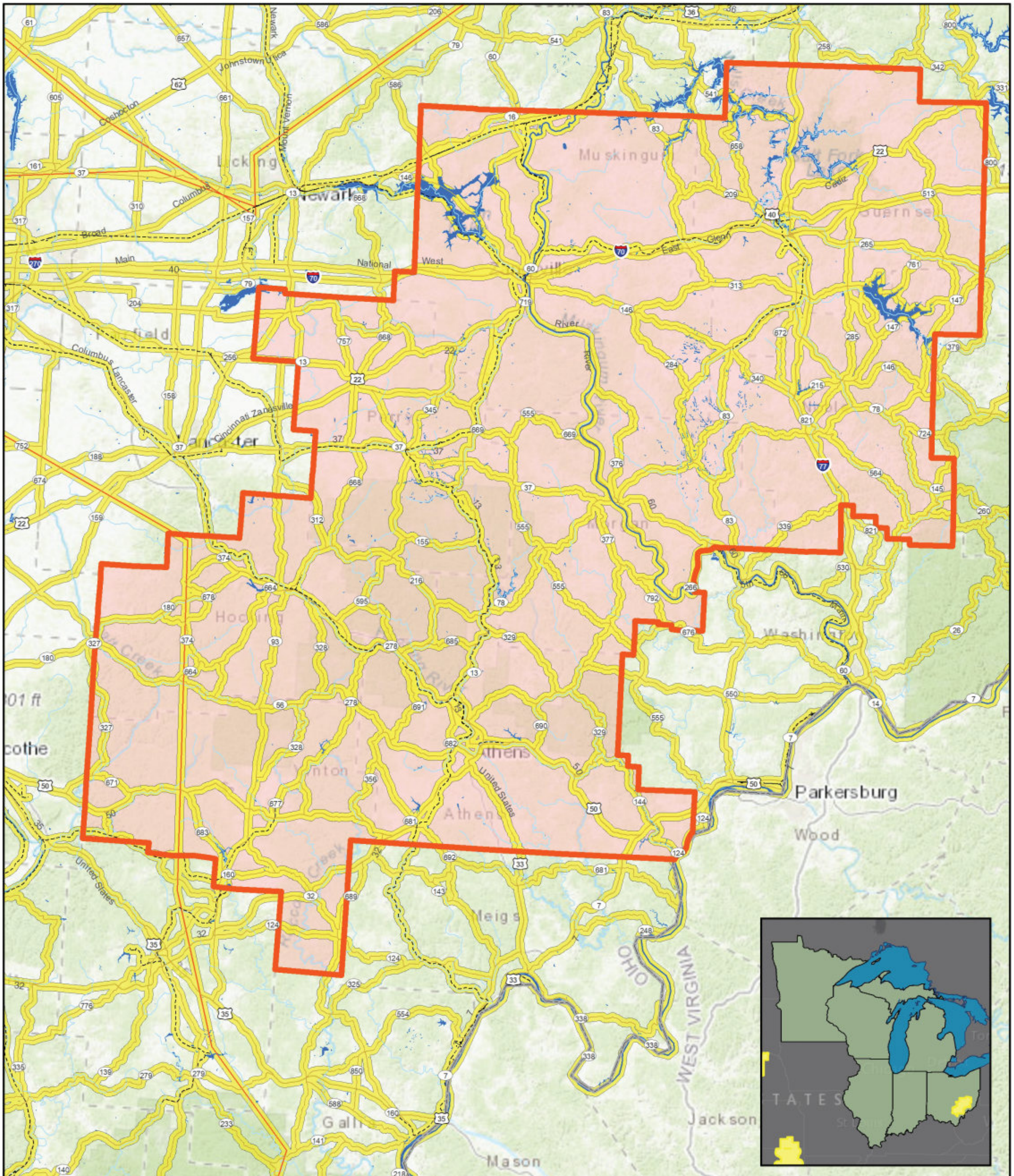
List of References

U.S. Fish and Wildlife Service (USFWS). (1991). American Burying Beetle (Nicrophorus americanus) recovery plan. Newton Corner, Massachusetts. 80 pp.

U.S. Fish and Wildlife Service (USFWS). (1997). American Burying Beetle fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/ambb/abb_fact.html

U.S. Fish and Wildlife Service (USFWS). (2008). American Burying Beetle (*Nicrophorus americanus*) 5-year review: summary and evaluation. Concord, New Hampshire. 43pp + appendices.

U.S. Fish and Wildlife Service (USFWS). (2019). Species Status Assessment Report for the American Burying Beetle (*Nicrophorus americanus*), Version 1.0. Retrieved from https://ecos.fws.gov/ServCat/DownloadFile/165011



0 3.25 6.5 13 19.5
Miles
0 3.25 6.5 13 19.5 26
Kilometers

AMERICAN BURYING BEETLE (*NICROPHORUS AMERICANUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:1,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	American Burying Beetle (*Nicrophorus americanus*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Bog (Bogbean) Buckmoth (*Hemileuca sp.*)

Federal Listing: Not Listed. The U.S. Fish and Wildlife Service is undertaking a discretionary status review of this species and will make a listing determination by the end of fiscal year 2021 (USFWS, 2020).
State Listing within the AA: Midwestern Fen Buckmoth (*Hemileuca nevadensis* ssp. 3) Special Concern in Wisconsin

In North America, there are approximately 20 species of buckmoths (*Hemileuca*), a well-studied group of silk moths (Saturniidae). Populations of buckmoth in the Great Lakes region vary to some extent in morphology, ecology and behavior, and these different populations have been identified as *H. maia, H. lucina,* or *H. nevadensis.* Collectively, these species are referred to as the *H. maia* complex, *maia* being the oldest name in the group. The Great Lakes populations comprise a sub-set of this complex. Bogbean Buckmoth (also known as Cryan's Buckmoth), is part of the *H. maia* species complex. As the species boundaries in this group are not well defined, the species-level classification of Bogbean Buckmoth remains tentative (Environment Canada, 2015).

Species Description
Adult Bog Buckmoths are large, black moths with translucent wings containing white bands and eyespots. Males have red tufts on the apical segments of the abdomen and bipectinate antennae, while females have simple antennae and lack the red tuft. Wingspan has been reported to be 6.5cm and males have forewings of 26 to 32mm in length, while females have 32- to 36-mm-long forewing. Larvae are dark, with rusty-orange, branched spines dorsally, and a reddish-brown head capsule and prolegs. The spines are urticating and can cause a welt if handled. This description is similar to other *Hemileuca* species, but Bog Buckmoth larvae have reduced yellow markings on the body compared to other species, and lack a yellow spiracular stripe ascribed to others in the *H. maia* complex (NYNHP, 2021)

Probably only a very distinctive subspecies of *H. nevadensis* (or *latifascia*), but was initially treated by NatureServe and others as a full species based on numerous and obvious differences in ecology. However, it has since been shown that some Midwestern populations do feed to some degree on *Menyanthes* so the foodplant restriction is not as unique as was formerly thought. There is no reliable character for the adults, but in series compared to other eastern buckmoths they are large (usually so for their latitude), very translucent (comparable to other buckmoths this far north) and with scalloped forewing bands and many can be correctly sorted. Separation of any stage from *H. maia* appears easy but characters match or widely overlap *H. nevadensis* subspecies 3 except that few if any other wetland buckmoth larvae have the normal yellow as reduced or even absent as this taxon does. More western populations with normal yellow larval pattern in which larvae use *Menyanthes* to varying degrees along with normal foodplants are not included in this taxon. To date no populations in the Midwest have been shown to specialize on that plant. While many more eastern wetland buckmoth populations will not accept *Menyanthes* some populations in at least Wisconsin do use that herb to some extent along with the usual willows. However such Wisconsin larvae are normal, resembling other populations from New Jersey to central Wisconsin in having a prominent yellow spiracular band and some dorsal yellow. Last instar Bogbean Buckmoth larvae have greatly reduced yellow or virtually none. Aside from the few in Ontario and New York assigned to this taxon, no other *Hemileuca* populations are known to use *Menyanthes* almost exclusively (NatureServe, 2021).

Species Distribution
The primary foodplant, bog buckbean, is not a full reason to grant a species separation. A population in Wisconsin has been found to feed upon bog buckbean, making the distinctive foodplant restriction not as unique to the New York and Ontario populations as previously thought. However, the larvae resemble other populations that span from New Jersey to central Wisconsin. The ecological differences between Bog Buckmoth and other *Hemileuca* species are significant and are the basis for its species recognition and protection in NY and Ontario. Bog Buckmoths are found on the northeastern margin of the *H. maia* complex

distribution, with known populations in central New York and eastern Ontario. In New York, this species occupies 6 wetlands, all within Oswego County. This species inhabits minerotrophic fens (DECNY, 2014).

Distribution within Action Area
The Midwestern Fen Buckmoth (*Hemileuca nevadensis* ssp. 3) has been reported from Douglas, Jackson, Juneau, Marathon, Marquette, Milwaukee, Portage, Waukesha, and Wood Counties, Wisconsin (WIDNR, 2021).

Critical Habitat
No critical habitat has been designated for the Bog Buckmoth.

Life History
Females lay their eggs after mating in the fall, with the eggs left to overwinter. Young hatch from April-June and develop into larvae in from May-July. Larvae pupate within peat and diurnal adults emerge from mid-September through mid-October, with peak flight around September 26-28. Life expectancy averaged 3.7 days, with a maximum of 9 days for adult females and 12 days for males. Females usually mate with the first male to reach them and then oviposit eggs on the same day. Females oviposit their eggs in clumps on shrubs and in rings around stems on a variety of plants. Early instar larvae have been observed feeding on the foliage of the closest plant until the preferred host plant, *Menyanthes trifoliata* emerges. Gravid females have a limited dispersal and move less than 10m between potential oviposition sites, but up to 500m after ovipositing. Mark-recapture studies of adults in New York showed no dispersal between adjacent fens through forested habitat. Adults were found to travel up to 500m within the same fen (DECNY, 2014)

Current Stressors and Threats

- Invasive plant species
  Nutrient enrichment from runoff from adjacent developed areas is a threat to one or more of the sites as increased nitrogen and phosphorus levels can lead to vegetation growth, especially that of the invasive plant Phragmites. Other invasive plants such as purple loosestrife and glossy buckthorn may also impact Bog Buckmoth habitat by outcompeting host plants.
- Hydrological changes
  Habitat change is a significant threat to the species in New York. Hydrological alteration due to water level regulation has constrained the water level range in Lake Ontario to 4ft, rather than the historical 8ft range. Two known sites, which lie directly adjacent to a stream that drains to Lake Ontario, have experienced dramatic expansion of cattails in the 50+ years since regulation began. Hydrological alteration can lead to habitat succession as drier habitat can promote shrub and/or Sphagnum growth, decreasing *M. trifoliata* at sites. Surface flooding is also a threat to this species, which presumably caused a population crash at two of the fens in recent years.
- Succession
- Climate change (Environment Canada, 2015)
  Extreme swings of weather (as seen in the winter of 2007-2008), excessive flooding (a threat to pupae and eggs), and extended dry periods (may support woody succession) are predicted to occur with climate change and could adversely affect the Bog Buckmoth.
- Parasites and predation
  During the egg life stage, in addition to flooding, parasitoid wasps, desiccation, and predation by rodents and birds are threats. Larval parasitoids, such as wasps in the family Ichumonidae, are reportedly common among the buckmoths, have been rarely seen in the New York popuations. A Texas study found parasitoides from the fly family Tachinidae and the wasp family Braconidae infecting Hemileuca larvae. Pupal predation can cause significant declines as well and potential predators on adults at the NY sites include mites, birds, araneid spiders, dragonflies, and carp.
- Inherent factors

Low dispersal ability of adult gravid females makes colonizing new sites of suitable habitat (even relatively closeby) unlikely. However, a comparison genetic variation between two of the NY sites and genetic diversity within sites and found evidence that there may be some gene flow between populations, suggesting that recolonization may be possible. The NY population of Bog Buckmoth exhibits high relative genetic divergence compared to other ecologically divergent populations within the *H. maia* complex, which they best explained by its geographic isolation which limits gene flow.

- Pesticides
  Pesticide spraying, especially for mosquito and gypsy moths could be a threat, depending on timing and concentration (NYNHP, 2021).

List of References

New York State Department of Environmental Conservation (DECNY). (2014). Bogbean Buckmoth species status assessment. 14pp.

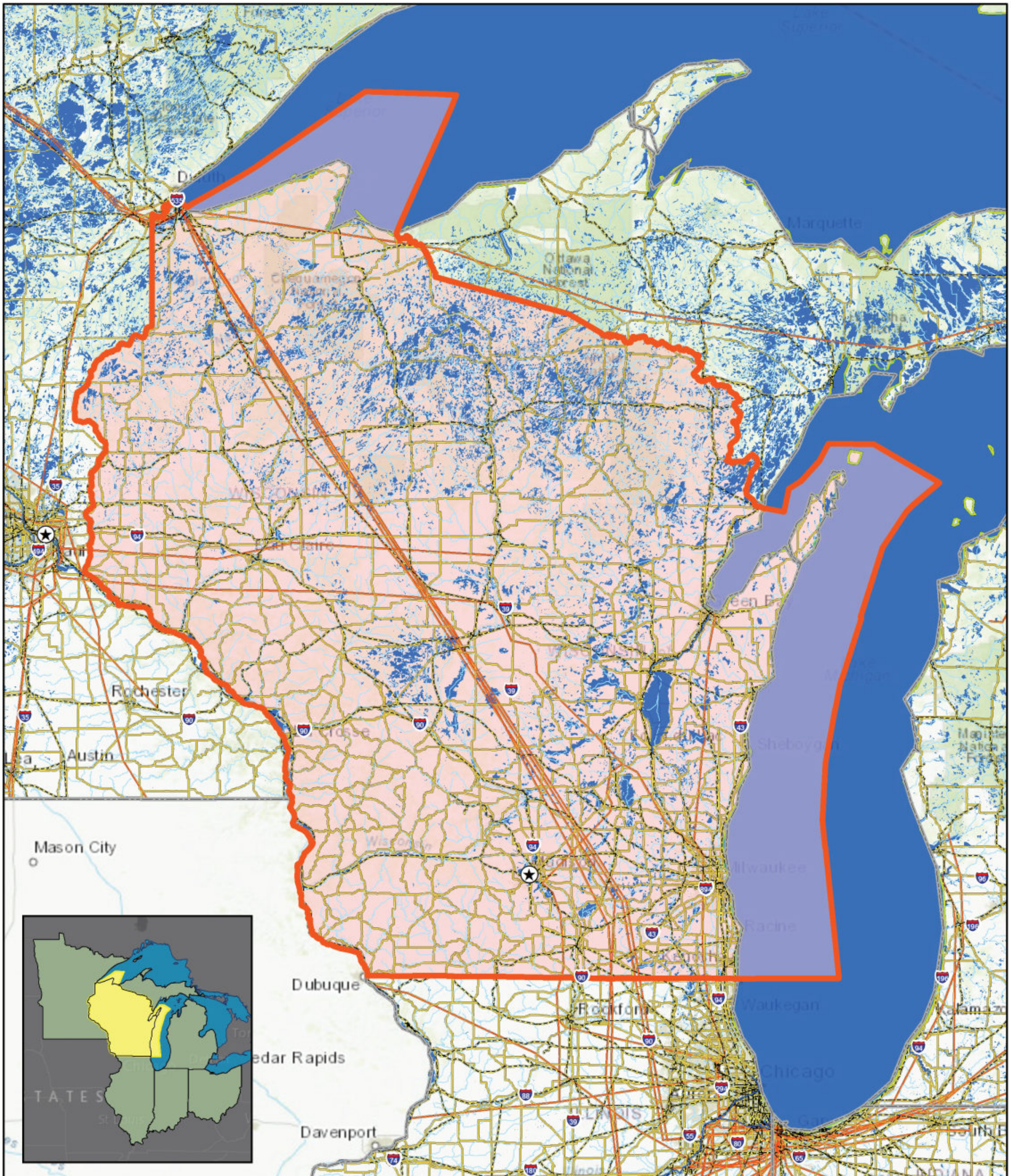
Environment Canada. (2015). Recovery strategy for the Bogbean Buckmoth (Hemileuca sp.) in Canada. Ottawa, Ontario, Canada. 18pp + appendix.

NatureServe (2021). NatureServe Explorer – Great Lakes Buckmoth (*Hemileuca nevadensis ssp. 3*). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.721455/Hemileuca_nevadensis_ssp_3

New York Natural Heritage Program (NYNHP). (2021). Online conservation guide for Hemileuca sp. Retrieved from https://guides.nynhp.org/bogbean-buckmoth/

U.S. Fish & Wildlife Service (USFWS). (2020). Bog Buckmoth peer review plan. Retrieved from https://www.fws.gov/northeast/science/pdf/peerreview/Peer_Review_Plan_bog_buckmoth_Final.pdf

Wisconsin Department of Natural Resources (WIDNR). (2021). Midwestern Fen Buckmoth (Hemileuca nevadensis ssp. 3). Retrieved from https://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=IILEW0M053



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

BOG BUCKMOTH (*HEMILEUCA SP.*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Bog Buckmoth (*Hemileuca sp.*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Dakota Skipper (*Hesperia dacotae*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Minnesota

Species Description
The Dakota Skipper is a small to medium-sized butterfly with a wingspan of 2.4 to 3.2cm (0.9 to 1.3in) and hooked antennae. Adult Dakota Skippers have variable markings. The dorsal surface of adult male wings ranges in color from tawny-orange to brown and has a prominent mark on the forewing; the ventral surface is dusty yellow-orange. The dorsal surface of adult females is darker brown with diffused tawny orange spots and a few diffused white spots restricted to the margin of the forewing; the ventral surfaces are dusty gray-brown with a faint white spotband across the middle of the wing. Adult Dakota Skippers may be confused with the Ottoe Skipper (*H. ottoe*), which is somewhat larger with proportionally longer wings. Dakota Skipper pupae are reddish-brown, and the larvae are light brown with a black collar and dark brown head with early instars being described as green with dark head and collar (USFWS, 2018).

Species Distribution
In Minnesota, the Dakota Skipper seems to prefer native dry-mesic to dry prairie where mid-height grasses such as little bluestem (*Schizachyrium scoparium* var*. scoparium*), prairie dropseed (*Sporobolus heterolepis*), and side-oats grama (*Bouteloua curtipendula* var*. curtipendula*) are a major component of the vegetation. In North Dakota, this skipper also occurs in more mesic prairie. The most productive sites in Minnesota feature some topographic variation. Adults will forage into nearby lowland prairie (mesic and wet prairie) for nectar (MNDNR, 2018).

Historically, the species occurred throughout the vast grasslands of the north-central United States and south-central Canada, extending from Illinois to Saskatchewan. There were few records for the species prior to 1960s, so our ability to describe the species' historical distribution is limited. The southernmost and easternmost records in Iowa and Illinois suggest that the species occurred in at least some portions of the prairie that once covered much of these two states, but whose almost complete destruction began in the 1800s. Based on all known records, at least 145 metapopulations and approximately 303 subpopulations can be identified. It is likely, however, that these delineated populations are artifacts that have resulted from the heavy destruction and fragmentation of the species' habitat. It is unclear to what degree distinct populations existed historically and what areas may have contained large panmictic breeding populations. The small genetic differences among seven Dakota Skipper populations in the southern portion of the species' range that are now disjunct, for example, suggest that they were formerly connected prior to European settlement. Nearly half of Dakota Skipper records are from the Prairie Parkland - Prairie Coteau mostly in Minnesota and South Dakota with fewer and more dispersed records located in Manitoba, North Dakota and Iowa (USFWS, 2018).

The skipper has disappeared south and east of Minnesota and has become increasingly rare and local in its remaining range. In pre-agricultural Minnesota, the Dakota Skipper probably occurred in about 40 counties where prairie predominated (Prairie Parkland Province) to at least the eastern limit of Des Moines Lobe calcareous glacial tills in Waseca and Freeborn counties. There are historical records from only 18 of these counties, most along the west edge of the state. As recently as the early 2000s this butterfly still occurred in 11 of these 18 counties with site complexes in four of them that supported good populations. Although observations suggested a possible decline in one of these sites beginning at this time, surveys in 2007 and 2008 still encountered this skipper in all four of these sites with robust numbers in two that were intensively surveyed. These surveys also found it present in several previously known sites that historically had smaller numbers of adults and in three sites searched for the first time. However, extensive surveys beginning in 2012 and continuing every year since have found only one Dakota Skipper population remaining in Minnesota in one of the four major site complexes. Intensive surveys at this site in 2014, 2015, and 2016 suggest that the total number of adults in each annual generation here has been in the low hundreds at most, compared with thousands of adults per year in the mid-1980s (MNDNR, 2018).

Distribution within Action Area
The Dakota Skipper is currently known or believed to occur in Big Stone, Chippewa, Clay, Lac qui Parle, Lincoln, Norman, Pipestone, Stevens, Swift, and Traverse Counties, Minnesota. Critical habitat has been designated in Chippewa, Clay, Kittson, Lincoln, Murray, Norman, Pipestone, Polk, Pope, and Swift Counties, Minnesota.

Critical Habitat
In total, approximately 19,903 acres (8,054 hectares) in Chippewa, Clay, Kittson, Lincoln, Murray, Norman, Pipestone, Polk, Pope, and Swift Counties, Minnesota; McHenry, McKenzie, Ransom, Richland, and Rolette Counties, North Dakota; and Brookings, Day, Deuel, Grant, Marshall, and Roberts Counties, South Dakota, fall within the boundaries of the critical habitat designation for Dakota Skipper (80 FR 59248).

Life History
Dakota Skippers have four basic life stages: egg, larva, pupa and adult. Dakota Skippers are univoltine (having a single flight per year), with an adult flight period that may occur from the middle of June through the end of July and vary across range and year-to year dependent on climatic conditions (USFWS, 2018). Females lay eggs on the underside of leaves. Eggs take about 10 days to hatch into larvae (caterpillar). After hatching, larvae build shelters at or below the ground surface and emerge at night to feed on grass leaves. This continues until fall when larvae become dormant (USFWS, 2019b). They overwinter (diapause) in shelters at or just below ground level, usually in the base of native bunchgrasses. In the spring, larvae resume feeding and undergo two additional molts before they pupate. During the last two instars, larvae shift from buried shelters to horizontal shelters at the soil surface. When Dakota Skipper larvae metamorphose into adults in late June or early July, habitats must provide nectar sources that are sufficient in quality and quantity to meet the butterflies' water and nutritional requirements (USFWS, 2018). Pupation takes about 10 days and usually happens in June. Adult males emerge from pupae about five days before females, and the adults live for three weeks, at most. This brief period is the only time that Dakota Skippers can reproduce. If a female Dakota Skipper lives for the full three weeks and adequate flowers for nectar are available, she may lay up to 250 eggs. Nectar, providing both water and food, is crucial for survival of both sexes during the adult flight period, which often occurs during the hottest part of summer (USFWS, 2019b).

Current Stressors and Threats
Dakota Skipper populations declined historically because of widespread conversion of native prairie to farms, ranches and other land uses. States and Canadian provinces in the historical range of Dakota Skipper have lost 85 percent to 99 percent of their original tallgrass prairie. Small, isolated patches of native prairie are often what remain of this once-vast ecosystem; Dakota Skippers survive on only some of these prairie remnants. Dakota Skippers are almost always absent from overgrazed or otherwise degraded prairies. Because of this sensitivity, historical survival of Dakota Skippers probably depended on the vastness of the prairie, with immigrants available to repopulate areas if the butterfly was eliminated by intense disturbance, such as wildfire or heavy bison grazing. Dakota Skippers and their native prairie habitat depend on periodic disturbance, without which the prairie would become shrubby or forested. Therefore, grazing, fire or mowing (haying) is necessary for the skipper. At the same time, these practices may eliminate populations, depending on how they are carried out, so they must be managed carefully to ensure skipper survival (USFWS, 2019b).

Loss of native prairie and the degradation of remaining patches of habitat have led to the decline of Dakota Skipper and pose continuing threats to the species' continued existence (79 FR 63672). Factors responsible for habitat loss, fragmentation, and degradation include:

- Conversion of native prairie for agriculture or urbanization (e.g. row crops, roads, gravel mining)

- Ecological succession of native prairie to habitats dominated by brush or trees
- Invasive species
- Direct and indirect effects of pesticides including herbicides
- Flooding
- Land management regimes (grazing, haying, or fire) if done in a fashion that degrades the species' habitat

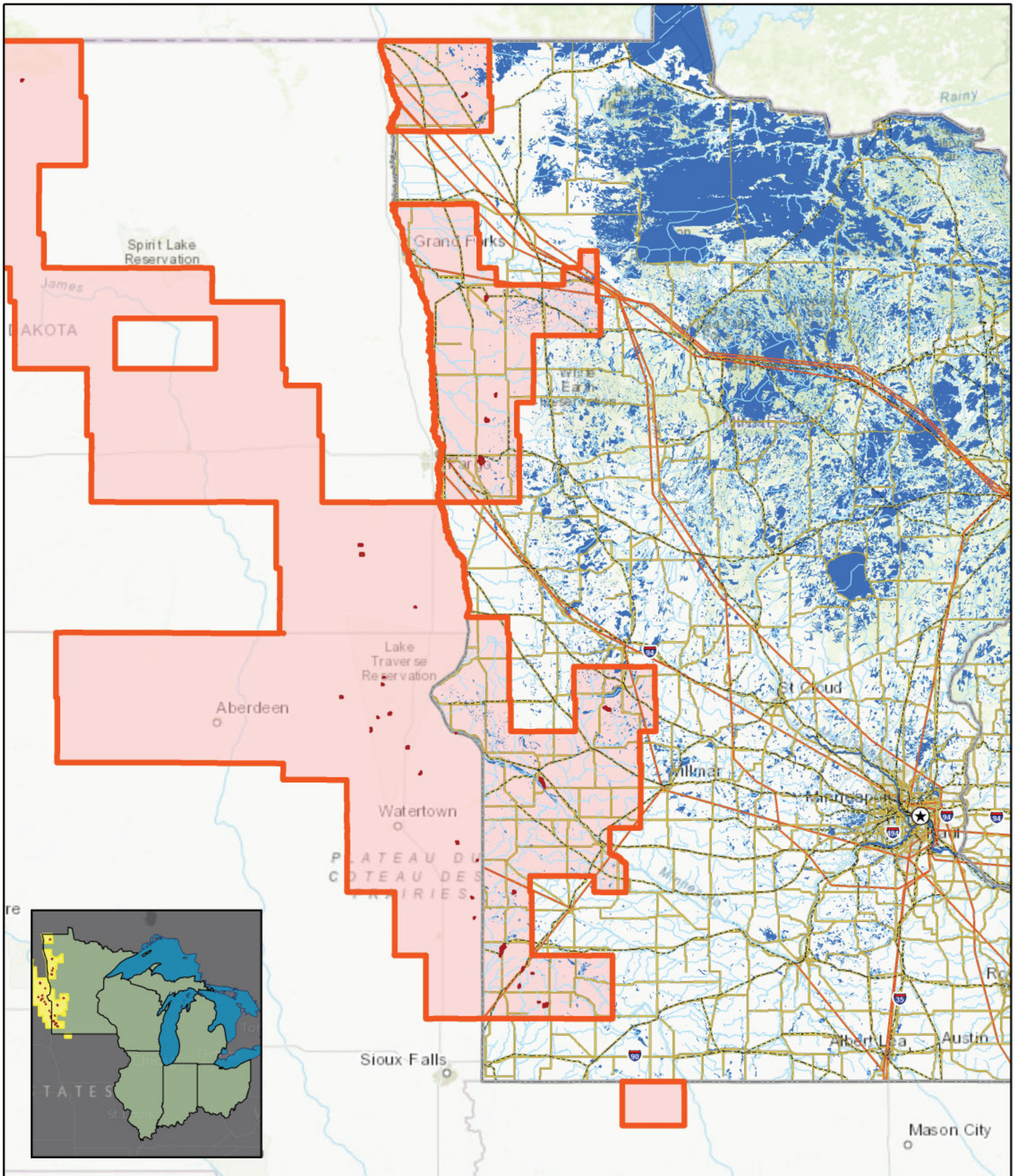
List of References

Minnesota Department of Natural Resources (MNDNR). (2018). *Hesperia dacotae* (Dakota Skipper). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEP65140

U.S. Fish & Wildlife Service (USFWS). (2018). Species status assessment report for the Dakota Skipper (*Hesperia dacotae*). 97pp.

U.S. Fish & Wildlife Service (USFWS). (2019a). Recovery plan for the Dakota Skipper (*Hesperia dacotae*) (Draft). Bloomington, Minnesota. 12pp.

U.S. Fish & Wildlife Service (USFWS). (2019b). Dakota Skipper (*Hesperia dacotae*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/dask/daskFactsheet.html



0 15 30 60 90 Miles 0 15 30 60 90 120 Kilometers	**DAKOTA SKIPPER (*HESPERIA DACOTAE*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:4,500,000**
	Petroleum Pipeline Major Road Railroad Commercial Navigable Waterway Rivers & Streams Lakes & Ponds 1-Mile Coastal Inland Buffer Action Area Dakota Skipper (*Hesperia dacotae*) Critical Habitat Dakota Skipper (*Hesperia dacotae*) Counties of Occurrence	N

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Frosted Elfin Butterfly (*Callophrys irus*)

Federal Listing: Not Listed. The U.S. Fish & Wildlife Service is proactively assessing the conservation status of this species and will determine whether Frosted Elfin needs protection under the Endangered Species Act by September 30, 2023 (USFWS, 2019).
State Listing within the AA: Endangered in Indiana and Ohio; Threatened in Michigan and Wisconsin; likely extirpated from Illinois.

Species Description
While all elfins are small butterflies, the Frosted Elfin is larger than most with a 22 to 36mm (0.87 to 1.42in) wingspan and short tails projecting from the hindwings. The upperside of the wings are uniform dark gray brown in color. The underside of the wings is also largely gray brown, but variegated, with a dusting of pale scales on the outer margin of the hindwing, with a dark spot and an irregular dark line. Male and female butterflies look very similar; however, they can be identified in flight as females tend to have an orange hue to il wings, appear to be larger, and do not exhibit territorial. Males also have a dark stigma on the forewing. While all populations of Frosted Elfins have adults that exhibit variations in appearance, some consistent tendencies have been observed. There is some evidence of phenotypical differences between lupine versus indigo feeders, with darker and larger individuals typically found feeding on indigo. We do not know if this is an important life history characteristic. In most locations, the larvae (caterpillars) are pale greenish white, with a pale lateral line and oblique dashes along the sides, and covered in short whitish hairs. However, in Oklahoma, larvae are yellow. Two similar looking species overlap in range with the Frosted Elfin. Henry's Elfin and hoary Elfin (*Callophrys polios*) also have dusting of pale scales on the hindwing margin. Henry's elfin usually does not have the distinctive dark spot near the tail and has more contrast between outer and inner halves of the hindwing. The hoary elfin lacks a tail, is smaller, and has pale scales on the forewing margin (USFWS, 2018).

Species Distribution
Frosted Elfins typically occur in small, localized populations that are reliant on managed or disturbance-dependent habitats. These habitats are composed of a mosaic of habitat types ranging from herbaceous openings with abundant host plants to forested areas with relatively closed canopies. Frosted Elfins are closely associated with their host plants. Adults, especially indigo feeders, are virtually never seen more than 20 meters (65.6 feet) from stands of the food plant. Frosted Elfins are found within oak-pine barrens, oak savannas, prairie and dry oak woodlands, and similar anthropogenic habitats such as powerline cuts, railways, old sand/gravel pits, and airports. Wild lupine and wild indigo plants both rely on disturbance (natural or anthropogenic) and open to semi-open habitats with partial to full sunlight. In areas with advanced regeneration, such as closed canopy forests and dense shrubby areas, these host plants are usually absent (USFWS, 2018).

The distribution of the Frosted Elfin once extended from southern Ontario and the northeastern United States, south to Florida, and west to Texas and Wisconsin. Maine was previously considered part of the range, but this appears to have been in error due to confusion with *Callophrys Henrici*. The Frosted Elfin continues to have a wide range (25 states) in North America. However, the species is likely extirpated from Ontario, Canada, and the District of Columbia, Georgia, Illinois, and Vermont due to loss of host plants as a result of incompatible vegetation management, loss of Frosted Elfin populations and habitat from catastrophic fire, and residential development. Most Frosted Elfin populations are essentially isolated from one another, and repopulation of extirpated locations from extant sites is unlikely to occur without active management. There are no known records from Mississippi. A portion of the range overlaps with the federally listed endangered Karner blue butterfly (*Lycaeides melissa samuelis*) and positive correlations have been found between abundances of the two species in Wisconsin. Where the species co-occur, both use wild blue lupine as host plants and face similar threats or potential benefits from management (USFWS, 2018).

Distribution within Action Area
ECOS does not provide county listings for this species. The Frosted Elfin Butterfly is considered critically imperiled in Indiana, Ohio, and Wisconsin, imperiled in Michigan, and presumed extirpated in Illinois. Per USFWS, the only known extant populations in Ohio occur in Lucas County (USFWS, pers. comm., 2022).

Critical Habitat
No critical habitat has been designated for the Frosted Elfin Butterfly.

Life History
This species is univoltine (single adult flight period) and adults are diurnal. The single flight period lasts approximately 4 to 8 weeks, generally from late April through mid-June in the northern parts of the range, with the peak flight usually occurring in mid-May. In Florida, adults may begin emerging in mid-to-late February, but cold spells may delay emergence to late March to mid-April. In Wisconsin, Frosted Elfin sightings occurred between 14 to 31.5°C (52.7 to 88.7°F) and elfin density (detectability) was strongly associated with increasing temperature and no other weather variables. In New Jersey, Frosted Elfins have been observed to emerge when wild indigo sprouts are greater than or equal to 6in (15.2cm) in height. While the flight period for multiple individuals within a population or state can last up to 2 months, individual adults may live 2 to 3 weeks. Adult males actively defend wild lupine patches against other males to gain exclusive access to females for breeding. In addition to host plants, adult Frosted Elfins require nectar sources that are available during their short flight window. The Frosted Elfin is a generalist when it comes to flower selection for nectaring. They have been observed feeding on a variety of flowers including wild lupine, bird-foot violet (*Viola pedata*), blueberry (*Vaccinium* spp.), huckleberry (*Gaylussacia* spp.), pin cherry (*Prunus pensylvanica*), sweetbells (*Leucothoe racemosa),* staggerbush (*Lyonia mariana*), and *Rubus* spp. Adult Frosted Elfins were also reported to feed on moist sand. After mating, adult females visit multiple host plants where they deposit a single egg, usually nestled in the apical shoot of a wild indigo plant or among the young flower stalks and buds of lupine. The duration of the egg and larval stages varies with temperature, but eggs generally hatch into larvae within 2 weeks of spring adult emergence. During a period of approximately 5 to 6 weeks, larvae feed on one of two specific host plants, either wild lupine or wild indigo, but individuals have not been observed to use both. During this time, they grow in size and pass through four instars. Frosted Elfin larvae typically consume flowers and seedpods of wild lupine and entire leaves and flower shoots of. Indigo plants flower later in the summer than wild lupine and flowers are not available during the time that caterpillars are feeding. Late instar larvae are known to girdle stems of the indigo, presumably to increase leaf nutrient concentrations or reduce stem toxicity. Caterpillars of wild lupine-feeding Frosted Elfin are reported to be cannibalistic and will also consume caterpillars of other butterfly species. Larvae pupate in mid to late spring in Florida and by late July in Massachusetts, and remain in pupal diapause until the following spring. Larvae pupate at the base of the plant, at the soil surface, in the duff, and below the leaf litter (USFWS, 2018).

Current Stressors and Threats

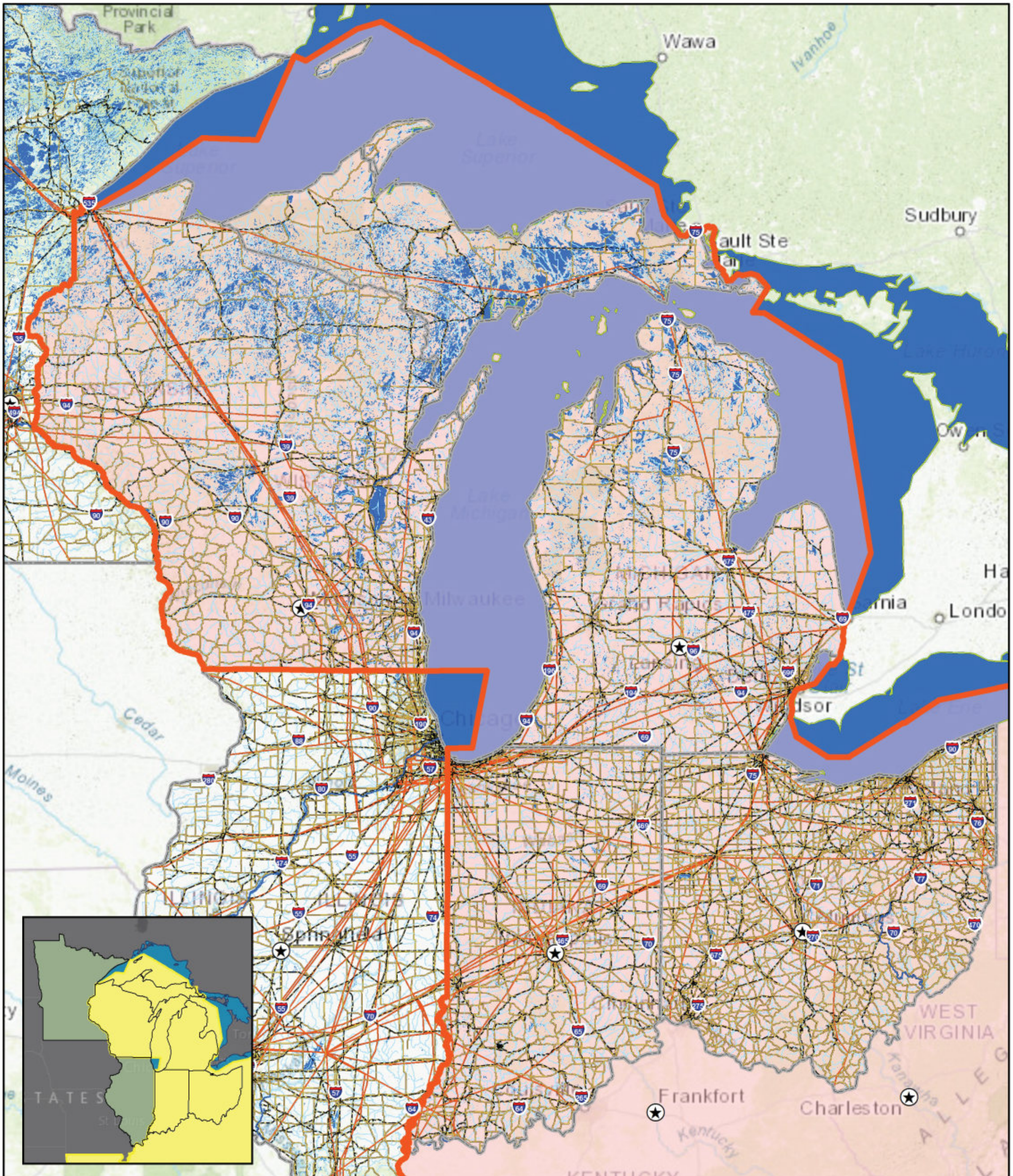
- Inherent factors
  Frosted Elfins exhibit several inherent traits that influence population viability, including: specialized habitat requirements, limited dispersal ability, small population size, area of occupancy, or extent of occurrence.
- Habitat loss and degradation
  The Frosted Elfin faces habitat loss from a variety of sources, including conversion of habitat as a result of human mediated causes such as development, invasive plant species, recreational activity, dumping in rights-of-way (ROWs), and fire exclusion or management, as well as natural causes such as succession. The Frosted Elfin overlaps with the Karner Blue Butterfly within the northern states and that species is influenced by similar factors.
- Insecticides

Insecticides are a tool to chemically control the spread of invasive insects. Use of insecticides may result in mortality of non-target species, depending upon the type of chemical, the application method, length of exposure, and the insect's tolerance.

List of References

U.S. Fish & Wildlife Service (USFWS). (2018). Species status assessment report for the Frosted Elfin (*Callophrys irus*), Version 1.1. Cortland, New York. 74pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Frosted Elfin. Retrieved from https://www.fws.gov/northeast/frosted-elfin/index.html



0 25 50 100 150
Miles
0 25 50 100 150 200
Kilometers

FROSTED ELFIN BUTTERFLY (*CALLOPHRYS IRUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:7,500,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Frosted Elfin Butterfly (*Callophrys irus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Hine’s Emerald Dragonfly (*Somatochlora hineana*)

Federal Listing: Endangered (Not Listed in Winnebago County, IL and Columbia, Iowa, Richland, and Rock Counties, WI)
State Listing within the AA: Endangered in Illinois, Michigan, and Wisconsin

Species Description
Hine’s Emerald Dragonfly, like many other members of its family, has brilliant green eyes. It is distinguished from all other species of *Somatachlora* by its dark metallic green thorax with two distinct creamy-yellow lateral lines, and distinctively-shapes male terminal appendages and female ovipositor. Adults have a body length of 60 to 65mm (2.3 to 2.5in) and wingspan of 90 to 95mm (3.5 to 3.7in). The wings are clear and may have an amber hue towards the base of the hind wings. Other species of *Somatochlora* that occur in the same range may be confused with Hine’s Emerald Dragonfly, include *S. linearis*, *S. tenebrosa*, *S ensignera*, *S. elongata*, and S. *williamson*i. However, distinctive shapes of terminal appendages and ovipositors separate adults of this species from all others. Two characteristics change with the ages of the Hine’s Emerald Dragonfly. After emerging as an adult, the eyes are initially brown and turn emerald green within 1 to 3 days. Toward the end of the adult life span, the wings may turn from clear to a slightly opaque, smokey color. No one character has been found that will easily and reliably differentiate larvae of Hine’s Emerald Dragonfly from the similar species listed above (USFWS, 2001). The larva (nymph, naiad) is approximately 25mm in length and is light to dark brown when mature. The body is densely clothed with coarse setae (hair) (Illinois State Museum, 2012).

Species Distribution
Hine’s Emerald Dragonfly lives in wetlands dominated by grass (graminoid) or grass-like plants and fed primarily by water from a mineral source, or fens. Two important characteristics common to wetlands inhabited by Hine’s Emerald Dragonfly appear to be groundwater fed, shallow water slowly flowing through vegetation, and underlying dolomitic bedrock or calcareous limestone. The flowing water can range from barely detectable sheet flow to deeper, well-defined streamlet channels. Parts of the streamlet channels are usually covered by vegetation such as cattails or sedges. These slow-moving aquatic systems provide appropriate habitat for larval development. Soil types of these aquatic systems can range from organic much to mineral soils like marl. Two other important components of these wetland complexes are open, vegetated areas and nearby or adjacent forest edge. Areas of open vegetation serve as places to forage. Forest, trees, or shrubs provide protected, shaded areas for Hine’s Emerald Dragonfly to perch and roost. Larval habitat may be an important factor affecting the distribution and population size of this species. Hine’s Emerald Dragonfly larvae are usually found in small flowing streamlets within cattail marshes, sedge meadows, and hummocks (USFWS, 2001).

Historically, the Hine’s Emerald Dragonfly was found in Alabama, Indiana, and Ohio and probably has been extirpated in those states. Today the dragonfly can only be found in Illinois, Michigan, Missouri and Wisconsin (USFWS, 2006).

Distribution within Action Area

- Illinois: Nine sites in Will, Cook, and Du Page Counties (USFWS, 2001); two sites added during five-year review (USFWS, 2013) with two new site updates in subsequent review, including Winnebago County (USFWS, 2019)
- Wisconsin: Twenty sites in Door, Kewaunee and Ozaukee Counties (USFWS, 2001); two sites added during five-year review including sites in Iowa and Richland Counties (USFWS, 2013) with no new site updates in subsequent review (USFWS, 2019).
- Michigan: Ten sites in Mackinac, Presque Isle, and Alpena Counties (USFWS, 2001); eight sites added during five-year review including adding sites in Alcona, Menominee, and Charlevoix counties (USFWS, 2013) with no new site updates in subsequent review (USFWS, 2019).

Critical Habitat
Critical habitat totals approximately 26,531.8 acres (ac) (10,737 hectares (ha)) in 37 units. The critical habitat units are located in Cook, DuPage, and Will Counties in Illinois; Alpena, Mackinac, and Presque Isle Counties in Michigan; Crawford, Dent, Iron, Phelps, Reynolds, Ripley, Washington, and Wayne Counties in Missouri; and Door and Ozaukee Counties in Wisconsin (75 FR 21394).

Life History
The life cycle of Hine's Emerald Dragonfly is similar to most dragonflies in that it is comprised of the following stages: aquatic egg, aquatic larva, and terrestrial/aerial adult. A Hine's Emerald Dragonfly female will most likely lay more than 500 eggs during her life. After an egg is hatched, the larvae may spend 2 to 4 years in small streamlets, foraging and molting as they grow. Upon completion of larval development, the larvae begin to emerge as adults, possibly as early as late May in Illinois and late June in Wisconsin and continue to emerge throughout the summer. The first emergence date can be estimated using temperature and precipitation data. The Hine's Emerald Dragonfly's know flight season lasts up to early October in Illinois and to late August in Wisconsin. Fully adult Hine's Emerald Dragonflies can live at least 14 days and may live 4 to 6 weeks. As with most dragonflies adult Hine's Emerald Dragonflies feed, establish territories, mate, and oviposit (lay eggs). Most dragonfly adults are general predators through their entire life cycle, feeding primarily on insects they can capture while flying (USFWS, 2001).

Current Stressors and Threats
The significant threats to the existence of this species have been identified as (USFWS, 2001):
- Habitat destruction/alteration, including changes in surface and sub-surface hydrology
- Contamination

Most of the wetland habitat that this dragonfly depends on for survival has been drained and filled to make way for urban and industrial development. Development that decreases the amount or quality of ground water flowing to the dragonfly's habitat threatens its survival because it depends on spring-fed shallow water to breed. Contamination of wetlands by pesticides or other pollutants also poses a threat. The dragonfly depends on pristine wetland or stream areas, with good water quality, for growth and development (USFWS, 2006).

Potential additional concerns include (USFWS, 2001):
- Environmental extremes (i.e. flood, drought, severe freezing)
- Transpiration (direct impact)
- Demographic and genetic stochasticity
- Disease or predation
- Overutilization for commercial, recreational, scientific, or educational purposes.

List of References

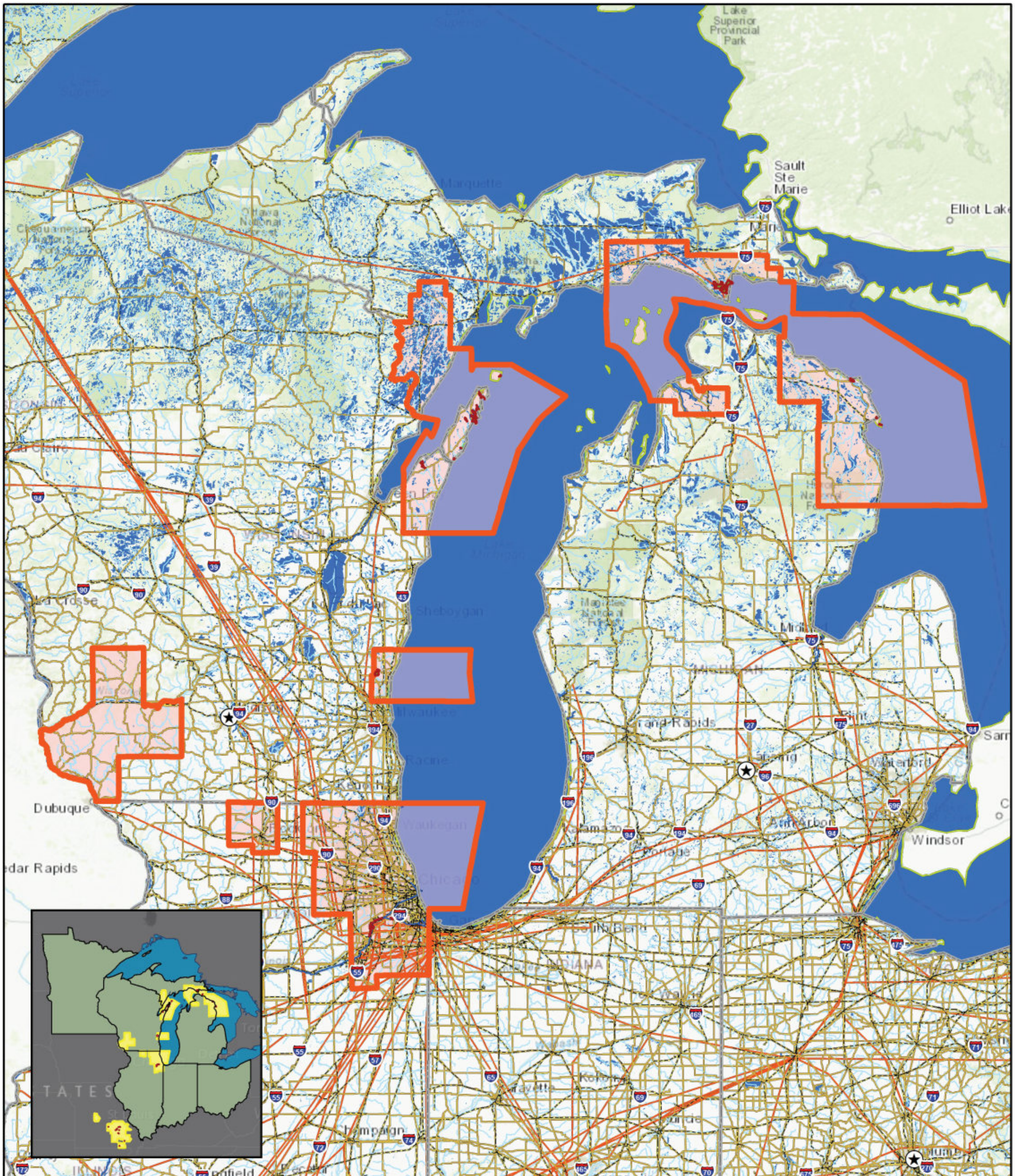
Illinois State Museum. (2012). Hine's Emerald Dragonfly. Retrieved from http://www.museum.state.il.us/research/entomology/hines/mainpage.html

U.S. Fish & Wildlife Service (USFWS). (2001). Hine's Emerald Dragonfly (*Somatochlora hineana*) recovery plan. Fort Snelling, Minnesota. 210pp.

U.S. Fish & Wildlife Service (USFWS). (2006). Hine's Emerald Dragonfly (*Somatochlora hineana*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/hed/hins_fct.html

U.S. Fish & Wildlife Service (USFWS). (2013). Hine's Emerald Dragonfly (*Somatochlora hineana*) (Odonata: Corduliidae) 5-year review: summary and evaluation. Barrington, Illinois. 50pp.

U.S. Fish & Wildlife Service (USFWS). (2019). 5-year review: Hine's Emerald Dragonfly (*Somatochlora hineana*). Barrington, Illinois. 10pp.



0 15 30 60 90
Miles
0 15 30 60 90 120
Kilometers

HINE'S EMERALD DRAGONFLY (*HESPERIA DACOTAE*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,500,000

Petroleum Pipeline	Commercial Navigable Waterway	Action
Major Road	Rivers & Streams	Hine's Emerald Dragonfly (*Somatochlora hineana*) Critical Habitat
Railroad	Lakes & Ponds	Hine's Emerald Dragonfly (*Somatochlora hineana*) Counties of Occurrence
	1-Mile Coastal Inland Buffer	

N

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Hungerford's Crawling Water Beetle (*Brychius hungerfordi*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Michigan

Species Description

In addition to its geographic distinction, HCWB can be identified from other members of the genus by denser punctation of the head, the presence of a transverse infuscation at the base of the head between the eyes, coarser punctuation on the pronotum (the plate at the base of the head), and larger average size. In addition, median lobe of the aedeagus (part of the male genitalia) of each *Brychius* species has a unique shape and can be used for identification. Adult HCWB are small and torpedo-shaped, with an average body length of 3.8 to 4.3mm (0.15 to 0.17in). They are yellowish-brown in color with irregular dark markings and longitudinal stripes on the elytra, each of which is comprised of a series of fine, closely spaced and darkly pigmented indentations. Males are characterized by thickened tarsal segments of the front legs with small tufts of hair on the first three segments. The females tend to be larger than the males. HCWB larvae are light yellowish brown with cylindrical bodies that taper to a hooked tail. They are stiff-bodied and possess short legs with five segments and single tarsal hook. The larvae have modified forelegs which could be an adaptation for feeding on filamentous algae and can be distinguished from other described haliplids by having the third antennal segment shorter than the second segment. Final instar larvae are approximately 13mm in length. Strand and Spangler (1994) provide a more thorough description of HCWB larvae.

Species Distribution

HCWB inhabits relatively cool (15 to 25°C), fast flowing (1st, 2nd, 3rd order) alkaline streams with sand and gravel substrates, often occurring in reaches with an open to partially open canopy just below beaver dams or similar human-made structures. Adults prefer gravel and cobble riffles while larvae occupy areas with slower current and dense growth of microalgae, especially Chara. Specifically, they occur in riffles in floodplain forest, northern shrub thicket, northern wet meadow and rich conifer swamp habitats (MNFI, 2021). The hydrology of a site appears to be important for this species. HCWB seems to prefer seasonal streams that have some groundwater input. These streams do not dry up completely, but the water level can drop considerably. However, habitat requirements of the species are not fully understood. It is uncertain what habitat characteristics are important for all life stages of this species. In general, the types of streams inhabited by this species do not appear to be rare. The species appears to prefer environmental conditions found downstream of culverts, beaver dams, and similar structures. However, the species may also have a broader range of suitable habitat (USFWS, 2006).

There are 13 streams range-wide (Michigan and Canada) with known populations of HCWB. In Michigan, HCWB is known to occur in the East Branch of Maple River and Carp Lake River in Emmet County; East Branch of Black River, Van Hetton Creek (also known as Van Hellon and Van Helen Creek), and Stuart Creek in Montmorency County; Canada Creek in Montmorency and Presque Isle Counties; Mullet Creek in Cheboygan County; North Branch of Boyne River in Charlevoix County; Middle Branch of Big Creek in Oscoda County; and Portage Creek in Kalkaska County. In Ontario, Canada, HCWB is known to occur in the North Saugeen River, Rankin River, and Saugeen River (USFWS, 2021).

Distribution within Action Area

Records of HCWB occurrence in Michigan include (MNFI, 2021):

- Charlevoix County (one occurrence; last observed in 2011)
- Crawford County (one occurrence; last observed in 2019)
- Emmet County (four occurrences; last observed in 2017)
- Kalkaska County (two occurrences; last observed in 2020)
- Montmorency County (three occurrences; last observed in 2013)
- Oscoda County (one occurrence; last observed in 2011)

- Presque Isle County (one occurrence; last observed in 2005)

Critical Habitat
No critical habitat has been designated for Hungerford's Crawling Water Beetle.

Life History
Very little is known about the life history of HCWB; however, there are observations and life history information reported for other haliplids, including *B. hornii*. Although differences occur among species, life history information for closely related species may give us a reasonable estimate of the likely life history of HCWB. Like all beetle species, HCWB undergoes complete metamorphosis with a life cycle that consists of four distinct stages. In general, the period of egg laying for haliplids extends from May through July, although this may extend later in the summer in HCWB, and there may be another generation in the fall for some species. Oviposition (egg-laying) has not been observed for any species of *Brychius*, nor has the egg stage been described. See recovery plan for discussion of eggs of *Peltodytes* and *Haliplus* which may be similar to *Brychius* suggesting eggs are deposited on or into leaves and stems of aquatic plants. Haliplid larvae pass through three instars and are herbivorous. In *B. hornii*, the first two instars occur in July, and the third instar stage lasts from August to April. HCWB larvae have been found in or near direct current in association with algae in the genus *Chara*, which is thought to be a possible food source. When mature, larvae leave the water in search of a place in damp soil to pupate. In the lab, larvae of *B. hornii* emerged from the water in November and remained throughout the winter months half-buried in moist earth and sand. In the fall, larvae of HCWB were found away from the current, buried in an island of damp sand and Chara up to 15 cm above the water line. Like other haliplids, they likely overwinter in the larval stage in position for spring pupation. The pupal stage is the only one spent in a terrestrial setting. This stage lasts two to three weeks, during which time the transformation to adult takes place. It requires several days before the adult beetle is ready to leave the pupal chamber and reenter the water. The pupal stage of HCWB has not been observed. The young adults of some haliplids do not reproduce until the following year. Reproduction in haliplids usually occurs in the spring and early summer. Mating has been observed in HCWB in June. Mating in *B. hornii* also occurs in June. Adults of HCWB have been found year-round, suggesting that some adults survive the winter, even beneath ice cover Studies have shown that some haliplids can even survive being frozen solid. Other species in the family Haliplidae have at least one generation in the summer and likely another in the late summer or fall. Observations of HCWB suggest that they may have two generations per year, with a second brood of adults emerging late in the season (USFWS, 2006). The recovery plan (2006) provides additional details on food habits, respiration, general behavior, and locomotion and dispersal.

Current Stressors and Threats
Specific threats were unknown during listing (1994), but the listing rule hypothesized that human activities such as fish management, logging, beaver control management, dredging, stream pollution, and general stream degradation had contributed to the reduction of HCWB habitat. In general, it is likely that threats to the species include any activities that degrade water quality or remove or disrupt the pools and riffle environment of streams in which this species lives (USFWS, 2006). The primary threat to HCWB is modification of its habitat. Actions that are potentially harmful include dredging, channelization, bank stabilization and impoundment (USFWS, 2004).

- Stream modification
  The primary threat to Hungerford's Crawling Water Beetle is modification of its habitat. Actions that are potentially harmful include dredging, channelization, bank stabilization, and impoundment.
- Fish management
  Fish introductions or removals may pose a threat to HCWB. The introduction of brown trout, for example, can result in increased predation of the beetle. Other management practices, such as the use of chemical treatments, may also be harmful to this rare species.
- Degradation of water quality

- Geographic isolation

List of References

Michigan Natural Features Inventory (MNFI). (2021). Brychius hungerfordi (Hungerford's Crawling Water Beetle). Retrieved from https://mnfi.anr.msu.edu/species/description/11555/Brychius-hungerfordi

Strand, R. M. & Spangler, P. J. (1994). The natural-history, distribution, and larval description of *Brychius hungerfordi* Spangler (Coleoptera, Haliplidae). *Proceedings of the Entomological Society of Washington* 96(2): 208-213.

U.S. Fish and Wildlife Service (USFWS). (2004). Hungerford's Crawling Water Beetle (*Brychius hungerfordi*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/hcwb/hungerfo.html

U.S. Fish and Wildlife Service (USFWS). (2006). Hungerford's Crawling Water Beetle (*Brychius hungerfordi*) recovery plan. Fort Snelling, Minnesota. 82pp.

U.S. Fish and Wildlife Service (USFWS). (2009). Hungerford's Crawling Water Beetle (*Brychius hungerfordi*) 5-year review: summary and evaluation. East Lansing, Michigan. 14pp.

U.S. Fish and Wildlife Service (USFWS). (2012). Hungerford's Crawling Water Beetle (*Brychius hungerfordi*) 5-year review: summary and evaluation. East Lansing, Michigan. 16pp.

U.S. Fish and Wildlife Service (USFWS). (2012). Status review: Hungerford's Crawling Water Beetle (*Brychius hungerfordi*). East Lansing, Michigan. 15pp.

0 3.25 6.5 13 19.5
Miles
0 3.25 6.5 13 19.5 26
Kilometers

HUNGERFORD'S CRAWLING WATER BEETLE (*BRYCHIUS HUNGERFORDI*) ACTION AREA OVERVIEW MAP

SCALE 1:1,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Hungerford's Crawling Water Beetle (*Brychius hungerfordi*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Karner Blue Butterfly (*Lycaeides [Plebejus] melissa samuelis*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Minnesota, and Ohio; Threatened in Michigan; Special Concern in Wisconsin

Species Description
Karner Blue Butterflies are small with a wingspan of about 2.5cm (1in). The forewing length of adult KBBs is 1.2 to 1.4cm for males and 1.4 to 1.6cm for females. The wing shape is rounded and less pointed than *L. m. melissa*, especially in the female hind wing. The upper (dorsal) side of the male wing is a violet blue with a black margin and white fringed edge. The female upper side ranges from dull violet to bright purplish blue near the body and central portions of the wings, and the remainder of the wing is a light or dark gray-brown, with marginal orange crescents typically restricted to the hind wing. Both sexes are a grayish fawn color on the ventral side. Near the margins of the underside of both wings are orange crescents and metallic spots. The black terminal line along the margin of the hind wing is usually continuous. The eggs of Karner Blue are tiny and radially symmetric, about 0.7mm in diameter, somewhat flattened, and pale greenish-white in color. The surface is deeply reticulated with a fine geometric pattern. Larvae are a pea-green color, pubescent and dorsally flattened, with a brown-black to black head capsule. The head is often not visible as it is tucked under the body. Older larvae have pale green (to white) lateral stripes, and a dark-green longitudinal stripe dorsally. In pre-pupal larvae, the lateral stripes become less distinct and the color becomes a duller green. Larvae have four instars (larval development stages), and three glandular structures that are known to mediate interactions with ants in other species of *Lycaenidae*. Pupae are bright green and smooth, changing to a light tan with hints of purple shortly before emergence when the adult cuticle separates from the cuticle of the pupal case. In the Midwest, Karner Blue Butterflies can be confused with Nabokov's Blue (*L. idas nabokovi*), Melissa Blue (*L. melissa melissa*), Eastern- and Western-Tailed Blues (*Everes comyntas* and *E. amyntula*), Reakirt's Blue (*Hemiargus isola*), Greenish Blue (*Plebius saepiolus*), Marine Blue (*Leptotes marina*), Acmon Blue (*Icaricia acmon*), Spring Azure (*Celastrina argiolus*) complex, and Silvery Blue (*Glaucopsyche lygdamus)* (USFWS, 2003).

Species Distribution
Almost all known extant KBB populations occur on sandy soils associated with glacial outwash plains and terraces, glacial moraines, the shores and bottoms of glacial lakes, the glacial shores of existing lakes, and dissected sandstone outwashes (USFWS, 2003).

Changes in the distribution of the KBB within its historical range have occurred since the 2012 5-year review and the number of KBB populations has decreased since listing. Of the eight states with KBBs at the time of listing in 1992 (Illinois, New Hampshire, New York, Indiana, Ohio, Michigan, Wisconsin, and Minnesota), KBBs are likely no longer present in Illinois, Minnesota, and Indiana. Wisconsin and Michigan have the largest number of local populations with the greatest numbers of individuals; New York has one large population. The historic northern, eastern, and western limits of the butterfly correspond roughly with the distributional limits of lupine. In all three regions, the present distribution of the butterfly has contracted away from these limits, with extirpations of populations occurring in all three geographic directions. The northernmost population of the Karner Blue occurs in the Superior Outwash Recovery Unit (RU) in Wisconsin, the westernmost population in the Paleozoic Plateau RU in Minnesota, and the easternmost population in the Merrimac/Nashua River System RU in New Hampshire (USFWS, 2003).

Distribution within Action Area

- Illinois: Lake County
- Indiana: Lake and Porter Counties
- Michigan: Allegan, Ionia, Kent, Lake, Mason, Mecosta, Monroe, Montcalm, Muskegon, Newaygo, and Oceana Counties
- Minnesota: Winona County

- Ohio: Lucas County
- Wisconsin: 25 counties

Critical Habitat
Despite 1978 proposal (43 FR 28941), no critical habitat has been designated for Karner Blue Butterfly.

Life History
The Karner Blue Butterfly is bivoltine, which means that it completes two generations per year. In typical years, first brood larvae (caterpillars) hatch from overwintered eggs in mid- to late April and begin feeding on wild lupine (*Lupinus perennis*), the only known larval food source. Larvae pass through four instars (developmental stages), between which the relatively soft larval exoskeleton is shed. Feeding by first and second instar larvae results in tiny circular holes in the lupine leaves while older larvae eat all but the upper or lower epidermis, creating a characteristic window-pane appearance. Larvae feed for about three to four weeks and pupate (transform from larvae to adult) in late May to early June. Ants commonly tend larvae which collect a sugary solution secreted by the larvae, and in turn may protect the larvae from predation and/or parasitism. Mature larvae enter a wandering phase, after which the pre-pupal larvae attach themselves to various substrates with a silk thread. Karner Blues are known to pupate in the leaf litter, on stems and twigs, and occasionally on lupine leaves. First flight adults begin emerging in late May with the flight extending through late June. Adults are believed to live an average of four to five days but can live as long as two to three weeks. First flight adult females lay their eggs primarily on lupine plants, often singly on leaves, petioles, or stems, or occasionally on other plants or leaf litter close to lupine plants. Second brood eggs hatch in five to ten days, and larvae can be found feeding on wild lupine leaves and flowers from early June through late July. Typically, a larva can survive on one large lupine stem; however, the larva moves from leaf to leaf on the lupine stem, often returning to leaves fed on during earlier instars, and it may even move to other lupine stems. Larvae are found often on the lower parts of the stems and petioles. Ants also typically tend second brood larvae, but during midday on hot days tending may be reduced. Pupae are also frequently tended by ants. Second brood adults begin to appear in early to mid-July and fly until mid to late August, and in some years into early September. Flight phenology may be delayed because of cool wet summers and result in an adult flight period lasting through late August. The peak flight period usually lasts one to two weeks. Generally, there are about three to four times as many adults in the second brood compared with the first brood. The first brood is usually smaller most likely due to high overwintering mortality of eggs, the inability of larvae to find lupine in the spring, or greater oviposition success of first-flight females. It is important to note that there is a significant amount of annual variation in adult abundance relative to peak flight date and in brood timing and length among years (USFWS, 2003).

Current Stressors and Threats
As reported in the 5-year review (USFWS, 2012), spatial distribution at the metapopulation level has improved at some KBB recovery sites as a result of habitat restoration and management activities, but habitat degradation and loss from plant community succession and the presence of invasive plants continue to be a stressor to the species at many or all recovery sites. The most important threats to the Karner Blue range wide are habitat loss, which has been accompanied by increased fragmentation of the remaining suitable habitat, and habitat alteration primarily resulting from vegetational succession. Related to these is the threat of incompatible management stemming from conflicting and potentially conflicting management objectives. Large-scale disturbances, such as large wildfire and unusual weather, are also threats to Karner Blue populations (USFWS, 2003).

- Loss and alteration of native habitat (reduction and hybridization of native lupine)
- Loss and alteration of other contemporary habitats
- Incompatible management (pesticide use, mowing, prescribed fire, deer grouse management)
- Overutilization for commercial, recreations, scientific, or educational purposes
- Disease or predation
- Stochastic events

- Invasion and hybridization with other species that use introduced legumes (MNDNR, 2021)

List of References

Michigan Department of Natural Resources (MIDNR). (2009). Michigan Karner Blue Butterfly habitat conservation plan. Lansing, MI. 113pp.

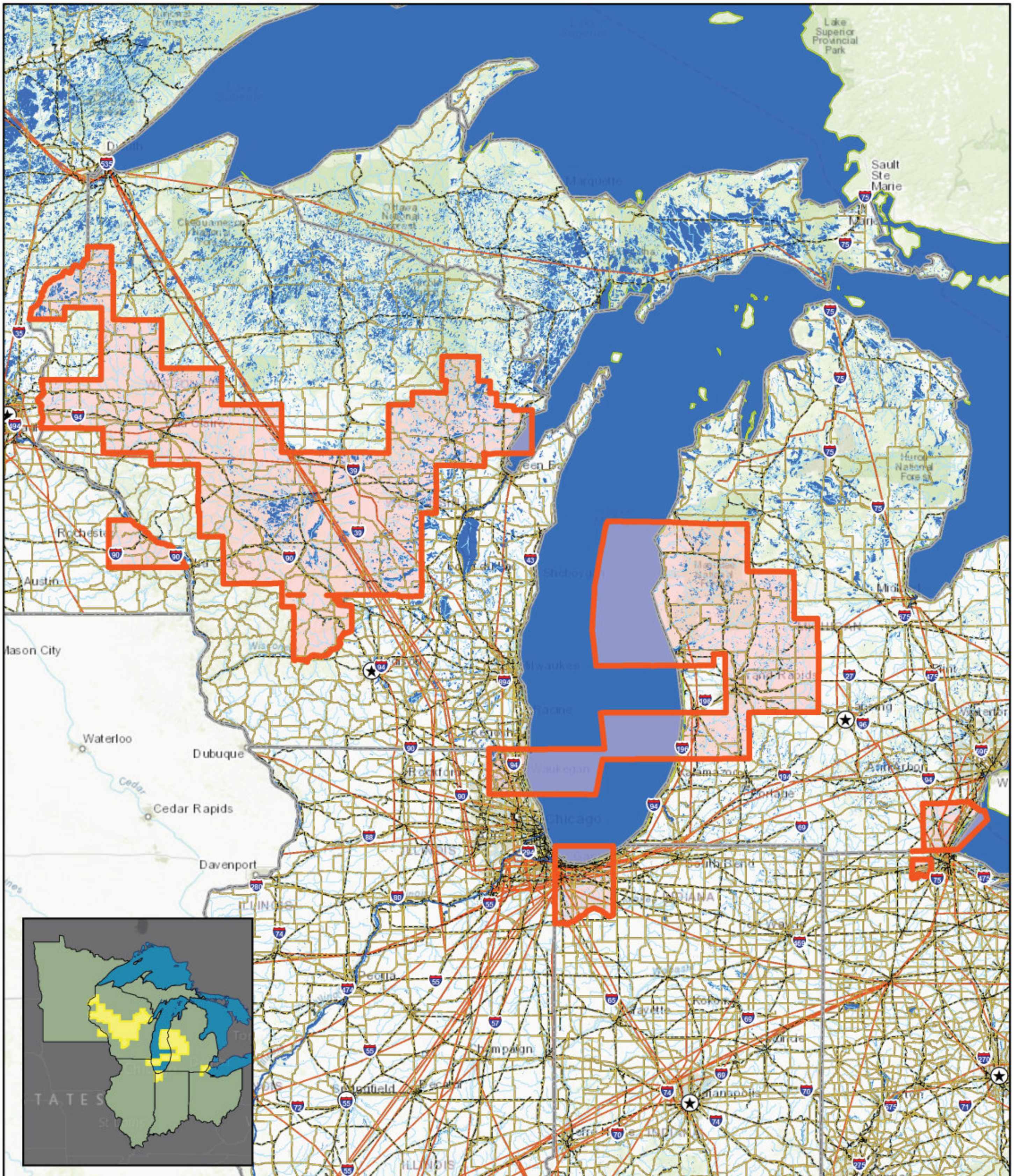
Minnesota Department of Natural Resources (MNDNR). (2021). *Plebejus melissa samuelis* (Karner Blue). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPG5021

U.S. Fish & Wildlife Service (USFWS). (2003) Final recovery plan for the Karner Blue Butterfly (*Lycaeides melissa samuelis*). Fort Snelling, Minnesota. 273pp.

U.S. Fish & Wildlife Service (USFWS). (2012) Karner Blue Butterfly (*Lycaeides melissa samuelis*) 5-year review: summary and evaluation. New Franken, Wisconsin. 68pp + appendices.

U.S. Fish & Wildlife Service (USFWS). (2019) Karner Blue Butterfly (*Lycaeides melissa samuelis*) 5-year review: summary and evaluation. Bloomington, Minnesota. 27pp.

Wisconsin Department of Natural Resources (WIDNR). (2009). Wisconsin statewide Karner Blue Butterfly habitat conservation plan. Madison, Wisconsin. 77pp.



0 20 40 80 120 Miles 0 20 40 80 120 160 Kilometers	**KARNER BLUE BUTTERFLY (*LYCAEIDES MELISSA SAMUELIS*) ACTION AREA OVERVIEW MAP**	**SCALE 1:6,000,000**

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Karner Blue Butterfly (*Lycaeides melissa samuelis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Linda's Roadside-Skipper (*Amblyscirtes linda*)

Federal Listing: Under Review. This species was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 59836).
State Listing within the AA: Not Listed

Species Description
Upperside primaries are dark brown with some fulvous overscaling toward the base and inner margin; the number of subapical spots variable, from three well defined to no spots at all. A few specimens show two poorly defined spots in the vicinity of the stigma. The stigma is well developed. Secondaries are dark brown with the basal and discal areas of the wings overscaled with fulvous scales and hairs. Underside primaries are grayish-brown, lighter than above. The cell area is occupied with reddish-fulvous scales. The spots reappear and are better defined, the subapical spots are clear white and the two spots near the stigma are fulvous. Secondaries are ground color dark brown, evenly suffused with grayish-white scales; an irregular curved discal band of five or six grayish-white spots, two above the cell and a faintly lighter area near the base. The overscaling almost obliterates the discal band and basal spots in some of the specimens. Fringes of both wings checkered. Body, above brown; beneath grayish-white; palpi, grayish-white; antennae, dark brown, ringed with gray; club, black above, beneath grayish-white. Females similar to the males except some of them have the discal band and basal spots on the under surface of the secondaries clear snow white. Males average 26mm (24 to 27mm) and females average 28mm (24 to 29mm) (Freeman, 1943).

Species Distribution
This species is endemic to a small area of the lower Midwest, U.S.A., centered in and near the Ozarks. It is found in the southern two-thirds of Missouri and immediately adjacent parts of Illinois, Kentucky, Tennessee, Arkansas and Oklahoma. It is known from Shawnee National Forest in Illinois. Other unprotected occurrences may have good viability but have not been assessed. (Nature Serve, 2021).

Critical Habitat
No critical habitat has been designated for Linda's Roadside Skipper.

Life History
There is debate on whether there are three broods from mid-April to early September or only two in late April-early May and late June-early July. Perhaps the third brood is partial. The egg and pupal stages are brief and most of the year is spent as larvae on the foodplant, perhaps among the litter over winter. Hibernation probably takes place as a late instar larva, possibly pupa. Larval diet probably restricted to the grass Indian Woodoats (*Chasmanthium latifolia)*. Feeding habits of adults are not well documented except that they do visit flowers and mud puddles (NatureServe, 2021).

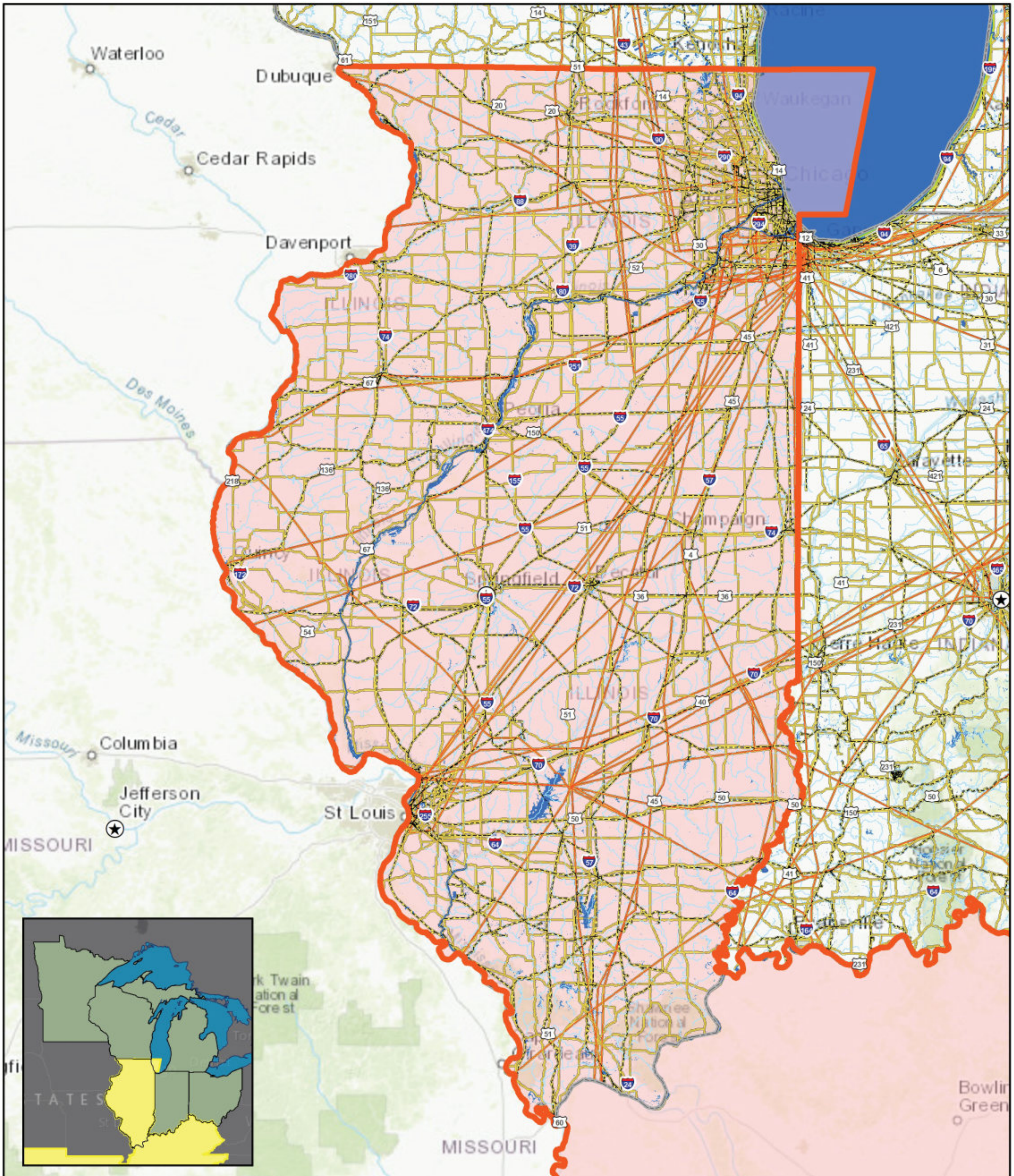
Current Stressors and Threats

- Habitat loss and fragmentation
  This species is threatened by loss and fragmentation of streamside habitat from development and forestry activities (logging, prescribed fire).
- Pesticides
  This species is likely to be threatened by fumigation to control gypsy moths and agricultural pests.
- Natural disturbances
  Natural disturbances, such as some floods, may also pose a threat to some subpopulations, although larvae of many skippers seem to tolerate some flooding. Concerted efforts to survey for this species are needed to determine the full extent of the species' distribution and delineate critical habitat. Studies into the natural history are needed to better understand habitat requirements and limiting factors on life history (NatureServe, 2021).

List of References

Freeman, H.A. (1943). Two new species of *Amblyscirtes* from Texas and Arkansas (Lepidoptera, Rhopalocera: Hesperiidae). *Entomological News* 54: 17-20.

NatureServe. (2021). NatureServe Explorer – *Amblyscirtes linda* (Linda's Roadside-Skipper). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.110939/Amblyscirtes_linda



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

LINDA'S ROADSIDE SKIPPER (*AMBLYSCIRTES LINDA*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Linda's Roadside Skipper (*Amblyscirtes linda*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Mitchell's Satyr Butterfly (*Neonympha mitchellii mitchellii*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Michigan and Ohio

Species Description
MSB is a medium-sized butterfly and is a typical member of the Satyrinae, a subfamily of Nymphalidae, which includes about 43 species of pearly eyes, satyrs, and wood nymphs in North America. Male forewing length ranges between 1.6 to 1.8cm (0.6 to 0.7in), females between 1.8 to 2.1cm (0.7 to 0.8in). Although the dorsal (upper) wings are essentially unmarked and dark warm-brown in color, the ventral (lower) wing pattern may show through the thinly scaled dorsal wing surfaces. The ventral wing ground color is also dark warm-brown. Two conspicuous pattern elements characterize the ventral wing surfaces. The first is a linear series of four to five sub-marginal ocelli (eye-spots) on both the forewings and hindwings. The second is a pair of orange lines which encircle the ocelli rows on both wings. As with most satyrines, the expression of the ocelli is variable, and they tend to be larger and more conspicuous in females. MSB is superficially similar to several species with which it occurs in Indiana, Michigan and Ohio. Two species of Satyrodes, the Appalachian Eyed Brown (*Satvrodes appalachia*) and the Eyed Brown (*S. eurydice*), both have a similar series of ventral ocelli. However, both these species can be separated by their larger size, which averages 50 percent greater, and their much lighter ground color (almost tan). The Little Wood Satyr (*Megisto cymela*) is also frequently encountered along the edges of wetlands which support MSB. The Little Wood Satyr is approximately the same size as MSB, but has ocelli on both the ventral and dorsal wing surfaces, and the ventral ground color is lighter, tending to warm-tan. Older, worn specimens of MSB found late in the season may be lighter in color than fresh ones, making it more likely to confuse with other species. Researchers may want to use other characteristics to confirm their identifications (USFWS, 1998).

Species Distribution
In Michigan and Indiana, the MSB is found exclusively in fens and open parts of rich tamarack swamps. MSB are not found in all fens and are not distributed throughout any one fen. MSB typically occur near (usually within 3m) woody vegetation within a fen. In more open fens, MSB occur along the shrubby edge of the fen. In fens with more tamarack or other woody vegetation, MSB are found in open, grassy lanes between trees and shrubs. In other fens, MSB are found among openings in rich tamarack swamps. MSB are rarely found in open fens without trees or tamarack swamps without openings. Similar to the federally endangered Karner Blue butterfly (*Lycaeides melissa samuelis*), the ideal MSB habitat appears to be an intermediate between a grass or sedge dominated prairie and a closed canopy forest. The MSB is found primarily in fen savanna, usually dominated by tamarack (MIDNR, 2018).

Currently, there are nine MSB populations in Michigan (six viable), which is a decline from 16 since the previous 5-year review (2014). Population trends have been stable or declining in recent years. None of these sites occur on state or federal land and many Michigan populations occur on lands not formally committed to conservation into perpetuity. There is one population in Indiana that is not considered viable and recently acquired by local government. Populations in Virginia (11) are confined to 1 county, despite wide ranging surveys. Only three of these populations are considered to be good to fair viability, with one partially owned by the state and three under a conservation easement. Mississippi has 15 populations across five counties, an increase from the 11 populations noted in the 2014 review; however, viability is unknown. While some of these populations occur on state and federal lands, status of monitoring or management are not known. Alabama has populations within the Oakmulgee Ranger District of the Talladega National Forest, ranging across six counties. Captive propagation, reintroduction, and augmentation are concentrated in Michigan and Indiana because of long-term trends of population declines and ongoing threats in the northern part of the species range. In 2016, the Service developed a Safe Harbor Agreement with the purpose to reintroduce butterflies to historic sites and/or to suitable fens that occur within its historic range. Limited introductions began in 2016 at a TNC property in Indiana; however, the number of individuals available for release have been relatively small and no individuals were found during surveys in recent years. An HCP was developed for Michigan and Indiana in 2018 and signed in 2020 to maintain and expand current populations through management, restoration, and protection of suitable habitat while minimizing take and restore unoccupied habitat for reintroduction to increase the number of extant populations (USFWS, 2021a).

Distribution within Action Area
Records of MSB occurrence in Michigan include (MNFI, 2021):

- Barry County (three occurrences; last observed in 2012)
- Berrien County (three occurrences; last observed in 2020)
- Branch County (one occurrence; last observed in 2020)
- Cass County (five occurrences; last observed in 2020)
- Jackson County (four occurrences; last observed in 2020)
- Kalamazoo County (four occurrences; last observed in 2009)
- Lenawee County (one occurrence; last observed in 1980)
- St. Joseph County (two occurrences; last observed in 2008)
- Van Buren County (three occurrences; last observed in 2020)
- Washtenaw County (two occurrences; last observed in 2019)
- Wayne County (one occurrence; last observed in 1931)

The populations in Barry, Kalamazoo, and St. Joseph County are now considered extirpated; however, it is hoped that MSB may be returned to these counties in the future (USFWS, pers. comm., 2022).

Although the Indiana population of MSB is not considered viable, the species may occur in LaGrange County, Indiana.

MSB was known from a single Ohio county at the time of listing (57 FR 21564). According to intensive MSB searches conducted from 1985 to 1990, no extant populations were found in Ohio. The recovery plan (USFWS, 1998) lists Portage and possibly Seneca counties as supporting historical populations of Mitchell's Satyr. As of 2013, the species is considered extirpated from the state. However, ECOS still lists Portage County, Ohio as potentially harboring MSB, and there may be opportunities to reintroduce this species into Portage County in the future.

Critical Habitat
No critical habitat has been designated for Mitchell's Satyr Butterfly.

Life History
The MSB exists for 95% of its life cycle as a caterpillar or larva. Larvae hatch from eggs after 7 to 11 days, in July. They immediately move to a nearby food plant. First instar larvae are initially white, with dark velvet-brown heads, but their bodies change to a lime green color after they begin feeding. The second through sixth instars are cryptically colored (green or tan, depending on the time of year). The MSB overwinters as a fourth instar larva on the leaves of tussock sedge. In the spring, the larvae continue eating and growing. In late-May to late-June, the larvae form a chrysalis about 40cm (5 to 68cm) or 15in (2 to 27in) from the base of the plant. MSB larvae feed on a variety of sedges and grasses found in fens, sedge meadows, tamarack swamps, and other wetlands. The chrysalis persists for 10 to 15 days. Adult butterflies in the northern portion of its range emerge from mid-June to late July. The populations are bivoltine in Alabama and Mississippi; the first flight begins in late May to early June and the second generation has flight in August to mid-September (USFWS, pers. comm., 2022). Males emerge earlier than females (USFWS, 1998). Adults are short-lived, do not usually feed, and exist primarily to mate, disperse, and lay eggs. Eggs are not usually laid on food plants. Instead, eggs are most often laid on forbs and short statured wildflowers. In captivity, eggs are most often laid on clearweed *Pilea pumila*.

Current Stressors and Threats

- Habitat loss and degradation
  The greatest threat to the Mitchell's Satyr is habitat destruction. Most of the wetland habitat that this butterfly depends on for survival has been drained and filled to make way for urban and agricultural development. Also, invasion from exotic weeds threaten the fens on which the butterflies depend.
- Pesticides and other pollutants
  Contamination of fen wetlands by pesticides, fertilizer, and nutrient runoff from adjacent agriculture, including livestock production, poses a threat to the butterfly's habitat.
- Butterfly collectors
  It is believed that some populations of the Mitchell's Satyr were eliminated by butterfly collectors. Because butterfly numbers are so low, the collection of even a few individuals could harm the butterfly population. Collection is illegal without a permit from the U.S. Fish and Wildlife Service (USFWS, 2021b).
- Hydrology alteration
- Inbreeding depression associated with small, isolated populations

Human-induced habitat loss, degradation, and fragmentation are the primary threats affecting MSB. These result from nutrients entering groundwater from surrounding agricultural and other lands; continued groundwater withdrawal and other changes to hydrology due to roads, wells, ditches, etc.; use of pesticides and other chemicals that drift from surrounding areas; loss of habitat due to residential development; invasive species; and natural succession resulting in woody shrub encroachment. These habitat stressors are expected to continue into the future and likely increase as the human population increases and expands. Wolbachia is present across the range, though more often found in the northern populations. The captive propagation program must continue to carefully avoid inadvertent introduction of Wolbachia into uninfected populations or introduction of a new strain into wild populations. Climate change will impact Mitchell’s Satyr across its disjunct range, but the level of impact may vary from state-to-state. Drier conditions in the northern part of its range could further limit populations that are already small and isolated. Lack of commitment to Mitchell’s Satyr habitat management and conservation is a long-term concern (USFWS, 2021a).

List of References

Michigan Department of Natural Resources (MIDNR). (2018). Habitat conservation plan for the Mitchell’s Satyr Butterfly and Poweshiek Skipperling. 42pp + appendices.

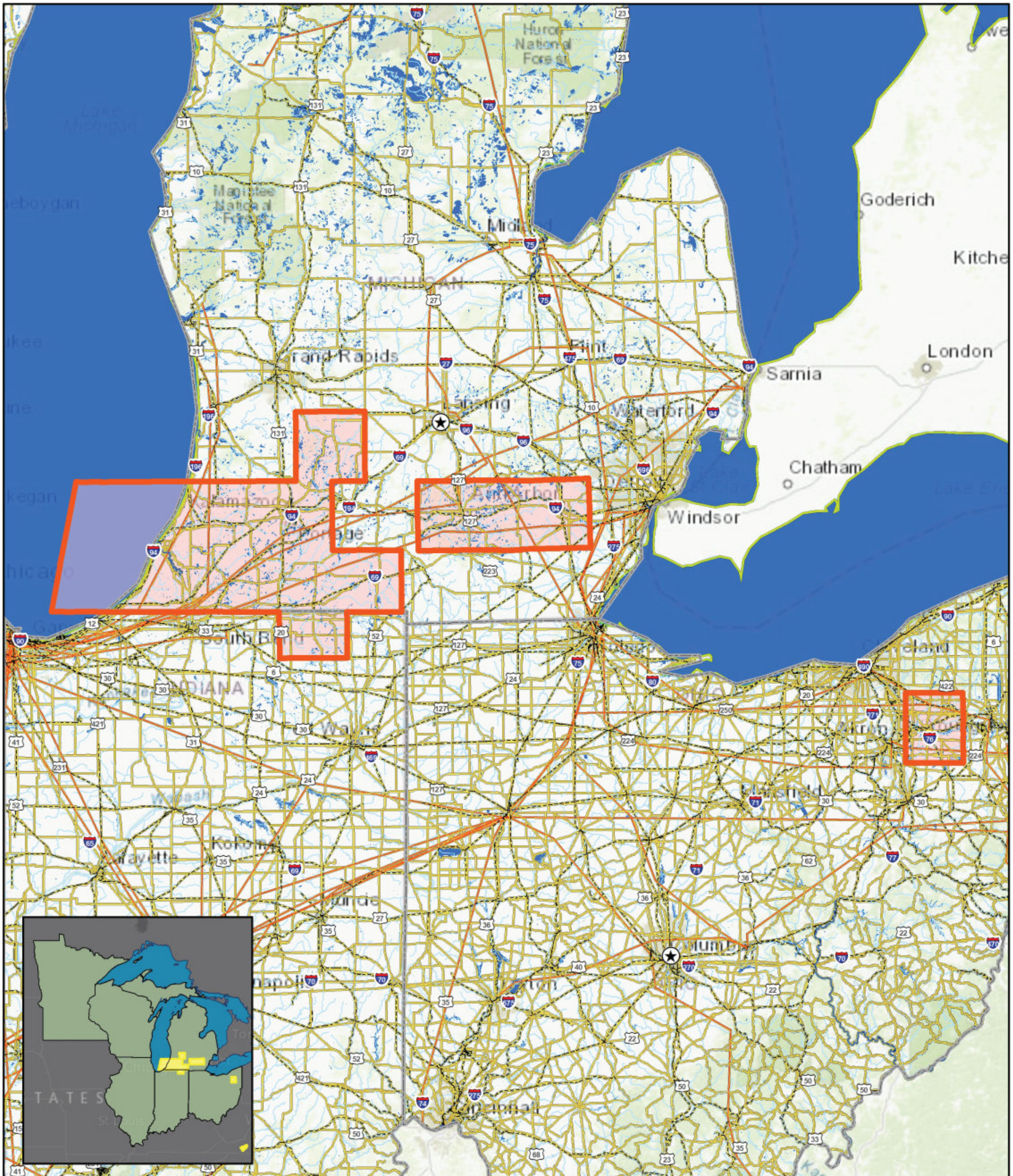
Michigan Natural Features Inventory (MNFI). (2021). *Neonympha mitchellii mitchellii* (Mitchell’s Satyr). Retrieved from https://mnfi.anr.msu.edu/species/description/11743/Neonympha-mitchellii-mitchellii

U.S. Fish & Wildlife Service (USFWS). (1998). Recovery plan for Mitchell’s Satyr Butterfly (*Neonympha mitchellii mitchellii* French). Fort Snelling, Minnesota. 71pp.

U.S. Fish & Wildlife Service (USFWS). (2014). Mitchell’s Satyr Butterfly (*Neonympha mitchellii mitchellii*) 5-year review: summary and evaluation. East Lansing, Michigan. 38pp.

U.S. Fish & Wildlife Service (USFWS). (2021a). Mitchell’s Satyr Butterfly (*Neonympha mitchellii mitchellii*) 5-year review: summary and evaluation. East Lansing, Michigan. 31pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Mitchell’s Satyr Butterfly fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/misa/misa_fctsht.html



MITCHELL'S SATYR BUTTERFLY (*NEONYMPHA MITCHELLII*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

0 12.5 25 50 75 Miles

0 12.5 25 50 75 100 Kilometers

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Mitchell's Satyr Butterfly (*Neonympha mitchellii*) Counties of Occurrence

N

Page Intentionally Left Blank

Monarch Butterfly (*Danaus plexippus*)

Federal Listing: Candidate. The Monarch is a candidate species and is not yet listed or proposed for listing.
State Listing within the AA: Not Listed. State insect of Illinois.

Species Description

The Monarch, *Danaus plexippus* (Linneaus, 1758), is a species of butterfly in the order Lepidoptera (family Nymphalidae). Adult Monarch Butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. The black border has a double row of white spots, present on the upper side and lower side of forewings and hindwings. Adult Monarchs are sexually dimorphic, with males having narrower wing venation and scent patches. The bright coloring of a Monarch is aposematic, as it serves as a warning to predators that eating them can be toxic (USFWS, 2020).

Species Distribution

The Monarch occurs in North, Central, and South America; Australia; New Zealand; islands of the Pacific and Caribbean, and elsewhere (USFWS, 2020). States/US Territories in which this population is known to or is believed to occur: Alabama, Arizona, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming (USFWS, 2021).

Distribution within Action Area

The Monarch Butterfly is known or believed to occur statewide in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin (USFWS, 2021).

Critical Habitat

No critical habitat has been designated for the Monarch Butterfly.

Life History

During the breeding season, Monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.), and larvae emerge after two to five days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic cardenolides as a defense against predators. The larva then pupate into chrysalis before eclosing 6 to 14 days later as an adult butterfly. There are multiple generations of Monarchs produced during the breeding season, with most adult butterflies living approximately two to five weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live six to nine months (USFWS, 2020).

The Monarch life cycle varies by geographic location. In many regions where Monarchs are present, Monarchs breed year-round, repeatedly following the above-referenced life cycle throughout the year. Individual Monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, where the migratory generation of adults is in reproductive diapause and lives for an extended period of time. In the fall, in both eastern and western North America, Monarchs begin migrating to their respective overwintering sites. This migration can take Monarchs distances of over 3,000 km and last for over two months. Migratory individuals in eastern North America predominantly fly south or southwest to mountainous overwintering grounds in central Mexico, and migratory individuals in western North America generally fly shorter distances south and west to overwintering groves along the California coast into northern Baja California. Data from Monarchs tagged in the southwestern states in the fall suggest that those in Nevada migrate to California, those in New Mexico migrate to Mexico, and those in Arizona migrate to either Mexico or California. In early spring (February-March), surviving Monarchs break diapause and mate at the overwintering sites before dispersing. The same individuals that undertook the initial southward migration begin flying back through the breeding grounds and their offspring start the cycle of generational migration over again (USFWS, 2020).

In eastern North America, Monarchs travel north in the spring, from Mexico to Canada, over two to three successive generations, breeding along the way. Individual Monarchs disperse as far north as they can physiologically tolerate based on climatic conditions and available vegetation; the most specific predictors of the northern distribution of individual Monarchs are monthly mean temperature and precipitation. The number of generations of Monarchs produced in a given year can vary between three and five and is dependent upon environmental conditions. While a majority of the eastern Monarchs shift to the more northern reaches of their range, western Monarchs continue to occupy and breed in warmer climates throughout the summer, while also expanding to include the farther reaches of their range. In the spring in western North America, Monarchs migrate north and east over multiple generations from coastal California toward the Rockies and to the Pacific Northwest. In the southwestern states, migrating Monarchs tend to occur more frequently near water sources such as rivers, creeks, roadside ditches, and irrigated gardens (USFWS, 2020).

Adult Monarch Butterflies during breeding and migration require a diversity of blooming nectar resources, which they feed on throughout their migration routes and breeding grounds (spring through fall). Monarchs also need milkweed (for both oviposition and larval feeding) embedded within this diverse nectaring habitat. The correct phenology, or timing, of both Monarchs and nectar plants and milkweed is important for Monarch survival. The position of these resources on the landscape is important as well. In western North America, nectar and milkweed resources are often associated with riparian corridors, and milkweed may function as the principal nectar source for Monarchs in more arid regions. Individuals need nectar and milkweed resources year-round in nonmigratory populations. Additionally, many Monarchs use a variety of roosting trees along the fall migration route (USFWS, 2020).

Migratory individuals of eastern and western North America require a very specific microclimate at overwintering sites. The eastern population of Monarchs overwinter in Mexico, where this microclimate is provided by forests primarily composed of oyamel fir trees (*Abies religiosa*), on which the Monarchs form dense clusters. The sites used for overwintering occur in mountainous areas west of Mexico City located between elevations of 2,900 and 3,300m. The temperature must remain cool enough to prevent excessive lipid depletion, while at the same time staying warm enough to prevent freezing. Exposure to these cooler temperatures also helps orient the Monarchs northward in the spring. The oyamel fir forest provides essential protection from the elements, including rain, snow, wind, hail, and excessive solar radiation. Many sites also provide a source of hydration via nectar plants or a water source. Most of the observed overwintering sites are located within the Monarch Butterfly Biosphere Reserve, which covers over 56,000 ha. Migratory information for the western population available in (USFWS, 2020).

Current Stressors and Threats

There are a myriad of influences operating on the North American populations. The primary drivers affecting the health of the two North American migratory populations are changes in breeding, migratory, and overwintering habitat (due to conversion of grasslands to agriculture, urban development, widespread use of herbicides, logging/thinning at overwintering sites, unsuitable management of overwintering groves, and drought), continued exposure to insecticides, and effects of climate change. Expert-elicited rank and extent of impact (% contribution to the decline from the historical period) of the influences on the eastern North American population:

1) Availability, spatial distribution, and quality of milkweed (25%)
2) Availability and quality of overwintering habitat (20%)
3) Climate (storms, drought, temperatures) (12.5%)
4) Availability, quality, and spatial distribution of migration resources (12%)
5) Disease and natural enemies (9.5%)
6) Insecticides (8%)

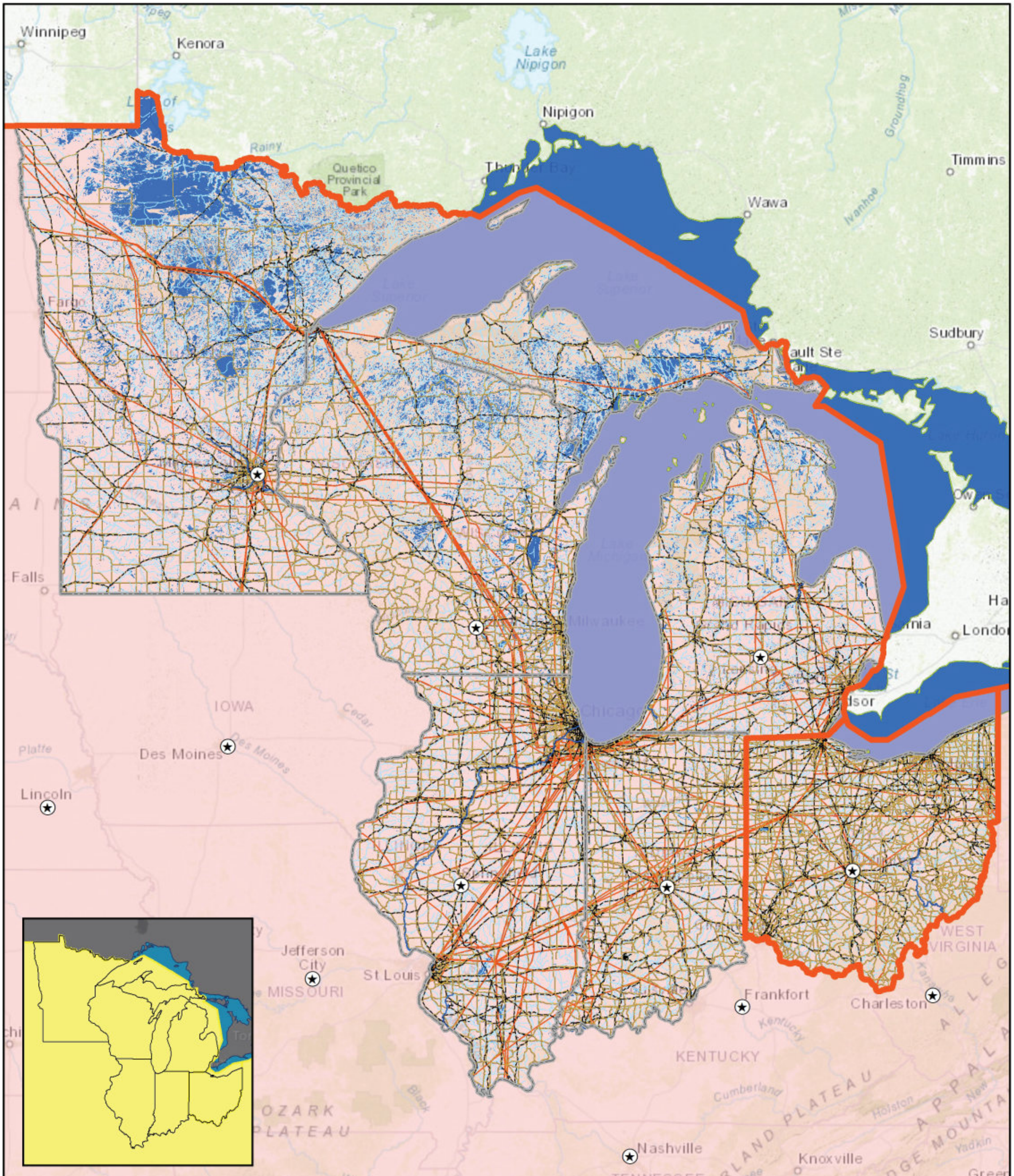
7) Availability, spatial distribution, and quality of nectar resources (breeding) (5%)
8) Road mortality and pollutants (3%)
9) Biogeographical scrambling of milkweed spp. (includes non-native spp.) (2%)
10) Other (2%)
11) Monarch releases, captive breeding, and translocation (1.5%)

Each of these impacts is discussed in detail in the Species Status Assessment (USFWS, 2020).

List of References

U.S. Fish and Wildlife Service (USFWS). (2020). Monarch (*Danaus plexippus*) species status assessment report, version 2.1. 96pp.

U.S. Fish and Wildlife Service (USFWS). (2021). Monarch butterfly (*Danaus plexippus*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile.action?spcode=I0WJ



0 30 60 120 180 Miles

0 30 60 120 180 240 Kilometers

MONARCH BUTTERFLY (*DANAUS PLEXIPPUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Monarch Butterfly (*Danaus plexippus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Poweshiek Skipperling (*Oarisma poweshiek*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Michigan, Minnesota, and Wisconsin

Species Description
The Poweshiek Skipperling is a small butterfly, more delicate looking than most "grass" skippers (subfamily Hesperiinae). The forewing length (base to apex) is 1.4 to 1.6cm (0.55 to 0.63in) in both sexes. Antennae are short and relatively stout and have blunt-tipped clubs. Although capable of rapid flight, this skipper more typically flies erratically just above the grasses at a speed that is relatively easy to follow with the eye. Its flight rarely exhibits the "skipping" quality that gives the family its name. Males and females are very similar in appearance apart from the thicker, heavier abdomen females have for a few days after eclosing. The upper surface of the wings is a uniform dark brown with a purplish gloss in fresh individuals, except for a splash of glossy orange along the leading edge of each forewing. Males do not have a brand on the forewing as most grass skippers do. The under surface of the hind wings is distinctive, having a pale finely pinstriped look created by white veins on a hoary gray-brown ground color. There are a couple of surface features that differ between the sexes but these are difficult to assess in the field. The forewing fringe of females is slightly paler on the upper side than that of males. Most reliably diagnostic, the antennae of females have alternating pale and brown annulations along their upper side while in males this surface is a smooth even golden color, but magnification is required for determination (MNDNR, 2018).

Species Distribution
Habitats utilized by the Poweshiek Skipperling in Minnesota include wet to dry native prairie but not sand prairie. The same is reported for the Dakotas, though moist prairie seems to be favored there. A reported preference for wet prairie in Wisconsin has been interpreted as an artifact of greater fire-mortality in upland prairie habitat. The habitat in Michigan is a type of open wetland known as prairie fen.These are plant communities on peaty soils saturated by upwelling calcareous groundwater; wetland-obligate sedges dominate, but several grasses characteristic of prairie communities are present as well. Interestingly, the Poweshiek Skipperling has never been reported from sedge-dominated wet meadow or fen in Minnesota. Habitats dominated by nonnative grasses such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and redtop (*Agrostis gigantea*) do not appear to be suitable for this skipper (MNDNR, 2018).

In the United States, there are historic records for the Poweshiek Skipperling from eight states (Illinois, Indiana, Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin) and one Canadian province (Manitoba). The only confirmed records for Illinois and Indiana are very old and it is presumed extirpated in both of those states. Poweshiek Skipperlings have been recently extant (e.g. since 2000) in each of the other states (Selby, 2010). Currently in the US, the species is known to or is believed to occur in Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin (USFWS, 2021)

Distribution within Action Area
- Michigan: Hillsdale, Jackson, Lenawee, Livingston, Oakland, and Washtenaw Counties
- Minnesota: Only known or believed to occur in Polk County, although critical habitat is designated in additional counties (see below)
- Wisconsin: only known or believed to occur in Green Lake and Waukesha Counties

Critical Habitat
In total, approximately 25,888 acres (10,477 hectares) in Cerro Gordo, Dickinson, Emmet, Howard, Kossuth, and Osceola Counties, Iowa; Hilsdale, Jackson, Lenawee, Livingston, Oakland, and Washtenaw Counties, Michigan; Chippewa, Clay, Cottonwood, Douglas, Kittson, Lac Qui Parle, Lincoln, Lyon, Mahnomen, Murray, Norman, Pipestone, Polk, Pope, Swift, and Wilkin Counties, Minnesota; Richland County, North Dakota; Brookings, Day, Deuel, Grant, Marshall, Moody, and Roberts Counties, South

Dakota; and Green Lake and Waukesha Counties, Wisconsin, fall within the boundaries of the critical habitat designation for Poweshiek Skipperling (80 FR 59248).

Life History

The Poweshiek Skipperling has a single annual generation. Adults have been recorded from the last week of June into the first week of August (in Minnesota), but in a typical year most adults fly between the end of June and the middle of July. Eggs hatch in about ten days, and the partly grown larvae overwinter and complete development the following spring. The grass skippers are so called because their larval food plants are restricted to grasses or sedges. A spike-rush (*Eleocharis elliptica*) has frequently been cited as the larval food plant of the Poweshiek Skipperling based on an early report of egg-laying on this member of the sedge family (Cyperaceae) in Michigan. However, observations in Minnesota and Wisconsin indicate that prairie grasses, especially prairie dropseed (*Sporobolus heterolepis*) and little bluestem (*Schizachyrium scoparium* var. *scoparium*), are probably the most important larval hosts. Apparently, females do not restrict egg-laying to suitable host plants but leave it to larvae to find them. Unlike most skippers, Poweshiek larvae do not construct shelters but rest head down on grass blades or stems when not feeding. Larvae overwinter in a similar position on stems. Males seek mating opportunities through meandering search flights above and among the tops of grasses. This mate-seeking behavior is known as “patrolling” and is different from the perch-chase behavior of many grass skippers. Females probably mate soon after they become capable of flight, but whether they mate with more than one male is unknown. Research in Canada has found that adults may live up to 10 to 12 days in the wild, but the average is probably about a week. Nothing is known about the dispersal behavior of mated females.

Current Stressors and Threats

The most comprehensive discussion of threats and stressors comes from COSEWIC (2013) and is summarized here:

- Conversion of habitat to non-grassland
  Since the 1850s, over 99% of the native North American prairie habitat has been converted to agricultural row crops or plowed and then converted to hay fields. Agricultural habitats are completely unsuitable for Poweshiek Skipperling. Remnant prairies where Poweshiek Skipperling now occurs are generally unsuitable for row-crop agriculture because of the shallow, rocky, highly calcareous soils.
- Grazing
  Tall-grass prairies appear to be very susceptible to the effects of overgrazing, which reduces or eliminates critical adult nectar sources for Poweshiek Skipperling and removes forage for larvae, thereby making the habitat unsuitable for the skipper.
- Haying
  Haying may either be detrimental or beneficial to Poweshiek Skipperling populations, depending on when in the season it is done. Mowing prairies and removing the cuttings helps to maintain the prairie flora and vegetation structure by preventing or delaying succession to woody plants and reducing the accumulation of litter on the soil. However, if mowing is done before or during the flight period, the critical nectar sources are eliminated and exotic grasses such as *P. pratensis* are favored. These changes can eliminate Poweshiek Skipperling and other specialist prairie skippers from the prairie.
- Controlled burning
  Wildfires were an important element for sustaining the flora and fauna of native prairies prior to their destruction. Now, prescribed or controlled burns are often used by managers to maintain the native grassland structure and floral complexes. These burns differ from wildfires in that remnant prairies are often burned far more frequently, more thoroughly, and at times during the season when natural wildfires would not normally occur. Although prescribed burns may be beneficial for maintaining the prairie flora, they may be devastating to certain insect species. Prescribed burning of isolated prairies can cause local extirpation of certain species of insects, especially habitat specialists like Poweshiek Skipperling. Prior to the destruction of the prairies, burns were patchy, which allowed recolonization of these sites by skippers from adjacent unburned areas.

- Succession
  Prairies that are protected from all activities, such as grazing, mowing or prescribed burns, will eventually become unsuitable for many prairie species of plants and insects because of the growth of woody shrubs and taller grasses, accumulation of litter, reduction of nectar sources, and invasion by such exotic plants as *B. inermis*. It appears that some form of disturbance is required for the long-term persistence of prairie habitat suitable for Poweshiek Skipperling.
- Exotic species
  Exotic plants, such as Leafy Spurge, Kentucky Blue Grass, and Smooth Brome, are significant threats to native prairie habitats in North America. Purple Loosestrife is a potential major threat to the wet tall-grass prairie habitats. Aggressive invaders can completely out-compete much of the native flora in wetlands and other seasonally flooded habitats. Once weeds invade a site, they can outcompete and replace the native plants required by Poweshiek Skipperling., making the habitat unsuitable for this insect.
- Habitat fragmentation
  Poweshiek Skipperling probably formerly existed as essentially a single population throughout much of the almost continuous tall-grass prairie in the north central plains of North America. Now, it occurs as a series of isolated populations throughout much of its range. Long-distance dispersal over more than a few kilometres is unlikely in this species. Unless source populations exist within a few kilometres, it is unlikely that a population eliminated by fire, overgrazing or other causes will be re-founded by immigrants.

List of References

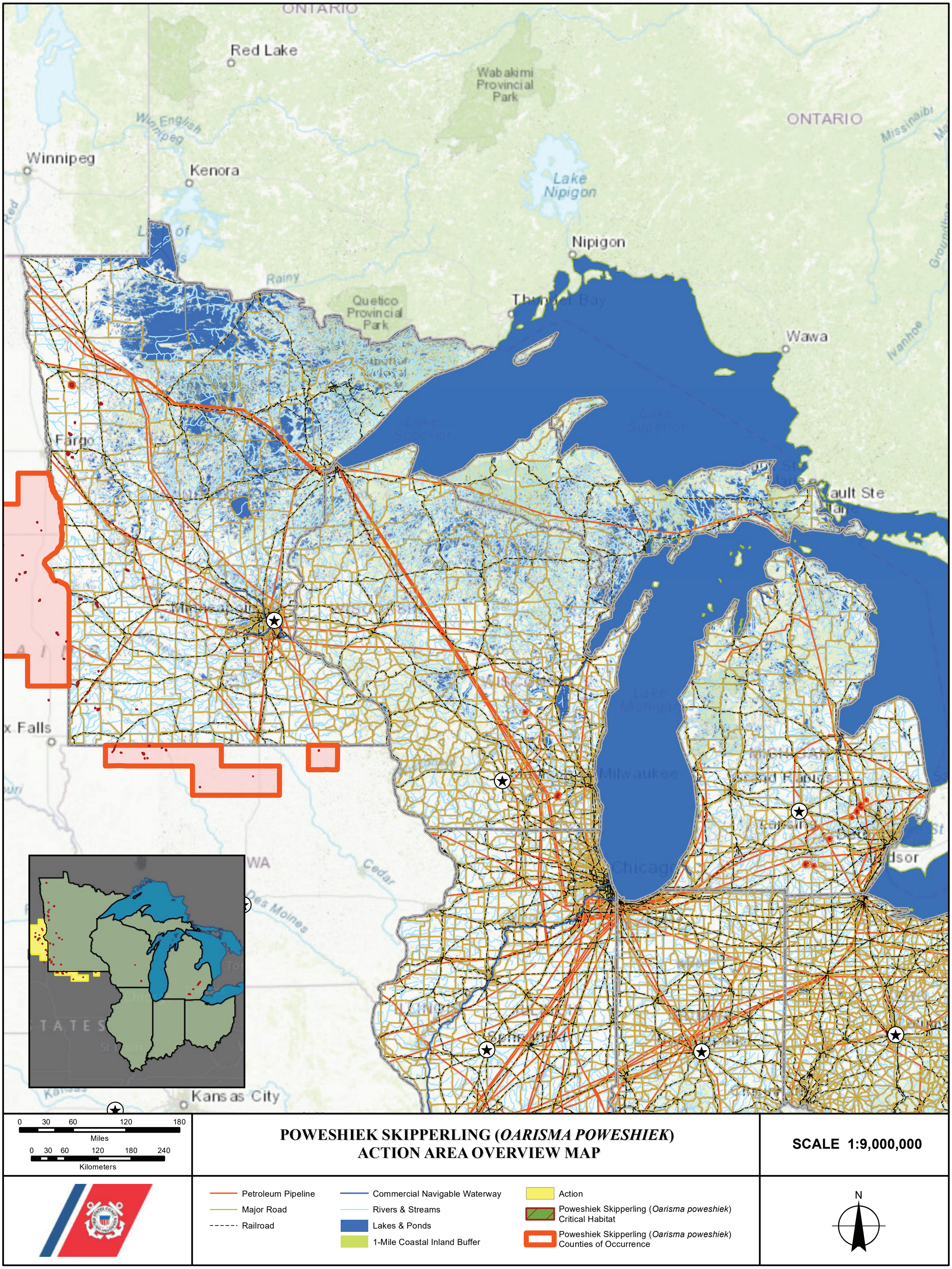
Committee on the Status of Endangered Wildlife in Canada (COSEWIC). (2013). COSEWIC assessment and status report on the Poweshiek Skipperling *Oarisma poweshiek* in Canada. Ottawa, Ontario, Canada. 25pp.

Minnesota Department of Natural Resources (MNDNR). (2018). *Oarisma poweshiek* (Poweshiek Skipperling). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEP57010

Selby, G. (2010). Status assessment update (2010): Poweshiek Skipperling (*Oarisma poweshiek* (Parker)) (Lepidoptera: Hesperiidae). Prepared for U.S. Fish & Wildlife Service, Bloomington, Minnesota. 29pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Poweshiek Skipperling (*Oarisma poweshiek*) 5-year review: summary and evaluation. Bloomington, Minnesota. 17pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Poweshiek Skipperling (*Oarisma poweshiek*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/9161



Basemap courtesy of Esri. Date: 6/14/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS, EIA Projection: WGS 1984 Web Mercator

Rattlesnake-Master Borer Moth [Eryngium Stem Borer] (*Papaipema eryngii*)

Federal Listing: Not Listed. The U.S. Fish & Wildlife Service announced in 2020 findings that the Rattlesnake-Master Borer Moth (RMBM) did not warrant listing as Endangered or Threatened under the Endangered Species Act (85 FR 44478).
State Listing within the AA: Endangered in Illinois

Species Description
The adult RMBM measures 3.5 to 4.8cm (1.4 to 1.9in) in wingspan. Both sexes are purple-brown with small, scattered yellow and white spots. Flight-worn moths appear lighter in color after darker scales have fallen away after a few nights of flying and crawling through vegetation, although the large white spots typically remain distinctive. Males have distinctive genitalia that allow distinction from other *Papaipema*. RMBM larvae appear similar to other *Papaipema* larvae but retain longitudinal white and purplish-striped markings until the last instar, when the purple fades and the larvae become mostly dull yellowish-white with scattered, raised, dark-brown spots (USFWS, 2020).

Species Distribution
RMBMs are obligate residents of undisturbed prairie, barrens, savanna, and woodland openings that contain rattlesnake-master, the sole larval food plant. RMBM was thought not to occur outside of a true prairie or prairie remnant; however, populations in Missouri and Arkansas were found in roadsides, savannahs, glades, and woodland openings with moist, well-drained soils (USFWS, 2020).

The historically occupied range and species condition of Rattlesnake-Master Borer Moth is not known. The species was described in 1917, and only occasional collection records exist until the 1990s. At the time of the original 12-month finding in 2013 (78 FR 49422), 16 known extant populations had been discovered since 1993. Additional surveys between 2013 and 2018 brought the total number of extant populations to 55. With more than a 98 percent decline of prairie landscapes across the U.S., it may be assumed that the currently occupied range is less than the historically occupied range. Conversion of grasslands began in the 1800s; it is feasible the species may have been lost from large parts of its historical range before the limits of its former distribution were recorded (USFWS, 2020). Currently RMBM is thought to occur in Arkansas, Illinois, Kansas, Kentucky, North Carolina, and Oklahoma (USFWS, 2021).

Distribution within Action Area
The State of Illinois has the most Rattlesnake-Master Borer Moth sites (USFWS, 2013). In Illinois, the species is historically recorded only from locations in Cook County, with multiple collections made from 1915 – 1938 across a localized area that retained larger prairie remnants containing rattlesnake master. As of 2014 there were a total of 10 element occurrences across 7 counties (Cook, Effingham, Fayette, Grundy Livingston, Marion, Will) in the Database for RMBM (Mankowski et al., 2014).

Critical Habitat
No critical habitat has been designated for the Rattlesnake-Master Borer Moth.

Life History
RMBM has a single flight per year (univoltine), with adults emerging from mid-September to early October and flying through mid-October or until killing. Larvae in southern populations emerge in mid-April to early May, up to a month before those in Illinois, but adults emerge from their pupae about a month later than northern populations, likely reflective of local temperature regimes and length of growing season. The adult flight period and breeding period is approximately 10 days of peak flight, with the greatest concentration of adults noted the last week of September. *Papaipema* females seldom fly before breeding, and Rattlesnake-Master Borer Moth is expected to follow this pattern. Adult moths live 10-14 days. Milder weather conditions in the southern 4 part of the species' range may allow the flight period to extend into November. Adult

RMBM feeding habits are largely unknown. Based on their short flight period, general scarcity of seasonal nectar sources in the fall, and large fat stores in adults, researchers postulate that adult moths likely do not feed much from nectar sources and likely use dew, puddles, aphid residue, or oozing sap for moisture and nutrients. Adults will drink from sugar water when held in captivity, extending the adult moth lifespan by several days. Based on their coloring, adult moths likely spend their days camouflaged and attached to plants or on the bottoms of leaves. Mating occurs during the flight period after which females lay eggs increases or folds on dead, dying, or green leaves of rattlesnake-master (*Eryngium yuccifolium*), where the eggs overwinter. Eggs darken a few days before larvae emerge between early May (southern portion of range) and early June. Rattlesnake-master is the only food source for the larvae, which are internal plant feeders, boring into stems and root of the host plant. The first larval instar often feeds behind new growth of a leaf or stem until capable of chewing into the harder growth and then enters the stem. Subsequent instars bore into the leaf whorl and burrow down to the root. Larvae generally finish feeding by mid- to late July after reaching the root crown and then begin to burrow into the bulb or root. The fifth instar will then stay in the root chamber and aestivate for several weeks before triggered to pupate in mid-August to mid-September. Pupation appears to take place either inside the feeding chamber in the root or in the soil next to the root and lasts 3-4 weeks. Before pupation, larvae may construct a short silken tube to the soil surface to allow the emerging moth to reach the surface. During the time of actively boring into the host plant, some larvae exhibit competitive behavior by moving into already occupied bore holes, killing the occupant and consuming it or pushing it back out. Multiple larvae may occur in a single stem early in the season, but by early June, only one larva remains. Those not killed and eaten by cannibalistic larvae move to another plant. When an older larva is located in a host plant insufficient for its needs, the larva can move to a different host plant on which it continues to develop normally, although this plant-to-plant movement is uncommon. One rattlesnake-master clump may contain multiple stems and multiple larvae. Although there are no specific data on their home range, RMBMs are not thought to disperse widely and have been described as “relatively sedentary”. RMBM appear to be capable of dispersal of up to 2 miles (3.2km) if the number of host plants is limiting. Recolonization of sites after prescribed fires in Missouri show that adult moths are able to fly at least two miles to seek out new breeding habitat. Farther dispersal may be aided by wind or severe weather events, and some females appear to disperse more widely just before death (USFWS, 2020).

Current Stressors and Threats

Management of the vegetation in an area occupied by Rattlesnake-Master Borer Moth can positively or negatively affect the species. Timing, intensity, type, frequency, and spatial rotation through a site are components of a land management strategy that have the potential to affect the species’ persistence and viability on a site through the effects on the rattlesnake-master host plant. Types of management actions that may affect the species are listed below (USFWS, 2020). See USFWS, 2020 and 78 FR 49422 for discussion of these stressors/threats.

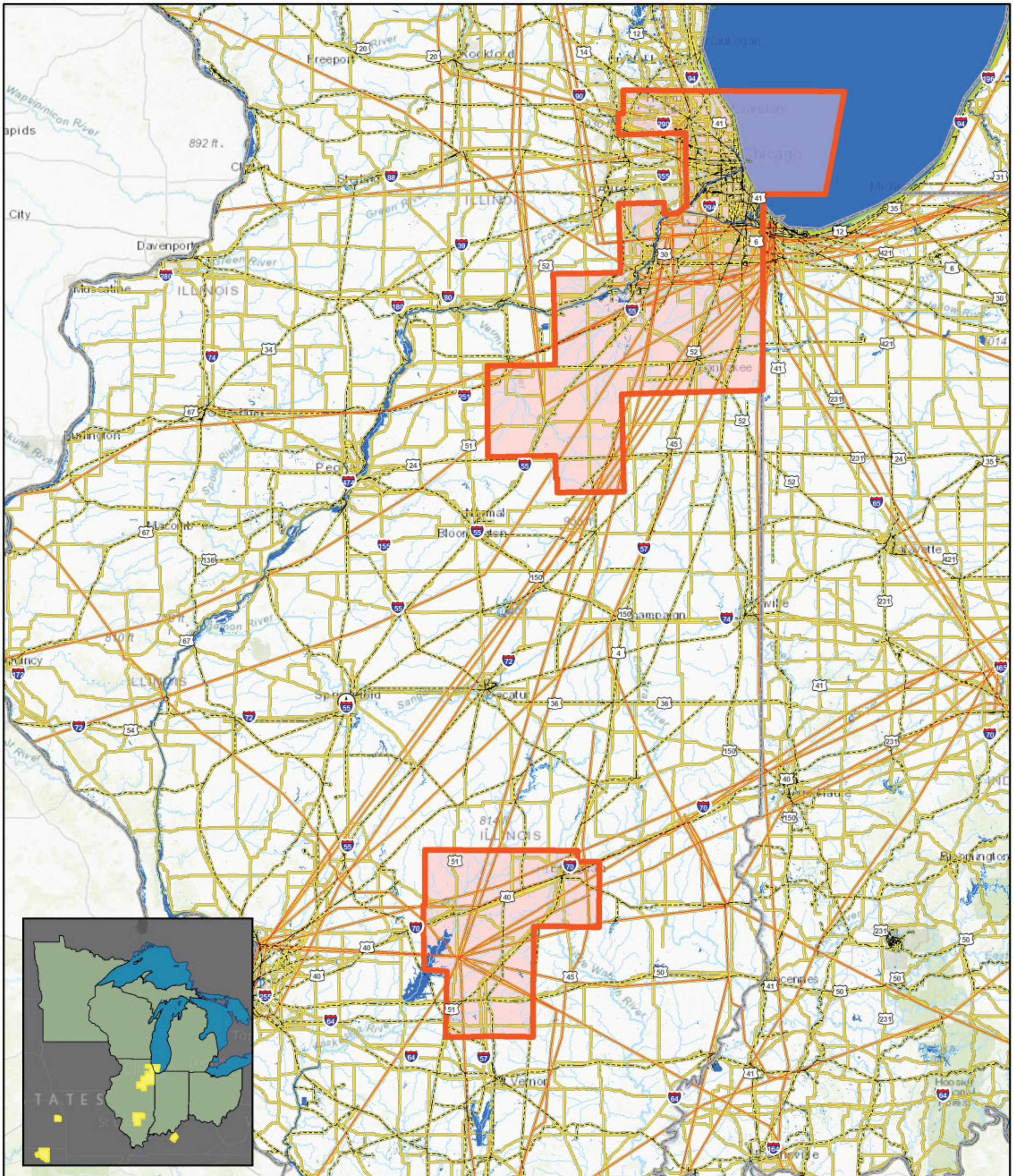
- Habitat loss or fragmentation (native prairie and host plant decline)
- Grazing/mowing
- Lack of habitat management (succession)
- Fire

List of References

Mankowski, A., Esker, T., & Walk, J. (2014). Final recovery planning outline with listing status review triggers for the Illinois endangered Eryngium Stem Borer (*Papaipema eryngii*). 17pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Species status assessment report for the Rattlesnake-Master Borer Moth (*Papaipema eryngii*), Version 1.1. Bloomington, Minnesota. 60pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Rattlesnake-Master Borer Moth (*Papaipema eryngii*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/7863



0 10 20 40 60 Miles; 0 10 20 40 60 80 Kilometers	**RATTLESNAKE MASTER BORER MOTH (*PAPAIPEMA ERYNGII*) ACTION AREA OVERVIEW MAP**	**SCALE 1:3,000,000**
	Petroleum Pipeline; Major Road; Railroad; Commercial Navigable Waterway; Rivers & Streams; Lakes & Ponds; 1-Mile Coastal Inland Buffer; Action Area; Rattlesnake Master Borer Moth (*Papaipema eryngii*) Counties of Occurrence	N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Regal Fritillary (*Speyeria idalia*)

Federal Listing: Under Review. This species was petitioned for Federal listing under the Endangered Species Act in 2013, and a 90-day finding was issued in 2015 (80 FR 56429).
State Listing within the AA: Endangered in Indiana, Ohio, Michigan, and Wisconsin; Threatened in Illinois; Special Concern in Minnesota

Species Description
The Regal Fritillary is a large, brushfooted butterfly with a wingspan of 67 to 105mm (2⅝ to 4⅛ in). It is similar in size to the Monarch butterfly (*Danaus plexippus*). Females are slightly larger than males. The upperside of the forewing is bright red-orange with black markings. On females the forewing is edged with a black marginal band with a postmedian row of white spots. The upperside of the hindwing is black with a postmedian row of white spots. There is also a submarginal row of spots that is orange on males and white on females. The underside of the forewing is orange with a marginal band of white spots and a black fringe. The hindwing is dark greenish brown with elongate white spots. Regal Fritillary eggs are initially “white or cream colored” and then darken to a frost gray. Larvae can be ochre-yellow to orangish, yellow on the rear with yellow lines and black spots. Larvae are about 2.03mm (0.08in) long when they hatch, and they reach a length of 44.45mm (1.75in) when fully developed. Pupae are light mottled brown tinged with pink, with small black spots on the wings and thorax, short dorsal cones, and yellow transverse bands on the abdomen and reach a size of about 27.94mm (1.10in) in length. No butterfly anywhere in the world resembles the Regal Fritillary. The species’ hindwings are unique, being a velvety, blue-black with two bands of spots. Because of size, females could be mistaken for a Monarch at great distances (WildEarth Guardians, 2013).

Species Distribution
Regal Fritillary butterflies live in tall-grass prairie and other open and sunny locations such as damp meadows, marshes, wet fields, and mountain pastures. In Michigan, regal fritillaries inhabit prairie or open environments frequently in sandy regions, including meadows, old fields, and floodplain forest openings and edges (MNFI, 2021). Wisconsin has identified Regal Fritillary habitat in the state as large grassland areas with prairie remnants or lightly grazed pasture lands containing prairie vegetation where topography often includes hills and valleys (WIDNR, 2020). The Regal Fritillary is strongly associated with native prairie habitat. Adults are encountered in both upland prairies and in wet prairies, although larval development may be restricted to upland prairie in Minnesota (MNDNR, 2021). In Illinois it lives in sand prairies, tallgrass prairies, savannas, dunes and other wet areas associated with sand (IDNR, 2021).

Historically the Regal Fritillary’s range covered more than a million square miles; today the species’ range is less than half that size. Its historical range extended from Nova Scotia, south to northern Georgia, west to the Dakotas and eastward to the Atlantic coast. The Regal Fritillary is currently restricted to tall-grass prairie remnants. Its core range is in Kansas, Missouri, and Nebraska. It is very rare or at best locally frequent in its entire range and has almost disappeared from its range east of the Mississippi. There has been a drastic loss of range since 1980, probably especially since 1987. The southwestern limit still is extreme eastern Colorado, Kansas and extreme northeastern Oklahoma but it has disappeared from western North Dakota while persisting in the eastern part. Regals are historic or extirpated in all six New England states; Canada (if ever really established), New York, New Jersey, Maryland, Delaware, probably West Virginia, Ohio, probably Indiana, and Michigan. By the late 1990s, a large population in central Pennsylvania (still extant in 2006) and another in Virginia were the only actually located extant occurrences east of the Illinois-Indiana border region, although there was one apparently reliable observation in western North Carolina in 1994. The Regal Fritillary is rapidly declining in the prairie states of Illinois, Iowa and Wisconsin. While it has been recorded in southern Ontario and Manitoba, it probably does not have permanent colonies in Canada (WildEarth Guardians, 2013).

Distribution within Action Area
Specific county listings are not provided in ECOS. However, the species is known or believed to occur in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin.

Critical Habitat
No critical habitat has been designated for the Regal Fritillary.

Life History
Adult regal fritillaries are nectarivores, while juveniles are herbivores. Adults feed on nectar from various flowers such as milkweeds, thistles, red clover, and mountain mint. However, no single nectar genus is crucial and nectar resources nearly always change over the lifetime of at least females. If a reliable source of nectar is not available, adult regal fritillaries will emigrate from an area quickly. The Regal Fritillary has demanding nutritional requirements due to its extended adult lifespan. Most butterflies use nectar resources primarily to meet energy needs, but many long-lived butterflies also use food resources for egg production. Adult food limitations may lead to decreased fecundity and fertility. Violets are the sole larval food source. The violet leaves must be from young or intermediately aged plants (WildEarth Guardians, 2013).

The Regal Fritillary's single flight period takes place between mid-June and mid-September (the timing of the flight period varies across the range and can vary significantly from year to year due to weather). Females emerge one to two weeks after the males and generally mate upon emergence. However, they do not lay eggs until at least three weeks after mating, between late August and early September. This extended period of time between mating and oviposition is known as "reproductive diapause" and is rare in other North American Lepidoptera. This appears to be an adaptation to the lifecycle of the larval food source—violets. The extended time period between mating and oviposition during the heat of the summer and the overwintering of larvae allow the caterpillars to emerge in the spring when violet hostplants are young. The Regal Fritillary females may lay more than 2,000 eggs. Females lay single eggs throughout their habitat even if the host violets are not present. Eggs are laid on vegetation, dead leaves, and pebbles and hatch in about 3-4 weeks. Once the caterpillars hatch, they enter diapause immediately and overwinter unfed. After becoming active in the spring, they eat the leaves of young violets. The pupal stage lasts two and a half to four weeks. June is typically the beginning of adult male emergence, although emergence may start as early as late May in the warmest part of the specie's range. Not much is known about the dispersal behavior of the Regal Fritillary. While some disperse for miles, adults usually stay in their natal area, at least for several weeks. The Minnesota Department of Natural Resources (MNDNR, 2021) describes regal fritillaries as powerful fliers, capable of ranging widely across the landscape, and further describes dispersal behavior: Adults are rarely encountered away from native prairie remnants, and they appear to have a strong tendency to remain within the boundaries of these. However, adults are frequently observed in remnants too small to produce self-sustaining populations, suggesting that dispersal among remnants is common. Regals are strong flyers and sometimes disperse over tens of kilometers or more, though it is their tendency to remain within the bounds of their natal prairie, especially if it is surrounded by trees, croplands, or roads. Adult Regal Fritillary males live about a month, dying about 2 weeks after mating. Females probably live approximately two months. Mortality for the Regal Fritillary is particularly high during the larval stage. The larva must survive winter and then locate a violet hostplant in spring, which it cannot detect from a distance of more than 1 to 2cm. Larvae are also extremely susceptible to disease, parasitoids, and direct and indirect mortality from fires that consume the vegetation where they are sheltered. (WildEarth Guardians, 2013).

Current Stressors and Threats
- Grassland conversion
- Prescribed burning and wildfires
- Grazing effects
- Exotic species

- Pesticides
- Overutilization for commercial, recreational, scientific, or educational purposes
- Environmental factors

Historic loss, fragmentation, and degradation of the prairie landscape have been the primary factors contributing to the decline and current vulnerability of Regal Fritillary populations, and continued habitat loss, fragmentation, and degradation are the greatest threats to future populations. Activities that threaten further habitat loss and fragmentation include row crop agriculture, urban development and housing construction, road construction and maintenance, gravel mining, and wind generators. Threats to habitat quality and the availability of critical resources (e.g., nectar plants, larval food plants) include indiscriminate use of herbicides, invasive exotic species, and encroachment by woody vegetation (native and exotic). Fire, grazing, and haying can play important roles in maintaining and shaping prairie ecosystems, so the complete absence of these influences can constitute a threat to the extent and quality of prairie remnants. However, they can also pose direct and indirect threats to regal fritillaries depending on their timing and intensity. Larvae in the leaf litter are extremely vulnerable to direct mortality from fires and indirect mortality from increased exposure after the fires remove the protective litter layer. Improperly timed fires, grazing, and haying can all impact the availability of nectar and larval food resources at critical times. Other more direct threats to regal fritillaries can include extreme weather (e.g., harsh winters, late frosts, unusually cool and wet growing seasons, and severe storms), indiscriminate use of insecticides, disease, and predation. A reduction in fitness resulting from genetic isolation may also pose a long-term threat (Selby, 2007).

List of References

Illinois Department of Natural Resources (IDNR). (2021). Regal Fritillary. Retrieved from https://www2.illinois.gov/dnr/education/Pages/WAMBRegalFritillary.aspx

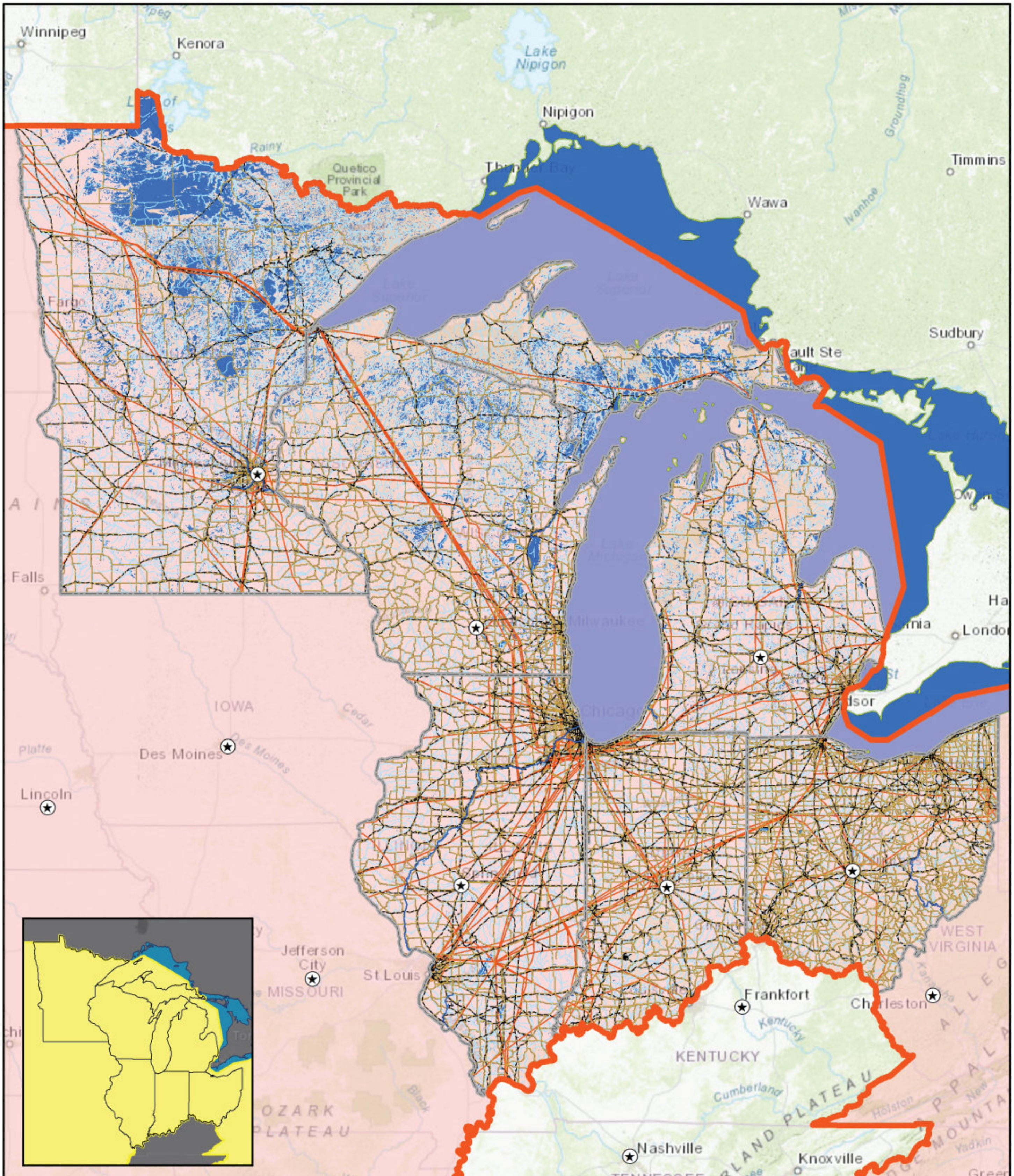
Michigan Natural Features Inventory (MNFI). (2021). *Speyeria idalia* (Regal Fritillary). Retrieved from https://mnfi.anr.msu.edu/species/description/11698/Speyeria-idalia

Minnesota Department of Natural Resources (MNDNR). (2021). *Argynnis idalia* (Regal Fritillary). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=IILEPJ6040

Selby, G. (2007). Regal Fritillary (*Speyeria idalia* Drury): a technical conservation assessment. Prepared for USDA Forest Service, Rocky Mountain Region. 52pp.

WildEarth Guardians. (2013). Petition to list the Regal Fritillary (*Speyeria idalia*) under the Endangered Species Act. Denver, Colorado. 18pp.

Wisconsin Department of Natural Resources (WIDNR). (2021). Regal Fritillary (*Speyeria idalia*). Retrieved from https://dnr.wi.gov/topic/EndangeredResources/Animals.asp?mode=detail&SpecCode=IILEPJ6040



0 30 60 120 180 Miles 0 30 60 120 180 240 Kilometers	**REGAL FRITILLARY (*SPEYERIA IDALIA*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:10,000,000**

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Regal Fritillary (*Speyeria idalia*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Rusty Patched Bumble Bee (*Bombus affinis*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Michigan and Ohio

Species Description
The Rusty Patched Bumble Bee (RPBB) is a eusocial (highly social) organism forming colonies consisting of a single queen, female workers, and males. Colony sizes are considered large compared to other bumble bees, and healthy colonies may consist of up to 1,000 individual workers in a season. Queens and workers differ slightly in size and coloration; queens are larger than workers. All RPBB have entirely black heads, but only workers and males have a rusty reddish patch centrally located on the abdomen.

Species Distribution
The current range consists of Illinois, Indiana, Iowa, Maine, Massachusetts, Minnesota, Ohio, Virginia, West Virginia, Wisconsin, and Ontario, Canada. Detailed mapping, including potential zones for the species can be found at https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html.

Historically, the species was widely distributed across areas of Quebec, North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Illinois, Kentucky, Tennessee, Indiana, Michigan, Ontario, Ohio, Pennsylvania, New York, Vermont, Maine, Massachusetts, New Hampshire, Delaware, Rhode Island, Connecticut, New Jersey, Maryland, Virginia, District of Columbia, West Virginia, North Carolina, South Carolina, and Georgia.

Distribution within Action Area

- Illinois: 25 counties
- Indiana: Fountain, Hamilton, Lake, Marion, Montgomery, and Parke Counties
- Minnesota: 29 counties
- Ohio: Lucas and Wood Counties
- Wisconsin: 39 counties

Critical Habitat
No critical habitat has been designated for the Rusty Patched Bumble Bee.

Life History
RPBB annual cycle begins in early spring with colony initiation by solitary queens and progresses with the production of workers throughout the summer and ending with the production of reproductives, males and new queens, in mid to late summer and early fall. The males and new queens disperse to mate and the original founding queen, males, and workers die. The new queens go into diapause (a form of hibernation) over winter. The following spring, the queen, or foundress, searches for suitable nest sites and collects nectar and pollen from flowers to support the production of her eggs, which are fertilized by sperm she has stored since mating the previous fall. She is solely responsible for establishing the colony. As the workers hatch and the colony grows, they assume the responsibility of food collection, colony defense, and care of the young, while the foundress remains within the nest and continues to lay eggs. During later stages of colony development, in mid-July or August to September, the new queens and males hatch from eggs. At the end of the season the foundress dies and the new queens (gynes, or reproductive females) mate before hibernating. RPBB has been observed and collected in a variety of habitats, including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens. RPBB requires areas that support sufficient food (nectar and pollen from diverse and abundant flowers), undisturbed nesting sites in proximity to floral resources, and overwintering sites for hibernating queens (USFWS, 2016).

Bumble bees are generalist foragers, meaning they gather pollen and nectar from a wide variety of flowering plants. RPBB is a short-tongued species, so they are not able to easily access the nectar in flowers with deep corollas (all of the petals of a flower). The species is one of the first to emerge early in the spring and the last to go into hibernation, so to meet its nutritional needs, RPBB requires a constant and diverse supply of flowers that bloom throughout the colony's long life cycle, from April through September. The nectar from flowers provides carbohydrates and the pollen provides RPBB with protein. The number of queens that a colony can produce is directly related to the amount of pollen that is available. It has been suggested that RPBB needs floral resources in close proximity to its nest sites, because studies of other *Bombus* species typically exhibit foraging distances of less than 1 km from their nesting sites. RPBB may also be dependent on woodland spring ephemeral flowers because of the species' early emergence in the spring and is often associated near woodland habitats. The availability of floral resources is dependent on the proper soil and precipitation conditions to sustain them. Extended periods of drought, for instance, may lessen the availability and diversity of flowering plants in a given area because plant phenology is primarily driven by temperature, precipitation, and the timing of snowmelt in the spring. RPBB nests are typically in abandoned rodent nests or other similar cavities, one to four feet below ground. RPBB nests have also been occasionally observed above ground. Little is known about the overwintering habitats of RPBB foundress queens, but other species of *Bombus* typically form a chamber in soft soil, a few centimeters deep and sometimes use compost or mole hills to overwinter. RPBB live in temperate climates and are not likely to sustain prolonged periods of high temperatures (over 35ºC [95ºF]). *Bombus* are able to fly in cool temperatures and low light levels, particularly in comparison to other bees, which can extend their daytime foraging times (USFWS, 2016).

Current Stressors and Threats

Prior to listing (in 2017), the species experienced a widespread and precipitous decline. The cause of the decline is unknown, but evidence suggests a synergistic interaction between an introduced pathogen and exposure to pesticides (specifically, insecticides and fungicides) (USFWS, 2020). The USFWS Fact Sheet (2019b) lists these factors leading to RPBB decline:

- Habitat loss and degradation
  Most of prairies and grasslands of the Upper Midwest and Northeast have been converted to monoculture farms or developed areas, such as cities and roads. Grasslands that remain tend to be small and isolated.
- Intensive farming
  Increases in farm size and technology advances improved the operating efficiency of farms but have led to practices that harm bumble bees, including increased use of pesticides, loss of crop diversity which results in flowering crops being available for only a short time, loss of hedgerows and the flowers that grew there, and loss of legume pastures.
- Disease
  Pathogens and parasites may pose a threat to the Rusty Patched Bumble Bee, although their prevalence and effects in North American bumble bees are not well understood.
- Pesticides
  The Rusty Patched Bumble Bee may be vulnerable to pesticides used across its range. Pesticides are used widely on farms and in cities and have both lethal and sublethal toxic effects. Bumble bees can absorb toxins directly through their exoskeleton and through contaminated nectar and pollen. Rusty Patched Bumble Bee nest in the ground and may be susceptible to pesticides that persist in agricultural soils, lawns and turf.
- Global climate change
  Climate changes that may harm bumble bees include increased temperature and precipitation extremes, increased drought, early snow melt and late frost events. These changes may lead to more exposure to or susceptibility to disease, fewer flowering plants, fewer places for queens to hibernate and nest, less time for foraging due to high temperatures, and asynchronous flowering plant and bumble bee spring emergence.

All of these factors are explored in detail with additional data in the SSA. The SSA additionally lists small populations dynamics and synergistic effect (multiple stressors) as threats (USFWS, 2016).

List of References

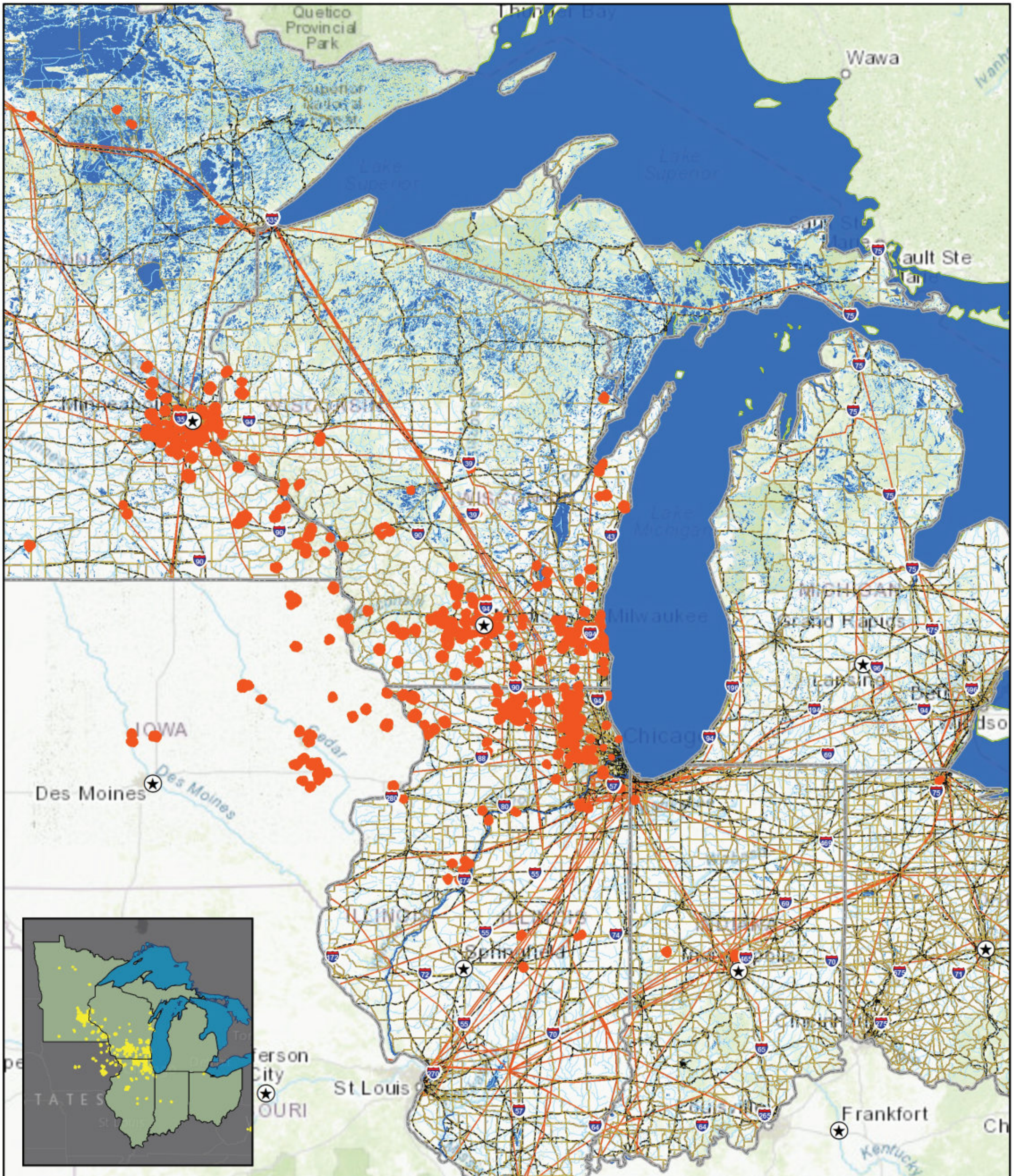
U.S. Fish & Wildlife Service (USFWS). (2016). Rusty Patched Bumble Bee (*Bombus affinis*) species status assessment. 100pp.

U.S. Fish & Wildlife Service (USFWS). (2019a). Draft recovery plan for Rusty Patched Bumble Bee (*Bombus affinis*). 10pp.

U.S. Fish & Wildlife Service (USFWS). (2019b). Rusty Patched Bumble Bee (*Bombus affinis*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/insects/rpbb/factsheetrpbb.html

U.S. Fish & Wildlife Service (USFWS). (2020). Rusty Patched Bumble Bee (*Bombus affinis*). Retrieved from https://www.fws.gov/midwest/endangered/insects/rpbb/

U.S. Fish & Wildlife Service (USFWS). (2021). Rusty Patched Bumble Bee map. Retrieved from https://www.fws.gov/midwest/endangered/insects/rpbb/rpbbmap.html



0 25 50 100 150
Miles
0 25 50 100 150 200
Kilometers

RUSTY PATCHED BUMBLE BEE (*BOMBUS AFFINIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:7,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Rusty Patched Bumble Bee (*Bombus affinis*) Counties of Occurrence

N

FISHES

Lake Sturgeon (*Acipenser fulvescens*)

Federal Listing: Under Review. The Lake Sturgeon was petitioned for Federal listing under the Endangered Species Act in 2018, and a 90-day finding was issued in 2019 (84 FR 41691).
State Listing within the AA: Endangered in Illinois, Indiana, and Ohio; Threatened in Michigan; Special Concern in Wisconsin and Minnesota

Species Description
The Lake Sturgeon is a primitive, heavy-bodied, torpedo-shaped fish, partially covered with bony plates rather than scales. The body is angular (5-sided) in young individuals, but more cylindrical in adults. The snout is short, rounded and conical and the tail is sharklike in profile (i.e. the upper lobe is longer than the lower lobe). The mouth is located on the underside of the head and the lower lip has a lobe at each corner. Four smooth barbels are located in front of the mouth. Young Lake Sturgeon are gray or brown dorsally with dusky dorsal and lateral blotches. Adults are gray to yellowish green dorsally and white ventrally. Adults can reach lengths of 8ft and weigh up to 310lbs, but this large size is rare, and more commonly, large specimens range in length over 60in. Although the male sturgeon's typical lifespan is 50 to 60 years, female sturgeon can live up to 150 years (USFWS, 2001).

As Lake Sturgeon grow older the five rows of spiny tipped, bony plates that run along the entire length of their body begin to smooth out. On older, larger individuals, the plates are barely visible, and the fish appears to be relatively smooth. The Lake Sturgeon has never evolved to the point of replacing the cumbersome plates with the smaller, thinner, flexible scales found on more modern species of fish (WIDNR, 2008).

Lake Sturgeon exhibit considerable color variation due to age and locality. Adult Lake Sturgeon in Wisconsin in generally slate-grey, olive-brown, or black over the body with a milky or yellow-white underside. Young Lake Sturgeon usually lighter in color than the adults and have dark blotches on their sides and snouts Young Lake Sturgeon caught in waters that drain to the Mississippi River are frequently confused with the smaller Shovelnose Sturgeon (*Scaphirhynchus platorynchus*). This distinct species differs from the Lake Sturgeon by their long, rounded, shovel-shaped snout; bony plates that cover the caudal fin; a long filament that extends from the upper lobe of the caudal fin; and the lack of spiracles present on the Lake Sturgeon (WIDNR, 2008).

Species Distribution
Lake Sturgeon are widely distributed in North America, being found in three major drainages: the Mississippi River, the Great Lakes, and the Hudson Bay. While they occur in the greatest abundance in the large lakes and rivers of the Great Lakes region of the United States and Canada, most of the Lake Sturgeon's natural range in the United States is in the Mississippi River Basin from the Upper Mississippi River and its major tributaries to the southern border of Arkansas. Formerly abundant throughout much of this area, the Lake Sturgeon has been drastically reduced or eliminated throughout most of its southern range (USFWS, 2001).

Distribution within Action Area

- In Illinois, Lake Sturgeon can be found in Lake Michigan where they spend most of their lives, and large and smaller rivers in early spring when they migrate to spawn as flows increase and water temperatures begin to warm.
- In Indiana, the Lake Sturgeon can primarily be found in the Wabash and White River drainages, and occasionally in other large rivers.
- In Ohio, Lake Sturgeon are probably extinct in Ohio River drainages and are likely only found in Lake Erie and associated drainages including the Maumee River and possibly the Cuyahoga River.
- In Michigan, Lake Sturgeon are found within Lake Erie (and two river drainages), Lake Huron (and five river drainages), Black Lake, Burt Lake, Mullett Lake, Otsego Lake, Lake Michigan (and eight

river drainages), Indian Lake, Big Manistique Lake, Millecoquins Lake, and Lake Superior (and two river drainages).

- In Wisconsin, Lake Sturgeon occur in Mississippi River drainages including the St. Croix, Chippewa, and Wisconsin Rivers (and major tributaries). It can also be found in Lake Michigan and Lake Superior drainages. In Minnesota, Lake Sturgeon are found in Lake of the Woods, Lake Superior, and many rivers including the Rainy, St. Croix, St. Louis, Kettle, and Red River of the North.

Critical Habitat
No critical habitat has been designated for Lake Sturgeon.

Life History
Lake Sturgeon migrate to their annual spawning grounds between late April and early June, preferring to spawn in shallow, rocky areas along riverbanks. Lake Sturgeon spawning is dependent on water temperature and flow. During seasons when water flow is high and water temperatures rise slowly spawning begins when the water temperature reaches 53ºF. In contrast, during seasons of low water flow and more rapid water temperature rise, spawning does not begin until water temperatures reach 58-59ºF (WIDNR, 2008).

Males arrive at the spawning sites ahead of the females, cruising in groups of eight or more, often so close to the surface that their tails, backs, or snouts are out of the water. Spawning begins as soon as a female enters the group. The males swim alongside the female, usually against the current, vigorously thrashing their tails as they release milt (sperm) while the female drops her eggs. The fertilized eggs, each about one-eighth inch in diameter, are sticky and cling to rocks and other solid materials in the water until they hatch. There is considerable variation in the number of eggs produced by the females of the same weight - the quantity can range from 50,000 to 700,000 eggs in one season (WIDNR, 2008).

The eggs hatch in five to eight days, depending on the water temperature. In 12 to 14 days, the fry (newly hatched fish) are 1in long and have fully developed mouths and barbels. A female sturgeon reaches sexual maturity when she is 24 to 26 years old and about 55 inches long, and will spawn once every four, five, or six years thereafter. Males mature at about 15 years, when they are about 45 inches long. Most males spawn every other year, while some do so every year. Lake Sturgeon grow larger and live longer than any other fish in its range (WIDNR, 2008).

Current Stressors and Threats

- Historic overharvesting
  Lake Sturgeon are long lived, late maturing, and sporadic spawners, and therefore are especially susceptible to overharvest. In the mid-1800's, commercial fishing operations for Lake Trout (*Salvelinus namaycush*) and Lake Whitefish (*Coregonus clupeaformis*) viewed Lake Sturgeon as a nuisance species. The sturgeon's bony scutes tore nets, and, as a result, the fish were often destroyed. By the 1880's, the value of the sturgeon for meat and roe and the production of isinglass resulted in increased harvest. Historic overharvest by commercial fishing operations is one of the major contributing factors in the demise of the Lake Sturgeon. In 1977, all commercial fishing for Lake Sturgeon in United States waters was discontinued (Galarowicz, 2003).
- Habitat degradation
- Water pollution
  Like many fish, Lake Sturgeon require stable, moderate levels of dissolved oxygen in the water to survive. Polluted waters have less available dissolved oxygen. In the winter and midsummer months, oxygen levels may drop too low to support Lake Sturgeons, resulting in mortality of the species and other fish species. Polychlorinated biphenyls (PCSs) a family of cancer-causing chemical products banned in 1972, are a special concern for Lake Sturgeon. The concentration of PCBs is greatest in sediments at the bottom of lakes and rivers where Lake Sturgeon feed. Fat-soluble PCBs are absorbed

easily by Lake Sturgeon due to their high percentage of body fat, and because the fish live for so many years, they may feed on contaminated food sources for a long time (WIDNR, 2008).

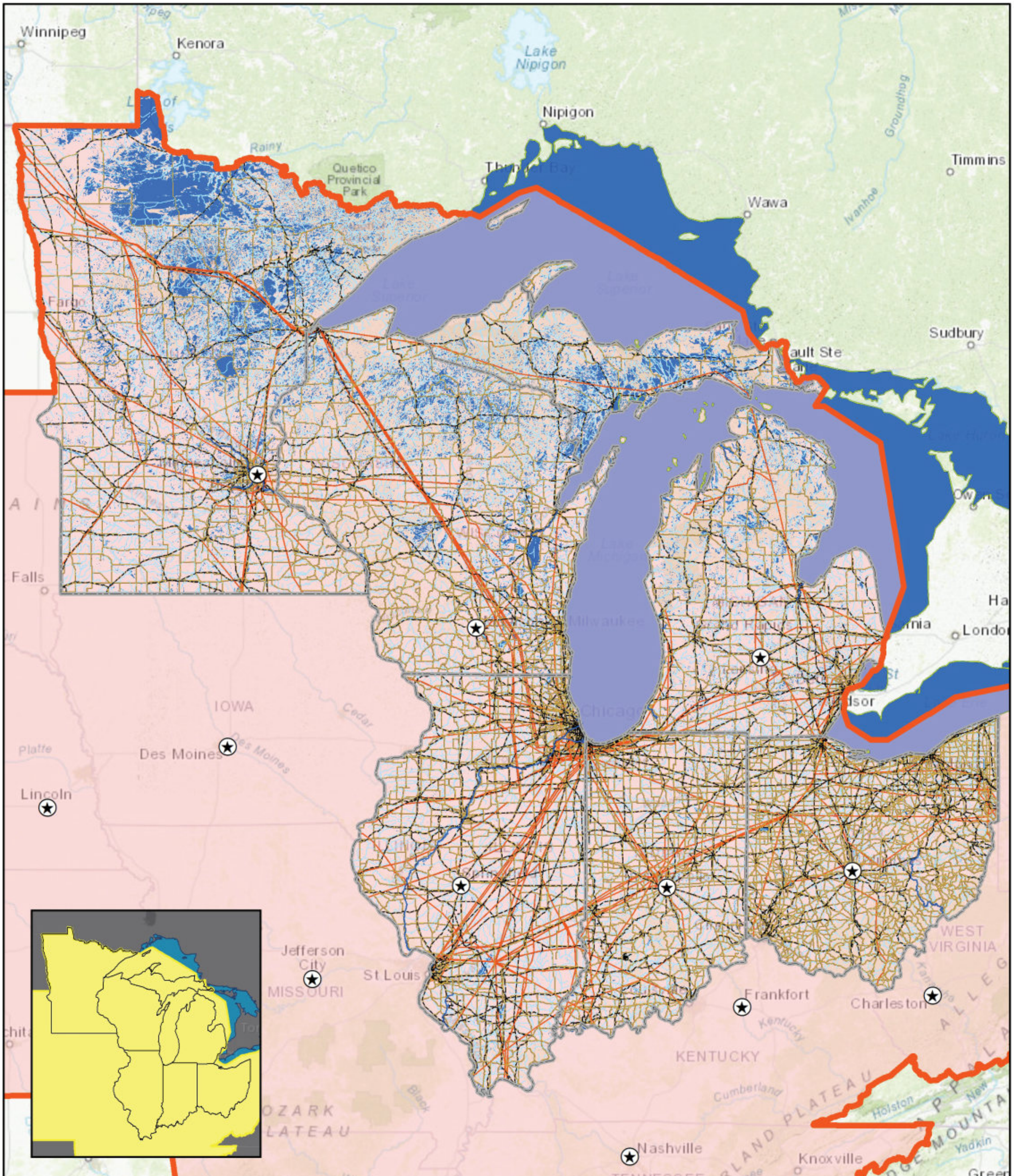
- Dams (spawning, habitat fragmentation)
  Preservation of habitat is the single most important factor in maintaining conditions for the survival of t he Lake Sturgeon. Changes in habitat have seriously reduced the capacity of our waters to support the Lake Sturgeon. For example, most of the remaining Lake Sturgeon populations in the United States are restricted in movement resulting from construction of dams (the exceptions being Sturgeon River, Michigan, and the Bad River, Wisconsin). Lake Sturgeon are sometimes blocked from spawning sites or prevented from even entering a system. The construction of dams also increases siltation, which could potentially affect egg survival. In addition, hydroelectric facility operations may alter water temperature and flow regime affecting spawning habitat.

List of References

Galarowicz, T. (2003). Conservation assessment for Lake Sturgeon (*Acipenser fulvescens*). USDA Forest Service, Eastern Region. 24pp.

U.S. Fish & Wildlife Service (USFWS). (2001). Lake Sturgeon (*Acipenser fulvescens*). Retrieved from https://www.fws.gov/uploadedFiles/lake%20sturgeon%20fold%20out%20brochure.pdf

Wisconsin Department of Natural Resources (WIDNR). (2008). Lake Sturgeon (*Acipenser fulvescens*). Bureau of Fisheries Management PUBL-FM-704 08. Retrieved from https://dnr.wisconsin.gov/sites/default/files/topic/Fishing/Species_lakesturgeon.pdf



0 25 50 100 150 Miles 0 25 50 100 150 200 Kilometers	**LAKE STURGEON (*ACIPENSER FULVESCENS*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:10,000,000**

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Lake Sturgeon (*Acipenser fulvescens*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Pallid Sturgeon (*Scaphirhynchus albus*)

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois

Species Description
Pallid Sturgeons have a unique dinosaur-like appearance. They have a flattened snout, long slender tail and are armored with lengthwise rows of bony plates instead of scales. Their mouth is toothless and positioned under the snout for sucking small fishes and invertebrates from the river bottom. The skeleton structure of a Pallid Sturgeon is primarily cartilaginous. Pallid Sturgeons can weigh up to 80lb and reach lengths of 6ft, whereas the closely related shovelnose sturgeon rarely weighs more than 8lb. The back and sides of Pallid Sturgeons are grayish-white versus the brown color of the shovelnose sturgeons (USFWS, 2019). Although in most instances Pallid Sturgeons are lighter in color than the shovelnose sturgeon, coloration cannot consistently be relied upon as a means of separating the two species (USFWS, 1993)

Pallid Sturgeon are similar in appearance to the more common Shovelnose Sturgeon. Both species inhabit overlapping portions of the Missouri and Mississippi river basins. A 1905 description of the species noted that Pallid Sturgeon differed from Shovelnose Sturgeon in size, color, head length, eye size, mouth width, barbel length ratios, ossification, gill raker morphology, number of ribs, and size of the air bladder. Bailey and Cross (1954) identified several additional differences between the two species, including barbel arrangement and position, barbel structure (i.e., diameter and papillae), and both dorsal and anal fin ray counts. They also developed a suite of diagnostic measurement ratios intended to eliminate the effects of size, age, and possibly geographic variation. In general, mature Pallid Sturgeon attain larger sizes than mature Shovelnose Sturgeon and they have longer outer barbels and shorter inner barbels with inner barbels originating anterior to outer barbels. Additionally, Pallid Sturgeon have wider mouths and naked bellies generally lack the mosaic of embedded scutes that armor the ventral surface of the Shovelnose Sturgeon (USFWS, 2014).

Several of these diagnostic characters and ratios change with age of the fish (allometric growth), making identification of juvenile and subadult fish difficult. Fishery biologists have found that in most cases morphometric ratios described in Bailey and Cross (1954) as well as subsequent indices developed by Wills et al. (2002) were not mutually exclusive when used to compare Pallid to Shovelnose sturgeon in the middle Mississippi River or when used to compare both species from different geographic reaches. Also, these indices do not work well on smaller-sized specimens. This lack of uniform applicability of morphometric indices may be attributable to greater morphological differences documented between upper Missouri River Pallid Sturgeon and Pallid Sturgeon samples in the middle and lower Mississippi and Atchafalaya rivers. Additionally, Pallid Sturgeon from the upper Missouri River live longer and grow larger than those found in the lower Missouri and Mississippi Rivers (USFWS, 2014).

Species Distribution
The historical distribution of the Pallid Sturgeon includes the Missouri and Yellowstone Rivers in Montana, downstream to the Missouri-Mississippi confluence, and the Mississippi River possibly from near Keokuk, Iowa downstream to New Orleans, Louisiana (USFWS, 2014).

Since listing in 1990, wild Pallid Sturgeon have been documented in the Missouri River between Fort Benton and the headwaters of Fort Peck Reservoir, Montana; downstream from Fort Peck Dam, Montana to the headwaters of Lake Sakakawea, North Dakota; downstream from Garrison Dam, North Dakota to the headwaters of Lake Oahe, South Dakota; from Oahe Dam downstream to within Lake Sharpe, South Dakota; between Fort Randall and Gavins Point Dams, South Dakota and Nebraska; downstream from Gavins Point Dam to St. Louis, Missouri (including Illinois); in the lower Milk and Yellowstone Rivers, Montana and North Dakota; the lower Big Sioux River, South Dakota; the lower Platte River, Nebraska; the lower Niobrara River, Nebraska; and the lower Kansas River, Kansas. Pallid Sturgeon observations and records have increased with sampling effort in the Mississippi River basin. The contemporary downstream extent of Pallid Sturgeon ends near New Orleans, Louisiana. Additionally, the species has been documented in the lower Arkansas River, the lower Obion River, Tennessee, as well as navigation pools 1 and 2, i.e., downstream from Lock and Dam 3, in the Red River, Louisiana (USFWS, 2014).

Distribution within Action Area
In Illinois, Pallid Sturgeon are very rare within the Upper Mississippi in Illinois (upstream of Lock and Dam 26 near Alton, Illinois) and are estimated at 1,600 – 4,900 individuals in the Middle Mississippi in Illinois (Mississippi River at confluence with Missouri River down to Mississippi River at confluence with Ohio River near Cairo, Illinois).

Critical Habitat
No critical habitat has been designated for Pallid Sturgeon.

Life History
Pallid Sturgeon can be long-lived, with females reaching sexual maturity later than males. Based on wild fish, estimated age at first reproduction was 15 to 20 years for females and approximately 5 years for males. Like most fish species, water temperatures influence growth and maturity. Female hatchery-reared Pallid Sturgeon maintained in an artificially controlled hatchery environment (i.e., near constant 16 to 20°C, 61 to 68°F temperatures) can attain sexual maturity at age 6, whereas female Pallid Sturgeon subject to colder winter water temperatures reached maturity around age 9. Hatchery-reared Pallid Sturgeon in the lower Missouri River reached sexual material at ages 9 and 7 for males and females, respectively. However, as of 2012, no 1997 year-class hatchery-reared Pallid Sturgeon, released in the upper Missouri River between Fort Peck Dam and Lake Sakakawea, have been found to be sexually mature. Thus, age at first reproduction can vary between hatchery-reared and wild fish and is dependent on local conditions (USFWS, 2014).

Females do not spawn each year. Observations of wild Pallid Sturgeon collected as part of the Pallid Sturgeon Conservation Augmentation Program (PSCAP) in the northern part of the range indicates that female spawning periodicity is 2 to 3 years (USFWS, 2014).

Fecundity is related to body size. The largest upper Missouri River fish can produce as many as 150,000 to 170,000 eggs, whereas smaller bodied females in the southern extent of the range may only produce 43,000 to 58,000 eggs. Spawning appears to occur between March and July, with lower latitude fish spawning earlier than those in the northern portion of the range. Adult Pallid Sturgeon can move long distances upstream prior to spawning; a behavior that can be associated with spawning migration. Females likely spawn at or near the apex of these movements. Spawning appears to occur adjacent to or over coarse substrate (boulder, cobble, gravel) or bedrock, in deeper water, with relatively fast, converging flows, and is driven by several environmental stimuli including day length, water temperature, and flow. Incubation rates are governed by and dependent upon water temperature. In a hatchery environment, fertilized eggs hatch in approximately 5 to 7 days. Incubation rates may deviate slightly from this in the wild. Newly hatched larvae are predominantly pelagic, drifting in the currents for 11 to 13 days and likely dispersing several hundred km downstream from spawn and hatch locations (USFWS, 2014).

Current Stressors and Threats

- Habitat degradation
  Modification and curtailment of Pallid Sturgeon habitat and range are attributed to large river habitat alterations, including river channelization, bank stabilization, impoundment, entrainment from energy water intake structures, and altered flow regimes (USFWS, 2014). The Pallid Sturgeon is ectothermic, that is its body temperature is dependent on water temperatures. As a result, water temperatures influence nearly every aspect of the Pallid Sturgeon life history requirements. Thus, the altered

temperature profiles of riverine habitats downstream from large bottom-release dams influence nearly every aspect of the life-history requirements and habitats of Pallid Sturgeon (USFWS, 2014).

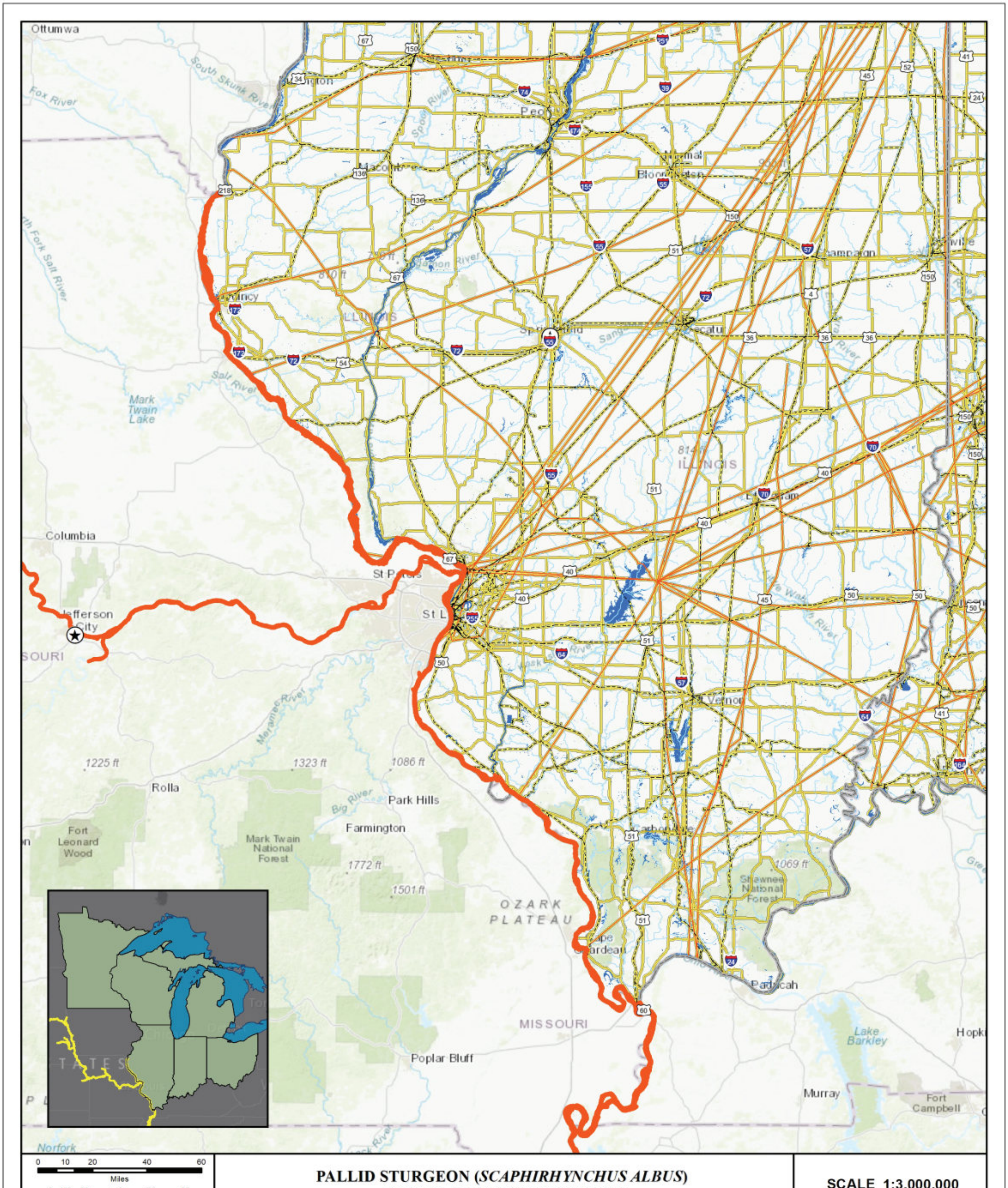
- Water quality
  Much of the available information regarding the likely effects to Pallid Sturgeon from contaminants comes from information obtained for Shovelnose Sturgeon, which can be used as a surrogate species to evaluate environmental contaminant exposure. Shovelnose Sturgeon are considered a suitable surrogate species for Pallid Sturgeon in that they live for 20 years or longer, inhabit the same river basins, spawn at similar intervals and locations, and accumulate similar inorganic and organic contaminants. However, Pallid Sturgeon may be at greater risk than Shovelnose Sturgeon to contaminants that bioaccumulate and cause reproductive impairment because they have a more piscivorous diet, greater maximum lifespan, and a longer reproductive cycle than Shovelnose Sturgeon (USFWS, 2014). Tissue samples from three Missouri River Pallid Sturgeon and 13 other Pallid Sturgeon, mostly collected from the Mississippi River had metals (e.g., mercury, cadmium, and selenium), PCBs, and organochlorine pesticides (e.g., chlordane, dichloro-diphenyltrichloroethane, and dieldrin) at concentrations of concern (USFWS, 2014).
- Entrainment
  Another issue that can cumulatively have negative consequences for Pallid Sturgeon range-wide is entrainment loss. The loss of Pallid Sturgeon associated with cooling intake structures for power facilities, towboat propellers, dredge operations, irrigation diversions, and flood control points of diversion has not been fully quantified, but entrainment has been documented for both Pallid and Shovelnose sturgeon (USFWS, 2014).
- Disease or predation
  Little information is available implicating piscivory as a threat affecting the Pallid Sturgeon. Predation on larval and juvenile fishes of all species occurs naturally. However, habitat modifications that increase water clarity and artificially high densities of both nonnative and native predatory fishes could result in increased rates of predation. Maintaining artificially elevated populations of certain species in these reservoirs has been hypothesized as a contributing factor in poor survival of larval and juvenile Pallid Sturgeon. Walleye and Sauger (*S. canadensis*) are capable of eating wild paddlefish up to 167mm (6.6in) body length, 305mm (12in) total length and, thus, likely could consume naturally-produced Pallid Sturgeon larvae, fry, and fingerlings (USFWS, 2014).

List of References

U.S. Fish & Wildlife Service (USFWS). (1993). Pallid Sturgeon recovery plan. Bismarck, North Dakota. 55pp.

U.S. Fish & Wildlife Service (USFWS). (2014). Revised Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). Denver, Colorado. 115pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Pallid Sturgeon (*Scaphirhynchus albus*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/fishes/PallidSturgeon/palld_fc.html



Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Popeye Shiner (*Notropis ariommus*)

Federal Listing: Under Review. The Popeye Shiner was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 59836).
State Listing within the AA: Endangered in Ohio; Presumed Extirpated from Illinois

Species Description
The Popeye Shiner is distinguished from other similar species of shiners (genus *Notropis*) by its very large eye (proportionally the largest eye compared to other species of *Notropis*), the diameter of which is usually >1.5 times its snout length. Adult Popeye Shiners range from 55–80 mm in standard length (tip of snout to caudal fin base). The body is characterized as laterally compressed and moderately to somewhat elongate (i.e., slender), with a moderate head, round to slightly pointed snout, and a large, terminal mouth. Dorsal fin origin is above or slightly posterior to pelvic fin base. It has a complete lateral line that distinctly (shallowly) slopes from just posterior to head. Pharyngeal teeth are usually 2,4-4,2. Dorsum is dusky (scales distinctly outlined by melanophores) and pale olive to olive-green, fading ventrally to white; lower two-thirds of body silvery. Lateral stripe present and diffuses anteriorly. Breeding males have small, densely spaced, tubercles on head, body (except along breast or urosome), and pectoral fins. Breeding females may have tiny tubercles on snout. Popeye Shiners closely resemble, and can occur sympatrically with, Telescope Shiners (*Notropis telescopus*). These species can be distinguished by typical anal ray counts of 9 in *N. ariommus* (versus 10 in *N. telescopus*), and the distinctly irregular shaped and sized anterdorsolateral scales with dark margins that appear as a zig-zag pattern, and black pre-dorsal stripe, that characterize *N. telescopus* and are absent in *N. ariommus* (NEAFWA, 2018).

Popeye Shiners (*Notropis ariommus*) belong to the carp and minnow family, Cyprinidae. Popeye Shiners and Telescope Shiners were first described by Cope (1867, 1868) as two distinct species. Later, and without rationale, Kuhne (1939, as cited by Gilbert 1969) listed *N. telescopus* as a subspecies of *N. ariommus*. This led to the notion that *N. ariommus* was composed of 2–3 subspecies based on geographically distinct distributions found in the Ohio (as *N. ariommus ariommus*), Cumberland and Tennessee (as *N. ariommus telescopus*), and (possibly) White River (as *N. ariommus arcansanus*) systems. It is believed that this idea erroneously developed in response to the lack of *N. ariommus* collections since 1893, and the little collections from the Cumberland and Tennessee pre-1900s. However, Gilbert (1969) suggests that this absence of occurrence data “can be attributed to failure of ichthyologists to collect at localities [during the 1894–1948 period] where the fish [had historically] occurred.” Gilbert’s (1969) comprehensive assessment of the systematics and distributions of *N. ariommus* and *N. telescopus* disputed those assertions and concluded these are two distinct species, which are the taxonomic distinctions recognized today. In addition to their different morphometric and meristic characteristics, *N. ariommus* and *N. telescopus* generally have different habitat preferences. *Notropis telescopus* can occur across a variety of sized systems, from headwaters to smaller streams, and sometimes larger rivers, whereas *N. ariommus* prefers to occupy larger creeks to small rivers (NEAFWA, 2018).

Species Distribution
Popeye Shiner populations were distributed widely, but are spotty, across the Tennessee, Cumberland, and Ohio river drainages, and have experienced fluctuating locality occurrences and abundances from the 1860s to 1970s. Popeye Shiners tend to be rare and highly localized. Historically, most of the occupied localities were centralized in and around Tennessee, Kentucky, West Virginia, and Virginia; extended outwards into adjacent the states of Alabama, Georgia, Indiana, North Carolina, Ohio, and Pennsylvania.
Today, Popeye Shiners occur in spotty distributions across the Ohio, Tennessee, and Cumberland River drainages, with most of its occupied localities continuing to be centralized within Tennessee, Kentucky, West Virginia, and Virginia. Popeye Shiners are now believed to be extirpated from Alabama, Pennsylvania, and Indiana, although a 2006 Indiana survey reported collections in at least one locality. One recent occurrence from Pennsylvania results from the collection of one individual believed to have washed downstream from an upper West Virginia extant population. Popeye Shiners still occur in the Scioto River

drainage of Ohio and were last collected in Georgia in the South Chickamauga Creek in 1993. It is unclear if this species still occurs in North Carolina (NEAFWA, 2018).

Distribution within Action Area

Popeye Shiners are found in extremely clear waters in moderate sized streams. These streams usually have slow to moderate flow and many long slow pools in which the Popeye Shiners reside. This species was thought to have disappeared from Ohio prior to 1900 until a population was discovered in Scioto Brush Creek in Southern Ohio in the mid 1980's.

Critical Habitat

No critical habitat has been designated for the Popeye Shiner.

Life History

Popeye Shiners are assumed to reproduce in spring or summer but little is known about their reproductive activities or requirements. It is likely that spawning occurs from late May to late June.

Popeye Shiners feed on various aquatic invertebrates and terrestrial insects that fall in the water or fly just above the surface (ODNR, 2017).

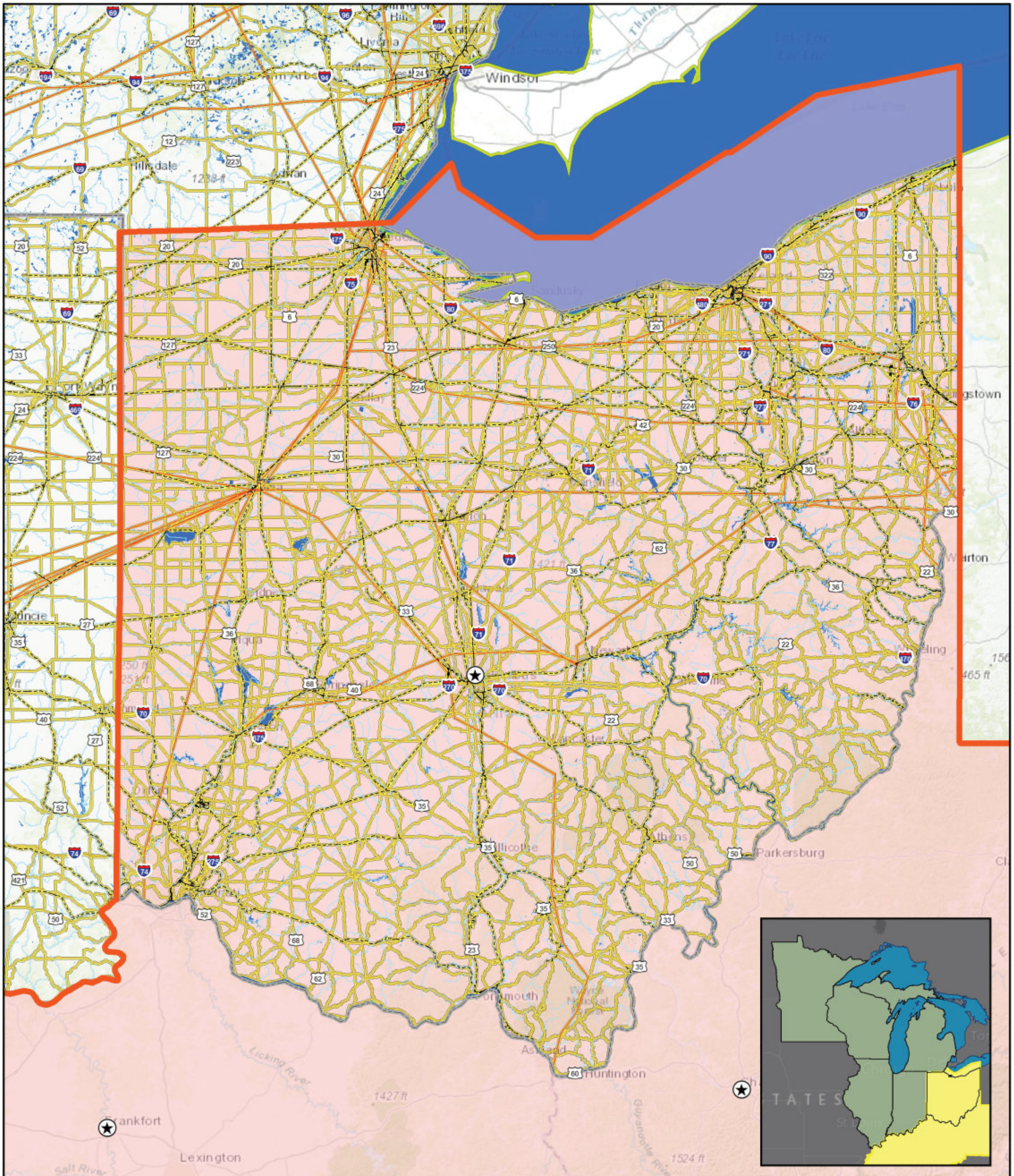
Current Stressors and Threats

- Habitat degradation
  The most significant threat to Popeye Shiner populations is the loss, degradation, and fragmentation of suitable habitat resulting from increased urbanization and agriculture, pollution (e.g., non-point source, contaminant spills, wastewater treatment plant effluent), coal mining, channel modification, dams, and climate change. (NEAFWA, 2018).
- Water pollution
  In regard to water quality, the species does not seem to have recovered from a fish kill event in 1967 on the Clinch River. However, the species did exhibit some population recovery on the North Fork of the Holston River after pollution was reduced there.
- Dams (spawning, habitat fragmentation)

List of References

Northeast Association of Fish and Wildlife Agencies (NEAFWA). (2018). Popeye Shiner Five Factor Status Review. Retrieved from https://rcngrants.org/sites/default/files/final_reports/RCN%202016-2%20PopeyeShiner_5FactorAnalysis.docx

Ohio Department of Natural Resources (ODNR). (2017). Stream Fishes of Ohio Field Guide. Retrieved from https://camp-joy.org/wp-content/uploads/2020/06/Stream-Fish-Guide.pdf



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

POPEYE SHINER (*NOTROPIS ARIOMMUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Popeye Shiner (*Notropis ariommus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Scioto Madtom (*Noturus trautmani*)

Federal Listing: Endangered; Recommended Extinct. Despite extensive searches, no one has seen this madtom in the wild since 1957 and many biologists believe it is extinct (USFWS, 1997).
State Listing within the AA: Endangered, Recommended Extinct in Ohio

Species Description
The Scioto Madtom has a long, slender body that is gray to dusky olive-brown above and has 4 dark saddles. The low adipose fin is broadly joined to the caudal fin with a small notch between the fins. The adipose fin is clear, without a dark bar or blotch. The short pectoral spine has 5 to 7 large teeth on the rear edge and small teeth along the front. The caudal fin has a straight edge or is slightly rounded. The caudal fin has 2 dark bands, 1 in the middle of the fin and 1 near the clear edge. There are 13 to 16, usually 14, anal rays. To 2.25in (6.1cm) total length (Florida Museum, 2021).

The Scioto Madtom prefers stream riffles of moderate current over gravel bottoms with high quality water that is free of suspended sediments. It is an omnivorous bottom feeder that eats a wide variety of plant and animal life, which it finds with its sensory barbels hanging down in front of its mouth (USFWS, 1997).

Species Distribution
It is believed to be endemic to the Scioto River basin in central Ohio. Only 18 individuals of the Scioto Madtom were ever collected. All were found along one stretch of Big Darby Creek, and all but one was found within the same riffle known as Trautman's riffle. The riffle habitat was comprised of glacial cobble, gravel, sand, and silt substrate, with some large boulders (USFWS, 2009).

Critical Habitat
No critical habitat has been designated for the Scioto Madtom.

Life History
Little is known of reproductive habits of the Scioto Madtom, though it likely spawned in summer and migrated downstream in the fall (USFWS, 1997).

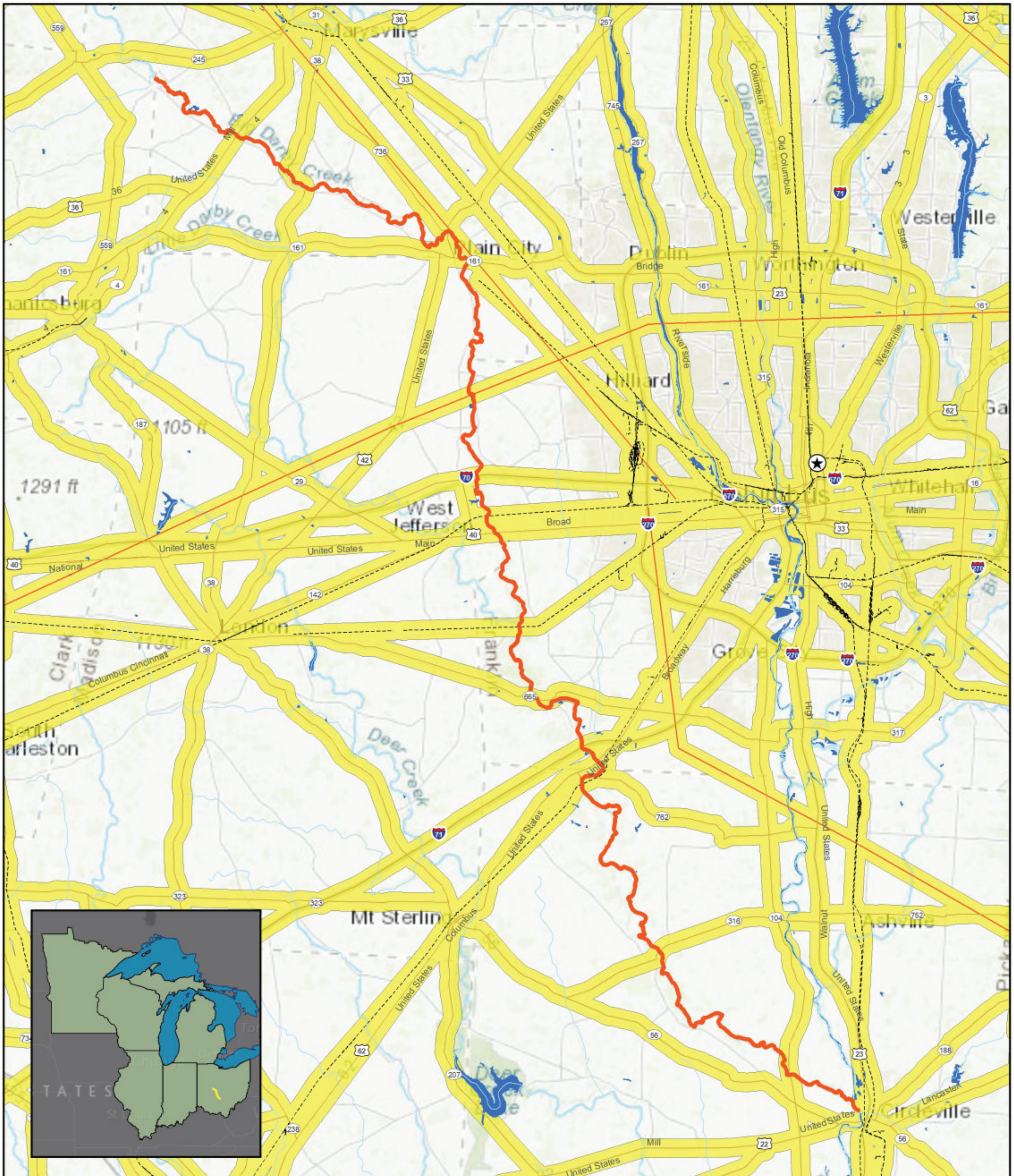
Current Stressors and Threats
- Habitat degradation
- Water pollution (industrial and agriculture)
- Competition

The exact cause of the Scioto Madtom's decline is unknown but was likely due to modification of its habitat from siltation, suspended industrial effluents, and agricultural runoff. In addition, competition from the Northern Madtom (*Noturus stigmosus*), first observed the same year the last Scioto Madtom was collected, may have also contributed to this fish's decline (USFWS, 2009).

List of References
Florida Museum. (2021). Scioto Madtom (*Noturus trautmani*). Retrieved from https://www.floridamuseum.ufl.edu/fish/catfish/ictaluridae/scioto-madtom/

U.S. Fish & Wildlife Service (USFWS). (1997). Scioto Madtom (*Noturus trautmani*). Retrieved from https://www.fws.gov/midwest/endangered/fishes/sciot_fc.html

U.S. Fish & Wildlife Service (USFWS). (2009). Scioto Madtom (*Noturus trautmani*) 5-year review: summary and evaluation. Columbus, Ohio. 10pp.



0 1.5 3 6 9
Miles
0 1.5 3 6 9 12
Kilometers

SCIOTO MADTOM (*NOTURUS TRAUTMANI*)
ACTION AREA OVERVIEW MAP

SCALE 1:450,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Scioto Madtom (*Noturus trautmani*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Sicklefin Chub (*Macrhybopsis meeki*)

Federal Listing: Under Review. The Sicklefin Chub was petitioned for Federal listing under the Endangered Species Act in 2016, and a 90-day finding was issued in 2017 (82 FR 60362).
State Listing within the AA: Not Listed

Species Description
The Sicklefin Chub is a small, obligate large-river minnow that has evolved specific phenotypic adaptations to the formerly turbid, moderate velocity Missouri River. These included a fusiform body shape, long sickle-shaped pectoral fins, a deeply forked caudal fin, reduced optic brain lobes and eyes, and development of external sensory organs, termed compound taste buds. It is usually light green to brown above, often with many dark brown and silver specks, and silver sides. It is distinguished from the Sturgeon Chub by long, sickle-shaped pectoral fins and the absence of ridge-like projections on its scales. Juvenile Sicklefin Chub diets are less specialized than diets of juvenile Sturgeon Chub, and comparison of taste bud distribution suggests *M. meeki* may be efficient at sorting and concentrating food after it has been ingested (WildEarth Guardians, 2016).

Maxillary barbels are positioned behind the blunt and slightly overhanging snout. Sicklefin Chubs use these barbels and external taste buds to locate food as their eyes are small and of little value in turbid waters. Their diet primarily consists of immature aquatic insects. Maximum size rarely exceeds 95mm and they have a relatively short life span (< 4 years) (WildEarth Guardians, 2016).

Species Distribution
Statistical analysis found four significant habitat variables influencing Sicklefin Chub distribution in the Missouri River: distance to upstream impoundment, flow constancy, mean segment turbidity, and percent of annual flow in August. Occurrence of Sicklefin Chub was highest when the river segment was greater than 187 miles (301km) downstream from a dam; flow constancy was 0.56 or less, indicating an association with river segments having more variable flow regimes; mean summer-early fall turbidity levels were 80 NTUs [Nephelometric Turbidity Units] or greater; and the percent of flow in August was low, less than 10 percent of the total annual flow (WildEarth Guardians, 2016).

Historically this species was recorded in 13 states of the Mississippi and Missouri rivers and their larger tributaries, including approximately 85 miles (136km) of the lower Yellowstone River, 1,950 miles (3,120km) of the main stem Missouri River (mouth to North Dakota), and about 1,150 miles (1,840km) of the Mississippi River below the mouth of the Missouri River (south to southern Mississippi); also the lower Kansas River in eastern Kansas (NatureServe, 2021)

This species lives in the main channel of the Mississippi River where there is a strong current and turbid water. The Sicklefin Chub historically occurred in 1,150 miles of the mainstem Mississippi River, from the mouth of the Missouri to the Gulf of Mexico. The USFWS estimates that as of 2001 it was still present in the entire mainstem, but it is now considered rare everywhere except the middle Missouri. The Sicklefin Chub historically occurred in 1,950 miles of the mainstem Missouri River, from the mouth of Cow Creek, Montana, to the confluence of the Mississippi. As of 2001 it occupied 1,015 miles of the Missouri: Cow Creek, Montana to the headwaters of Fort Peck Reservoir; Fort Peck Dam to the headwaters of Lake Sakakawea; and from Gavins Point Dam to the confluence of the Mississippi. The Sicklefin Chub historically occurred in at least 70 miles of the Lower Yellowstone River, from the mouth of Thirteen Mile Creek to the confluence of the Missouri River. Very few Sicklefin Chub have been collected in the Kansas River. (WildEarth Guardians, 2016).

Distribution within Action Area
This species lives in the main channel of the Mississippi River (adjacent to Illinois) where there is a strong current and turbid water.

Critical Habitat
No critical habitat has been designated for the Sicklefin Chub.

Life History
The Sicklefin Chub can reach sexual maturity at age 2, with most fish mature by age 3. The fish first become mature at shorter lengths of 70 to 79mm (2.8 to 3.1in) in the Missouri River in Montana than the 90 to 99mm (3.5 to 3.9in) downstream in Kansas and Missouri. Spawning occurs throughout the summer at water temperatures of 18 to 28°C (64.4 to 82.4°F). Multiple stages of eggs in gravid females suggest that the fish spawn multiple times during the summer. Sicklefin Chubs may have a protracted spawning period and may have a high degree of post-spawn mortality. The most recent study on Sicklefin Chub reproduction determined that *M. meeki* hatch dates showed a distinct, bell-shaped curve that started in early June, peaked in mid-July and subsided in mid-August. While *M. gelida* and *M. meeki* both require long reaches of unfragmented river, *M. meeki* may be tied to a more specific spawning cue, as suggested by their unimodal peak in hatch dates (WildEarth Guardians, 2016).

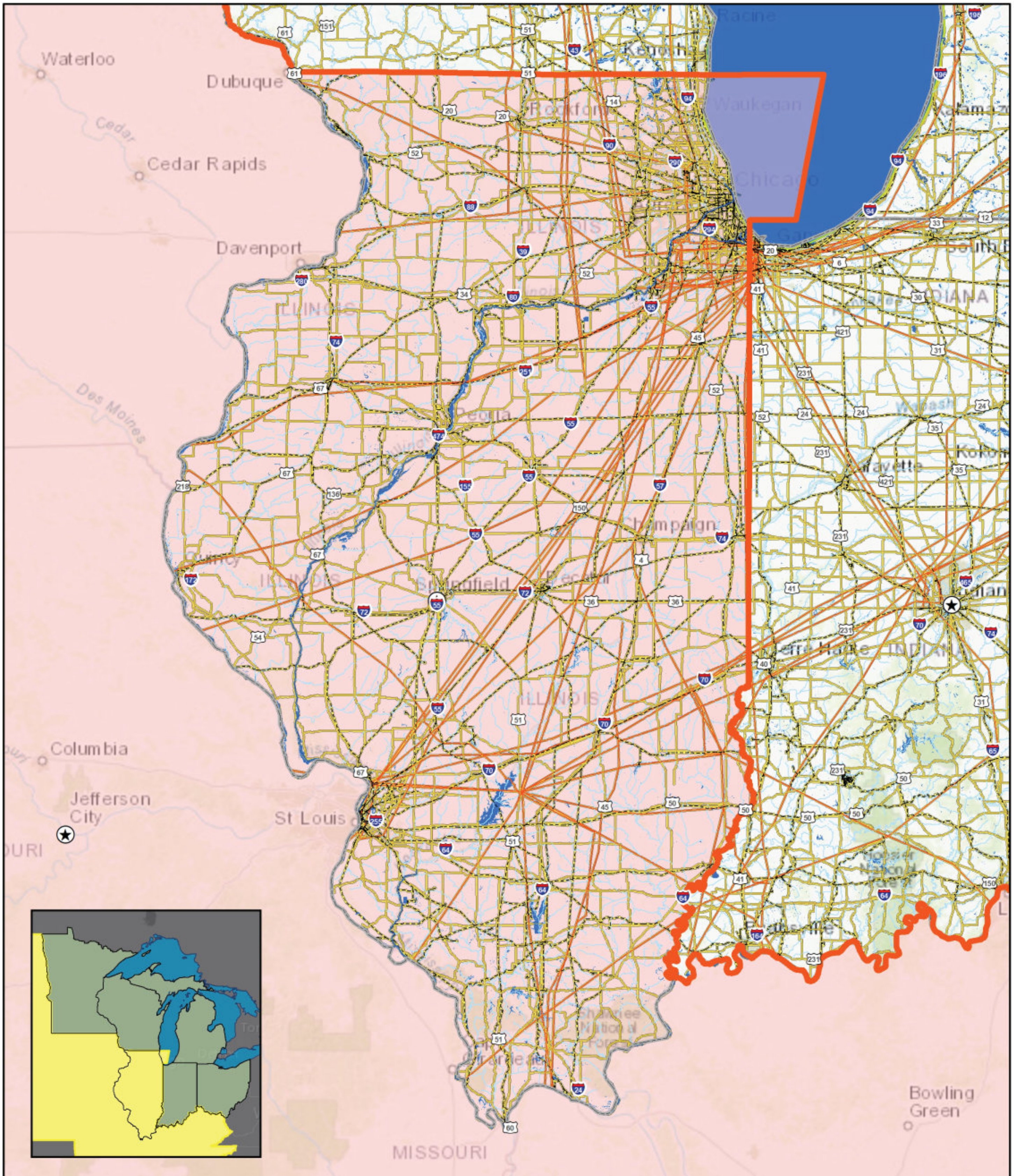
Sicklefin Chub are "pelagic-spawning cyprinids," small-bodied fish that "produce semi-buoyant, nonadhesive eggs within pelagic zones of large flowing streams." These fish produce eggs that achieve semi-buoyancy soon after fertilization but require water movement to remain in suspension. The Sicklefin Chub is a lithopelagophilic broadcast spawner, with a similar reproductive strategy to the Sturgeon Chub except that the eggs are released over rock or gravel and might be initially adhesive. Pelagic-spawning cyprinids represent 25-40% of imperiled species within ecoregions of the Great Plains and have precipitously declined since at least the 1950s when species belonging to this guild dominated vertebrate communities within Great Plains prairie rivers. A growing body of literature suggests imperilment of pelagic-spawning cyprinid species is a direct consequence of stream fragmentation. The availability of downstream transport (unfragmented river kilometers) is particularly important for the pelagic-spawning reproductive guild because high mortality rates occur among ichthyoplankton [drifting eggs and larvae] deposited within downstream reservoirs, due to suffocation within anoxic sediments or predation from lacustrine species (WildEarth Guardians, 2016).

Current Stressors and Threats

- Dams (habitat fragmentation, temperature, flow regimes)
  Decline in Sicklefin Chub populations has resulted from human-induced changes in river conditions. Dams have flooded river habitat, altered temperature and flow regimes, reduced sediment transport and turbidity, fragmented populations, and reduced movement opportunities. Channelization has reduced habitat diversity and reduced overbank flooding.
- Water pollution and industrial depletion
  Pollution and water depletion from industry and agriculture may have altered water quality. Sand and gravel excavation have removed habitat and restricted fish movements in some areas. Further water depletion is likely to occur in the future due to energy development in the Upper Missouri River Basin, increased interbasin transfer of water, and increased municipal, industrial, and irrigation use.
- Dredging of river substrates
  Dredging for channel maintenance and sand/gravel extraction will continue in new areas.
- Invasive species
  Sicklefin Chub may be negatively impacted by the numerous species of non-native fishes that have been introduced into the habitat. Ongoing and proposed conservation measures are likely to have a beneficial impact on Sicklefin Chub and Sturgeon Chub populations (NatureServe, 2021).

List of References
WildEarth Guardians. (2016). Petition to list the Sturgeon Chub (*Macrhybopsis gelida*) and Sicklefin Chub (*Macrhybopsis meeki*) under the U.S. Endangered Species Act. Denver, Colorado. 70pp.

NatureServe. (2021). NatureServe Explorer – Sicklefin Chub (*Macrhybopsis meeki*). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.101978/Macrhybopsis_meeki



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

SICKLEFIN CHUB (*MACRHYBOPSIS MEEKI*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Sicklefin Chub (*Macrhybopsis meeki*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Sturgeon Chub (*Macrhybopsis gelida*)

Federal Listing: Under Review. The Sturgeon Chub was petitioned for Federal listing under the Endangered Species Act in 2016, and a 90-day finding was issued in 2017 (82 FR 60362).
State Listing within the AA: Endangered in Illinois

Species Description

The Sturgeon Chub is a slender, streamlined benthic minnow that inhabits mainstem, turbid rivers and resides over sandy and gravel shoals. Generally, their back is light brown with silvery colored sides and belly with the defining characteristic being its long snout that overhangs the mouth, similar to the morphology of sturgeon species, and presence of ridge-like projections on many scales. Similar to other chub species, maxillary barbels and external taste buds cover the head and body and are used to locate food in highly turbid waters. They are benthic insectivores with small eyes that are of little value for locating food. Maximum size has been reported to be 70mm; however, adults exceeding 100mm have been captured in the channelized Missouri River. Juvenile diets are dominated by midge larvae. The Sturgeon Chub is a relatively short-lived species with a lifespan of up to four years; however, few live beyond two years (WildEarth Guardians, 2016).

Sturgeon Chub have characteristics considered typical of fish associated with benthic, fast-water environments, including a narrow, streamlined shape, large fins, dorsally positioned eyes, a subterminal mouth, and an arched back and flattened ventral surface. The unique epidermal ridges on the scales of Sturgeon Chub have been proposed to function as keels. The adaptation of Sturgeon Chub to high turbidity is evident by their reduced eyes, numerous cutaneous taste buds, and a brain morphology that indicates well developed chemosensory perception (WildEarth Guardians, 2016).

Species Distribution

Historically, the Sturgeon Chub occurred throughout 2,100 miles of the main stem Missouri River and 1,150 miles of the main stem Mississippi River. The species also was found in the Yellowstone River in Montana and North Dakota and 30 tributaries to the Yellowstone and Missouri Rivers. The Sturgeon Chub occurred in portions of four tributaries in Wyoming, nine in Montana, five in North Dakota, six in South Dakota, six in Nebraska, and four in Kansas. Other tributaries that historically hosted Sturgeon Chub include the Big Horn, Little Missouri, and Republican Rivers (WildEarth Guardians, 2016).

As of 2001, Sturgeon Chub occupied approximately 1,155 miles or about 55 percent of its former range in the Missouri River. The species also continues to be found in 11 of 30 tributaries to the Yellowstone and Missouri Rivers that were documented as providing Sturgeon Chub habitat. Field studies have documented a viable population of Sturgeon Chub in the Middle Mississippi River and in the Wolf Island area of the Lower Mississippi River. They are “fairly common” in the middle Missouri River and rare elsewhere, meaning that in the Middle Missouri they may be found in their preferred habitat within their range, but are very unlikely to be found in their preferred habitat within their range outside the Middle Missouri. A 2010 study indicated that Sturgeon Chub have been extirpated from a majority (75 percent) of 60 Great Plains stream fragments surveyed (WildEarth Guardians, 2016).

Distribution within Action Area

This species lives in the main channel of the Mississippi River (adjacent to Illinois).

Critical Habitat

No critical habitat has been designated for the Sturgeon Chub.

Life History

The Sturgeon Chub reaches sexual maturity at age 2. Spawning occurs throughout the summer at water temperatures of 18.3 to 22.7°C (65 to 72.9°F). Multiple stages of eggs in gravid females suggest that fish spawn multiple times during the summer. Estimates of fecundity range from 2,000 to 5,310 eggs per female. The most recent study on Sturgeon Chub reproduction determined that *M. gelida* spawned throughout the summer, ranging from early May to late August. Sturgeon Chub exhibit no sexual dimorphism during the breeding season (WildEarth Guardians, 2016).

Sturgeon Chub are pelagic-spawning cyprinids, small-bodied fish that “produce semi-buoyant, nonadhesive eggs within pelagic zones of large flowing streams. These fish “produce eggs that achieve semi-buoyancy soon after fertilization but require water movement to remain in suspension. The Sturgeon Chub is a pelagophilic broadcast spawner, meaning it reproduces by releasing non-adhesive, semi-buoyant eggs in open water whereby they are passively transported downstream by the current (WildEarth Guardians, 2016).

Pelagic-spawning cyprinids represent 25-40% of imperiled species within ecoregions of the Great Plains and have precipitously declined since at least the 1950s when species belonging to this guild dominated vertebrate communities within Great Plains prairie rivers. A growing body of literature suggests imperilment of pelagic-spawning cyprinid species is a direct consequence of stream fragmentation. The availability of downstream transport (unfragmented river kilometers) is particularly important for the pelagic-spawning reproductive guild because high mortality rates occur among ichthyoplankton [drifting eggs and larvae] deposited within downstream reservoirs, due to suffocation within anoxic sediments or predation from lacustrine species (WildEarth Guardians, 2016).

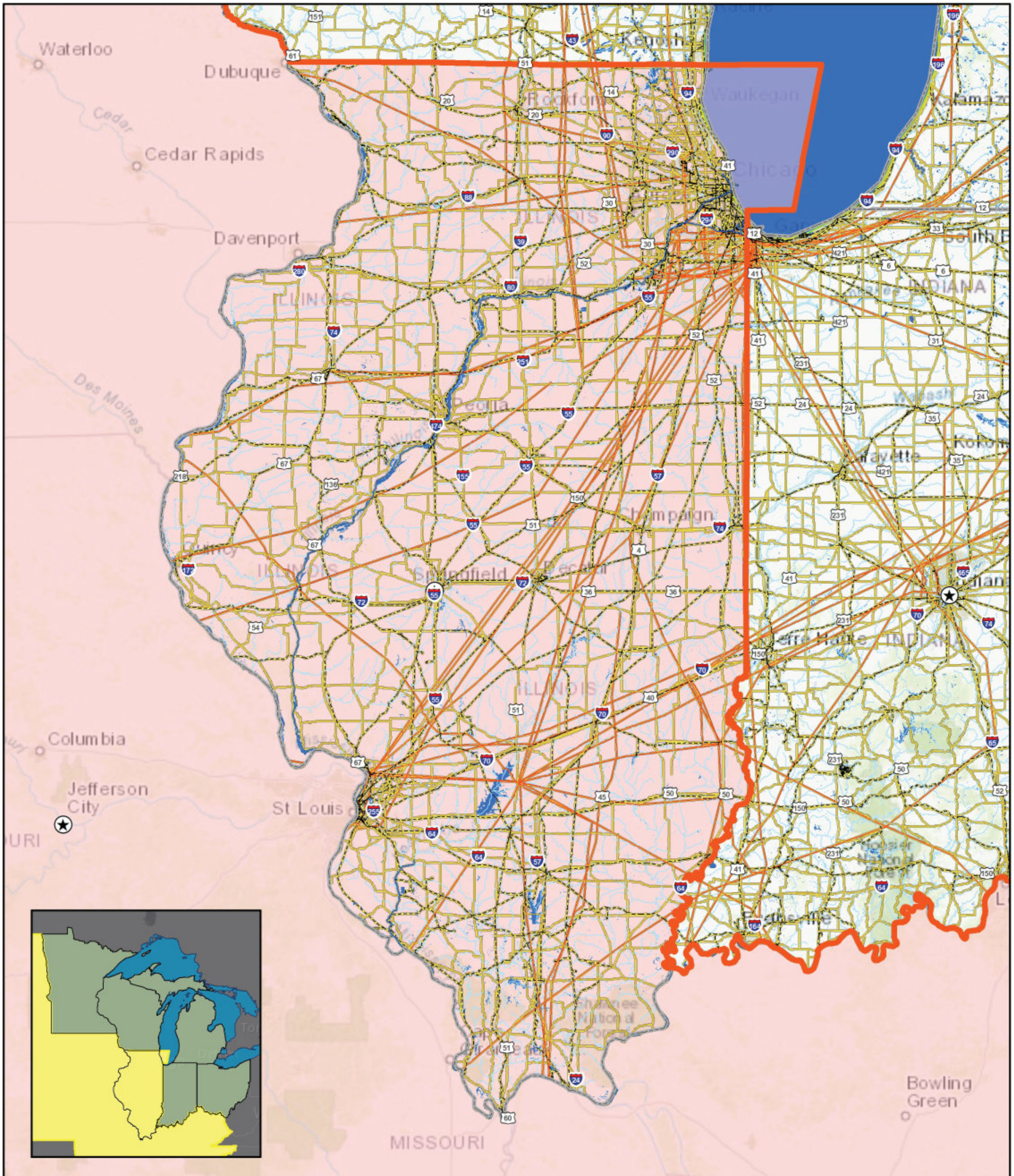
Current Stressors and Threats

- Habitat fragmentation (dams, temperature, flow regimes)
  Decline resulted mainly from human-induced changes in river conditions, particularly the development and operation of reservoirs on large rivers. Dams have flooded river habitat, altered temperature and flow regimes, reduced sediment transport and turbidity, fragmented populations, and reduced movement opportunities. By fragmenting the habitat and chub populations, dams exacerbate the loss of fish populations caused by drought, channel dewatering due to irrigation, or poor water quality. For example, extended drought may extirpate a population. and impoundments may block recolonization pathways from potential source populations in mainstem rivers. Also, existing habitat fragments may be too small to support successful spawning and development. When impoundments are numerous, Sturgeon Chub eggs and fry may become entrained in reservoirs and encounter heavy predation. Water diversion for irrigation potentially threatens chub populations where eggs and fry enter and become stranded in canals. Channelization has reduced habitat diversity and reduced overbank flooding.
- Water pollution and industrial depletion
  Pollution from industry and agriculture may negatively alter water quality and ongoing water depletion is likely to occur in the future due to energy development in the Upper Missouri Basin, increased interbasin transfer of water, and increased municipal, industrial, and irrigation use. Sever drought in the 1990s may have eliminated populations in some Missouri River tributaries. Populations in the mainstem Missouri River may be too small and widespread to naturally recolonize these tributaries even if suitable habitat is available.
- Dredging of river substrates
  Sand and gravel excavation have removed habitat and restricted fish movements in some areas. Dredging for channel maintenance and sand/gravel extraction will continue in new areas.
- Non-native fish competition
  This species also may be negatively impacted by the numerous species of non-native fishes that have been introduced into the habitat. These non-native fishes flourish in dam-altered waters with reduced turbidity, and they may compete with and prey on Sturgeon Chubs. However, the degree and effect of predation on Sturgeon Chub populations are unknown. Similarly, the effects of potential non-native competitors are unknown (NatureServe, 2021).

List of References

WildEarth Guardians. (2016). Petition to list the Sturgeon Chub (*Macrhybopsis gelida*) and Sicklefin Chub (*Macrhybopsis meeki*) under the U.S. Endangered Species Act. Denver, Colorado. 70pp.

NatureServe. (2021). NatureServe Explorer – Sturgeon Chub (*Macrhybopsis gelida*). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.106309/Macrhybopsis_gelida



0 12.5 25 50 75 Miles 0 12.5 25 50 75 100 Kilometers	**STURGEON CHUB (*MACRHYBOPSIS GELIDA*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:4,000,000**
	Petroleum Pipeline Major Road Railroad Commercial Navigable Waterway Rivers & Streams Lakes & Ponds 1-Mile Coastal Inland Buffer Action Area Sturgeon Chub (*Macrhybopsis gelida*) Counties of Occurrence	N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Topeka Shiner (*Notropis topeka*)

Federal Listing: Endangered
State Listing within the AA: Special Concern in Minnesota

Species Description
The Topeka Shiner is a small, stout minnow, not exceeding 75mm in total length. The head is short with a small, moderately oblique (slanted or sloping) mouth. The eye diameter is equal to or slightly longer than the snout. The dorsal fin is large, with the height more than one half the predorsal length of the fish, originating over the leading edge of the pectoral fins. Dorsal and pelvic fins each contain 8 rays. The anal and pectoral fins contain 7 and 13 rays respectively, and there are 32 to 37 lateral line scales. Dorsally the body is olivaceous (olive-green), with a distinct dark stripe preceding the dorsal fin. A dusky stripe is exhibited along the entire longitudinal length of the lateral line. The scales above this line are darkly outlined with pigment, appearing crosshatched. Below the lateral line the body lacks pigment, appearing silvery-white. A distinct chevron-like spot exists at the base of the caudal (tail) fin. The species is dimorphic only during the reproductive season (63 FR 69008).

Species Distribution
The Topeka Shiner is characteristic of small, headwater, prairie streams with good water quality and cool temperatures, although they also may tolerate relatively harsh conditions that can develop in winter and summer low-water periods. Many streams in which Topeka Shiners occur generally exhibit perennial flow, however, some approach intermittency (periodic flow) during summer. At times when surface flow ceases, pool levels and cool water temperatures are frequently maintained by percolation through the streambed, spring flow and/or groundwater seepage. The predominant substrate types within some streams inhabited by Topeka Shiners are clean gravel, cobble and sand. However, bedrock and clay hardpan overlain by a thin layer of silt are not uncommon and thick layers of silt predominate in some occupied habitats. Topeka Shiners most often occur in pool and run areas of streams, seldom being found in riffles.

The Topeka Shiner is known to occur in portions of South Dakota, Minnesota, Kansas, Iowa, Missouri, and Nebraska. In South Dakota, Topeka Shiners were known at 11 localities in the Vermillion and James River watershed at the time of listing, and were believed extirpated from the Big Sioux River drainage. Since listing, Topeka Shiners have been captured from an additional 48 streams, including many from the Big Sioux River watershed. In Minnesota, Topeka Shiners were known from 15 locales in 8 streams in the Rock and Big Sioux River watersheds at the time of listing. The species is now known from 75 sites in at least 17 named streams. The species is now believed to be widely distributed in the Rock and Big Sioux River watersheds in Pipestone, Nobles, and Rock counties, with an additional number of occurrences in adjoining Murray and Lincoln Counties. The species also has been discovered to inhabit off-channel floodplain pools adjacent to these streams. In Kansas, Topeka Shiners were extant in several watersheds within the Kansas and Cottonwood River basins at the time of listing. These populations were largely restricted to portions of the Flint Hills region. An additional isolated population was known from Wallace County, near the Colorado border in the Smoky Hill River watershed. The Wallace County population is now believed extirpated, resulting in the elimination of the last known population of the species in Kansas west of the Flint Hills. In Iowa, at the time of listing, the Topeka Shiner was known extant at 10 sites in 4 tributaries to the North Raccoon River watershed, from 2 sites in the Boone River watershed, and 1 site immediately adjacent to the Minnesota border in the Big Sioux/Rock River watershed. Since 1999, the species has been captured from streams or off-channel pools of 16 tributaries to the North Raccoon River and from 5 off-channel pools adjacent to the mainstem North Raccoon River. The species also has been captured in low numbers from 2 tributaries in the Des Moines River and in 5 tributaries of the Boone watershed. In Missouri, three populations were believed extant at the time of listing. At present, two populations exist in the wild. The Bonne Femme Creek watershed population is now presumed extirpated. The last collection of the species from this stream occurred in 1997. In Nebraska, the Topeka Shiner was believed extant in two streams in Cherry and Madison counties at the time of listing. The last capture of the species from these streams occurred in 1989 and 2000, respectively. Access is now prohibited at the Cherry County site; however, a single Topeka Shiner was found in a small stream in Cherry County in 2006 approximately 6 miles from the previous record site as of 2006 (USFWS, 2009).

Distribution within Action Area

This species is known from Lincoln, Pipestone, Murray, Rock, and Nobles Counties, Minnesota (MNDNR, 2021).

Critical Habitat

Designated critical habitat consists of 83 stream segments, representing 1,356km (836 miles) of stream in Iowa, Minnesota, and Nebraska (USFWS, 2004). In determining which areas to designate as critical habitat, the USFWS considered physical and biological features, referred to as primary constituent elements (PCEs), that are essential to the conservation of the species, and that may require special management considerations or protection. These include but are not limited to space for individual and population growth and for normal behavior; food, water, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing or development of offspring; and, habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. The area designated as critical habitat for the Topeka Shiner is a subset of the geographical area presently occupied by the species and contains the physical or biological features essential for species conservation. When critical habitat was first proposed in 2002, it encompassed all of the known range of the species (USFWS, 2019).

Life History

The Topeka Shiner is pelagic in nature, occurring in mid-water and surface areas, and are primarily considered a schooling fish. Occasionally, individuals of this species have been found in larger streams presumably as waifs (strays) and downstream of known populations. In Minnesota, Iowa, and South Dakota, Topeka Shiners depend heavily on off-channel habitats, such as oxbows, that may be only periodically connected to nearby streams. Densities in these off-channel habitats are typically several times greater than in adjacent instream habitats. Juveniles are sometimes abundant during autumn in off-channel habitats. The value of these off-channel habitats may depend on inflows of groundwater. Such inflows may also be important in maintaining sufficient dissolved oxygen and water temperatures to allow the species to persist in its headwater habitats during periods when dissolved oxygen or temperature levels would otherwise result in significant mortality. Definitions of Topeka Shiners' general diet vary among studies, although insect larvae and microcrustacea seem to be consistently important. The species is primarily a diurnal feeder on insects, with chironomids (midges), other dipterans (true flies), and ephemeropterans (mayflies) making up the bulk of the diet. However, the microcrustaceans Cladocera and Copepoda (zooplanktons) also contribute significantly to the species' diet. Identification of 25 food categories in a gut analysis of Topeka Shiners in Minnesota led Hatch and Besaw (2001) to conclude that the species is an opportunistic and omnivorous feeder, although insect larvae and microcrustacea comprised 75% of the gut contents (USFWS, 2019).

Current Stressors and Threats

- Water pollution (agriculture, stormwater)
  Water quality throughout the Topeka Shiner's range has been degraded by nutrient and pesticide run-off, heavy sediment loading, highway construction, urban development, and dewatering and construction of impoundments. Minnesota and South Dakota populations may be more secure due to availability of off-channel habitat as summer refugia and as low-predator environments.
- Dams
- Sedimentation
  Siltation of streams in southwestern Minnesota is still a concern and should be minimized. To protect Topeka Shiner spawning habitat, no in-stream work should be conducted before August 15.
- Introduced species predation

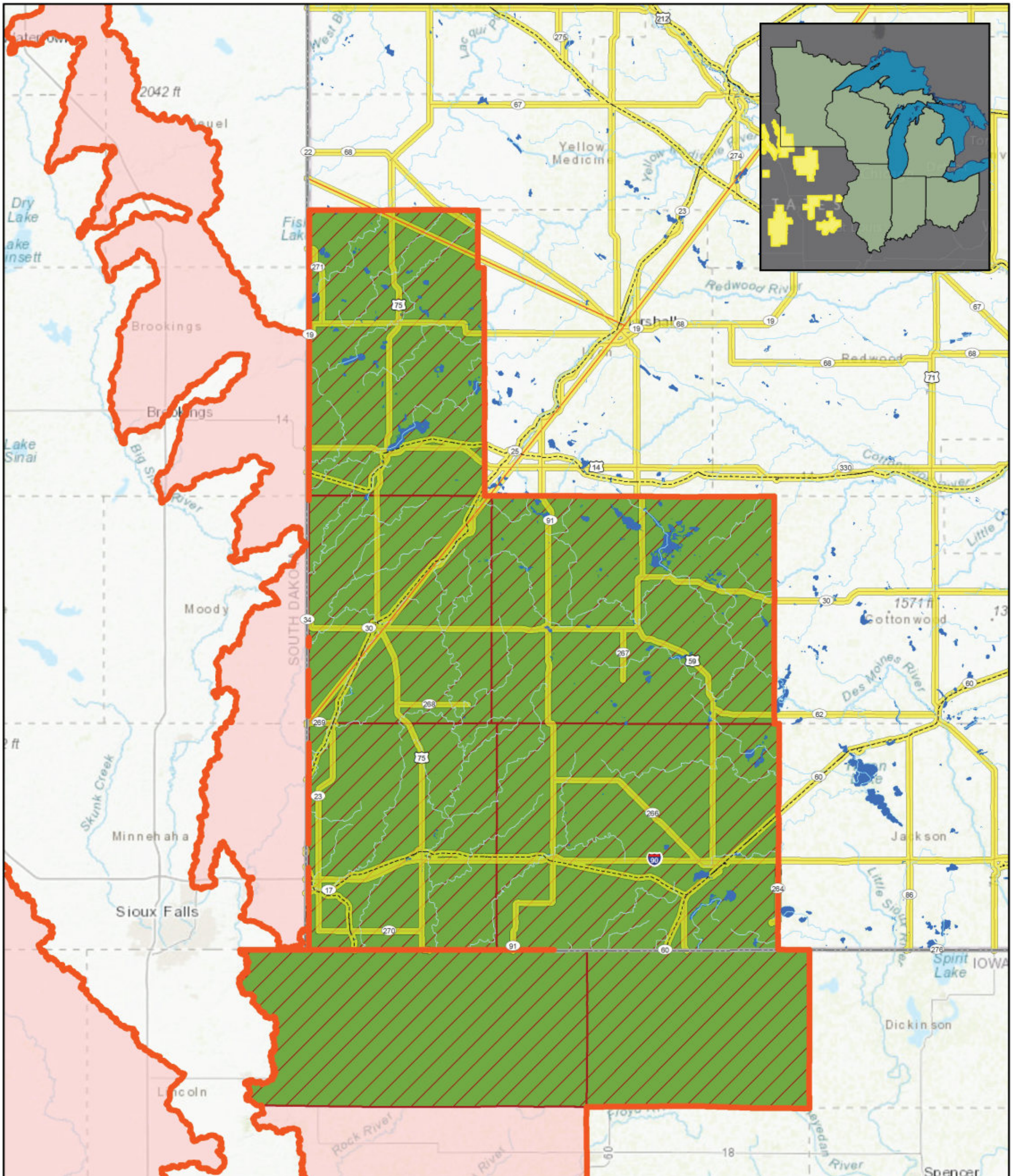
The introduction of Largemouth Bass (*M. salmoides*) has been identified as one factor causing the drastic decline of the species. The impact on Topeka Shiners of a new piscivorous species in their habitats, which are relatively free of predators, is unknown and needs further study (MNDNR, 2021).

List of References

Minnesota Department of Natural Resources (MNDNR). (2021). *Notropis topeka* (Topeka Shiner). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AFCJB28960

U.S. Fish & Wildlife Service (USFWS). (2009). Topeka Shiner (*Notropis topeka*) 5-year review: summary and evaluation. Manhattan, Kansas. 43pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Biological Opinion: effects to the Topeka Shiner from the implementation of state project 059-602-026, County State Aid Highway 2, Pipestone County, Minnesota. Bloomington, Minnesota. 29pp.



0 4 8 16 24
Miles
0 4.25 8.5 17 25.5 34
Kilometers

TOPEKA SHINER (*NOTROPIS TOPEKA*)
ACTION AREA OVERVIEW MAP

SCALE 1:1,250,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Topeka Shiner (*Notropis topeka*) Critical Habitat
- Topeka Shiner (*Notropis topeka*) Counties of Occurrence

N

*** Critical Habitat is designated for this species; however, data is unavailable.**

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

HERPTILES

Alligator Snapping Turtle (*Macrochelys temminckii*)

Federal Listing: Under Review. The Alligator Snapping Turtle was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2015 (80 FR 37568).
State Listing within the AA: Endangered in Illinois and Indiana

Species Description
The AST is characterized by a very large head and three rows of spiked scutes (enlarged scales or laminae). The rows of spiked scutes usually form three distinct complete or incomplete keeled ridges on the brown carapace (upper shell), which distinguish *M. temminckii* from the Snapping Turtle (*Chelydra serpentina*). Some of the marginal scutes on the carapace occur in a double row rather than the single row seen in *Chelydra*. A strongly hooked beak is present on most, but not all specimens. The tongue has a unique worm-like appendage ("fishing lure"). The plastron (lower shell) is relatively small. AST is the largest freshwater turtle in the U.S. reaching a record carapace length of 800mm (31.5in), and weight of 113.9kg (251lbs) (Fuller & Somma, 2019).

Species Distribution
Habitat consists of slow-moving, deep water of rivers, sloughs, oxbows, and canals or lakes associated with rivers (e.g., large impoundments including reservoirs); also swamps, bayous, and ponds near rivers, and shallow creeks that are tributary to occupied rivers, sometimes including swift upland streams. This turtle sometimes enters brackish waters near river mouths. Usually, it occurs in water with a mud bottom and some aquatic vegetation but uses sand-bottomed river and creeks in Florida. Within streams, Alligator Snapping Turtles may occur under or in logjams, beneath undercut banks, under rock shelters, or in deep holes. These turtles are highly aquatic and rarely are found out of water (except during nesting) (NatureServe, 2021).

The indigenous range of AST encompasses eastern Texas, eastern Oklahoma, extreme southeastern Kansas and adjacent southwestern Missouri, the Mississippi River Valley of eastern Missouri up the valley northward through western Illinois, southern Indiana, and southeastern Iowa, western Kentucky and Tennessee (including disjunct populations in central Indiana and Tennessee), and other Gulf Coast drainages in Arkansas, Alabama, Louisiana, Mississippi, southwestern Georgia, and northern Florida as far south as the Santa Fe and Suwanee Rivers (Fuller & Somma, 2019).

Distribution within Action Area
The status of the Alligator Snapping Turtle in Illinois has been the subject of extensive debate since the Illinois Department of Natural Resources announced plans to reintroduce the species to Illinois waters in 2005. With less than 20 confirmed records in Illinois, the species has been considered an infrequent visitor; the result of rare, long-distance migrants from the south via the large rivers. Ed Moll considered all records north of St. Louis questionable and considered the Big Muddy River and its confluence with the Mississippi River as the most promising area in the state to search for viable populations (INHS, 2021). Kessler et al. (2017) report the first record of a wild Alligator Snapping Turtle in Illinois since 1984, only the second in the past 50 years. This individual was captured in a tributary of the undammed portion of the Mississippi River in close proximity to the last 3 published records in Illinois. It is possible that this region provides the last accessible, suitable habitat for the species in Illinois. As it was unlikely the species would persist in Illinois without active management, a reintroduction feasibility study was initiated by IDNR (with many partners) in 2008, and reintroductions began in July 2014 (Kessler et al., 2017).

In Indiana, ASTs are known from the lower Wabash and Ohio Rivers from historic written and oral accounts as well as old, bleached shells and shell fragments found in the area. They may have been more widespread at one time, but presumed sharp population declines coupled with the scarcity of incidental encounters with such an aquatic animal make understanding their historic population trends impossible. A more recent record for a large adult in the White River likely represents either an escaped/released captive animal or a very old adult that gradually made its way upstream from populations further south. In all likelihood, this species is either extirpated or functionally extirpated (no breeding population, just a few old adults) in rivers in Indiana (Indiana Herp Atlas, 2021).

Critical Habitat
No critical habitat has been designated for the Alligator Snapping Turtle.

Life History
Alligator Snapping Turtles are long-lived organisms and have lived longer than 70 years in captivity. Based on laparoscopic examination of the reproductive tracts of free-ranging subadults found no reproductive females under 15 years old, and no reproductive males under 17 years old. In captivity, mating has been observed from February to October, but geographic variation in mating season is poorly understood. Males apparently are capable of sperm production year-round. Females ovulate in the spring, and most nesting occurs in May through July. Females appear to breed annually but may skip a year if they have poor foraging success. Production of multiple clutches in a single year has not been observed in the wild. Somewhat surprisingly considering their larger size, AST has a lower average reproductive output than *C. serpentina*. Clutch sizes are 31 to 40 (n=17) in the Apalachicola River (FL), but some adult females may lay as few as 9 eggs in GA. In Louisiana, a series of 13 harvested females had clutch sizes averaging 23.8 (range 16 to 38), and egg sizes were 34.0 to 51.8mm at their greatest diameter. Reproductive output is positively correlated with female body size, but this relationship is characterized by high variability among females. Like most turtles, it appears that AST has high adult survivorship under natural conditions (i.e., absent anthropogenic mortality). Average age of adults is greater than that of many other turtles, suggesting that adult survivorship of AST especially important demographically. ASTs are omnivorous and consume a wide variety of plant and animal matter. They possess a unique lingual lure used to catch fish, and fish are a dietary mainstay. However, dietary items other than fish are common in their stomachs; these include plant matter (oak acorns, tupelo fruits, wild grapes, roots, palmetto fruits, hickory nuts, persimmons, etc.) and animal matter (salamanders, crayfish, mussels, snakes, alligators, turtles, clams, mammals, snails, etc. ASTs are among the most aquatic of freshwater testudines, and overland movements appear to be undertaken only by nesting females and juveniles moving from the nest to water. Females have been observed to nest up to 72m from the nearest water, although nests averaged 12.2m from the nearest water. Radiotelemetry indicates that adults are capable of moving >1 km/day, and mean daily distances traveled ranged from 27.8 to 115.5m/day (Reed et al., 2002).

Current Stressors and Threats
Overharvesting and habitat alteration are the major threats to the species (CBD, 2012).

- Habitat alteration and destruction
  Water pollution and erosion have altered the food chain and otherwise degraded the turtle's habitat in many areas. In addition, dredging river bottoms to maintain shipping channels destroys habitat. May inhabited sites were manipulated for channelization or drained and converted to agricultural fields. Dams have blocked passage of Alligator Snapping Turtles on many rivers and thermal alteration by hypolimnetic releases from impoundments have caused declines.
- Overutilization
  Given its size and catchability, the Alligator Snapping Turtle has a long history of both commercial and personal harvest throughout its range.
- Disease and predation
  As for all turtles, predation, particularly by human-subsided raccoons, accounts for the loss of a majority of Alligator Snapping Turtle eggs throughout their range.
- Inadequacy of existing regulatory mechanisms
  Although the Alligator Snapping Turtle is now protected from take across most of its range, collection remains a threat. Endangered Species Act protection would prohibit all take and increase fines and resources for enforcement that would likely deter illegal collection.

List of References

Center for Biological Diversity (CBD). (2012). Petition to list 53 amphibians and reptiles in the United States as threatened or endangered species under the Endangered Species Act. 454pp.

Fuller, P., & Somma, L.A. (2021) *Macrochelys temminckii* (Troost in Harlan, 1835). U.S. Geological Survey, Nonindigenous Aquatic Species Database. Retrieved from https://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=1227

Illinois Natural History Survey (INHS). (2021). Alligator Snapping Turtle *Macrochelys temminckii* (Troost, in Harlan, 1835). Retrieved from https://herpetology.inhs.illinois.edu/species-lists/ilspecies/alligator-snapping-turtle/

Indiana Herp Atlas. (2021). Alligator Snapping Turtle (*Macrochelys temminckii*). Retrieved from https://www.inherpatlas.org/species/macrochelys_temminckii

Kessler, E.J., Phillips, C.A., Ballard, S.R., & Dreslik, M.J. (2017). The first record of an Alligator Snapping Turtle (*Macrochelys temminckii*) in Illinois in 30 years. *Southeastern Naturalist* 16(3): N29-N35.

NatureServe. (2021). NatureServe Explorer – Alligator Snapping Turtle (*Macrochelys temminckii*). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.102590/Macrochelys_temminckii

Reed, R.N., Congdon, J., & Gibbons, J.W. (2002) The Alligator Snapping Turtle [*Macrochelys (Macroclemys) temminckii*]: a review of ecology, life history, and conservation, with demographic analysis of the sustainability of take from wild populations. Prepared for the U.S. Fish & Wildlife Service, Division of Scientific Authority. 17pp.

0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

ALLIGATOR SNAPPING TURTLE (*MACROCLEMYS TEMMINCKI*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Alligator Snapping Turtle (*Macroclemys*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Blanding's Turtle (*Emydoidea blandingii)*

Federal Listing: Under Review. Blanding's Turtle was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2015 (80 FR 37568).
State Listing within the AA: Endangered in Illinois and Indiana; Threatened in Minnesota and Ohio; Special Concern in Michigan; Delisted (2014) in Wisconsin

Species Description
Blanding's Turtles are dark brown to black with some yellow spotting on the carapace. The carapace is domed and elongate and the plastron in hinged at the pectoral-abdominal seam. The characteristic that most easily separates them from other species within their range is the bright yellow color of the entire ventral portion of their throat and long neck. The vent is located posterior to the margin of the carapace and the plastron is slightly concave in males. The plastron hinge of juveniles becomes movable by ages two to three and the anterior of the plastron can completely close at five years of age. Across most of their range, adults of both sexes range from approximately 150 to 240mm in carapace length, and from about 750 to 1400g in body mass (Congdon et al., 2008).

Species Distribution
In general, Blanding's Turtles occupy a variety of eutrophic wetlands such as swamps, marshes, beaver dams, permanent and temporary ponds/pools, and slow flowing streams. Blanding's Turtles frequently emerge from water to bask on logs and tussocks, or sedge clumps (Congdon et al., 2008).

The main range extends disjunctly from southeastern Ontario, adjacent Quebec, and southern Nova Scotia, south into New England, and west through the Great Lakes to western Nebraska, Iowa, and extreme northeastern Missouri. With the exception of two populations in the western portion of their range (Minnesota and Nebraska), populations are frequently small, discontinuous, and often isolated. In the eastern USA and Canada, small and disjunct populations occur in southeastern New York, Massachusetts, New Hampshire, and Nova Scotia. A major population center of this species included southeastern Ontario, the lower peninsula of Michigan, Wisconsin, and Minnesota. Two populations of note are in southeastern Minnesota (>5000 adults) and north central Nebraska (>130,000 individuals) (Congdon et al., 2008).

Distribution within Action Area
ECOS does not provide specific range information for Blanding's Turtle. Blanding's Turtle is considered vulnerable in Wisconsin and imperiled in Illinois, Indiana, Michigan, Minnesota, and Ohio (NatureServe, 2021).

Critical Habitat
No critical habitat has been designated for Blanding's Turtle.

Life History
Blanding's Turtles were considered to be primarily terrestrial in the early literature, whereas they have been considered to be primarily aquatic and secondarily terrestrial in more recent publications. One explanation of the difference in perception is that the extensive terrestrial nesting activity was mistakenly viewed as indicative of the entire activity season. Another reason may be that a reduction in temporary wetland and terrestrial movement corridors in human dominated landscapes has let to less overall terrestrial activity by Blanding's Turtles. Blanding's Turtles make seasonal movements among aquatic areas that may be related to seasonally abundant resources or access to mates. Winter dormancy is primarily between mid-October/November until late March but Blanding's Turtles have been recorded active until early December and as early as March 1. Adult *Emydoidea* are thought to be primarily carnivorous or omnivorous consuming crayfish and other crustaceans, insects, other invertebrates, and vegetable matter. On average, nesting takes place from late May to early July. Most nesting activity occurs from 1900 to 2100 hrs, with nest construction taking 2 to 2.5 hours to complete. Some females apparently return to the same general nesting

area over a number of years while others had up to 2km inter-nest distances between years. Exposure to sunlight, low vegetation cover, well-drained soils, and proximity to wetlands combine to determine the quality of a nesting area. Nest predation rates are highly variable and most nest predation is due to raccoons and foxes. From nest construction to hatchling emergence takes approximately 84 days and results in hatchlings emerging from late August through early October. Although most hatchlings emerge from nests in the fall, some do not immediately move toward water. As a result, a few hatchlings may successfully overwinter on land but only if the surrounding area is moist enough to prevent desiccation. Females mature between ages 14 and 20. Clutch sizes range from 3 to 19 eggs. There are no data to suggest that females produce more than one clutch per year, and some adult females do not reproduce each year. Both egg size and clutch frequency increase with ae of females, but clutch size does not. Annual survival of adults exceeds 0.94 and life table analysis results in a mean cohort generation time of approximately 37 years. Blanding's Turtles are long-lived (known maximum ages >75 years). Several adult Blanding's Turtles were marked between 1953 and 1957 on the University of Michigan's E.S. George Reserve and were still alive and reproductive in 2007. Because of their extended longevity, long reproductive lifespans, and apparently lack of expression of actuarial senescence, Blanding's Turtles have become of interest to life historians researching the evolution of longevity and gerontologists working with non-human models of aging (Congdon et al., 2008).

Current Stressors and Threats

Blanding's Turtles are suffering from degradation of wetlands and the terrestrial portion of their core habitat. Reduction and alteration of nesting areas and wetland habitat, together with delayed maturations, less than annual reproductive frequency, and losses due to predations, collecting, and automobiles are all serious problems. In many instances females either cross roads, or due to nest site limitations, nest on road edges (both make females susceptible to collectors and being killed by cars). Negative impacts on their populations are exacerbated by life history traits associated with delayed sexual maturity, low annual fecundity, and extreme longevity (Congdon et al., 2008).

The Center for Biological Diversity list these threats in the petition document (2012)

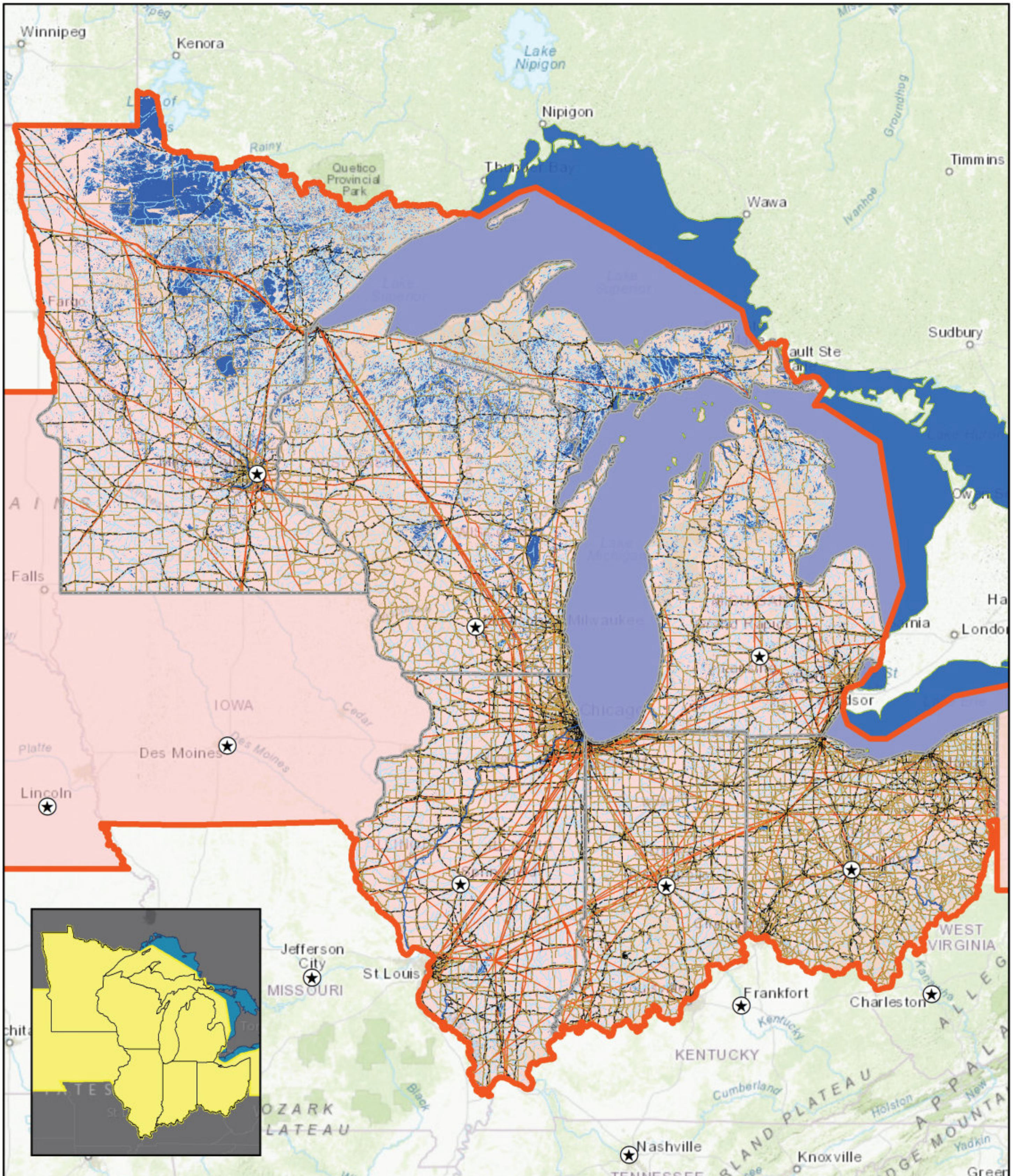
- Habitat alteration and destruction
  Blanding's Turtles are suffering from degradation of wetlands and the terrestrial portion of their core habitat. These impacts are especially severe near large metropolitan areas. Destruction of resident aquatic habitat is of primary conservation concern because it impacts all stages of the life cycle. Reduction in the numbers of such wetlands can increase risks of mortality for adults and reduce hatchling recruitment into populations. Cultivation to the edge of wetlands and the use of fertilizers, pesticides, and herbicides that wash into wetlands can also degrade aquatic habitats. Blanding's Turtles are known to be sensitive to use of herbicides, which destroy aquatic vegetation and likely affect the turtle itself. Water management activities related to fish management and agriculture can be detrimental to overwintering Blanding's Turtle populations if they are conducted during winter. Drawdown activities to remove undesired fishes such as carp and vegetation in lakes were cited in both Illinois and Minnesota as detrimental due to death from predation, road mortality, freezing when the substrate was exposed in late winter, and poisoning from pesticides sprayed on the exposed lake bottom after the turtles were already moving in late spring. Subpopulations are increasingly fragmented by the extensive road network that crisscrosses all of this turtle's habitat, and Blanding's Turtles have been reported as being impacted by road mortality. Indeed, the complex movement ecology and habitat requirements of Blanding's Turtles make their populations especially vulnerable to road mortality: over the course of a year, they typically visit multiple wetlands to forage, mate, thermoregulate, and overwinter, requiring frequent overland migrations and road crossings. Nesting females are especially susceptible to roadkill because they often attempt to nest on gravel roads or on shoulders of paved roads.
- Overutilization
  While Blanding's Turtles are not consumed, the pet trade is a serious ongoing threat.
- Disease or predation

Eggs and young hatchlings are highly vulnerable to predation by birds, mammals, and predatory fishes.

List of References

Center for Biological Diversity (CBD). (2012). Petition to list 53 amphibians and reptiles in the United States as threatened or endangered species under the Endangered Species Act. 454pp.

Congdon, J.D., Graham, T.E., Herman, T.B., Lang, J.W., Pappas, M.J., & Brecke, B.J. (2008). *Emydoidea blandingii* (Holbrook 1838) – Blanding's Turtle. In A.G.J. Rhodin, P.C.H. Pritchard, P.P. van Dijk, R.A. Saumure, K.A. Buhlmann, & J.B. Iverson (Eds). *Conservation Biology of Freshwater Turtles and Tortoises: A Compliation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group.* Chelonian Research Monographs 5.



0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Blanding's Turtle (*Emydoidea blandingii*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Copperbelly Water Snake (*Nerodia erythrogaster neglecta*), northern DPS

Federal Listing: Threatened
State Listing within the AA: Endangered in Indiana, Michigan, and Ohio

Species Description

Copperbelly Water Snakes have solid, dark, dorsal coloration with bright orange-red ventral coloration that is typically visible from the side; however, body color varies with age. Juveniles often have obvious dorsal banding for the first year or two of their life. This banding is gradually lost leading to the typical solid, dark, dorsal color over time (USFWS, 2008). Copperbelly Water Snakes may be confused with the co-occurring Northern Water Snake (*Nerodia sipedon sipedon*), which may occasionally display similar dark dorsal coloration, yet the Northern Water Snake lacks the solid colored ventral coloration, instead having a pattern of half-moon shaped spots (USFWS, 2008). The Copperbelly Water Snake grows 3 to 5ft in length, with females often larger than males. Relative to other water snakes, the head and eyes of the Copperbelly Water Snake are proportionally larger (USFWS, 2008).

Species Distribution

Copperbelly Water Snakes migrate seasonally across their habitat, which includes wetlands like bottomland forests and scrub-shrub swamps and surrounding upland forest and forest edge. Generally, wetlands used by this species have shallow water, an open canopy, and short dense vegetation. Copperbelly Water Snakes also frequently use upland habitats including forest and grasslands for both foraging and movement among wetlands across the landscape. Due to the variety of habitats required through their life history, the species requires 13.1 to 18.5ha (32 to 46ac) of contiguous wetland/upland habitat and corridors (USFWS, 2008).

The historical range of the Copperbelly Water Snake is somewhat convoluted, but certainly included “south central Michigan and northeastern Ohio, southwestward through Indiana to extreme southeastern Illinois and adjacent Kentucky” (USFWS, 2008). The northern distinct population segment is defined as all populations occurring north of 40˚ north latitude. At the time of listing, the northern distinct population segment consisted of eight clusters knows to have individuals present in the ten years prior, with snakes found at only five of these clusters in 1996 (62 FR 4183).

Distribution within Action Area

- Indiana: only a single individual Copperbelly Water Snake was observed at a single site in the Fish Creek watershed in northeastern Indiana.
- In Michigan, surveys from 1997 – 2000 only found Copperbelly Water Snake populations at three localities including two in Hillsdale Co. and one in Cass and St. Joseph Co. Subsequent surveys from 2001 – 2006 failed to detect individuals at the site in Cass and St. Joseph Co., but did find individuals at three sites in Hillsdale Co., possibly representing a metapopulation that extends to connect population in Indiana and Ohio (USFWS, 2008).
- In Ohio, surveys from 2001 – 2006 detected one substantive metapopulation in Williams Co., located across two adjacent sites (USFWS, 2008). This population located in the West Branch St. Joseph River watershed is believed to connect to three sites in Hillsdale Co., Michigan. Conant (1951) describes an additional small population in Hardin Co. near Mt. Victory, Ohio; however, this population is now extirpated.

Critical Habitat

No critical habitat has been designated for the Copperbelly Water Snake.

Life History

Copperbelly Water Snakes emerge from hibernacula in early spring at which point they remain nearby hibernacula for a period of time. As ambient and water temperatures increase, the snakes begin moving to adjacent wetlands for foraging and searching for mates. Courtship and mating activities for this species primarily occur in the spring but may extend into the early summer (62 FR 4183). During this period, snakes will engage in a behavioral pattern of spending a few days to weeks in one wetland, followed by a move to upland or another wetland (USFWS, 2008). During the summer, as ephemeral forested wetlands dry out, snakes increasingly rely on upland habitats for foraging and aestivation. In fall, Copperbelly Water Snakes migrate to hibernacula sites, typically located in or near bottomland forests (USFWS, 2008).

Hibernacula for Copperbelly Water Snakes are generally located in portions of habitat positioned above flood stage, but where the water-table is accessible but will also utilize areas that may become briefly inundated. Although hibernacula sites may include root wads, dense brush piles, fieldstone piles, and potentially muskrat or beaver lodges, more often abandoned crayfish burrows are used. Early studies indicated that hibernacula in upland habitats may be critical for the survival of the species due to the risk of inundation or freezing temperatures. More recently, however, multiple radio-tracked snakes were found covered by 2 to 3m of floodwater for more than two weeks and emerged with no mortality, suggesting that upland hibernacula may be less important than previously assumed (USFWS, 2008).

Copperbelly Water Snakes forage in both aquatic and terrestrial environments. In wetlands, these snakes forage in water only a few centimeters deep in search of amphibian adults and larvae, but do not forage in deeper water or actively pursue fish. The gradual drying of ephemeral wetlands provides important breeding habitat for amphibians and foraging habitat for Copperbelly Water Snakes as tadpoles become stranded in the shallow waters (USFWS, 2008).

Current Stressors and Threats

Historical habitat loss and fragmentation have occurred across the range of the northern distinct population segments of the Copperbelly Water Snake. Much of the critical wetland habitat has been modified or destroyed for conversion to agricultural, commercial, or residential uses (USFWS, 2008). Impacts of fragmentation have resulted in few extant small, scattered, and isolated populations (62 FR 4183). USFWS (2008) also references the observed presence of skin lesions and blisters and noted it as a fairly common occurrence. Recent studies indicate this to likely be snake fungal disease, a potentially fatal fungal infection caused by *Ophidiomyces ophiodiicola* (Allender et al., 2015).

In the Final Rule to list the Copperbelly Water Snake as threatened, the USFWS determined that the species is impacted by one or more of the following factors to the extent that he species meets the definition of a threatened species under the ESA:

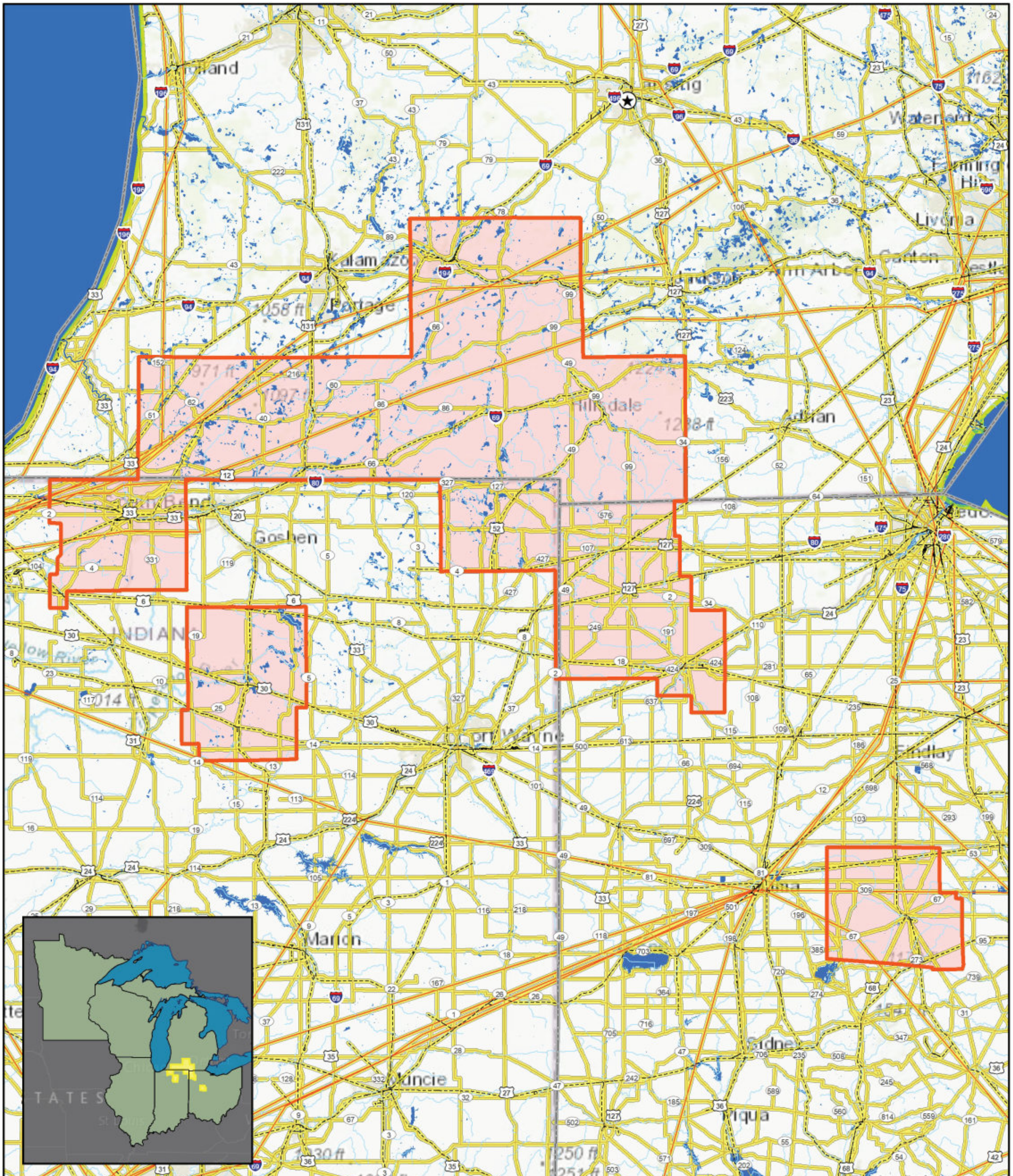
- Habitat loss and fragmentation due to conversion of wetlands to agricultural, commercial, and residential land uses;
- Collection of specimens for scientific and museum studies and commercial pet trade:
- Predation related to mowing, roads, and farming activities that may increase predation during movement and mortality due to vehicle strikes;
- Inadequate existing regulatory mechanisms within the southern population segment that provide loopholes for illegal take and trade; and
- Other natural or manmade factors including small isolated populations that leave the species vulnerable to extreme weather events, continued habitat destruction and modifications, and collection and persecution.

In the most recent 5-year review, the USFWS recommended that the Copperbelly Water Snake be uplisted to endangered due to a documented high degree of threat from continued habitat loss and fragmentation.

List of References

Allender, M.C., Raudabaugh, D.B., Gleason, F.H., & Miller, A.N. (2015). The natural history, ecology, and epidemiology of *Ophidiomyces ophiodiicola* and its potential impact on free-ranging snake populations. Fungal Ecology 17: 187-196.

U.S. Fish & Wildlife Service (USFWS). (2008). Northern population segment of the Copperbelly Water Snake (*Nerodia erythrogaster neglecta*) recovery plan. Fort Snelling, Minnesota. 79pp.



0 5 10 20 30
Miles
0 5 10 20 30 40
Kilometers

COPPERBELLY WATERSNAKE (*NERODIA ERYTHROGASTER NEGLECTA*)
ACTION AREA OVERVIEW MAP

SCALE 1:2,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Copperbelly Watersnake (*Nerodia erythrogaster neglecta*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Eastern Massasauga (=rattlesnake) (*Sistrurus catenatus*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois, Indiana, Ohio, Wisconsin, and Minnesota (extirpated); Special Concern in Michigan

Species Description
The EMR is a small, heavy-bodied snake with a heart-shaped head and vertical pupils. The average length of an adult is approximately 0.6m (2ft), with a maximum length of approximately 1m (3ft). Adult EMRs are most often gray or light brown with large, light-edged chocolate brown to black blotches on the back and smaller blotches on the sides, though in some areas (especially in northeast Indiana, southeast Michigan, and northern Ohio) significant numbers of individuals in populations may be nearly or completely black in color. The belly is marbled dark gray or black and there are brown stripes on the sides of the head, each of these bordered by a narrow, white stripe. Its tail has several dark brown rings and is tipped by gray-yellow keratinized rattles. Young snakes have the same markings as adults, but are paler, and have bright yellow tails that darken in color as age progresses. Until the first time the neonates (newborns) shed their skin, the rattle is represented by a single “pre-button” and between the first and second time they shed, the rattle is represented by a complete terminal segment called a “button.” As pitvipers, this species, and all rattlesnakes have an extrasensory “pit” located on each side of the head between the eyes and nares. These pits allow thermal sensing of the environment, potential prey, and other objects (USFWS, 2015).

Species Distribution
The type of habitat used during the active season generally consists of high, dry habitats, open canopy wetlands and adjacent upland areas. Active season habitat use varies regionally, and this variability has been observed in multiple EMR populations across its range. Because of this, individual snakes can be found in a wide variety of habitats including old fields, bogs, fens, shrub swamps, wet meadows, marshes, moist grasslands, wet prairies, sedge meadows, peatlands, forest edge, scrub shrub forest, floodplain forests, and coniferous forests. Active season habitat use can also be site dependent even within a particular region. Active season habitat consists of thermoregulatory or basking sites, retreat sites, and foraging sites and are thoroughly examined in the SSA. After the active season, EMRs move to low wet areas for overwintering or hibernation. To survive the winter, each individual EMR requires a suitable hibernation site which is critical to avoid lethally low temperatures and reduce the risk of desiccation. Consequently, hibernation sites must provide insulated and moist subterranean spaces below the frost line where individuals can avoid freezing and dehydration. Most EMRs will either return to the same hibernacula annually or to an area within roughly 100m (328ft) of their previous hibernation site. Across its range, EMRs have been reported to hibernate for up to six months of the year, and have used crayfish burrows, mammal burrows, rocky crevices, rodent holes, hummocks, old stumps, rotten logs, and tree and shrub root systems or any excavation that reaches the water table. The snakes hibernate either singly or in small groups or clusters, aggregating where favorable microhabitats occur (USFWS, 2015).

The documented historical range of the EMR included sections of western New York, western Pennsylvania, southeastern Ontario, the upper and lower peninsulas of Michigan, the northern two thirds of Ohio and Indiana, the northern three quarters of Illinois, the southern half of Wisconsin, extreme southeast Minnesota, east central Missouri, and the eastern third of Iowa. The limits of the current range of the EMR resemble the boundaries of its historical range. However, the geographic distribution of extant localities has been restricted by the loss of the populations from much of the area within the boundaries of that range. Extant populations in central and western Missouri previously considered to be EMR are now known to cluster genetically with the western massasauga rattlesnake. However, the non-extirpated populations in the St. Louis metropolitan area of east central Missouri are believed to be EMRs. This determination is based entirely upon phenotypes of museum specimens, but because no viable tissues are available to confirm their phylogeographic relationships through molecular techniques (as the species is extirpated throughout Missouri), USFWS includes these populations within the historical range of the EMR.

Based on the information that USFWS has collected, the EMR is also likely extirpated from Minnesota (USFWS, 2015).

Distribution within Action Area

- Illinois: Clinton, Cook, DuPage, Knox, Lake, Piatt, and Will Counties
- Indiana: Allen, Carroll, Elkhart, Fulton, Kosciusko, LaGrange, Lake, LaPorte, Marshall, Noble, Porter, Pulaski, Starke, Steuben, St. Joseph, and Whitley Counties
- Michigan: 57 counties
- Ohio: 27 counties
- Wisconsin: Buffalo, Columbia, Crawford, Jackson, Juneau, La Crosse, Monroe, Pepin, Rock, Sauk, Trempealeau, Walworth, and Wood Counties

Critical Habitat

USFWS determined that the designation of critical habitat for EMR is not prudent due to an increased risk of collection and persecution (81 FR 67193).

Life History

The annual cycle of EMR is characterized by 2 seasons: the active season and the inactive or winter dormant season. The start of the active season varies by latitude but generally it begins in March or April when EMRs emerge from their winter hibernacula and move to their summer habitat where mating and parturition occurs in later summer. Generally, males and non-gravid females spend the active season foraging, while gravid females thermoregulate to obtain optimal body temperatures for young development. In fall, EMRs return to their winter areas to hibernate. Massasauga populations demonstrate considerable variation in reproductive traits throughout the range. Most recent data indicate that mating is actually most prevalent in summer or early autumn, though it may rarely occur in spring. The mating system of many pitvipers includes ritualized male-male aggression, sometimes called “combat” to assert dominance, though it is not as well known in the genus *Sistrurus*. However, there are published observations of male massasaugas behaving aggressively towards one another. Males may also use chemical cues to simultaneously trail and pursue individual females during the mating season. Because mature male EMRs often occur at a higher ratio to receptive females, competition for mates can be intense. Males may exhibit prolonged periods of mate searching, longer daily movements, and defensive female polygyny during the mating season. Like most pitvipers, the EMR is ovoviviparous, meaning embryos develop within eggs held by the female, and gives birth to live young. Data indicate average brood size varies greatly across the range (average 9.3). With few exceptions, the female reproductive cycle in EMRs follows a biennial pattern in which mating, and parturition are skipped in years following ones where broods are born. Ovulation and fertilization take place following emergence from hibernation during the following spring, with embryonic heartbeats detectable by late May. Skeletal formation, growth of the embryos, and birth follows from late July to August. Following giving birth in summer, females enter a non-reproductive state characterized by the presence of non-vitellogenic oocytes and may forage heavily before entering hibernation. The time needed to forage and reallocate nutrient resources expended while carrying broods may be great, and the success in replenishing lost energy reserves may not only determine whether they will survive hibernation, but also whether they will mate or reproduce the following year. Because of this, receptive females may occur in lower proportion to males during the breeding season, even in populations in which there is a female bias. The diet or prey of the EMR varies across the species range but may consist primarily of small mammals. Juvenile EMR occasionally feed on snake species. It has been demonstrated that subadults consume an equal proportion of both mammal and snake prey (USFWS, 2015).

Current Stressors and Threats

See the SSA (USFWS, 2015) for detailed discussion of stressors and threats:

- Habitat loss and modification

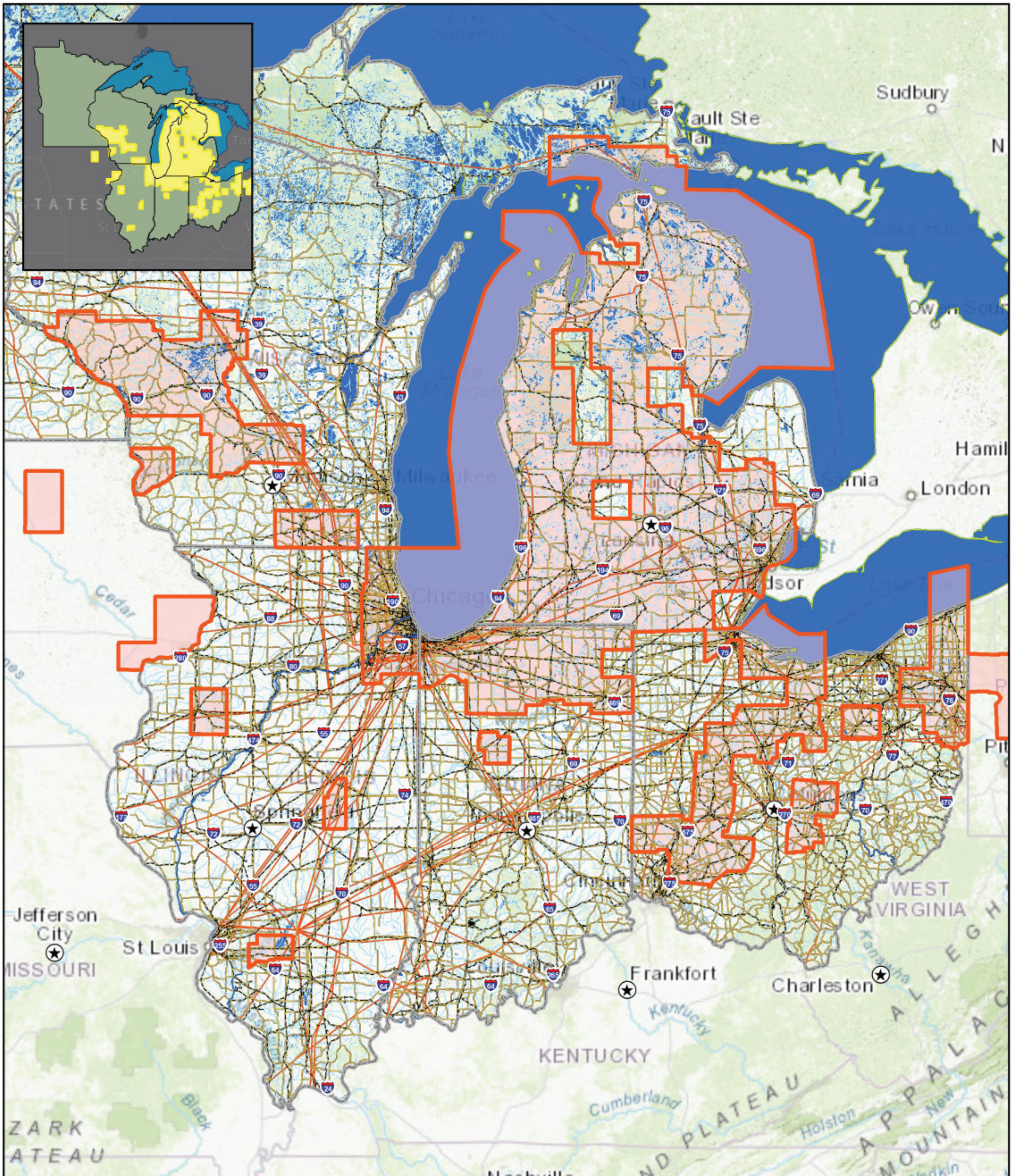
The loss of habitat was historically, and continues to be, the primary threat affecting this species. Habitat loss includes direct habitat destruction of native land types (e.g., grassland, swamp, fen, bog, wet prairie, sedge meadow, marshland, peatland, floodplain forest, coniferous forest) due to conversion to agricultural land, development, and infrastructure associated with development (roads, bridges).

- Management practices
  An effective tool for controlling vegetative succession is the use of prescribed fire which kills or temporarily sets back the growth of woody vegetation, retards the growth of undesirable species, and stimulates the response of prairie species. However, direct mortality of EMR can result from exposure to fire if burning occurs when the snakes are out of their hibernacula. Mowing prior to burning results in additional direct mortality to EMRs beyond that incurred by prescribed burning.
- Road mortality
  Although viperids like EMR are more sedentary than other snakes, they also move more slowly which increases the probability of being killed while crossing roads.
- Persecution and collection
  Collection and killing are forms of loss to both the snake individually and to the population; the animals are removed from the population either through death (persecution) or disappearance (collection).
- Disease
  The recent documentation of disease in EMR populations is an additional threat to the species. Although disease (Snake Fungal Disease [SFD] and/or ophidian paramyxovius) in any snake population could be considered a normal life event, a fatal disease outbreak in a population with low population size may compromise the viability and integrity of the entire population.

List of References

U.S. Fish & Wildlife Service (USFWS). (2015). Species status assessment for the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*). 102pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Draft recovery plan for the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*). Bloomington, Minnesota. 17pp.



0 25 50 100 150 Miles 0 25 50 100 150 200 Kilometers	**EASTERN MASSASAUGA (*SISTRURUS CATENATUS*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:7,500,000**

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Eastern Massasauga (*Sistrurus catenatus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Illinois Chorus Frog (*Pseudacris illinoensis)*

Federal Listing: Under Review. The Illinois Chorus Frog was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2015 (80 FR 37568).
State Listing within the AA: Threatened in Illinois

The taxonomic status of the ICF and Strecker's Chorus Frog (SCF; *P. streckeri*) has been debated in the literature. The principal range of SCF extends from central Texas and adjacent Louisiana through Oklahoma to extreme southcentral Kansas and over to central Arkansas. There are a few separated populations in west-central and southwestern Illinois, southeastern Missouri and adjacent Arkansas of what has been considered the sub-species *P. streckeri illinoensis. Pseudacris illinoensis* was proposed as a separate species due to its separated geographic distribution and distinct physical features. However, recent work has shown ICF and SCF are not genetically different and the disconnected populations have only recently separated from the Texas populations. Still, physical features vary geographically. The International Union for Conservation of Nature recognizes a single species, *P. streckeri*, with disjunct populations. The Integrated Taxonomic Information System recognizes both *P. streckeri* and *P. illinoensis* as valid species. In Illinois, the ICF was recognized as *P. s. illinoensis* until the 2009 revision of the endangered and threatened species list, when it was listed as *P. illinoensis* (Henning and Hinz, 2016).

Species Description
The Illinois Chorus Frog (ICF) is a small (1.4 to 1.75in and 0.2oz) tan to gray frog. Its body is stout and toad-like with robust forearms. Its skin is granular rather than smooth. It has dark brown or black lines on its back with a white belly. It has a characteristic dark masklike stripe from snout to shoulder, a dark spot under each eye, and a V- or Y-shaped mark between the eyes. The throat (vocal pouch) of the male ICF darkens during the breeding season. ICF tadpoles can be distinguished from other tadpoles by their round shape, large size, forward attachment point of the tail, and large tail height. Once they develop two functioning limbs, they also develop other ICF markings including the dark "Y" between the eyes. ICF are rarely seen because they spend most of their lives underground, emerging only during the breeding season. The males' breeding call is a series of high-pitched, rapid, birdlike whistles that can be heard as much as 1.3 mile away (Henning and Hinz, 2016).

Species Distribution
ICF populations are restricted to Missouri, Arkansas, and Illinois. ICF likely migrated into Illinois along river floodplains that contain sands or sandy soils deposited by either water or wind.

Distribution within Action Area
In Illinois, ICF records occur in three widely separated sandy floodplain regions. The northern region covers the largest area; it occurs along the east side of the Illinois River in the central portion of the state from Tazewell County in the north to Scott County in the south and east to Logan County. The central region near the Mississippi River in Monroe and Madison counties has been greatly reduced to an area of roughly 250 acres in Madison County. The southern region near the junction of the Ohio and Mississippi Rivers in extreme southern Illinois in Alexander County has a single population with multiple breeding ponds in the area around Horseshoe Lake Conservation Area. A genetic comparison of the northern and southern regions of the state found the populations were genetically different, indicating little to no connectivity between the regions. Habitat conditions that are similar to these three regions have been identified in additional areas in Illinois, but there is no evidence ICF has ever inhabited these areas (Henning and Hinz, 2016).

Critical Habitat
No critical habitat has been designated for the Illinois Chorus Frog.

Life History
ICF spend most of their life underground, where they dig forward through the sandy soil with their unusually strong forearms, rather than backward with their hind legs like most fossorial amphibians. Only four ICF burrows have ever been observed and documented; they were found in April and November in areas free of vegetation. The burrows observed have varied in depth between 4 to 8in and from roughly level (into a hill side) to nearly straight down. There is some evidence (surface depressions and lab experiments) that ICF may surface at night, especially in association with rainstorms, yet very little is known about this behavior. No overwintering burrows have been located, but ICF is not freeze tolerant and must therefore burrow below the freeze line to overwinter. One season of soil temperature monitoring at a Madison County site indicated that ICF must burrow at least 5in below the surface, perhaps as deep at 10in, to avoid freezing. When there is a shallow layer of clay below the upper layer of sandy soil, it will likely limit the depth of ICF burrowing and impede ICF overwintering in that area (Henning and Hinz, 2016).

ICF are the only known frog capable of feeding below ground, but surface feeding is also likely. During the breeding season, adult ICF diet consists of small insects and burrowing larvae including moth and butterfly larvae (specifically the agricultural pest dingy cutworm *Feltia ducens*), true bugs (specifically nabids), beetles (specifically curculionids), and flies. Very little is understood about their fossorial behavior and their ability to locate prey items. Although many adult frogs are visual predators, ICF cannot use sight while feeding underground. It is presumed prey are eaten as encountered, but ICF may be using vibrations or chemical cues to track and detect prey as has been observed in some other amphibians (Henning and Hinz, 2016).

ICF are among the earliest of Illinois frogs to emerge and call, often while snow is on the ground and air temperatures are below freezing in late winter or early spring (February to April). ICF emergence often coincides with heavy rainfall (1in or greater), although it is unknown which cue triggers the emergence: moisture, temperature, vibration, etc. ICF may not breed in years without suitable breeding conditions, such as drought. Breeding begins soon after emergence and continues irregularly for approximately seven weeks. ICF may be able to detect the presence of fish and forego breeding ponds containing fish. Upon emergence, breeding males gather in wetlands to form choruses, calling at night to attract females. Most choruses consist of 1 to 20 males but may have as many as 100 males. The males temporarily maintain calling territories with about 5ft between them. Most males call from water while clasping emergent vegetation to keep their vocal sac above the water line. Advertisement calls that attract females can be heard from more than 1 mile away. Breeding mostly takes place in the center of ponds in deeper water and further from the shoreline. Females approach and swim around the calling male until the male jumps onto and clasps the female's back. The pair then deposits eggs and sperm clusters of 10 to 40 eggs on the underside of submerged or floating vegetation. Egg masses quickly become covered by silt and debris, perhaps disguising and protecting them. No further parental care is given (Henning and Hinz, 2016).

ICF eggs likely hatch into tadpoles within a few days. As tadpoles they eat suspended matter, organic debris, algae, plant tissue, and plankton. There is evidence that some ICF tadpoles may be cannibalistic, capable of eating smaller ICF tadpoles when necessary, to ensure their metamorphosis prior to drying of breeding ponds. After about two months, ICF tadpoles undergo metamorphosis into the terrestrial form and disperse from the pond around late May or early June. They have been found more than half a mile from their pond of origin and are likely capable of traveling much further, perhaps as much as 2 to 3 miles away. Immature ICF grow rapidly and are capable of breeding after one year of growth. Most ICF were not found to return to their birth pond for breeding but dispersed across the landscape colonizing other breeding ponds (Henning and Hinz, 2016).

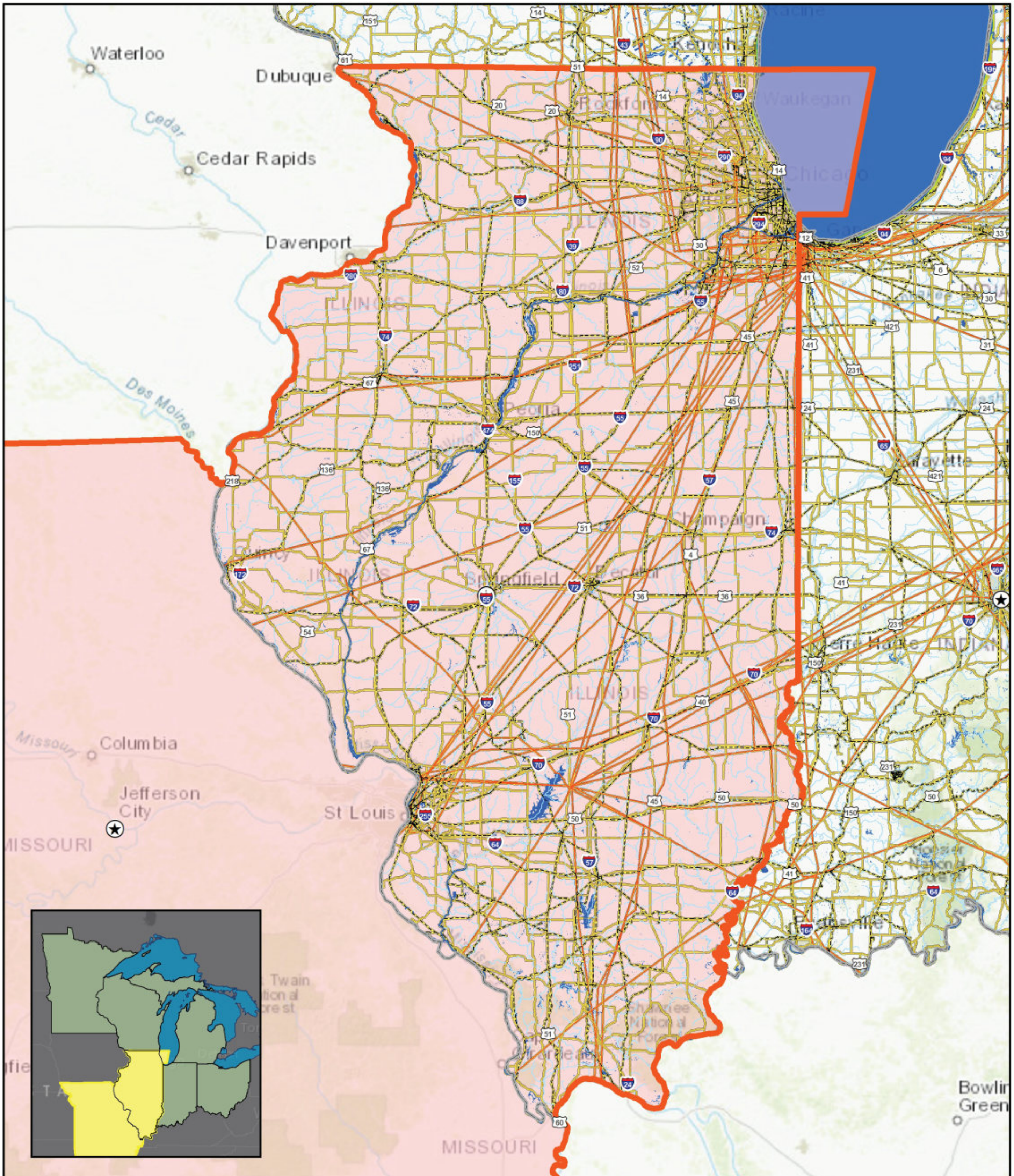
Current Stressors and Threats
The largest threat to ICF populations is likely loss of breeding habitat, which is associated with agricultural drainage. Additional threats, such as loss of terrestrial habitat, invasive species, pollution, disease, and

climate change are also of concern. These threats and avoidance/minimization best practices are detailed IDNR Conservation Guidance (Henning and Hinz, 2016).

- Habitat loss
  Loss of breeding habitat is likely the greatest threat to ICF. Hydrology has been altered on a large scale by agricultural production and other developments that have eliminated some breeding habitats, caused others to dry up before tadpoles have time to undergo metamorphosis, and reduced habitat connectivity of individual breeding ponds. In addition, some temporary wetlands have been dammed creating permanent water bodies that allow fish to survive, making unsuitable ICF habitat.
- Fragmentation
  Fragmentation of habitat, such as by highway construction, reduces dispersal and limits connectivity, which decreases population persistence and genetic diversity in the long term. In recent years there have been numerous linear development projects, such as roads, underground pipelines, and transmission lines, which have crisscrossed ICF habitat and increased fragmentation. Road kills are common around breeding ponds as frogs disperse to terrestrial habitat across roadways.
- Habitat degradation
  Even areas that are protected may become unsuitable due to habitat degradation from invasive species and succession. Invasive species can alter ICF habitat, making it unusable. For instance, woody encroachment of black locust (*Robinia pseudoacacia*) or red cedar (*Juniperus virginiana*) into sand prairie openings consolidates soil making it difficult for ICF to burrow.
- Climate change
  ICF is rated as “Extremely Vulnerable” or “Highly Vulnerable” to climate change due to potential drying of ephemeral pools, which is worsened by fragmented landscapes and increased water demand for irrigation.

List of References

Henning, B.M., & Hinz, L.C. (2016). Conservation guidance for Illinois Chorus Frog (*Pseudacris illinoensis*). INHS Technical Report 2016 (56). 16pp.



0 12.5 25 50 75
Miles
0 12.5 25 50 75 100
Kilometers

ILLINOIS CHORUS FROG (*PSEUDACRIS ILLINOENSIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:4,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Illinois Chorus Frog (*Pseudacris illinoensis*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Spotted Turtle (*Clemmys guttata)*

Federal Listing: Under Review. The Spotted Turtle was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2015 (80 FR 37568).
State Listing within the AA: Endangered in Illinois and Indiana; Threatened in Michigan and Ohio

Species Description
The Spotted Turtle is a relatively small freshwater turtle species, with adult carapace (upper shell) length averaging 9 to 14cm. The species is recognized by its black keel-less, unserrated carapace overlaid with an irregular pattern of yellow or yellow-orange spots. Hatchlings usually have one spot per carapacial scute. The plastron (lower shell) is orange to yellow-orange with black blotches on each scute; however, the plastron tends to become more black with age. Individuals from some subpopulations may exhibit a spotless carapace or an entirely black plastron. The head is black, with yellow to yellow-orange spots and large orange "ear" patches on either side. The legs are black with yellow-orange spots on the upper surface and orange to pinkish-orange on the lower surface. Spotted Turtles are sexually dimorphic. Females have orange mandibles and irises, a flat to convex plastron, and relatively small, thin tails with cloaca at the margin of the carapace. In contrast, males have brown-buff mandibles and irises, a concave plastron, and larger, thicker tails with cloaca extending past the margin of the carapace. Male coloration may not develop until maturity. Adult Spotted Turtles may be confused with juvenile Blanding's Turtles (*Emydoidea blandingii*). which have a similarly dark carapace with yellow spots and flecks; however, young Blanding's Turtles can be distinguished by their yellow throats and chins and by the yellow, rather than orange scales, on their otherwise black legs (Ernst & Lovich, 2009).

Species Distribution
Spotted Turtles occur in high organic content wetlands with unpolluted shallow waters, soft substrates, and high amounts of aquatic and emergent vegetation including: ponds, vernal pools, ditches, acidic bogs, alkaline fens, Cattail/tussock marshes, shallow graminoid meadowmarsh, woodland streams, sheltered edges of shallow bays, and various swamp habitats. Sphagnum moss, grass and sedge tussocks, cattails, floating plants and mats of vegetation, and hydrophilic shrubs appear to be important components of aquatic habitats in northern populations. Spotted Turtles use a mosaic of habitat types, display distinct seasonal shifts in habitat use and may require terrestrial habitats during certain times of their seasonal activity cycle (COSEWIC, 2014).

The Spotted Turtle's current distribution is restricted to eastern North America. Disjunct subpopulations range from southern Ontario and Maine southward along the Atlantic Coastal Plain to central Florida, and westward through Pennsylvania, Ohio, Indiana, northeastern Illinois, and across the lower peninsula of Michigan (COSEWIC, 2014).

Distribution within Action Area

- Historically known from Cook and Will Counties in Illinois. No Cook County populations are extant. This species survives in Illinois at two Nature Preserves in Will County (INHS, 2021).
- Currently known from 15 counties in northern Indiana (Indiana Herp Atlas, 2021).
- Known throughout the lower peninsula of Michigan, but populations more disjunct in the northern portion (MNFI, 2021).
- In Ohio, the Spotted Turtle is known from the southwest, northwest, and northeast portions of the state but distribution is patchy, and many records are historic (ODNR, 2018).

Critical Habitat
No critical habitat has been designated for the Spotted Turtle.

Life History

Spotted Turtles aggregate in aquatic habitats in early spring to mate and tend to show fidelity to breeding sites. Nesting takes place from May to June and is primarily nocturnal with most reports of nest construction starting between 1700 and 2300 hrs; however, females will also nest on warm overcast afternoons during rain events. Females may disperse outside their regular home range to oviposit, making upland travels of 0 to 900m and spending up to 9 days on land before returning to wetland habitat. Egg incubation is at least 72 days in the wild with up to 108 days recorded for a couple of nests at a southwestern Ontario marsh. In northern North America hatchling emergence occurs around September and October though neonates may overwinter in the nest chamber and emerge the following spring. Spotted Turtles have low reproductive output. Clutch sizes for northern Spotted Turtles range from 1 to 7 eggs, with a mean of 4 to 5 eggs. Most females do not oviposit every year, and some do not produce eggs for at least three consecutive years. Adult females in better body condition (i.e. non-gravid body mass relative to carapace length) have been shown to produce more eggs through greater frequency of reproduction. Spotted Turtles at the northern limit of their range are larger and have larger clutch sizes but reproduce less frequently than their southern U.S. counterparts. A stage-classified matrix model, based on average nest survivorship data collected from across the North American range, estimated that average egg survivorship for this species is 55%. Sexual maturity is delayed until turtles are 7 to 15 years old. Spotted Turtle body size varies across the species' range with the largest turtles occurring in the northern (45°N latitude) and the smallest turtles occurring near the northcentral part of the range (39°N latitude). This drop in body size near 39°N latitude likely represents a "transition zone" where there is a tradeoff between growth and reproductive output, with turtles north of this zone producing fewer clutches per year and thereby allotting more resources to growth. Food items reported for U.S. Spotted Turtles include algae, cranberries, earthworms, aquatic insect larvae, small crustaceans, snails, tadpoles, salamanders, and carrion from fish and birds. Some individuals in some subpopulations avoid the hot, dry, and desiccating conditions of summer by aestivating in either aquatic or terrestrial habitats. Summer dormancy may be a more appropriate term than aestivation for this behavior as not all turtles become inactive in summer and for those that do, activity becomes reduced, rather than ceased. This reduced activity period may occur from late June through to early September and may last several days or weeks. Emergence from hibernation in northern populations occurs from late March to late April with dispersal from hibernacula occurring from early to late April. Spotted Turtles move back to hibernation areas in late summer to late fall and enter hibernacula between mid-September and mid-November, where they remain until the following spring Spotted Turtles often hibernate communally and as many as 16 to 34 individuals have been observed using a single den; however, they also hibernate singly. Spotted Turtles have also been observed to occasionally share hibernacula with Blanding's Turtles. Spotted Turtles often show fidelity to hibernation areas; however, individuals may also choose hibernacula that differ in habitat and locality between years (COSEWIC 2014).

Current Stressors and Threats

Spotted Turtle numbers are in decline mainly due to road mortality; collection for the pet, food, and medicine trade; and the loss and degradation of wetland habitat from invasive plants and development. The Spotted Turtle is particularly susceptible to habitat destruction and to exploitation by poachers in spring and fall when turtles aggregate at breeding and hibernation sites, respectively. Low juvenile recruitment, low fecundity, and late age of maturity exacerbate the Spotted Turtle's vulnerability to decline. Subpopulations are at high risk of demographic stochasticity given their small sizes and high degree of isolation from each other (COSEWIC, 2014).

The Center for Biological Diversity list these threats in the petition document (2012):

- Habitat alteration and destruction

  Habitat alteration and fragmentation is a major threat. The species is reasonably specialized in its habitat requirements and is not a good disperser. Additionally, the complex movement ecology and habitat requirements of Spotted Turtles make their populations especially vulnerable to road mortality: over the course of a year, they typically visit multiple wetlands to forage, mate, thermoregulate, and overwinter, requiring frequent overland migrations and road crossings.

- Overutilization
  Legal and illegal commercial exploitation (for both domestic use and export) and incidental collecting have impacted and continue to impact Spotted Turtle populations in many parts of the species' range.
- Predation
  Subsidized predators (i.e., unnaturally large populations of predators subsidized by easily available resources near human settlements) have a huge impact on eggs and juveniles and reduce recruitment into existing populations. This threat increases as the habitat becomes more and more fragmented by urbanization.

List of References

Center for Biological Diversity (CBD). (2012). Petition to list 53 amphibians and reptiles in the United States as threatened or endangered species under the Endangered Species Act. 454pp.

Ernst, C.H., & Lovich, J.E. (2009). *Turtles of the United States and Canada* (2nd Edition). The Johns Hopkins University Press.

Illinois Natural History Survey (INHS). (2021). Spotted Turtle (*Clemmys guttata* Schneider, 1792). Retrieved from https://herpetology.inhs.illinois.edu/species-lists/ilspecies/spotted-turtle/

Indiana Herp Atlas. (2021). Spotted Turtle (*Clemmys guttata*). Retrieved from https://www.inherpatlas.org/species/clemmys_guttata

Michigan Natural Features Inventory (MNFI). (2021). *Clemmys guttata* (Spotted Turtle). Retrieved from https://mnfi.anr.msu.edu/species/description/11488/Clemmys-guttata

Ohio Department of Natural Resources (ODNR). (2018). Reptiles of Ohio field guide. Retrieved from https://ohiodnr.gov/static/documents/wildlife/backyard-wildlife/Pub%205354_Reptiles%20of%20Ohio%20Field%20Guide.pdf

0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

SPOTTED TURTLE(*CLEMMYS GUTTATA*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline	Commercial Navigable Waterway	1-Mile Coastal Inland Buffer
Major Road	Rivers & Streams	Action Area
Railroad	Lakes & Ponds	Spotted Turtle (*Clemmys guttata*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Streamside Salamander (*Ambystoma barbouri)*

Federal Listing: Under Review. The Streamside Salamander was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 59836).
State Listing within the AA: Special Concern in Indiana

Species Description
The Streamside Salamander is of medium size, with a relatively small head, short snout, stout body, short limbs, relatively short and fat tail, 14 to 15 deeply impressed costal grooves on the body, and similarly impressed grooves along most of the tail. The dorsal ground color is dark gray, black, or brown but is largely hidden by a dense pattern of gray (dorsally) and light blue-gray (laterally) lichenose frosting; ventral ground color is slightly lighter, with more discrete lichenose blotches. Internal morphological features are important for distinguishing the Streamside Salamander from its closest relatives that are not discussed here (see Kraus, 2013). Adults reach 89mm snout vent length and can reach 146mm total length. Larvae are dark green-brown dorsally and laterally, dirty white ventrally, with a sharp transition to the pale mid-ventral coloration laterally at a point below the limb insertions. They have dark throat and a wide dorsal tail fin that extends to the rear of the head. Young larvae typically have 3 to 6 paired, light dorsal blotches or saddles. These eventually become obscure or disappear in older larvae; the throat lightens in color somewhat, and the pigmentation on the sides becomes a black reticulum. Larvae metamorphose at approximately 37 to 40mm. Newly metamorphosed animals are uniformly dark brown, gray, or gray-brown and they begin to acquire adult color pattern elements within 3 to 6 weeks after transforming. The Streamside Salamander is easily distinguished from other members of the genus, except for the Small-mouthed Salamander. The most reliable means of distinguishing them is by examining the maxillary/premaxillary teeth but can be distinguished by being somewhat stockier than Small-mouthed with relatively fatter tail, which is often thick and well-rounded along most of its length with conspicuous grooves. Small-mouth tails are usually thinner and more compressed, at least posteriorly; if grooves are present, they are usually shallow and limited to the anterior portion. The lichenose frosting of Streamside Salamanders is typically denser and of a light blue color than that of Small-mouthed Salamanders, wich is usually arrayed in more discrete blotches and is brown, gray, or dark blue-gray. The breeding habitat and egg-laying habitat of the two species also differ, with Streamside Salamanders usually breeding in first and second-order streams, depositing a layer of singly attached eggs on the undersides of rock. Small-mouthed salamanders usual breed in ponds/pools and lay small clusters of eggs on vegetation (Kraus, 2013).

Species Distribution
The species inhabits upland deciduous forests or rolling topography. Most populations occur on a substrate of limestone bedrock, but some inhabit substrates of sandstone or shale. Forested areas within its native range have been highly disturbed by humans, and the species can often persist in highly fragmented landscapes. However, in such landscapes these salamanders will typically be limited to remnant forests and will not be found in cleared areas. For breeding habitat, it is dependent on ephemeral first- and second-order streams having natural barriers that prevent the ingress of fish, so salamanders are never found far from the hills that provide such habitat. Breeding streams are typically small (2 to 5m wide) and shallow (usually <50cm), contain large flat rocks, and have alternating areas of pools, runs, and riffles. Larvae typically inhabit small, still, shallow stream pools having clear water and a bottom of bedrock and silt, with large flat rocks that can be used as refugia (Kraus, 2013).

The range of the Streamside Salamander lies largely within the upper Bluegrass Region in the middle portion of the Ohio River Drainage. The majority of the range encompasses central Kentucky and the immediately adjacent areas of southwestern Ohio and southeastern Indiana, but outlying populations occur in western and southern Kentucky, northern Tennessee and western West Virginia. Some of these outlying populations show evidence of genetic introgression with Small-mouthed Salamanders. The two species were likely segregated by habitat and closely parapatric originally, but extensive forest clearing has obscured the original distributional pattern of Streamside Salamanders along the northern margins of their range. Populations on the western and northern margins of their range may be parapatric with Small-mouthed Salamanders.

Distribution within Action Area

- In Ohio adults have been obtained from Adams, Brown, Butler Clermont, Clinton, Hamilton, Jackson, Lawrence, Montgomery, Scioto and Warren counties (Kraus, 2013).
- Streamside Salamanders are restricted to the southeastern part of Indiana and some of the south-central counties bordering the Ohio River (Indiana Herp Atlas, 2021).

Critical Habitat

No critical habitat has been designated for the Streamside Salamander.

Life History

Like other members of the genus, adult Streamside Salamanders spend most of their lives underground. Adults are most readily observed while present in streams during their breeding season, and they can sometimes be located under large logs or rocks adjacent to these streams during or immediately after that period. When not active on the surface adults have not be located, and they presumably reside in the forest patches adjacent to their breeding streams. How widely they disperse from breeding habitats into surrounding upland is unknown. Migration to breeding stream begins in autumn and continues in late winter. This gives a bimodal patters of surface activity, with an autumnal peak in late October, a decrease in surface activity during the harsh winter months, followed by a larger peak during February and March as additional animals migrate. Prior to breeding, autumnal migrants presumably remain burrowed into the hillsides adjacent to breeding streams. As with other Ambystoma, males initiate migration before females do. Migration is highly correlated with occurrence of rainfall, and surface activity typically ends within 30 minutes of cessation of rainfall; however, migration is not correlated with the intensity of rainfall, with air temperature, or with time of night. The breeding period is extensive commencing in January/February and extending through April. During the breeding season, small numbers of animals enter and breed in the stream at any one time. In streams, eggs are almost always attached on the undersides of flat limestone rocks; eggs may occur singly, but most often occur in a layer under the rock, sometimes in groups up to several hundred. Clutches are usually deposited in shallow pools or runs of 10 to 20cm depth, with a preference for pools. Eggs incubate for a period ranging from 29 to 82 days, with those laid later in the season requiring shorter incubation times. Hatchlings from longer incubating eggs are typically larger and more developmentally advanced, and eggs can delay hatching in the presence of chemical cues from predatory flatworms or fish, thereby allowing hatchling to emerge at a larger size that may confer greater resistance to these predators. Larvae feed primarily on a diversity of zooplankton and chironomid fly larvae but will take isopods and amphipods if they prey is not too large to swallow. The larval period is approximately 7 to 9 weeks (Kraus, 2013).

Current Stressors and Threats

The Center for Biological Diversity list these threats in the petition document (2010):

- Habitat destruction

  The Streamside Salamander has declined due to the loss of native forests for agriculture and urban development. This salamander's habitat in Kentucky is undergoing rapid development and one of the two known populations in West Virginia was lost due to urbanization. In Tennessee, what is possibly the last remaining population in the state is imminently threatened by development. Deforestation is also a threat to this species. Where surrounding land has been logged, this salamander is usually not detected. Siltation is also likely a threat to the Streamside Salamander. The Ohio Division of Wildlife reports that the Streamside Salamander is threatened by logging, urbanization, pollution of stream habitats by acid mine drainage, pesticides, and the channelization and scouring of streams.
- Predation

  Predation is a significant source of mortality for Streamside Salamander populations. Fish predation may restrict this species to upper portions of breeding. Flatworms and water nakes are also known to prey on Streamside Salamander larvae. In conjunction with other threats, natural predation could increasingly threaten this species.

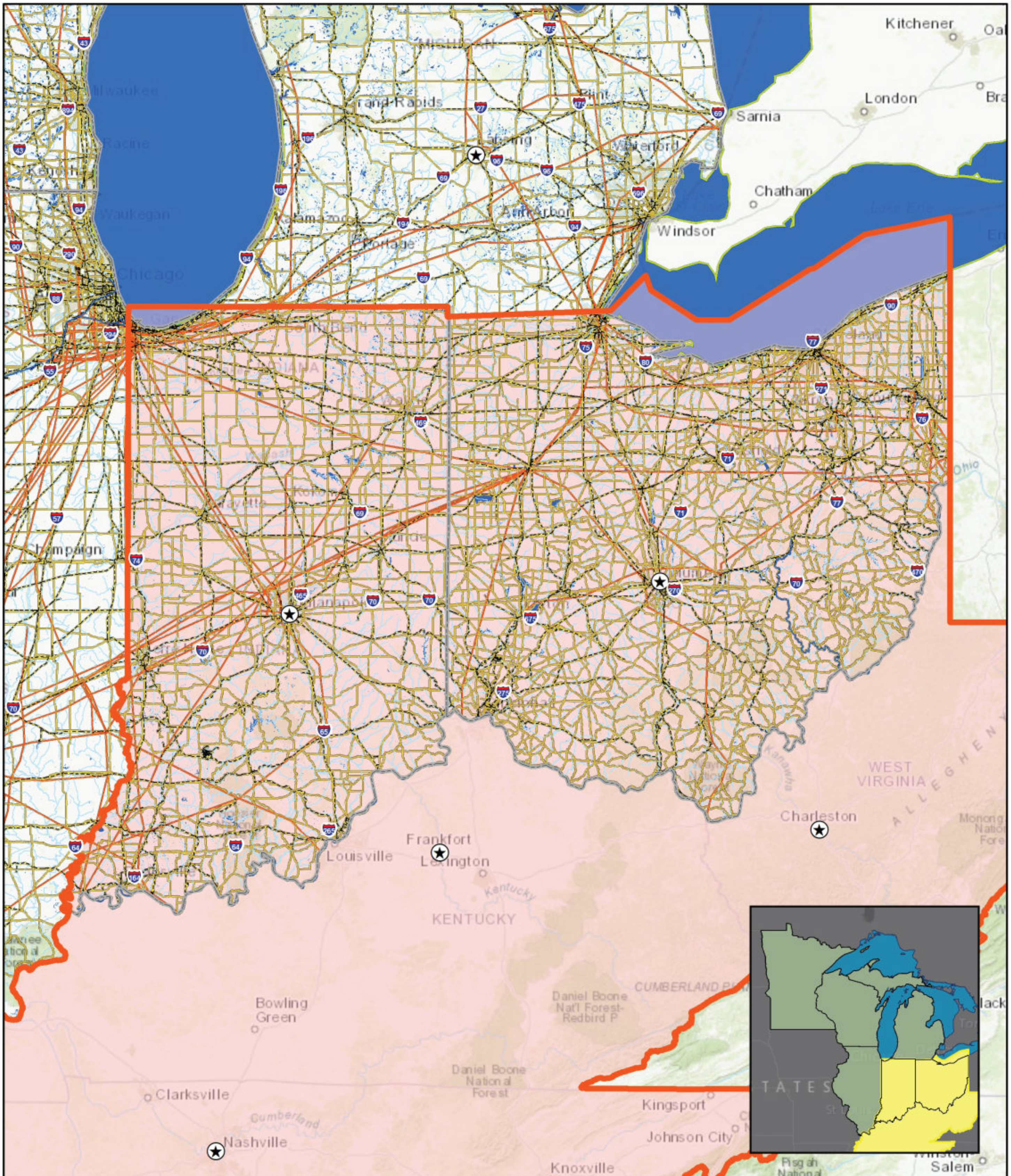
- Stochastic weather events
  Stream drying and flooding are significant mortality sources for this species.

List of References

Center for Biological Diversity (CBD). (2010). Petition to list 404 aquatic, riparian and wetland species from the southeastern United States as threatened or endangered under the Endangered Species Act. 1145pp.

Indiana Herp Atlas. (2021). Small-Mouthed Salamander (*Ambystoma texanum*). Retrieved from https://www.inherpatlas.org/species/ambystoma_texanum

Kraus, F. (2013). Streamside Salamander. In R.P. Pfingsten, J.G. Davis, T.O. Matson, G. Lipps, D. Wynn, & B.J. Armitage (Eds). *Amphibians of Ohio*. Ohio Biological Survey.



STREAMSIDE SALAMANDER (*AMBYSTOMA BARBOURIN*)
ACTION AREA OVERVIEW MAP

SCALE 1:5,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Streamside Salamander (*Ambystoma barbourin*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Wood Turtle (*Glyptemys insculpta)*

Federal Listing: Under Review. The Wood Turtle was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2015 (80 FR 37568).
State Listing within the AA: Threatened in Minnesota and Wisconsin (delisting recommended); Special Concern in Michigan. Only two old records from extreme eastern Ohio (not listed).

Species Description
The Wood Turtle is a medium-sized turtle. Carapace (upper shell) length ranges from 12 to 24cm (4.7 to 9.4 in). Unlike many species of turtles, mature males are usually 7 to 10% larger than mature females. Their low-keeled carapace ranges in color from brown to grayish brown to tan, and is accompanied with black and yellow flecks, at times with yellow rays. Scutes on the carapace have an irregular, pyramidal appearance from the concentric circles that are formed by growth rings and ridges. Dorsal portions of the head, arms, legs, and tail are dark brown, while the neck, throat, and forelegs are yellow, orange, or red. Females are generally pale yellow in color, while pigmentation in males is often bright yellow, orange, or red. The hingeless plastron (lower shell) has a yellow base with a black blotch on the outer posterior corners of each scute. Wood Turtle plastrons are flat in females, whereas they become more concave in sexually mature males. Males have long, thick tails with the cloacal opening posterior to the margin of the shell, and females have shorter tails with the cloacal opening level to or under the carapace margin (WIDNR, 2016).

Species Distribution
Wood Turtles are most often found in and around clear, moderate to fast moving rivers and streams with sand, gravel, or cobble substrates. Wood Turtles are habitat generalists, using a wide variety of forested habitats that are in close proximity to water. Forest edges near open canopy habitats are often used for thermoregulation and foraging. Young mixed forest stands with low to moderate levels of shrub and tree cover are often preferred at the microhabitat level. Prior to nesting and hibernation (i.e., in the spring and fall when nighttime air temperatures are low), Wood Turtles are found predominantly near aquatic habitats and alder thickets. Nesting habitat includes moderately sloughing sand banks, sand prairies and barrens, agricultural fields, roadsides, and other areas with disturbed sandy or gravelly substrates that support little or no vegetation. During mid-summer, Wood Turtles also use dry and wet meadows, upland fields, pastures, swamps, and bogs. In Wisconsin, summer shelters include rabbit holes, sod overhangs, gullies, hollow logs, and buttressed tree roots. Wood Turtles overwinter underwater in rivers and streams within deep pools, under overhanging banks, roots, and logs, and in beaver lodges and muskrat burrows (WIDNR 2016).

Wood Turtles are native to eastern North America. They range in the northeast from Nova Scotia, New Brunswick, and Maine, southwest along the Atlantic coast to Maryland, Virginia, and West Virginia, northwest to Wisconsin, northeast Iowa, and eastern Minnesota, and north to southern Ontario and southern Québec.

Distribution within Action Area

- Wood Turtles are found throughout the northern and southwestern portions of Wisconsin. They are absent from southeast Wisconsin and the southern Lake Michigan drainage. Species occurrences are scattered throughout their Wisconsin range; however, occurrences are most dense in the forested regions of the northern and western portions of the state (WIDNR, 2016).
- The Wood Turtle is found on the western edge of its range in Minnesota and is restricted to the western third of the state (MNDNR, 2021).
- Occurrences in Michigan are in the northern half of the lower peninsula and throughout the upper peninsula (MNFI, 2021).

Critical Habitat
No critical habitat has been designated for the Wood Turtle.

Life History

In the Upper Great Lakes Region, the active season for the Wood Turtle generally begins with the emergence of turtles from streams in April or May and lasts until September or October as turtles return to their overwintering stream. Overwintering typically begins in October. Their terrestrial activity varies and is dependent on geographic location and annual fluctuations in weather. From late June until August, Harding and Bloomer found females preferring terrestrial sites over aquatic ones. Wood Turtles have been found mating from April until November, although mating is more widely documented in the fall. Females search for nesting habitat and lay eggs from late May until early July, peaking in June. In years with sufficient temperatures for embryo development, eggs begin to hatch throughout August and September. Wood Turtles remain relatively close to streams and rivers during the spring and fall and often return to the water at night when air temperatures are low. During warmer summer months, they begin to disperse further distances from the water as they forage for food and as females look for suitable nesting areas. A large subset of Wood Turtle telemetry studies throughout their range, including Wisconsin, have documented high proportions of individuals remaining within 300 m (984 ft) of flowing water throughout their active season. A small proportion of Wood Turtles have been found dispersing longer distances (i.e., 400 – 933 m [1,312 – 3,061 ft]) from moving water throughout their range. Wood Turtles typically reach sexual maturity around 14 – 18 years of age. Maturation can be as early as 12 years and as late as 20 years. Mating generally takes place in 0.1 – 1.2 m (0.3 – 3.9 ft) of water; however, terrestrial copulation has also been observed. Females nest generally from mid-May to early-July, though it is quite uncommon after 30 June. Preferred nesting areas include well-drained yet moist soils that are free of rocks and thick vegetation, with direct sunlight exposure, 2.0 – 5.0 m (6.6 – 16.4 ft) above water levels, and within 40 m (131 ft) of flowing water. Most nests are located within 10 m (33 ft) of flowing water, but some females have been documented nesting up to 150 m (492 ft) away (Walde et al. 2007). Females will typically lay one clutch a year (occasionally two); however, clutches may not be laid every year. Clutch sizes are known to be as high as 20 eggs. Hatchlings emerge from the nest between August and October. Hatchlings rarely overwinter in the nest, and are thought to survive terrestrial overwintering only in the warmest of winters (WIDNR 2016).

Current Stressors and Threats

Threats are explored in many of the status assessments referenced above. In the upper Great Lakes region (but also range wide), they include (WIDNR, 2016):

- Habitat loss

  Habitat destruction and modification are widely considered to be the most serious threats to Wood Turtle populations. Urbanization, recreation, some agricultural practices, and flood control (i.e., dams and stream channelization/stabilization) in suitable Wood Turtle habitat are often associated with localized habitat loss, alteration, and fragmentation. These threats may eliminate or modify all or a significant portion of the critical habitat Wood Turtles need for nesting, foraging, and overwintering. Foraging and nesting grounds often become overgrown by succession due to a lack of natural disturbance (i.e., fire, flooding, and beavers) and are often infiltrated by invasive plants. Flood control measures prevent or slow sand and gravel from distributing downstream to enhance or create new nesting sites. Wood Turtles respond to this decline of suitable nesting habitat by searching elsewhere, often finding sandy or gravelly substrates in fragmented habitats near roads and bridges that serve as ecological sinks or traps. Roads also contribute to direct mortality of individuals moving from one fragmented habitat to another, and subsequently provide easier access for predators (e.g., raccoons) and humans to exploit nests and adults. Fragmented habitats also promote further isolation of populations by minimizing natural recolonization attempts into previously extirpated areas and by lessening inter-population exchange of individuals. Pollution and agricultural pesticides that filter into rivers and streams are also suspected of causing population declines in some areas.
- Adult removal

  Wood Turtles have low fecundity, delayed maturity, and high hatchling/juvenile mortality levels. Therefore, the consistent annual removal of one or more adults from a population can be detrimental to future population sustainability. Road mortality of adult Wood Turtles is a significant issue in areas with increasing human population pressures. Females make up a higher proportion of road mortality cases, due to their annual upland forays to lay eggs in suitable nesting grounds. Adult turtles, in addition, are found crushed by agricultural and utility equipment in many parts of their range. Adult predation by raccoons and humans (illegal shooting/poaching) has been reported in some cases to cause population decline. Localized declines are also associated with the over-collection of wild individuals for human use.

- Low recruitment
  As a result of extremely low and reduced levels of hatchling/juvenile recruitment, many Wood Turtle populations display high proportions of adults to young. Nest predation (especially from raccoons and skunks) is common in highly urbanized and fragmented landscapes although high predation rates in non-fragmented and remote locations are also possible.

List of References

Bowen, K.D., & Gillingham, J.C. (2004). R9 cpecies conservation assessment for Wood Turtle - *Glyptemys insculpta* (LeConte, 1830). USDA Forest Service, Eastern Region. 39pp.

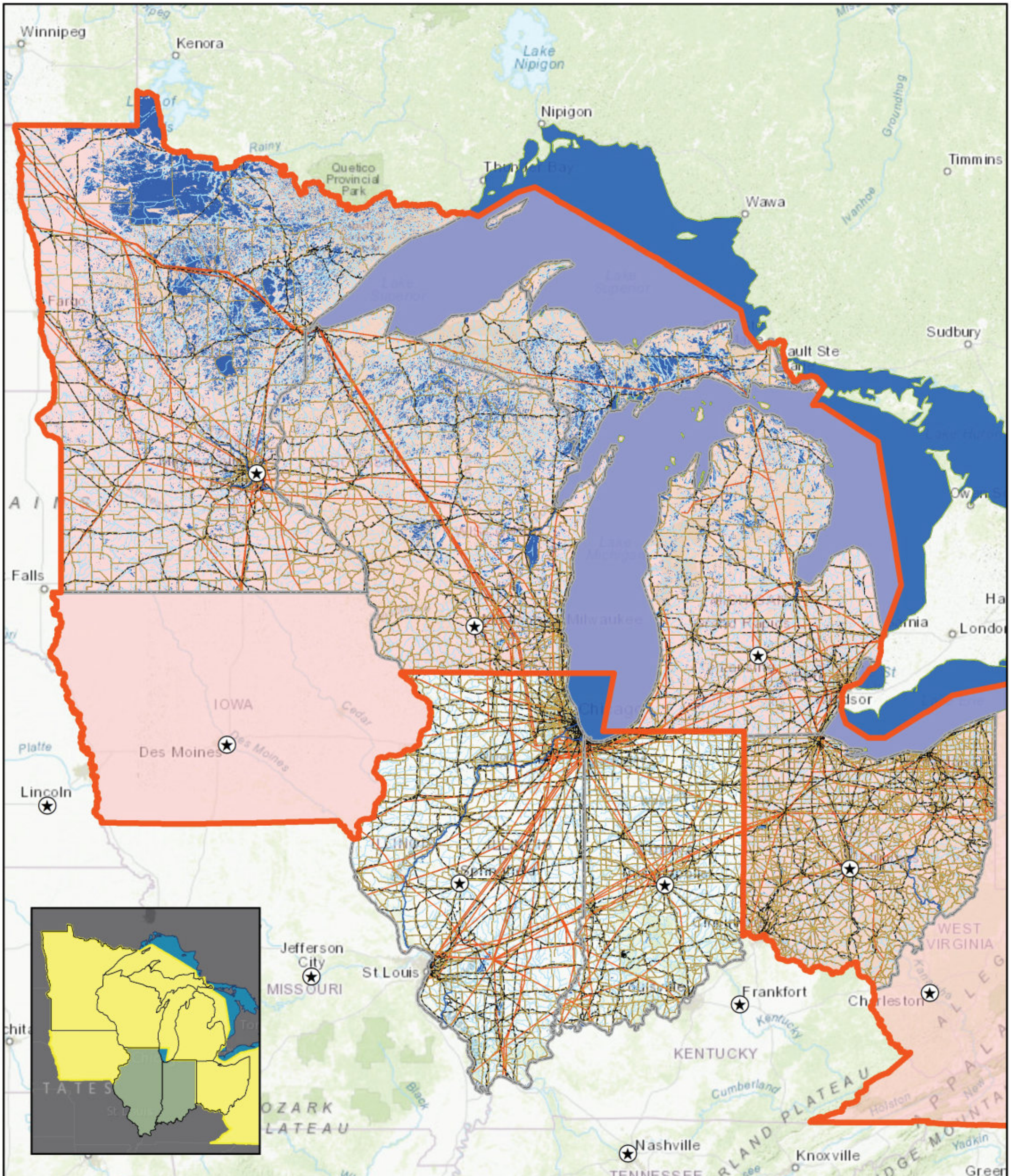
Jones, M.T., & Willey, L.L. (2015). Status and conservation of the Wood Turtle in the northeastern United States. 271pp + appendices.

Jones, M.T., Roberts, H.P., & Willey, L.L. (2018). Conservation plan for the Wood Turtle in the northeastern United States. Report to the Massachusetts Division of Fisheries & Wildlife and the U.S. Fish & Wildlife Service. 259 pp.

Michigan Natural Features Inventory (MNFI). (2021). *Glyptemys insculpta* (Wood Turtle). Retrieved from https://mnfi.anr.msu.edu/species/description/11489/Glyptemys-insculpta

Minnesota Department of Natural Resources (MNDNR). (2021). *Glyptemys insculpta* (Wood Turtle) Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ARAAD02020

Wisconsin Department of Natural Resources (WIDNR). (2016). Wisconsin Wood Turtle (*Glyptemys insculpta*) Status Assessment and Conservation Strategy. PUB NH-935 2016. Wisconsin Department of Natural Resources, Madison, Wisconsin. 33pp.



0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

WOOD TURTLE (*GLYPTEMYS INSCULPTA*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Wood Turtle (*Glyptemys insculpta*) Counties of Occurrence.

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

MAMMALS

Canada Lynx (*Lynx canadensis*) Contiguous Distinct Population Segment

Federal Listing: Threatened
State Listing within the AA: Endangered in Michigan; Special Concern in Minnesota

Subspecies Description
The Canada Lynx is a medium-sized cat with long legs and large, well-furred paws. In winter, the lynx's fur is dense and has a grizzled appearance with a grayish-brown mix of buff or pale brown fur on the back, and a grayish-white or buff-white fur on the belly, legs, and feet. In summer, its fur is more reddish to gray-brown. It has long tufts of black hairs extending from the tips of its ears, a short, completely black-tipped tail, and often a distinct dish-like facial ruff of pale hairs tipped black. Lynx generally measure 75 to 90 cm (30 to 35 in) long and weigh 6 to 14 kg (14 to 31 lb), and males are 13-25 percent larger than females. The lynx's large feet and long legs make it well-adapted for traversing and hunting in deep, powdery snow, where its low foot-loading (weight per surface area of foot) is thought to provide a competitive advantage over other terrestrial predators of snowshoe hares, the lynx's primary prey. In southern Canada and the northern contiguous United States, where the southern edge of the lynx range overlaps the northern edge of the bobcat range, the 2 species are easily confused because of their similar size and appearance. However, the lynx's longer ear-tufts, larger feet, and black-tipped tail distinguish it from the bobcat, which has shorter ear tufts, small feet, and white on the underside of the tail. Bobcats are much more common, widespread, and abundant than lynx in most of the contiguous United States (USFWS, 2017).

Species Distribution
The Canada Lynx is broadly distributed across northern North America from eastern Canada to Alaska. It is strongly associated with the expansive, continuous boreal forests of those areas, and its range largely overlaps that of its primary prey, the snowshoe hare, also a boreal forest specialist. In Canada, lynx are thought to occupy about 5.5 million km^2 (over 2.1 million mi^2), which represents 95 percent of their historical range in that country, and over 89 percent of the species' entire distribution. Nationally in Canada, lynx are classified as secure, widespread, and abundant; they are managed for long-term population stability. In Alaska, lynx are distributed across roughly 534,454 km^2 (206,354 mi^2) of boreal forest, which represents about 8.7 percent of the species' breeding distribution. Lynx in Alaska are apparently secure, with low to moderate threats, and populations appear stable statewide, although total abundance is unknown (USFWS, 2017).

When it listed the DPS under the ESA, the Service defined its range as the forested portions of Maine, New Hampshire, New York, Vermont, Michigan, Minnesota, Wisconsin, Colorado, Idaho, Montana, Oregon, Utah, Washington, Wyoming. Some of these states, and parts of others, are thought to have historically supported only dispersing lynx or to have only occasionally supported resident breeding lynx. Such areas were included within the range of the DPS because of the possibility that lynx could establish small, local populations in them and perhaps contribute to the persistence of the DPS, though evidence of this was (and remains) lacking and on research and monitoring that have occurred since then, it seems likely that lynx occurred historically in some states (New York, Vermont, Wisconsin, Oregon, and Utah) only intermittently as dispersers or as small, naturally ephemeral populations; not as persistent resident breeding populations. In other states (New Hampshire, Michigan, Colorado, and Wyoming), it remains uncertain whether resident lynx occurred historically as small but persistent breeding populations or only ephemerally. Parts of the remaining states (Idaho, Maine, Minnesota, Montana, and Washington) show the strongest evidence of historical and recent (at the time of listing and since then) persistent resident populations. In Minnesota, research conducted since the 2003 remand has demonstrated the continuous presence of a resident lynx population in the northeastern part of the state that seems to be the southern periphery of a larger population in southwestern Ontario (USFWS, 2017).

Distribution within Action Area

- Occurs on Michigan's Upper Peninsula in Alger, Baraga, Chippewa, Delta, Dickinson, Gogebic, Houghton, Iron, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, and Schoolcraft Counties
- Occurs in northern Minnesota in Aitkin, Beltrami, Carlton, Cass, Clearwater, Cook, Itasca, Koochiching, Lake, Lake of the Woods, Marshall, Pine, Roseau, and St. Louis Counties
- Occurs in northern Wisconsin in Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Marinette, Oneida, Price, Sawyer, Vilas, and Washburn Counties

Critical Habitat

Critical habitat for the DPS was designated in 2006 (71 FR 66008). The Service revised the critical habitat designation for the DPS in 2009 (74 FR 8616) and 2014 (79 FR 54782). The final critical habitat designation totals 38,954 square miles in five units: northern Maine, northeastern Minnesota, northwestern Montana and northeastern Idaho, north-central Washington, and the Greater Yellowstone area of southwestern Montana and northwestern Wyoming.

Life History

All aspects of lynx life history are inextricably tied to its primary prey, the snowshoe hare, which comprises most of the lynx diet throughout its range. Lynx are highly specialized hare predators and require landscapes that consistently support relatively high hare densities. Although lynx take a variety of alternate prey species, especially red squirrels, which may be important when hare numbers are low, hare abundance is the major driver of lynx population dynamics. Lynx denning area selection, pregnancy rates and litter sizes, as well as survival (kitten, subadult, and adult), recruitment, and dispersal rates, and population age structure, home range sizes, density, and distribution are all strongly influenced by hare abundance. Lynx and snowshoe hares are strongly associated with moist boreal forests, where winters are long, cold, and snowy. The predominant vegetation of boreal forest is conifer trees, primarily species of spruce and fir. Snowshoe hares feed on conifers, deciduous trees, and shrubs and are most abundant in forests with dense understories that provide forage, cover to escape from predators, and protection during extreme weather. Lynx population dynamics, survival, and reproduction are closely tied to snowshoe hare availability, making snowshoe hare habitat the primary component of lynx habitat. However, lynx do not occur everywhere within the range of snowshoe hares in the contiguous United States. This may be due to inadequate abundance, density, or spatial distribution of hares in some places, or the absence of snow conditions that would provide lynx a competitive advantage over other terrestrial hare predators, or a combination of these factors.

Lynx typically mate in March and April, and kittens are born from late April to mid-June after a 60- to 70-day gestation period. Female lynx typically reach reproductive maturity in their second year (at 22 months of age); however, when hares are abundant, females may breed at 10 months of age and produce kittens as 1-year-olds. Males do not seem to breed as yearlings, and they do not contribute to rearing of young. Lynx dens are typically located in areas of dense cover, where coarse woody debris, such as downed logs and windfalls, provides security and thermal cover for lynx kittens. Dens must be near foraging habitat to allow females to adequately provision dependent kittens, and females seem to select den sites near prey sources to minimize time spent away from kittens while foraging. Females attend kittens at the natal den site and 1 or more (up to 5) alternate or maternal dens until kittens are about 6-10 weeks old. Thereafter, kittens remain with their mothers through their first winter, apparently learning from her how to hunt and capture prey, initially on a small portion of her home range, but by fall on the larger area the female used before kittens were born. Juveniles remain closely associated with their mothers until February or March, when family groups begin to break up, with young typically dispersing in April and May to establish their own home ranges. Female offspring may establish home ranges overlapping or adjacent to their mother's home range and maintain mother-daughter bonds throughout their lives. Male home ranges may slightly overlap adjacent male home ranges. While male home ranges typically overlap 1 to 3 female home ranges, and female home ranges are partially or completely encompassed by a male's home range, core areas within home ranges appear to be exclusive except during the breeding season. Fidelity to home ranges over several years has been documented for both sexes, but shifts and abandonment of home ranges have also been. Lynx have been documented to live up to 16 years in the wild (USFWS, 2017).

Current Stressors and Threats

- Inadequate regulations/management

Lynx in the contiguous U.S. were designated a distinct population segment (DPS) and were listed as threatened under the Endangered Species Act in 2000 because regulations governing forest management activities on Federal lands were deemed inadequate, at that time, to conserve lynx and their habitats. Since listing, most Federal land managers throughout the lynx's range, as well as States and several private landowners in Maine, have formally amended management plans to conserve lynx and hare habitats.

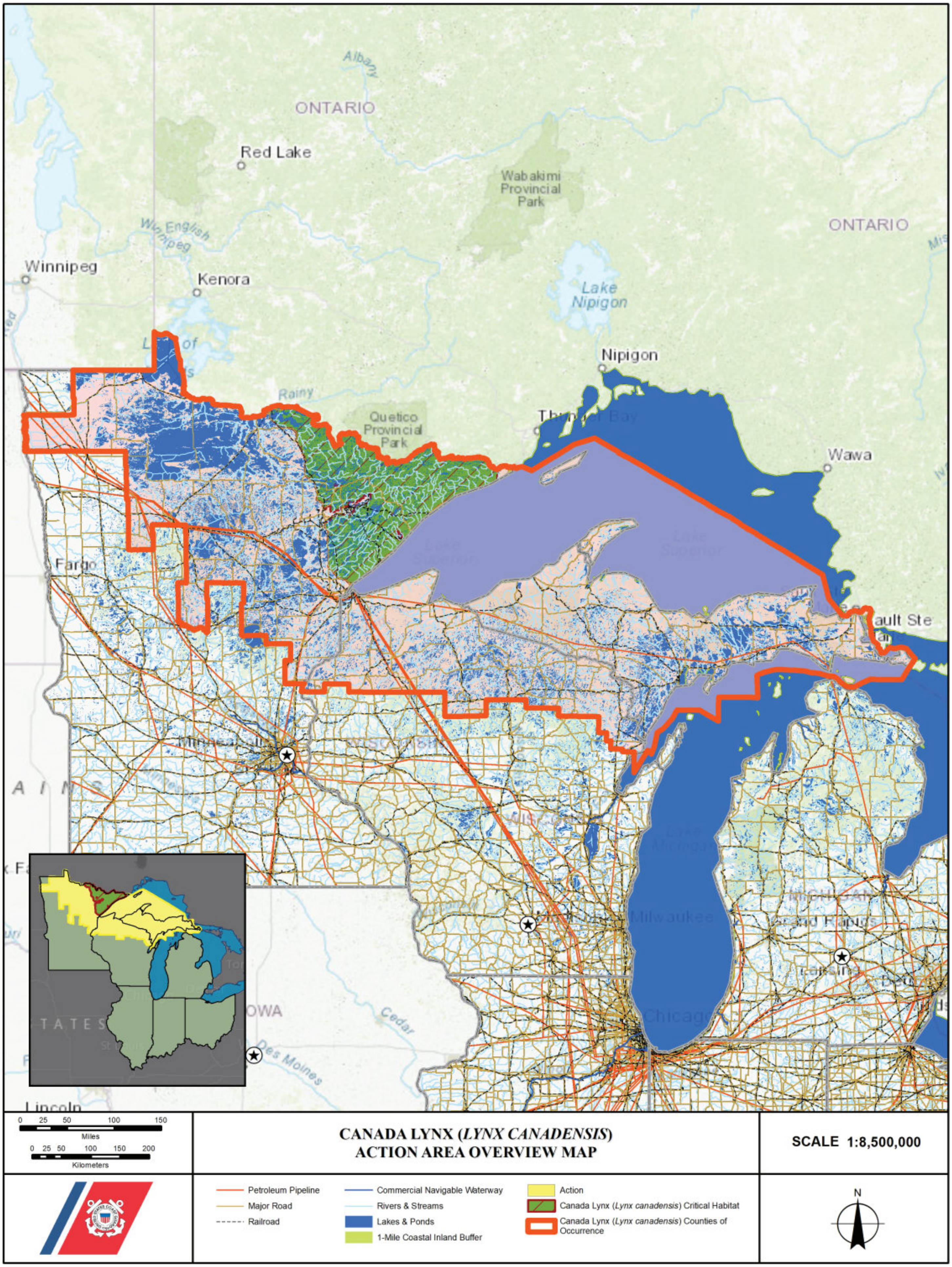
- Climate change

Recent modeling suggests that climate change is likely to impact lynx in the DPS. Although the timing, magnitude, and consequences of climate-related impacts are difficult to predict, lynx habitats and populations in the contiguous U.S. are likely to be smaller and more isolated in the future and, therefore, more vulnerable to other threats (USFWS, 2013).

List of References

U.S. Fish & Wildlife Service (USFWS). (2013). Canada Lynx (*Lynx canadensis*) fact sheet. Retrieved from https://www.fws.gov/mountain-prairie/es/species/mammals/lynx/CandaLynxFactSheet_091613.pdf

U.S. Fish and Wildlife Service (USFWS). (2017). Species status assessment for the Canada Lynx (*Lynx canadensis*) Contiguous United States Distinct Population Segment, Version 1.0. Lakewood, Colorado. 292pp.



CANADA LYNX (*LYNX CANADENSIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:8,500,000

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Gray Bat (*Myotis grisescens)*

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

Species Description
The Gray Bat can reach a body length of 3.5 in (8.9 cm), a wingspan of 9-11 in (22.9-27.9 cm) and a forearm length of 1.8 in (4.6 cm). Although typically gray, the fur can turn to a reddish-brown color during the summer. Gray Bats also have a calcar (spur of cartilage) on their foot, which is used for stability during flight (FFWCC, 2021).

Gray Bats are distinguished from other bats by the unicolored fur on their back. In addition, following their molt in July or August, Gray Bats have dark gray fur which often bleaches to a chestnut brown or russet. They weigh 7-16 g. The bat's wing membrane connects to its ankle instead of at the toe, where it is connected in other species of *Myotis*.

The diet of the Gray Bat primarily consists of insects, including moths and beetles. Bats are nocturnal hunters, typically remaining inactive throughout the day and flying at night to hunt. During extended periods of inactivity, bats go into a state of reduced activity called torpor. During torpor, they decrease their heart rate and body temperature to conserve energy.

Gray Bats reach sexual maturity at the age of two years, which makes it one of the slowest maturing small mammals. The Gray Bat breeds before hibernation begins (in the winter) and the female bats retain sperm until spring when eggs are fertilized. Pregnant females form nursing colonies, which contain few male bats. It is not known why exactly males can be found in nursing colonies. Females migrate to their nursing colonies in the spring where they give birth to one pup. Offspring are weaned at two months old (FFWCC, 2021).

Species Distribution
The Gray Bat occupies a limited geographic range in limestone karst areas of the southeastern United States. They are mainly found in Alabama, northern Arkansas, Kentucky, Missouri, and Tennessee. A few can be found in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina.

Distribution within Action Area

- Occurs in southwestern Illinois in Alexander, Hardin, Jackson, Johnson, Monroe, Pike, Pope, and Pulaski Counties
- Occurs in southern Indiana in Clark, Crawford, Floyd, Harrison, Perry, and Spencer Counties

Critical Habitat
No critical habitat has been designated for the Gray Bat.

Life History
Gray Bats roost, breed, rear young and hibernate in caves year-round. They migrate between summer and winter caves and will use transient or stopover caves along the way. Mating occurs as bats return to winter caves in September and October. By November, most Gray Bats are hibernating. Adult females begin to emerge in late March, followed by juveniles and adult males. Females store sperm over winter and become pregnant the following spring. A few hundred to many thousands of pregnant females congregate to form maternity colonies. Males and nonreproductive females gather in smaller groups to form "bachelor colonies". A single pup is born in late May or early June. Young begin to fly 20 to 25 days after birth. Gray

Bats feed primarily on flying insects over rivers and lakes. Aquatic insects, particularly mayflies, make up most of their diet (KDFWR, 2021).

Current Stressors and Threats

- Human disturbance
  Gray Bats are endangered largely because of their habit of living in very large numbers in only a few caves. As a result, they are extremely vulnerable to disturbance. Arousing bats while they are hibernating can cause them to use up a lot of energy, which lowers their energy reserves. If a bat runs out of reserves, it may leave the cave too soon and die. In June and July, when flightless young are present, human disturbance can lead to mortality as frightened females drop their young in the panic to flee from the intruder.
- Flooding and reservoir construction
  Many important caves were flooded and submerged by reservoirs. Other caves are in danger of natural flooding. Even if the bats escape the flood, they have difficulty finding a new cave that is suitable (USFWS, 1997).
- Commercialization of caves
  The commercialization of caves drives bats away. Any gating on the cave that prevents access or alters the air flow, temperature, humidity, and amount of light is harmful (USFWS, 1997).

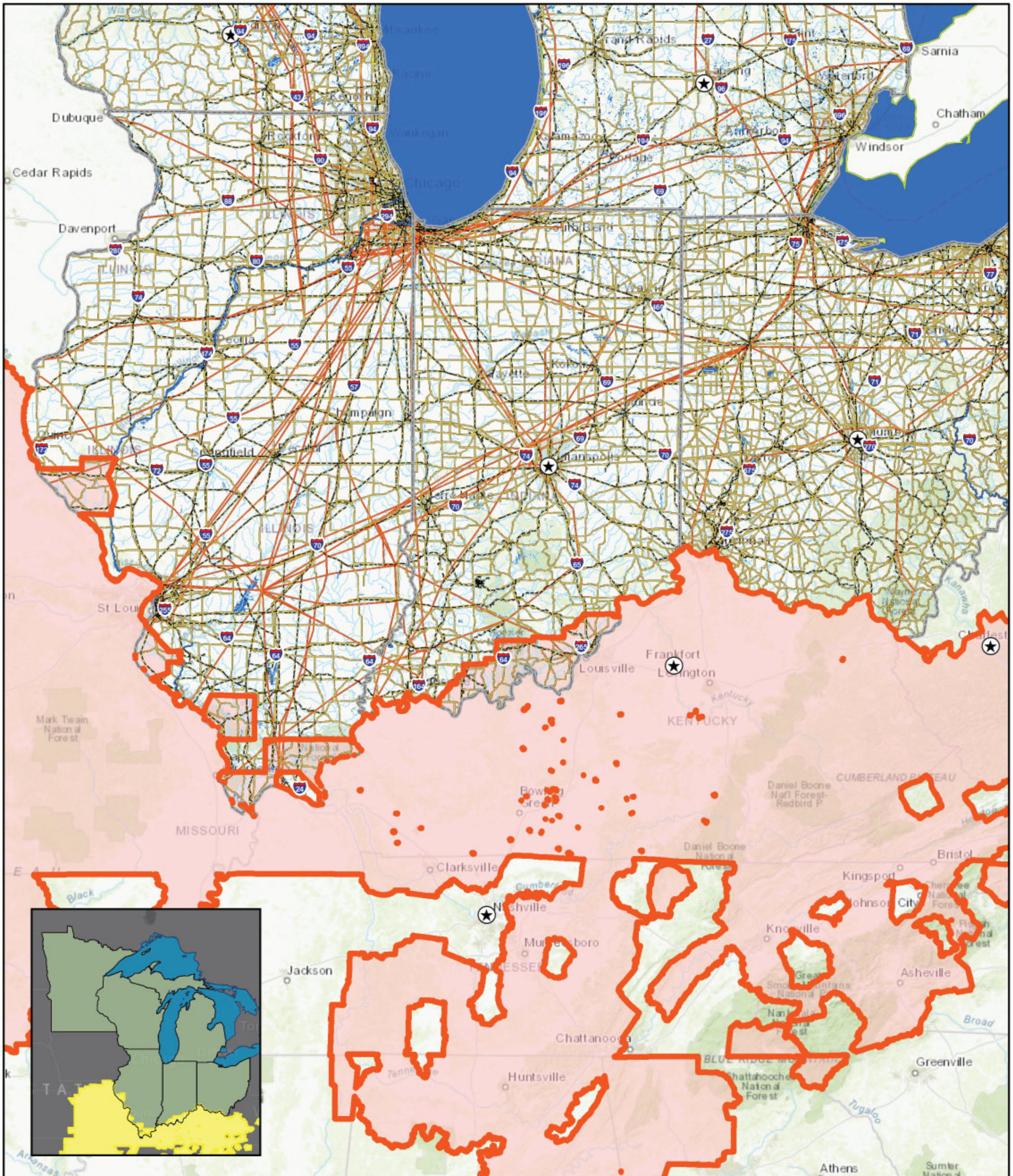
List of References

Florida Fish & Wildlife Conservation Commission (FFWCC). (2021). Gray Bat (*Myotis grisescens*). Retrieved from https://myfwc.com/wildlifehabitats/profiles/mammals/land/gray-bat/

Kentucky Department of Fish & Wildlife Resources (KDFWR). (2021). Gray Bat (*Myotis grisescens*). Retrieved from https://fw.ky.gov/Wildlife/Pages/Gray-Bat.aspx

U.S. Fish & Wildlife Service (USFWS). (1997). Gray Bat (*Myotis grisescens*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/mammals/grbat_fc.html

U.S. Fish & Wildlife Service (USFWS). (2021). Gray Bat (*Myotis grisescens*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A04J



GRAY BAT (*MYOTIS GRISESCENS*) ACTION AREA OVERVIEW MAP

SCALE 1:6,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Gray Bat (*Myotis grisescens*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Gray Wolf (*Canis lupus*)

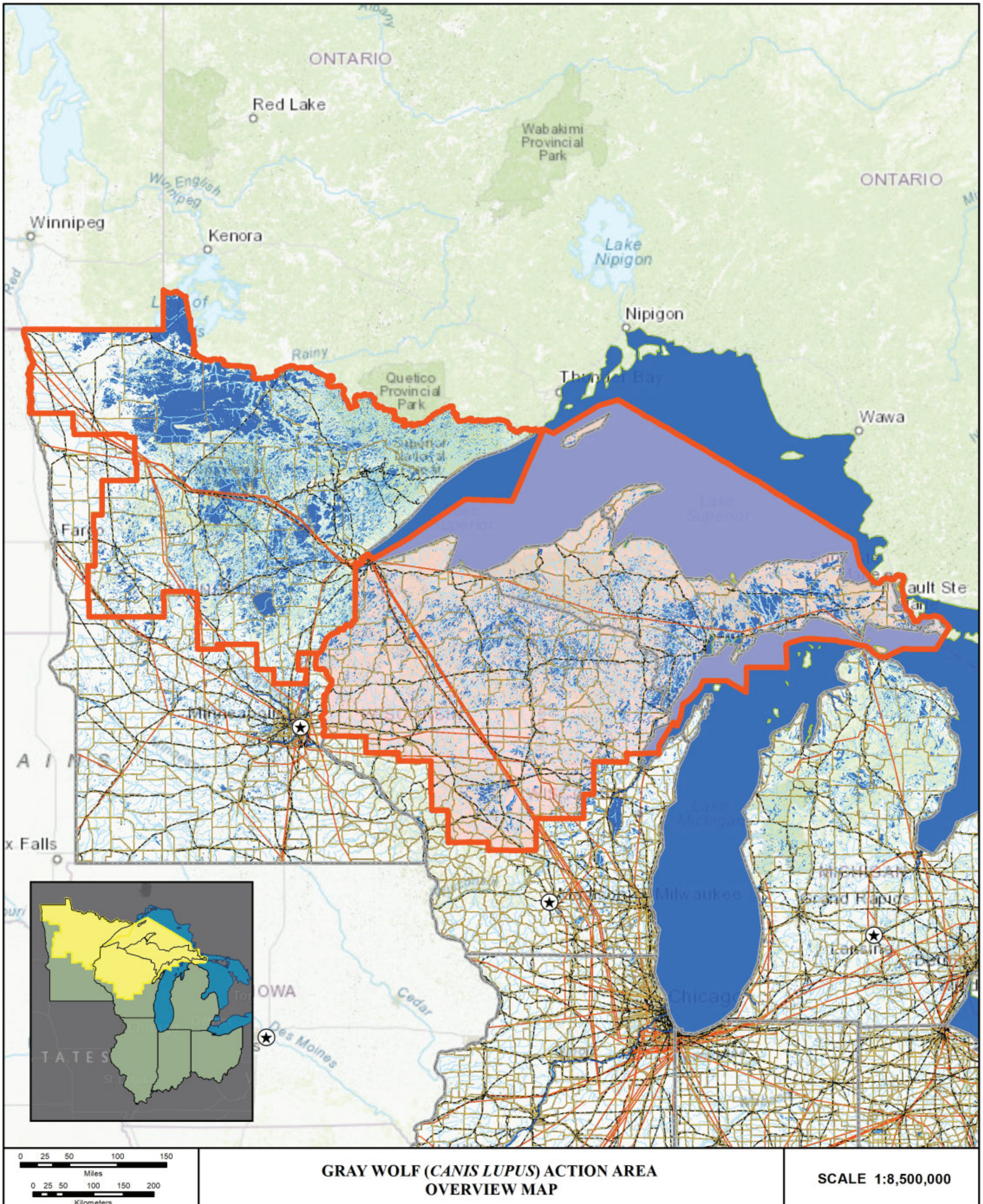
Federal Listing: Delisted
State Listing within the AA: Special Concern in Michigan; Delisted in Minnesota

Prior to European settlement, the Gray Wolf inhabited most of North America south to at least 20deg latitude. Human persecution, habitat deterioration, and the reduction of prey populations led to the decline of wolves. Wolves were almost eliminated from the western United States by the 1930s. In Wisconsin and Michigan, wolves were eliminated by the mid-1960s. At that time, only a small number of wolves survived in northeastern Minnesota and on Isle Royale in Michigan, although large populations remained in Canada and Alaska. In the first federal Endangered Species Preservation Act Gray Wolves were classified as endangered and provided limited protection (1967). In 1974, four subspecies of Gray Wolves in the lower 48 states were afforded full protection under the federal Endangered Species Act (ESA) of 1973. In 1978, the Gray Wolf was relisted as endangered at the full species level (*C. lupus*) throughout the conterminous 48 States and Mexico, except for Minnesota where it was reclassified as threatened. Gray Wolves were originally state listed as threatened in Minnesota in 1984, but as wolf numbers continued to increase, they were reclassified as state special concern in 1996 (MNDNR, 2021). This expansion led to wolves naturally recolonizing northwest Wisconsin and the first breeding pack confirmed in Douglas County in 1978. While initial population growth was slow, by the mid-1990s Wisconsin's wolf population began to increase and expand steadily. Wolves in the Western Great Lakes region surpassed federal recovery goals in the winter of 1999-2000, when Wisconsin and Michigan had a combined total of 100 wolves for 5 consecutive years, and the population in Minnesota remained stable or continued to grow (WIDNR, 2021). In January 2012, wolves in the western Great Lakes population, including Minnesota, were completely removed from the federal Endangered Species List. On December 19, 2014, a federal judge issued a decision to immediately reinstate federal ESA protections for Gray Wolves in Minnesota, Wisconsin and Michigan. In Minnesota, this ruling returned the wolf to threatened status under the federal ESA and returned management to the U.S. Fish and Wildlife Service. In Minnesota, the current density of the Gray Wolf is approximately 1 per 10 square miles. Alaska is the only US state with a higher population of Gray Wolves than Minnesota. Minnesota's Gray Wolf range has expanded from a 12,000 square mile area in the 1950's to over 27,000 square miles. As of 2013, the population was estimated at 2,200, which exceeded the federal delisting goal of 1,250-1,400. Minnesota's Gray Wolf population has remained stable over the last 10 years, with most areas of suitable habitat in the state now occupied. The Gray Wolf was removed from Minnesota special concern status in 2013 (MNDNR, 2021). USFWS removed Gray Wolves from the federal endangered species list in January 2021, returning management authority to state agencies.

List of References

Minnesota Department of Natural Resources (MNDNR). (2021). *Canis lupus* (Gray Wolf). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAJA01030

Wisconsin Department of Natural Resources (WIDNR). (2021). Wolves in Wisconsin. Retrieved from https://dnr.wisconsin.gov/topic/WildlifeHabitat/wolf/index.html



GRAY WOLF (*CANIS LUPUS*) ACTION AREA OVERVIEW MAP

SCALE 1:8,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Gray Wolf (*Canis lupus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Indiana Bat (*Myotis sodalis)*

Federal Listing: Endangered
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

Species Description

The Indiana Bat was listed as endangered in 1967 due to episodes of people disturbing hibernating bats in caves during winter, resulting in the death of large numbers of bats. Indiana Bats are vulnerable to disturbance because they hibernate in large numbers in only a few caves (the largest hibernation caves support from 20,000 to 50,000 bats). Other threats that have contributed to the Indiana Bat's decline include commercialization of caves, loss of summer habitat, pesticides and other contaminants, and most recently, the disease white-nose syndrome. Indiana Bats are quite small, weighing only one-quarter of an ounce (about the weight of three pennies) although in flight they have a wingspan of 9 to 11 in. Their fur is dark-brown to black. They hibernate during winter in caves or, occasionally, in abandoned mines. During summer they roost under the peeling bark of dead and dying trees. Indiana Bats eat a variety of flying insects found along rivers or lakes and in uplands (USFWS, 2019). During hibernation, they require cool, humid caves with stable temperatures, under 50° F but above freezing. Very few caves within the range of the species have these conditions (USFWS, 2006).

Hibernation is an adaptation for survival during the cold winter months when no insects are available for bats to eat. Bats must store energy in the form of fat before hibernating. During the six months of hibernation the stored fat is their only source of energy. If bats are disturbed or cave temperatures increase, more energy is needed and hibernating bats may starve (USFWS, 2006).

After hibernation, Indiana Bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana Bats also forage in or along the edges of forested areas (USFWS, 2006).

Species Distribution

Indiana Bats are found over most of the eastern half of the United States. Almost half of all Indiana Bats (207,000 in 2005) hibernate in caves in southern Indiana. In 2005, other states which supported populations of over 40,000 included Missouri (65,000), Kentucky (62,000), Illinois (43,000) and New York (42,000). Other states within the current range of the Indiana Bat include Alabama, Arkansas, Connecticut, Iowa, Maryland, Michigan, New Jersey, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Vermont, Virginia, and West Virginia. The 2005 population estimate is about 457,000 Indiana Bats, half as many as when the species was listed as endangered in 1967 (USFWS, 2006).

Prompted by declining populations caused by disturbance of bats during hibernation and modification of hibernacula, the Indiana Bat was listed in 1967 as “in danger of extinction” under the Endangered Species Preservation Act of 1966. It is listed as “endangered” under the current Endangered Species Act of 1973. Listing under the Endangered Species Act protects the Indiana Bat from take (harming, harassing, killing) and requires Federal agencies to work to conserve it (USFWS, 2006).

Distribution within Action Area

- Occurs statewide in Illinois except in Cook, DuPage, Kane, Lake, McHenry, and Will Counties in the northeast corner of the state
- Occurs statewide in Indiana
- Occurs in 41 counties in the southern half of Michigan and along the Lake Michigan shoreline

Critical Habitat
Critical habitat for the Indiana Bat was established and published in September of 1977 (42 FR 47840). These sites include existing mines and caves in Kentucky, Missouri, Tennessee, West Virginia, Illinois, and Indiana.

Life History
Indiana Bats mate during fall before they enter caves to hibernate. Females store the sperm through winter and become pregnant in spring soon after they emerge from the caves. After migrating to their summer areas, females roost under the peeling bark of dead and dying trees in groups of up to 100 or more. Such groups are called maternity colonies. Each female in the colony gives birth to only one pup per year. Young bats are nursed by the mother, who leaves the roost tree only to forage for food. The young stay with the maternity colony throughout their first summer (USFWS, 2006).

Current Stressors and Threats

- Human disturbance
  Indiana Bats, because they hibernate in large numbers in only a few caves, are extremely vulnerable to disturbance. During hibernation, they cluster in groups of up to 500 per square foot. Since the largest hibernation caves support from 20,000 to 50,000 bats, it is easy to see how a large part of the total population can be affected by a single event. Episodes of large numbers of Indiana Bat deaths have occurred due to human disturbance during hibernation (USFWS, 2006).
- Commercialization of caves
  The commercialization of caves – allowing visitors to tour caves during hibernation – drives bats away.
- Changes in cave structure
  Changes in the structure of caves, such as blocking an entrance, can change the temperature in a cave. A change of even a few degrees can make a cave unsuitable for hibernating bats. Some caves are fitted with gates to keep people out, but improper gating that prevents access by bats or alters air flow, temperature, or humidity can also be harmful. Properly constructed gates are beneficial because they keep people from disturbing hibernating bats while maintaining temperature and other requirements and allowing access for bats (USFWS, 2006).
- Habitat loss and fragmentation
  Indiana Bats use trees as roosting and foraging sites during summer months. Loss and fragmentation of forested habitats can also affect bat populations (USFWS, 2006).
- Pesticides and contaminants
  Insect-eating bats may seem to have an unlimited food supply, but in local areas, insects may not be plentiful because of pesticide use. This can also affect the quality of the bats' food supply. Many scientists believe that population declines occurring today might be due, in part, to pesticides and environmental contaminants. Bats may be affected by eating contaminated insects, drinking contaminated water, or absorbing the chemicals while feeding in areas that have been recently treated (USFWS, 2006).

List of References
U.S. Fish & Wildlife Service (USFWS). (2006). Indiana Bat (*Myotis sodalis*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/mammals/inba/inbafctsht.html

U.S. Fish & Wildlife Service (USFWS). (2019). Indiana Bat (*Myotis sodalis*). Retrieved from https://www.fws.gov/midwest/endangered/mammals/inba/index.html

0 20 40 80 120
Miles
0 20 40 80 120 160
Kilometers

INDIANA BAT (*MYOTIS SODALIS*) ACTION AREA OVERVIEW MAP

SCALE 1:6,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Indiana Bat (*Myotis sodalis*) Critical Habitat
- Indiana Bat (*Myotis sodalis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Little Brown Bat (*Myotis lucifugus)*

Federal Listing: Under Review. The U.S. Fish and Wildlife Service is currently conducting a discretionary review of the species.
State Listing within the AA: Endangered in Indiana and Ohio; Threatened in Wisconsin; Special Concern in Michigan and Minnesota

Species Description

The Little Brown Bat is a member of the genus *Myotis*. This bat weighs between 5.5 and 12.5g (0.19 to 0.44oz). Individual bats' weights vary seasonally and are least in the spring as bats emerge from hibernation. Adult forearm lengths range from 36 to 40mm (1.4 to 1.6in), and total body length is 8.0-9.5 cm (3.1-3.7 in). Adult Little Brown Bat wingspan is 222 to 269mm (8.75 to 10.5in). Body color ranges from pale tan to reddish to dark brown and is lighter on the ventral side. Feet have long toe hairs that extend to the tips of the toes. They also have an unusually long lifespan for a small mammal and may live 20 to 30 years (WIDNR, 2017).

Male and female Little Brown Bats begin to leave hibernacula in April, and often migrate great distances to reach their summer roosting sites and foraging grounds. A study in Kentucky showed that Little Brown Bats migrate 6 to 280 miles. Females begin forming maternity colonies in late April and early May. Little Brown Bats are born between early June and the end of July (but annual variation around this range is typically one to three weeks). Maternity colonies disperse in late July and August, after which bats visit several summer roosting sites before settling on a hibernaculum in which to hibernate from November through April. The Little Brown Bat is long-lived for its size, and lives over 10 years in most cases. Recent identification-band recoveries in Wisconsin found two male Little Brown Bats captured 18 years after banding, and one 25 years after banding. Little Brown Bats make both short- and long-distance migrations in the spring to their summer foraging ranges and maternity roosts, and they return in the fall to their hibernacula. Many return to the same site year after year (WIDNR, 2017).

Species Distribution

The species historical range included Alabama, Alaska, Arkansas, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, and Wyoming (USFWS, 2021).

Before white-nose syndrome (WNS), thousands of Little Brown Bats would hibernate in one place together. With bats often huddled together during this time, it is easy to see how the fungus may have spread so quickly and continues to infect bats today. Now, most winter roost sites are home to no more than 10 or 100 bats for the winter. There are now only a handful of places that still have winter colonies with a few thousand Little Brown Bats. Conservation efforts to protect these remnant colonies are critical. Research to understand why some winter colonies manage to persist with WNS while most colonies experience such high mortality is also a high priority (Bat Conservation International, 2020).

The Little Brown Bat is found in abundance throughout the northern United States into Canada. It is present in lesser numbers in southern states and is absent from the southern Great Plains. Little Brown Bats are not territorial—they live in colonies numbering in the hundreds of thousands of individuals. Colonies aggregate at nesting sites called roosts. There are several different types of roosts that serve different purposes—day and night roosts provide habitat for bats when they are sleeping or resting. Hibernacula are a type of roost that is occupied in the winter months. Little Brown Bats choose buildings, caves, trees, rocks, and wood piles as roost sites. They may migrate hundreds of miles to get from their summer habitats to hibernacula. A variety of wild mammals, birds, and snakes will incorporate these bats into their diets, because the large colony sizes make them easy to catch. Domestic cats are a major predator of bats that roost near people (NWF, 2021).

Distribution within Action Area

ECOS only indicates the species is known or believed to occur in Ohio. NatureServe (2021) indicates the species may occur in all Action Area states. It is considered secure in Illinois, vulnerable in Minnesota and Wisconsin, imperiled in Indiana, and critically imperiled in Michigan and Ohio (NatureServe, 2021).

Critical Habitat

No critical habitat has been designated for the Little Brown Bat.

Life History

The life cycle of the Little Brown Bat begins at emergence from hibernation. Emerging males and females mate repeatedly and with multiple partners prior to flying to their summer roosting areas. The pregnant females group together in a nursery roost that is notable for its warm temperatures (pregnant females are not able to thermoregulate very efficiently). After fifty to sixty days gestation each female gives birth to a single pup. The pup will cling to the mother and even go out on her feeding flights tightly attached to her fur. Soon, though, the pup gets too large for these free rides and must remain in the nursery roost where it is cared for and fed by the mother. Pups are weaned in three or four weeks and then they join the females on their nightly forays and in both their day and night roosts. Females become sexually mature around nine months and males become sexually mature at one year of age. A Little Brown Bat, especially if it survives its first winter, may live twenty or even thirty years (PSU, 2014).

Current Stressors and Threats

- White nose syndrome
  No other threat is as severe and immediate as the disease, white nose syndrome. If this disease had not emerged, it is unlikely the Little Brown Bat would be experiencing such a dramatic population decline. Since symptoms were first observed in New York in 2006, white nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the Little Brown Bat's range where it was most common before this disease. Although there is uncertainty about the rate that white nose syndrome will spread throughout the species' range, it is expected to spread throughout the United States in the foreseeable future (USFWS, 2015).
- Changes in cave structure
  Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and internal cave and mine microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats.
- Human disturbance
  Cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their already reduced energy stores, which may lead to individuals not surviving the winter (USFWS, 2015).
- Development
  Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range.
- Forest management activities
  Forest management benefits Little Brown Bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.
- Wind facility construction
  Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality has been documented for Little Brown Bats, although a small number have been found to date. However, there

are many wind projects within a large portion of the bat's range and many more are planned (USFWS, 2015).

List of References

Bat Conservation International. (2020). Meet the Little Brown Bat. Retrieved from https://www.batcon.org/meet-the-little-brown-bat/

National Wildlife Federation (NWF). (2021). Little Brown Bat (*Myotis lucifugus*). Retrieved from https://www.nwf.org/Educational-Resources/Wildlife-Guide/Mammals/Bats/Little-Brown-Bat

NatureServe. (2021). NatureServe Explorer – Little Brown Myotis (*Myotis lucifugus*). Retrieved from https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.100473/Myotis_lucifugus

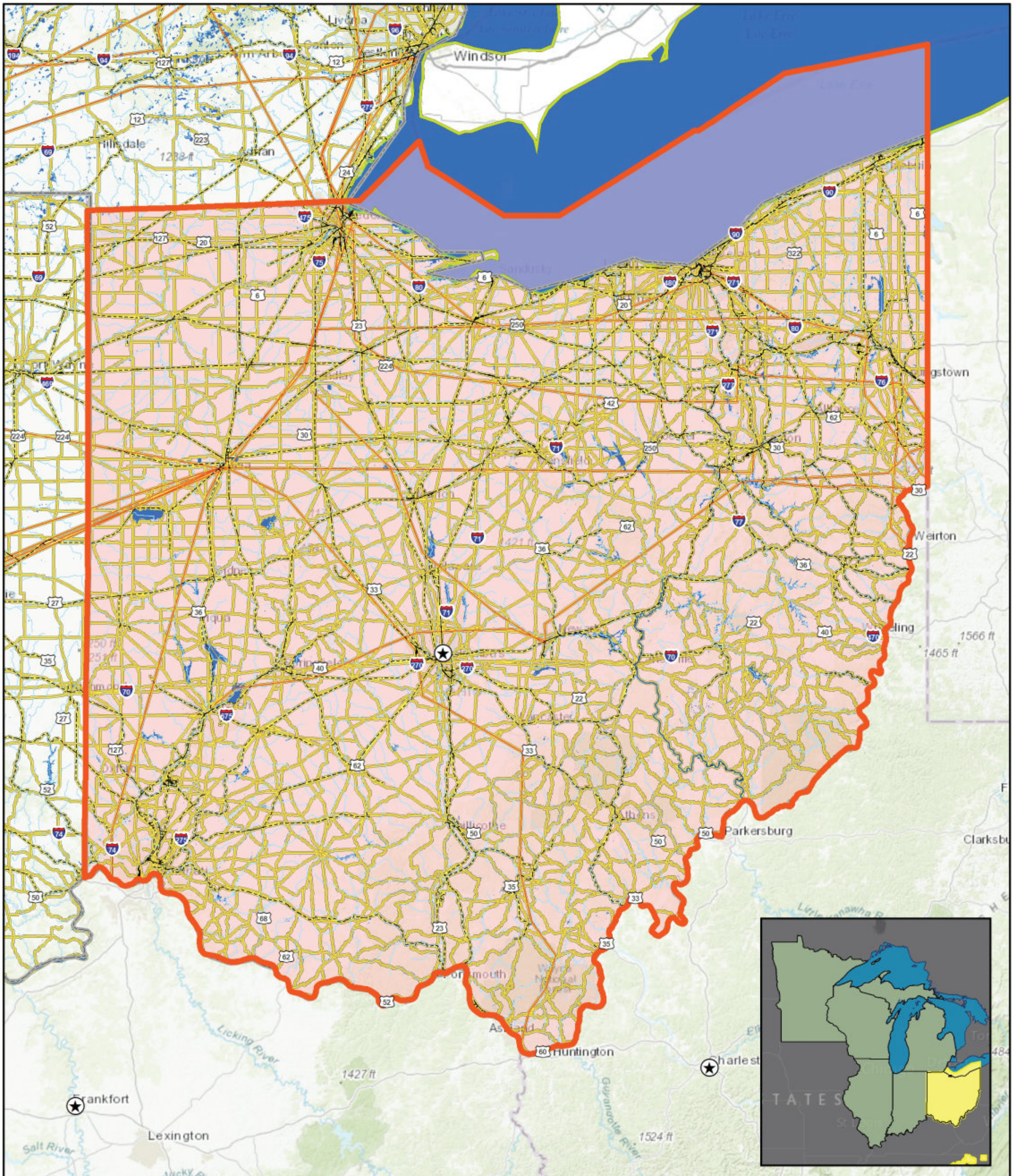
The Pennsylvania State University (PSU). (2014). Little Brown Bat (*Myotis lucifugus*). Retrieved from https://www.dept.psu.edu/nkbiology/naturetrail/speciespages/little_brown_bat.html

U.S. Fish & Wildlife Service (USFWS). (2015). Northern Long-Eared Bat (*Myotis septentrionalis*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

U.S. Fish & Wildlife Service (USFWS). (2019). Little Brown Bat (*Myotis lucifugus*) fact sheet. Retrieved from https://www.fws.gov/southeast/pdf/fact-sheet/little-brown-bat.pdf

U.S. Fish & Wildlife Service (USFWS). (2021). Little Brown Bat (*Myotis lucifugus*) species profile. Retrieved from https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=9051

Wisconsin Department of Natural Resources (WIDNR). (2017). Little Brown Bat (*Myotis lucifugus*) species guidance. PUB-ER-705. Madison, Wisconsin. 11pp.



0 10 20 40 60
Miles
0 10 20 40 60 80
Kilometers

LITTLE BROWN BAT (*MYOTIS LUCIFUGUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:3,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Little brown Bat (*Myotis lucifugus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Northern Bog Lemming (*Synaptomys borealis*)

Federal Listing: Under Review. The Northern Bog Lemming was petitioned for Federal listing under the Endangered Species Act in 2014, and a 90-day finding was issued in 2015 (80 FR 56423).
State Listing within the AA: Special Concern in Minnesota

Species Description
The Northern Bog Lemming closely resembles other microtine rodents with which it may share habitat. Grooved upper incisors, a very short tail (18-25 mm; 0.7-1.0 in), and grizzled grayish brown to chestnut colored pelage, with a buffy orange patch at the base of the ear, can help distinguish Bog Lemmings of the genus *Synaptomys* from other microtines, such as *Clethrionomys, Microtus,* and *Phenacomys.* The Northern Bog Lemming closely resembles the more common Southern Bog Lemming (*S. cooperi*) and both may be found at the same location. Female Northern Bog Lemmings have 4 pairs of mammae, while female Southern Bog Lemmings have 3 pairs. Species identification can only be confirmed by examining dental and skull characteristics. In the Northern Bog Lemming, lower molars lack distinct inward angles on the outer (labial) edge, the upper incisors frequently have labial spines, and the palate has a sharply pointed spine at its posterior end (MNDNR, 2021).

Species Distribution
Northern Bog Lemmings typically occur in open, wet habitats dominated by sphagnum moss, ericaceous shrubs, and graminoids (acid peatland and open rich peatland systems). Subspecies exhibit different habitat preferences including conifer forests, shrublands, alpine meadows, and dry sagebrush hillsides. In Minnesota, Northern Bog Lemmings have been found in open bog, shrub carr, and black spruce swamp (MNDNR, 2021).

The Northern Bog Lemming ranges across much of boreal North America from the southern two-thirds of Alaska south into northern Washington and east across Canada to the Atlantic coast. In the conterminous United States, it is found near the Canadian border in Washington, Idaho, Montana, North Dakota, Minnesota, New Hampshire, and Maine. Despite its extensive distribution, the Northern Bog Lemming is unpredictable in occurrence and nowhere is it considered common.

Distribution within Action Area
Minnesota is the only Action Area state in which Northern Bog Lemming occurs. In Minnesota, it was classified as a species of special concern in 1984 due to its rarity in the state. It was first reported in Lake of the Woods County in 1932, and since then less than a dozen occurrences have been documented in Roseau, Clearwater, Beltrami, Koochiching, Itasca, and St. Louis counties. The small number of documented locations in areas of apparently suitable habitat supports the species' listing as special concern.

Critical Habitat
No critical habitat has been designated for the Northern Bog Lemming.

Life History
Little is known about this rare species' habits. The diet of Northern Bog Lemmings consists of herbaceous vegetation, primarily grasses and sedges, but they also will eat snails, slugs, and other invertebrates. Small piles of clipped vegetation and bright green feces indicate the presence of Bog Lemmings. Northern Bog Lemmings are active throughout the year, during day and night. They construct well-defined runways or use those of other species. Globular nests of grass or sedge are hidden in short underground burrows, under logs, in sphagnum hummocks, or on the surface under the snow. The breeding season for Northern Bog Lemmings occurs from May through August. Gestation lasts approximately 3 weeks. Litters of up to 8 young are possible, with an average of 4 young per litter. One day after giving birth, females are capable

of breeding again and young Northern Bog Lemmings are sexually mature at 5-6 weeks. Predators of Northern Bog Lemmings include hawks, owls, and weasels (MNDNR, 2021).

Current Stressors and Threats

During the period of Pleistocene glacial advance, Northern Bog Lemmings occurred as far south as Kansas. Today, their distribution has retreated northward into boreal bog and forest habitats. The species is patchily distributed, occurs in low numbers, and likely experiences little-to-no gene flow between populations. The current distribution of Northern Bog Lemmings may comprise isolated, relic populations that are now trapped in remnant post-glacial habitats. All Minnesota records for Northern Bog Lemmings are from peatland habitats in the Agassiz Lowlands, Littlefork-Vermillion Uplands, and Border Lakes ecological subsections. While this region has not experienced the level of habitat destruction and alteration observed in other parts of the state, harvesting of pulpwood, peat, and Christmas trees affects the habitats used by Northern Bog Lemmings. Delineating the distribution of Northern Bog Lemmings in Minnesota will be a priority of the Minnesota Biological Survey when surveys are conducted in the Agassiz Lowlands ecological subsection. Large tracts of suitable peatland habitat should be protected where the species is found to occur (MNDNR, 2021).

WildEarth Guardians list these threats in the petition document (2014):

- Altered hydrology and water chemistry
- Peat harvest
- Timber harvest and associated activities
- Loss of beavers
- Wildfire
- Snowmobiles
- Invasive Plants
- Mineral exploration
- Climate Change
- Life history factors

List of References

Center for Biological Diversity (CBD). (2014). Petition to list the Northern Bog Lemming (*Synaptomys borealis*) under the U.S. Endangered Species Act. 41pp.

Minnesota Department of Natural Resources (MNDNR). (2021). *Synaptomys borealis* (Northern Bog Lemming). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAFF17020

0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

NORTHERN BOG LEMMING (*SYNAPTOMYS BOREALIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Northern Bog Lemming (*Synaptomys borealis*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Northern Long-Eared Bat (*Myotis septentrionalis*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Indiana; Threatened in Illinois, Ohio, and Wisconsin; Special Concern in Michigan and Minnesota

Species Description
The Northern Long-Eared Bat is a medium-sized bat about 3 to 3.7in in length but with a wingspan of 9 to 10in. As its name suggests, this bat is distinguished by its long ears, particularly as compared to other bats in its genus, *Myotis*, which are actually bats noted for their small ears (*Myotis* means mouse-eared). The Northern Long-Eared Bat is found across much of the eastern and north central United States and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species range includes 37 states. White-nose syndrome, a fungal disease known to affect bats, is currently the predominant threat to this bat, especially throughout the Northeast where the species has declined by up to 99 percent from pre-white-nose syndrome levels at many hibernation sites. Although the disease has not yet spread throughout the Northern Long-Eared Bats entire range (white-nose syndrome is currently found in at least 25 of 37 states where the Northern Long-Eared Bat occurs), it continues to spread. Experts expect that where it spreads, it will have the same impact as seen in the Northeast (USFWS, 2021).

Species Distribution
The Northern Long-Eared Bat is widely but sparsely distributed across forested regions of the eastern United States. It ranges across southern Canada and up to Newfoundland. It extends down into Florida, through the south-central states and through the Dakotas, into eastern British Columbia. In the Columbia Basin *M. septentrionalis* inhabits several different regions including Cranbrook, Invermere, Golden and Revelstoke forest districts. It has also been found scattered throughout eastern, central and northern British Columbia including the Peace River, Revelstoke and Liard River areas (Ollendorff, 2002).

The species historical range included Alabama, Arkansas, Connecticut, Delaware, District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, Wyoming (USFWS, 2015).

Distribution within Action Area
The Northern Long-Eared Bat is known or believed to occur statewide in all Action Area states.

Critical Habitat
No critical habitat has been designated for the Northern Long-Eared Bat.

Life History
Breeding begins in late summer or early fall when males begin to swarm near hibernacula. After copulation, females store sperm during hibernation until spring. In spring, they emerge from their hibernacula, ovulate and the stored sperm fertilizes an egg. This strategy is called delayed fertilization. Like most bats, Northern Long-Eared Bats emerge at dusk to feed. They primarily fly through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation or by gleaning motionless insects from vegetation (USFWS, 2015).

During the summer, Northern Long-Eared Bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees). Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern Long-Eared Bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. This bat has also been found rarely roosting in structures, like barns and sheds (USFWS, 2015).

Northern Long-Eared Bats spend winter hibernating in caves and mines, called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. Within hibernacula, surveyors find them hibernating most often in small crevices or cracks, often with only the nose and ears visible (USFWS, 2015).

Current Stressors and Threats

- White nose syndrome
  No other threat is as severe and immediate as the disease, white nose syndrome. If this disease had not emerged, it is unlikely the Little Brown Bat would be experiencing such a dramatic population decline. Since symptoms were first observed in New York in 2006, white nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the Little Brown Bat's range where it was most common before this disease. Although there is uncertainty about the rate that white nose syndrome will spread throughout the species' range, it is expected to spread throughout the United States in the foreseeable future (USFWS, 2015).
- Changes in cave structure
  Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and internal cave and mine microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats.
- Human disturbance
  Cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their already reduced energy stores, which may lead to individuals not surviving the winter (USFWS, 2015).
- Development
  Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range.
- Forest management activities
  Forest management benefits Little Brown Bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.
- Wind facility construction
  Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality has been documented for Little Brown Bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat's range and many more are planned (USFWS, 2015).

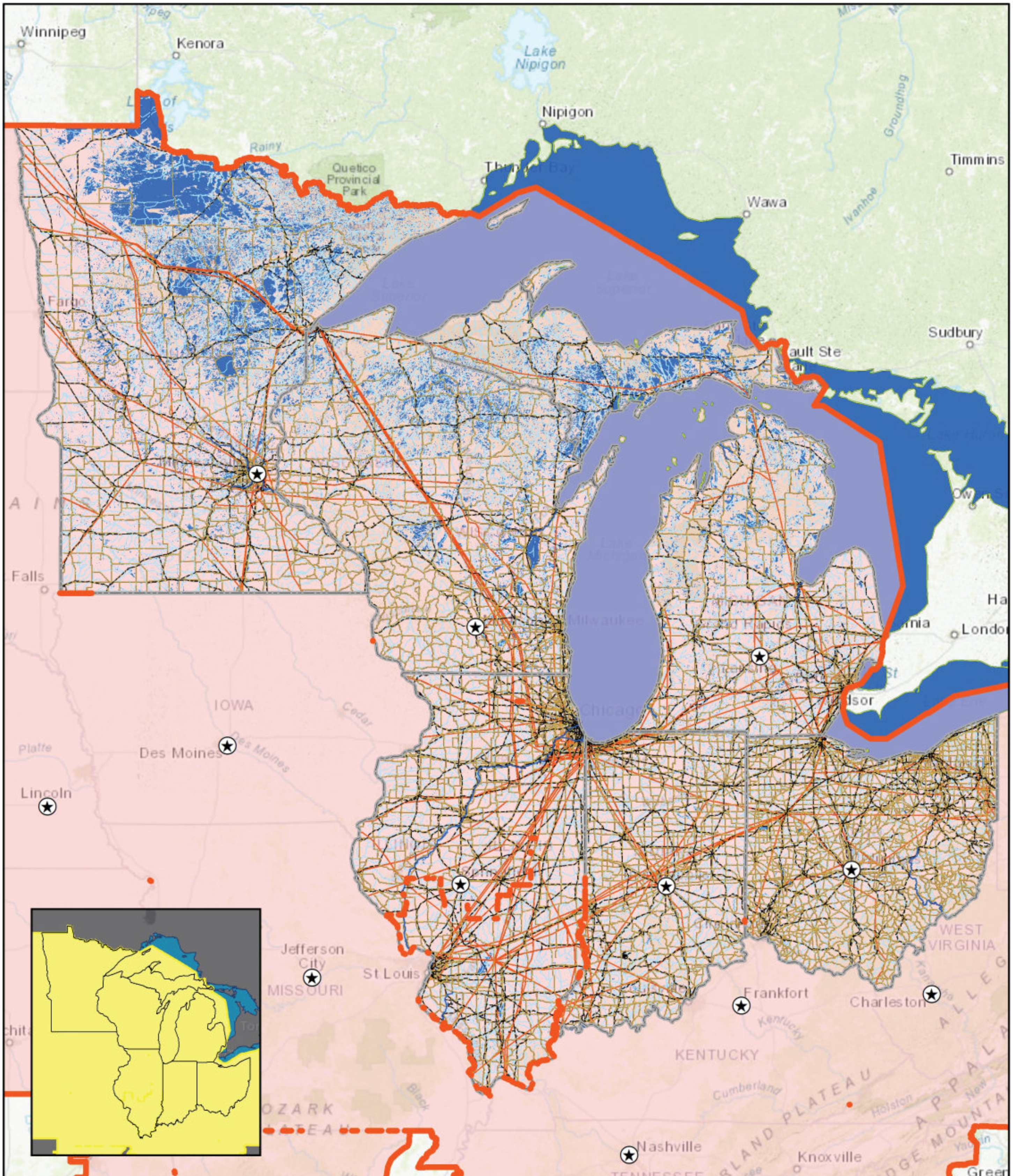
List of References

Ollendorff, J. (2002). Animal Diversity Web – *Myotis septentrionalis*. Retrieved from https://animaldiversity.org/accounts/Myotis_septentrionalis/

U.S. Fish & Wildlife Service (USFWS). (2015). Northern Long-Eared Bat (*Myotis septentrionalis*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

U.S. Fish & Wildlife Service (USFWS). (2021). Northern Long-Eared Bat (*Myotis septentrionalis*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/9045

Wisconsin Department of Natural Resources (WIDNR). (2017). Northern Long-Eared Bat (*Myotis septentrionalis*) species guidance. PUB-ER-700. Madison, Wisconsin. 11 pp.



0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

NORTHERN LONG-EARED BAT (*MYOTIS SEPTENTRIONALIS*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Northern Long-eared Bat (*Myotis septentrionalis*) Counties of Occurrence

N

Critical Habitat is designated for this species; however, data is unavailable.

Basemap courtesy of Esri.
Date: 5/25/2021
Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS
Projection: WGS 1984 Web Mercator

Plains Spotted Skunk (*Spilogale putorius interrupta)*

Federal Listing: Under Review. The Plains Spotted Skunk was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2012 (77 FR 71759).
State Listing within the AA: Threatened in Minnesota

Species Description
The Plains Spotted Skunk is one of three recognized subspecies of the Eastern Spotted Skunk. Spotted Skunks are members of the Order Carnivora and Family Mephitidae. Little variation in skull or body measurements exists among the Plains Spotted Skunk subspecies. The Plains Spotted Skunk can be distinguished from other subspecies by the reduced amount of white on its body, particularly the entirely black tail. USFWS accepts the characterization of the Plains Spotted Skunk as a subspecies because of morphological distinction of its color pattern from other subspecies of Eastern Spotted Skunk. Both the Plains Spotted Skunk and Striped Skunk (*Mephitis mephitis)* have contrasting black and white markings; however, they are easily distinguished by size (Spotted Skunks are substantially smaller) and color pattern. The Plains Spotted Skunk is a small, slender mammal with short legs and a tail with prominent, long hairs. Body weight ranges from 300 to 1,300 g (0.75 to 2.75 lb), and total length ranges from 36 to 61 cm (14 to 23.75 in). In contrast, the striped skunk's average weight is 6,300 g (14 lb), and its length is 80 cm (31.5 in). The Plains Spotted Skunk is black overall with narrow white stripes and spots. Four stripes on the neck, back, and sides run longitudinally from the head to the middle of the body. The four white stripes break into patches or spots on the hindquarters. There is a white spot on the forehead and in front of each ear (77 FR 71759).

Species Distribution
Habitat associations of this subspecies are likely influenced by whether it is using a natural or human-dominated landscape. The subspecies lives in a wide range of habitats including forests, prairies, brushy areas, farmyards, and cultivated land. Regardless of habitat type used, the Plains Spotted Skunk requires extensive vegetative cover. Brushy borders along fields, fence rows, farm buildings, wood piles, heavily vegetated gullies, leaf litter, or downed logs may provide the required extensive cover, which primarily provides protection from predators. Plains Spotted Skunks are more likely to occur where the landscape is composed of a high proportion of forest cover, and they use oak-hickory forests more than old fields or glades. Within forest habitats skunks use young, dense forest stands or stands with downed logs and slash more often than mature stands with open understories and clean forest floors. Spotted skunks also require an early successional component to their habitat to provide cover and denning areas. Dens can be located above ground or below ground. In natural landscapes, Plains Spotted Skunks den in grassy banks and crevices or cavities under rock piles, hollow logs, and stumps. In landscapes dominated by humans, they den in shelterbelts, fencerows, farm buildings, haystacks, woodpiles, or corn cribs. Plains Spotted Skunks might dig their own dens, but they often use burrows excavated by other animals, such as Franklin's ground squirrel (*Spermophilus franklinii*), thirteen-lined ground squirrel (*S. tridecemlineatus*), woodchuck (*Marmota monax*), long-tailed weasel (*Mustela frenata*), striped skunk, and woodrats (*Neotoma* spp.) (77 FR 71759).

The Plains Spotted Skunk currently (and historically) occurs between the Mississippi River and the Continental Divide from Minnesota to the Gulf of Mexico. Historical records indicate that the Plains Spotted Skunk was broadly distributed across its range through the early to mid-1900s and was one of the most common mesocarnivores (a carnivore whose diet consists of 50 to 70 percent meat) where suitable habitat occurred. Likewise, harvest records in the Midwest indicate that population levels in most States were at their highest through the mid-1900s, during which harvest in most years exceeded 100,000 Plains Spotted Skunks. More contemporary records consistently show that the Plains Spotted Skunk underwent declines in the mid- to late 1900s. Declines occurred first in Missouri and Oklahoma in the late 1930s and early 1940s, followed by Nebraska in the mid-1940s, and Kansas, Iowa, and Minnesota in the mid- to late 1940s.

Distribution within Action Area
Minnesota is the only Action Area state in which the Plains Spotted Skunk occurs (Eastern Spotted Skunk Cooperative Study Group, 2018). Though the last effort of live-trapping to survey for the Eastern Spotted Skunk was done in 1995, Minnesota requests that citizens who see a spotted skunk report to the state's DNR. Periodically, request for recent sightings is sent out to groups of people that are most likely to have encountered them: farmers, trappers, fur-buyers, and wildlife managers. Since 2013, only six individual spotted skunks have been sighted in the state. If an Eastern Spotted Skunk is verified, Minnesota DNR may conduct surveys around the area of sighting to determine if a population exists.

Critical Habitat
No critical habitat has been designated for the Plains Spotted Skunk.

Life History
Eastern Spotted Skunks spend the winter in dens, but they are not true hibernators and may awaken on mild days to feed. They are social, non-territorial animals, and different skunks may use the same den site on different days. Mating usually takes place in April, and litters of 4-6 young are born in July. The young are weaned after about 54 days. This species is mainly nocturnal, and escapes detection by climbing a tree or freezing in place (their color pattern is thought to camouflage them during moonlit nights). If an Eastern Spotted Skunk feels threatened it will balance on its forefeet with its hind legs and tail in the air, directed towards the threat. From this position, the skunk can aim and accurately spray the intruder with musk (MNDNR, 2021). During most of the year, individual Plains Spotted Skunks remain in an area of approximately 40 hectares (ha) (98.8 acres (ac)), but the home range can vary based on habitat quality and food availability. The home range can vary seasonally as well; in spring, the range of males can expand to as much as 1,040 ha (2,569.9 ac). The Plains Spotted Skunk is omnivorous but is primarily an insectivore and feeds on insects during all seasons of the year. The proportion of different types of food items varies seasonally. Arthropods are the major dietary component during summer and autumn, with grasshoppers, crickets, ground beetles, and scarab beetles being the preferred food. In the winter, small mammals, including eastern cottontail (*Sylvilagus floridanus*), voles (*Microtus pennsylvanicus* and *M. ochrogaster*), and rats (*Rattus norvegicus*), are the dominant food source. Other foods include birds, eggs, wild ducks that are injured or killed by hunters, fruit, corn, lizards, snakes, crayfish, salamanders, and mushrooms (77 FR 71759).

Current Stressors and Threats
Eastern Spotted Skunk habitat management concerns consist of several major themes including decline of early successional forest, loss of woody cover and habitat fragmentation. These issues have historical roots in changes of land use patterns and management over the last 100 years. Based on the historical and current land use patterns, habitat loss and fragmentation are continued threats to the Eastern Spotted Skunk (Eastern Spotted Skunk Cooperative Study Group, 2018). Despite intensive efforts to locate them, a maximum of six Eastern Spotted Skunks have been documented in the last 20 years in Minnesota. Reasons for the population decline are unclear, but the consolidation of farms, the modernization of farming practices, and the use of pesticides may have been contributing factors. Additionally, changes in grain handling practices and modifications of building and storage facilities to exclude skunks and rodents eliminated many den sites and reduced food sources for skunks. These relatively slow changes, however, are unlikely to be the sole cause of this species' swift decline (MNDNR, 2021).

The Eastern Spotted Skunk Cooperative Study Group Conservation Plan (2018) details these stressors and threats:

- Conversion to agricultural landscapes and loss of forest habitats
- Altered disturbance and fire regimes, including managed fire
- Small and fragmented population dynamics
- Disease

List of References

Eastern Spotted Skunk Cooperative Study Group. 2018. Eastern Spotted Skunk conservation plan. 45pp.

Minnesota Department of Natural Resources (MNDNR). (2021). *Spilogale putorius* (Eastern Spotted Skunk). Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMAJF05010

0 30 60 120 180 Miles 0 30 60 120 180 240 Kilometers	**PLAINS SPOTTED SKUNK (*SPILOGALE PUTORIUS INTERRUPTA*) ACTION AREA OVERVIEW MAP**	**SCALE 1:10,000,000**

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Plains Spotted Skunk (*Spilogale putorius interrupta*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Prairie Gray Fox (*Urocyon cinereoargenteus spp. ocythous)*

Federal Listing: Under Review. The Prairie Gray Fox was petitioned for Federal listing under the Endangered Species Act in 2012, and a 90-day finding was issued in 2012 (77 FR 71759).
State Listing within the AA: Species of Concern in Ohio, but different subspecies than petitioned.

Species Description
The following characteristics describe the Gray Fox species in general, as they are similar to the characteristics of the PGF subspecies. The Gray Fox has a distinguishable appearance with gray fur on its upper body; reddish fur on its neck, the sides of the belly, and inner legs; and white on the rest of its underbody. The guard hairs (long, course hairs that protect soft underfur) are banded with white, gray, and black, which gives the fox's fur a grizzled appearance. It has a black tipped tail and a coarse dorsal mane of black-tipped hairs at the base of its tail. Gray Fox are also distinguished from other canids by their widely separated temporal ridges that come together posteriorly in a U-shaped form. Gray Fox are smaller than the Red Fox *(Vulpes vulpes),* with a total length of 80 to 112.5 cm (31.5 to 44. 3 in), weight of 3 to 7 kilograms (6.6 to 15.4 lb), and males are slightly larger than females. The size of Gray Fox varies with geographic location, with individuals in the northern part of the range larger than those in the south (77 FR 71759).

Species Distribution
Gray Fox dens are usually located in wooded areas and include underground burrows, cavities in trees or logs, wood-piles, and rock outcrops or cavities under rocks. Gray Fox are generally associated with wooded habitats. Gray Fox use oak-hickory forests almost exclusively in southern Missouri, and are frequently found in dense stands of young trees during the day. Gray Fox use woody cover in deciduous or pine forest, but they also use edge habitat and early old-fields (open habitats that are transitioning from field to forest and are dominated by forbs, grass, and shrubs and small trees. The Gray Fox tends to select against agricultural areas. (77 FR 71759).

The Gray Fox has a wide distribution, from the Canadian border at Manitoba to Quebec, and southward through the eastern and southern United States, and to northern Colombia and Venezuela. The Gray Fox is absent from the northwestern United States and the Great Plains in the United States (COESWIC 2016). The PGF subspecies ranges primarily west of the Mississippi and Illinois Rivers through portions of the central plain States. The historical range for this subspecies included western Wisconsin, Minnesota, Iowa, Missouri, Arkansas, and the eastern sections of North and South Dakota, Nebraska, Kansas, and Oklahoma in the United States, and the southernmost sections of Ontario and Manitoba, Canada (77 FR 71759).

Distribution within Action Area
The Prairie Gray Fox is known or believed to occur in Minnesota and Wisconsin; no specific county listings are available.

Critical Habitat
No critical habitat has been designated for the Prairie Gray Fox.

Life History
Gray Fox will use dens year-round, but predominantly when young are born. Gray Fox mate at different times of the year, depending on their geographic location. For example, for the PGF, breeding lasts from late January through February in southern Illinois and from late January through March in Wisconsin. The average litter size for the Gray Fox is 3.8 pups per female, with litters ranging from 1 to 7 pups. Gray Fox are more active at night, with activity at sunrise sharply decreasing and increasing again at sunset. The Gray Fox is primarily an opportunistic carnivore, with mammals composing most of its diet in the Midwest. Although rabbits have been found to be one of their primary food sources, they routinely feed on small

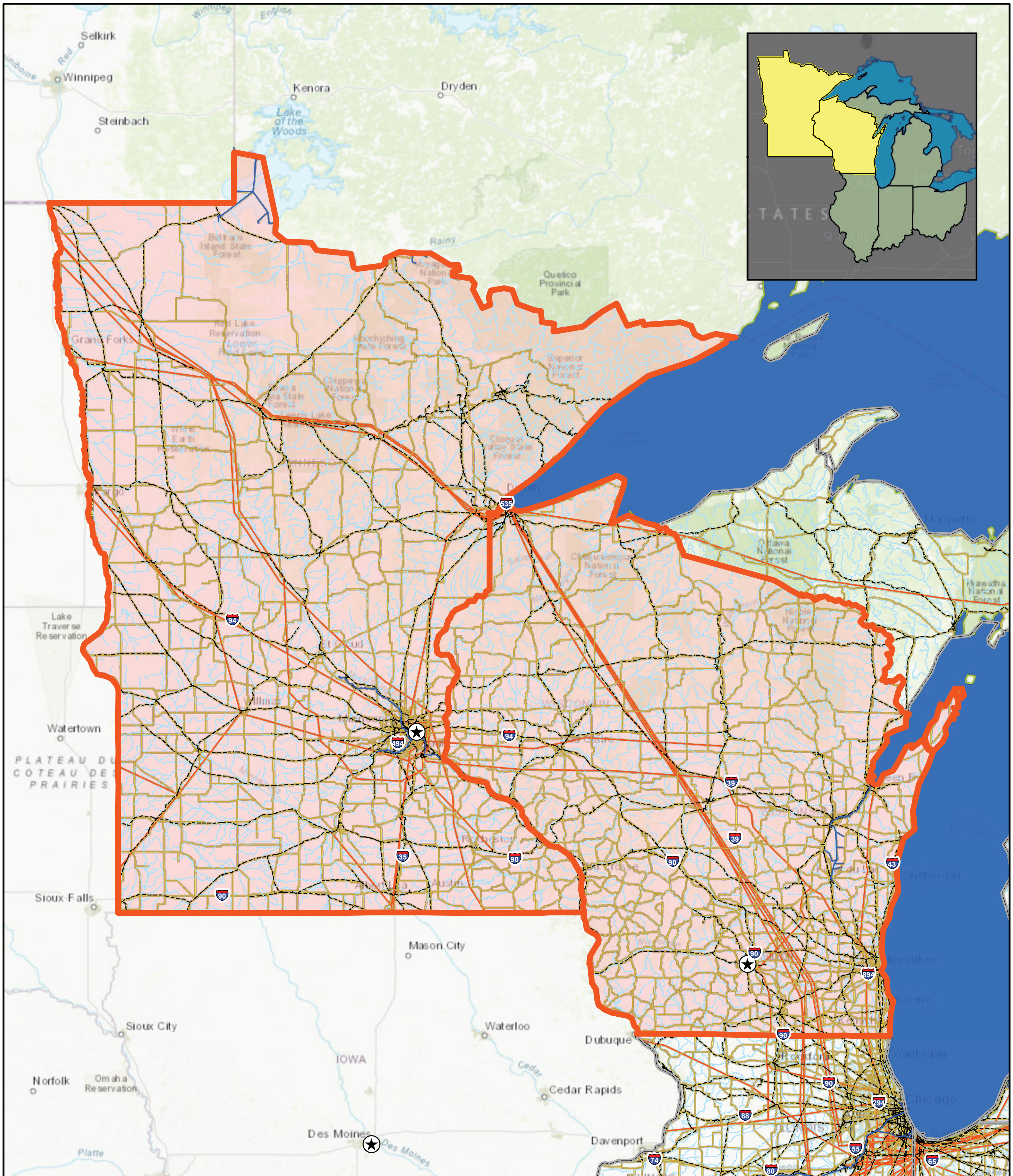
rodents and other mammals, birds, and reptiles. In the summer, invertebrates have been found to be more important food items, while in the fall, the Gray Fox consumes more fruit and sometimes corn. A notable characteristic of the Gray Fox is their ability to climb trees; Gray Fox are capable of climbing a tree trunk using their claws to grasp and pull themselves up or bounding from branch to branch. This behavior is used during foraging, predator avoidance, or resting (77 FR 71759).

Current Stressors and Threats
The petition asserts that PGF numbers have declined in many of the States within its range. The average Statewide indices between the 1980 and 1981 surveys showed a decline in Minnesota from 2.4 to 1.9, and in Oklahoma from 2.0 to 1.0. The Statewide indices for Kansas, Nebraska, North Dakota, South Dakota, and Wisconsin were zero in both 1980 and 1981. There was an increase in the numbers of Gray Fox between 1980 and 1981 in Illinois; however, all of the scent stations recorded were outside the range of the PGF subspecies, so they were likely a different subspecies. The petitioners cite these numbers when asserting that the PGF was rare to absent in the plains States by 1980. The petitioners cite the Minnesota Department of Natural Resources' annual carnivore scent station survey as including Gray Fox in their "fox" numbers; however, USFWS can find no indication in this reference that Gray Fox were counted during those surveys. The petitioners state that the number of Gray Fox in Wisconsin, as observed by the Wisconsin Department of Natural Resources during routine field work, was comparable to the badger, which is listed by the State as endangered. The report does indicate that the number of Gray Fox observed in 2010 was 0.78 observations per respondent, which is higher than the long-term average (during the 23 years of the study) of 0.42 observations per respondent. The petitioners attribute this decline to the loss of preferred habitat and the increase in agricultural habitat, which Gray Fox avoid. Although the evidence included in the petition and within USFWS files shows a decline in the population of the PGF for several States, there are no studies included that specifically indicate what the population of the PGF was prior to human settlement or how much the population has declined rangewide.

A COSEWIC (2015) Threats Calculator exercise identified the following threats:

- Hunting and trapping
  Hunting and trapping are considered a high threat to the Gray Fox. While Gray Fox have the ability to sustain high harvest pressure in the core range, incidental capture in the low density populations likely is limiting. The species is legally trapped and/or hunted in the US.
- Residential and commercial development
  Urbanization was cited as a threat to Gray Fox in California, but is unclear if it is a threat in the Prairie subspecies region.
- Roads
  Mortality from vehicles is a possible threat. Gray Fox are susceptible to roadkill mortality due to their large home range size, large dispersal distances and association with rural landscapes.
- Disease and predation
  Diseases such as canine distemper and rabies are fatal to Gray Fox. Coyotes (*Canis latrans*) prey upon Gray Fox. Over 50% of radio-tagged Gray Foxes in California were killed by Coyotes. Small populations of Gray Fox may be particularly susceptible to Coyote predation (COSEWIC, 2015).

List of References
COSEWIC. (2016). COSEWIC assessment and status report on the Gray Fox *Urocyon cinereoargenteus* in Canada. Ottawa, Ontario, Canada. 54pp.



0 20 40 80 120 Miles 0 20 40 80 120 160 Kilometers	**PRAIRIE GRAY FOX (*UROCYON CINEREOARGENTEUS SSP. OCYTHOUSA*)** **ACTION AREA OVERVIEW MAP**	**SCALE 1:6,596,118**

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Prairie Gray Fox (*Urocyon cinereoargenteus ssp. ocythous*) States of Occurrence
Action Area

N

Basemap courtesy of Esri. Date: 7/2/2021 Spatial data courtesy of: US EPA, HIFLD, ESRI, NPMS, US EIA Projection: WGS 1984 Web Mercator

Tricolored Bat (*Perimyotis subflavus)*

Federal Listing: Under Review. The Tricolored Bat was petitioned for Federal listing under the Endangered Species Act in 2016, and a 90-day finding was issued in 2017 (82 FR 60362).
State Listing within the AA: Endangered in Indiana and Ohio; Threatened in Wisconsin; Special Concern in Michigan and Minnesota

Species Description
The Tricolored Bat, formerly known as the Eastern Pipistrelle (*Pipistrellus subflavus*), is a small bat weighing 0.2 to 0.3 oz (5 to 8 g) with a wingspan of 8 to 10 in (21 to 26 cm). The term "tricolored" refers to the bat's yellowish-brown coat that is dark at the base, yellowish-brown in the middle, and dark at the tips. The wing membranes are blackish, but the face and ears have a pinkish color. An obvious identifying characteristic of this species is the pink color of the skin on the radius bone. The feet are also relatively large compared to its body size (USFWS, 2017).

Tricolored Bats hibernate in caves, mines, and tunnels. While this species is often found hibernating in the same sites as large populations of other bats, such as Little Brown Bats (*Myotis lucifugus*) and Northern Myotis (*M. septentrionalis*), Tricolored Bats tend to occupy the deeper portions of the hibernaculum where temperatures and humidity are higher. In the summer, Tricolored Bats generally roost singly, often in trees, but some males and non-reproductive females also roost in their winter hibernaculum (MNDNR, 2021).

Species Distribution
The Tricolored Bat is distributed throughout the eastern United States, ranging as far west as Nebraska, Kansas, Oklahoma, and Texas, and from southern Canada south to Honduras. States/US Territories in which this population is known to or is believed to occur include Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming (USFWS, 2021).

Distribution within Action Area
The Tricolored Bat is known or believed to occur in all Action Area states; no specific county listings are available.

Critical Habitat
No critical habitat has been designated for the Tricolored Bat.

Life History
Tricolored Bats hibernate from October into April. During this time, they enter a state of torpor in which their body temperature drops to that of the surrounding air temperature. Human activity in caves where bats are hibernating can be detrimental, causing disturbed bats to awaken frequently during the winter. Such disturbance may result in bats emerging from the hibernaculum early, before there is an adequate supply of insects for them to feed on, or they may fail to awaken altogether. Disturbance during hibernation is especially damaging to juveniles, who are already less likely to survive the winter because they have had less time than adults to accumulate fat reserves. Tricolored Bats mate in the fall, and females give birth to litters, usually of two young, in the spring. While the young are growing, the mothers roost in small maternity colonies. After about four weeks, the young are able to fly and will accompany their mothers on foraging flights. They become independent after another week or two. Tricolored Bats forage early in the evening and may catch up to half their body weight in insects each hour. They forage mainly over water, and tend to avoid deep woods or open fields. Tricolored Bats eat moths, flies, beetles, and ants (MNDNR, 2021).

Current Stressors and Threats

- White nose syndrome
  No other threat is as severe and immediate as the disease, white nose syndrome. If this disease had not emerged, it is unlikely the Little Brown Bat would be experiencing such a dramatic population decline. Since symptoms were first observed in New York in 2006, white nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the Little Brown Bat's range where it was most common before this disease. Although there is uncertainty about the rate that white nose syndrome will spread throughout the species' range, it is expected to spread throughout the United States in the foreseeable future (USFWS, 2015).
- Changes in cave structure
  Gates or other structures intended to exclude people from caves and mines not only restrict bat flight and movement, but also change airflow and internal cave and mine microclimates. A change of even a few degrees can make a cave unsuitable for hibernating bats.
- Human disturbance
  Cave-dwelling bats are vulnerable to human disturbance while hibernating. Arousal during hibernation causes bats to use up their already reduced energy stores, which may lead to individuals not surviving the winter (USFWS, 2015).
- Development
  Highway construction, commercial development, surface mining, and wind facility construction permanently remove habitat and are activities prevalent in many areas of this bat's range.
- Forest management activities
  Forest management benefits Little Brown Bats by keeping areas forested rather than converted to other uses. But, depending on type and timing, forest management activities can cause mortality and temporarily remove or degrade roosting and foraging habitat.
- Wind facility construction
  Wind turbines kill bats, and, depending on the species, in very large numbers. Mortality has been documented for Little Brown Bats, although a small number have been found to date. However, there are many wind projects within a large portion of the bat's range and many more are planned (USFWS, 2015).

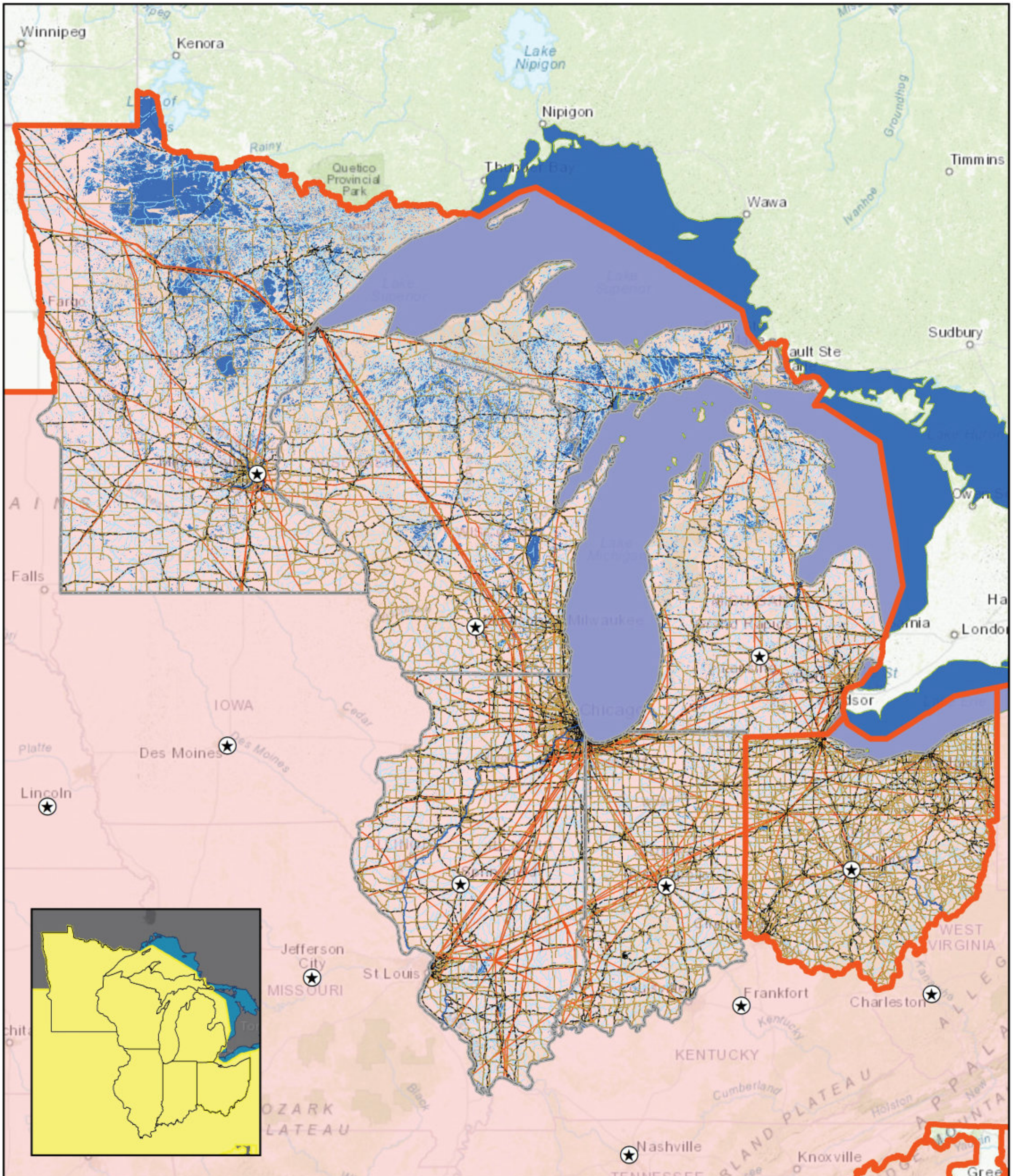
List of References

Minnesota Department of Natural Resources (MNDNR). (2021). *Perimyotis subflavus* (Tricolored Bat. Retrieved from https://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=AMACC03020

U.S. Fish & Wildlife Service (USFWS). (2015). Northern Long-Eared Bat (*Myotis septentrionalis*) fact sheet. Retrieved from https://www.fws.gov/midwest/endangered/mammals/nleb/nlebFactSheet.html

U.S. Fish & Wildlife Service (USFWS). (2017). Tricolored Bat (*Perimyotis subflavus*) fact sheet. Retrieved from https://www.fws.gov/charleston/pdf/ARS%20fact%20sheets%20for%20web/tri-colored%20bat%20fact%20sheet_SC_2017.pdf

U.S. Fish & Wildlife Service (USFWS). (2021). Tricolored Bat (*Perimyotis subflavus*) species profile. Retrieved from https://ecos.fws.gov/ecp/species/10515



0 30 60 120 180 Miles 0 30 60 120 180 240 Kilometers	**TRICOLORED BAT (*PERIMYOTIS SUBFLAVUS*) ACTION AREA OVERVIEW MAP**	**SCALE 1:10,000,000**

Legend:
- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action
- Tricolored Bat (*Perimyotis subflavus*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

BIRDS

Eastern Black Rail (*Laterallus jamaicensis ssp. jamaicensis*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Illinois and Indiana

Subspecies Description
The EBR, subspecies of Black Rail, is the smallest rail in North America. Adults range from 10-15 cm in total length and have a wingspan of 22-28 cm. EBRs weigh 35 g on average and are larger but have less brightly colored plumage than California black rails (mean mass = 29 g). Males and females are similar in size, and adults are generally pale to blackish gray, with a small blackish bill and bright red eyes. The underparts from chin to abdomen are uniformly colored but are lighter on the chin and throat. The nape and upper back are chestnut and the remaining back, uppertail feathers, and remiges (wing flight feathers) are dark gray to blackish with small white spots and sometimes washed with chestnut-brown. The lower abdomen, undertail feathers and flanks are blackish streaked with narrow white and dark gray barring, washed with chestnut. Overall, males are darker and have pale to medium gray throats, while females are lighter and have pale gray to white throats. The tarsi (lower legs) and toes are a brownish gray or gray to blackish-brown. Juvenile black rails are similar in appearance to adults, but have duller plumage and fewer and smaller white spots (USFWS, 2019).

Species Distribution
The Eastern Black Rail is a wetland dependent bird primarily associated with herbaceous, persistent, emergent wetland plant cover. The subspecies requires dense overhead cover and soils that are moist to saturated (occasionally dry) and interspersed with or adjacent to very shallow water (typically ≤ 3 cm). The substrate of ideal habitat is generally considered to be moist soil with scattered small pools. In the interior US EBR utilize wet sedge meadows with dense coverage of sedges and cattail (USFWS, 2021).

In the United States, EBR are found in both coastal and interior areas, but the majority of detections are from coastal sites. Approximately 90% of documented breeding-season occurrence records occurred at coastal locations. Interior records accounted for less than 10% of total occurrences and over 60% of the interior records occurred before 1950. Interior areas are undersampled compared to coastal habitats and expanding survey networks to include more interior habitats is a research priority. However, interior records have always been relatively uncommon throughout the subspecies' documented occurrence history in the United States when compared to the relative frequency and quantity of coastal occurrence records during the same time frame. The 2016 "coastal" assessment of 23 states along the Atlantic and Gulf Coasts of the United States covers a large area of the subspecies' range, both geographically and in terms of the areas presumed to support the highest abundances of EBR and is the most comprehensive treatment of the subspecies completed to date. A similar species assessment was completed in 2012 for an additional 15 states in the interior United States. The 2012 interior assessment concluded that EBR are currently vagrants (casual or accidental vagrants) in Arkansas, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, New Mexico, Ohio, and Wisconsin. Some of these states have conducted marshbird surveys following the 2012 assessment, which have yielded few additional detections of EBR in Nebraska and South Dakota. There appear to be small non-vagrant populations in Kansas and Colorado (USFWS, 2019).

Distribution within Action Area
EBR is considered a vagrant in all states within the Action Area.

Critical Habitat
No critical habitat has been designated for the Eastern Black Rail.

Life History
EBR have four life stages: egg, chick, juvenile (hatch-year), and adult. The egg stage lasts for approximately 26 days (7 days of egg-laying and 19 days of incubation) depending on the clutch size. Adult females lay one egg per day and have an average clutch size of seven eggs (4-13). Both sexes incubate and when one parent is at the nest the other is presumably foraging. Adults may aggressively defend the nest site by raising their wings and charging potential predators. Eggs are laid in a bowl constructed of live and dead fine-stemmed emergent grasses, rushes, or other herbaceous plant species, often with a canopy and a ramp. Nests are typically well hidden in a dense clump of vegetation over moist soil or shallow water. There is evidence of Eastern Black Rail pairs having two successful nests in a season (double brooding); however, whether or not double brooding is common is unknown. EBR egg-laying and incubation primarily occur from May to August with some early nesting in March and April. Once an egg hatches, the chick stage begins and lasts for approximately 1.5 months until the chick enters the juvenile stage. Hatching is synchronous and chicks remain in the nest until all eggs have hatched. The downy chicks are precocial and typically leave the nest within 24 hours of hatching but stay with the parents in the area of the parental territory and often return to the nest site to roost for the evening. Chicks are brooded at least for the first few days and are fed bill-to-bill by both parents, but sometimes only the female; brood division may occur for foraging and brooding. The chick stage occurs from May through September. The juvenile (hatch-year) stage begins when a chick has fledged and is independent from the parents. Juveniles undergo a partial post-juvenile (also known as pre-formative or first pre-basic) molt and obtain immature plumage by approximately 3 months of age. This molt takes place between June and November on the breeding grounds. A partial first prebreeding (or first pre-alternate) molt takes place prior to the breeding season between February and April of the following calendar year. The juvenile stage may last up to 10.5 months, until an individual obtains its first breeding plumage and becomes sexually mature at approximately 1 year of age. Eastern Black Rails reach the adult life stage the spring after hatch year once sexually mature. Adults presumably breed each year and are probably monogamous. Adults undergo a complete post-breeding molt (also known as a definitive pre-basic molt) each year between July and September on the breeding grounds. Breeding Eastern Black Rails are territorial, but the extent and nature of this behavior is poorly known due to birds frequently shifting call sites over a short time period as well as ceasing to call when nesting begins. The nature of migration for the subspecies is poorly understood. The species' lifespan is not known (USFWS, 2019).

Current Stressors and Threats
Eastern Black Rail populations are affected by a variety of factors. However, due to its wide geographic range, the suite of factors affecting the subspecies may vary regionally. Despite these regional differences, their numbers are impacted by the loss, degradation, and fragmentation of wetland habitats resulting from conversion of wetlands to agricultural or urban land uses, sea level rise along the coast, and ground- and surface-water withdrawals across the range. Incompatible land management practices may also have negative impacts on the Eastern Black Rail, i.e., poorly timed and planned prescribed fires, excessive grazing, and/or certain mechanical treatments, particularly when they are conducted during the breeding season or the flightless molt period. Stochastic events, such as flood events and hurricanes, may have significant impacts on populations of Eastern Black Rail. For example, extensive flooding from major hurricanes has been documented at occupied sites during the subspecies' flightless molt period, potentially impacting multiple individuals. When considering the future risk factors to the Eastern Black Rail, there is a complex interaction of threats and other factors having synergistic effects on the subspecies (USFWS, 2021).

The SSA (USFWS, 2019) lists the following as factors influencing viability:

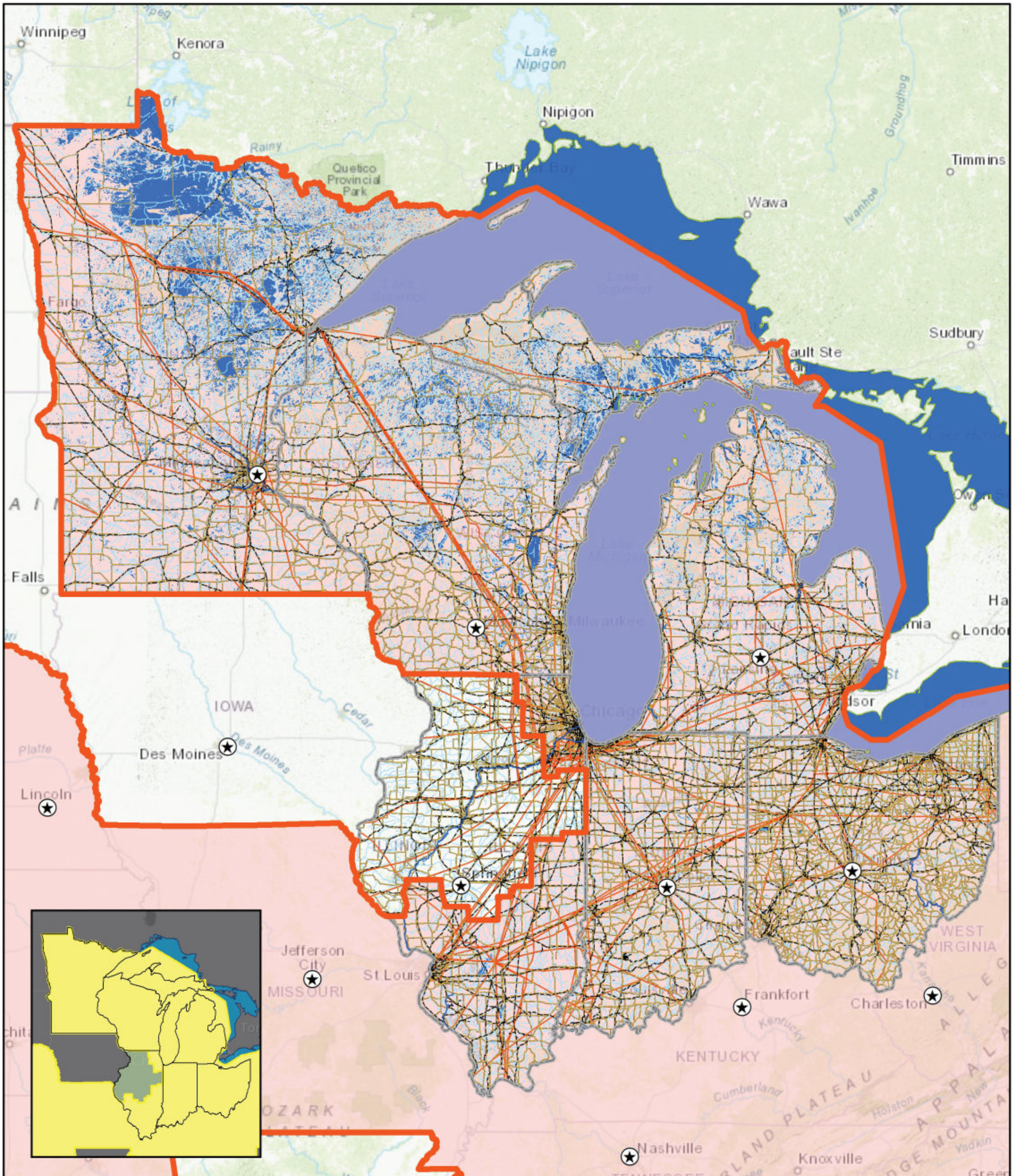
- Habitat fragmentation and conversion
- Altered plant communities
- Altered hydrology
- Groundwater declines
- Groundwater-related subsidence

- Drainage modifications
- Land management (fire, haying and mowing, grazing, impounded wetlands)
- Climate change (changes in temperature and precipitation, sea level rise and tidal flooding, wildfire patterns)
- Oil/chemical spills and environmental contaminants
- Predation (domestic cats, red fire ant)

List of References

U.S. Fish & Wildlife Service (USFWS). (2019). Species status assessment for the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*). Version 1.3. Atlanta, Georgia. 175pp.

U.S. Fish & Wildlife Service (USFWS). (2021). Recovery outline for the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*). Charleston, South Carolina. 14pp.



0 25 50 100 150
Miles
0 25 50 100 150 200
Kilometers

EASTERN BLACK RAIL (*LATERALLUS JAMAICENSIS SSP.*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Eastern Black Rail (*Laterallus jamaicensis ssp.*) Counties of Occurence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Golden-Winged Warbler (*Vermivora chrysoptera)*

Federal Listing: Under Review. The Golden-Winged Warbler was petitioned for Federal listing under the Endangered Species Act in 2010, and a 90-day finding was issued in 2011 (76 FR 31920).
State Listing within the AA: Endangered in Indiana and Ohio; Special Concern in Wisconsin

Species Description
Classic GWWs are gray-backed and whitish-bellied, with a yellow crown and large yellow wing patches; males have a black and females a gray facial mask and throat. Although GWW is described as a distinct species in the 7th Edition of the Check-list of North American Birds, it is closely related to and hybridizes with Blue-Winged Warbler (*V. cyanoptera*). Phenotypically distinct first-generation hybrids (Brewster's Warbler) display the dominant plumage characters of a white belly and reduced head patterning; backcrosses between hybrids and Golden-Winged or Blue-Winged Warblers were thought to produce the distinct Lawrence's Warbler, which expressed recessive traits of a yellow belly and more extensive head patterning. However, many individuals which appear at first glance to be clearly one species can, on closer inspection, show color flushes typical of the other. In addition, recent mitochondrial DNA (mtDNA) sequencing work reveals that genetic mixing appears to be much more extensive than is suggested by the identification of classical Brewster's and Lawrence's forms, producing an array of introgressed birds (i.e., that exhibit plumage intermediate between the parental types but do not conform to either the Brewster's or Lawrence's classification) as well as "cryptic hybrids" that resemble the parental types phenotypically but which carry genes of the other species. Since birds that appear phenotypically pure may occasionally sing the song characteristic of the other species; visual confirmation of heard birds is necessary, especially in zones of known overlap and hybridization (Roth et al., 2019).

Species Distribution
GWW is a Nearctic/Neotropical long-distance migrant songbird that breeds from mainly in the Great Lakes and St. Lawrence/Champlain states and provinces from Manitoba to Vermont and in the Appalachian Mountains from New York to Tennessee. It spends the northern hemisphere winter in tropical habitats from Central America to the northern Andes of Colombia and Venezuela. Although specific connectivity between breeding and non-breeding populations has yet to be determined, it is possible that at least some individuals make annual round trips of more than 6,000 miles (9600 km). Wintering habitat includes humid evergreen and semi-deciduous forest and edge (Mexico/Honduras); forest canopy and edges, openings of tall second-growth or semi-open forests or mid-elevation undisturbed wet forest (Costa Rica); young woodlands and forest borders (Panama); subtropical lower montane wet forest (northern Colombia); relatively high elevation (1600 m) transitional forest (southwestern Colombia; and undisturbed pre-montane rainforest (1000 m) on the Pacific slopes (western Colombia). Although GWW utilizes mature forest throughout its annual cycle, even during the breeding season, disturbed patches of habitat within a forested matrix are important for nesting. There appear to be three essential components to GWW nesting habitat— grassy and herbaceous openings, shrubs or tree saplings (generally <10 cm diameter), and taller deciduous trees. GWW habitat thus has a characteristic gestalt- faily open patches of herbaceous vegetation and shrubs of different heights either on the edge of a forested patch, associated with a group of trees in an opening of an otherwise forested landscape, or interspersed with forest trees-either young early successional tress or mature canopy trees. For USFWS Midwest Region 3, which contains all AA states, detailed habitat use by state can be found in Roth et al., 2019.

For nearly 150 years, the known breeding range of GWW has been changing substantially. Currently, the northern portion of the range—the Great Lakes population segment—extends from the extreme eastern edge of Saskatchewan through west-central Manitoba, southern Ontario, and extreme southwestern Quebec and then southward into northern Minnesota, Wisconsin, Michigan, and the St. Lawrence River Valley, with a few individuals in Vermont and rarely New Hampshire. The eastern portion of the range—the Appalachian population segment—extends from the southern Appalachians (northern Georgia, western North Carolina, and eastern Tennessee) northeastward through eastern Kentucky, western Virginia, and

West Virginia into Pennsylvania and southern New York, with a few scattered individuals in Connecticut. The Great Lakes population is now separated from the Appalachian population by the near complete absence of GWW in Illinois, Indiana, Ohio, and central New York (Roth et al., 2019).

Distribution within Action Area
Minnesota, Wisconsin, and Michigan currently harbor an estimated 76% of the total global population of breeding GWW. Densities increase dramatically from southeast to northwest across with 5%, 24%, and 47% of the estimated population in Michigan, Wisconsin, and Minnesota, respectively. GWW has been extirpated as a breeding species from Missouri, Iowa, Illinois, and Indiana, where habitat loss has been more concentrated, is virtually extirpated from Ohio, and risks extinction from Michigan and Wisconsin by 2100. See Roth et al. 2019 for detailed status information for each state in the AA.

Critical Habitat
No critical habitat has been designated for the Golden-Winged Warbler.

Life History
Territoriality is one of the most intensively studied components of GWW behavior, and territorial boundaries often are used to infer habitat preference. Traditionally, territorial boundaries have been demarcated largely by mapping singing perches of territorial males, and consequently mapped boundaries of breeding territories frequently follow a forest edge or a row of taller trees along an old fence line. Perches, usually the tallest available trees, are used repeatedly for song display and foraging. Where scattered trees are available throughout shrubby habitat (as in aspen clearcuts with canopy tree retention), defended territories often do not include the stand edges. Recent studies indicate that male GWW are also highly territorial during the resident non-breeding (wintering) season in the Neotropics. The species is single-brooded, with the exception of renesting after early failure of first nests or late second nests by bigamous males. Females appear to select the nest site—usually on the ground, often at the base of leafy herbaceous growth (e.g., Solidago) and well-concealed by leafy vegetation or in some cases by tussock grass or sedge, and sometimes within dense patches of shrubby growth (e.g., Rubus). Often the nest site includes a taller and thicker stem on which the adults descend to the nest when visiting or feeding nestlings. Clutch size ranges for 4-6 and varies in parasitism from Cowbirds. Recently fledged birds wander widely and utilize many different habitat community types. Virtually nothing is known about dispersal behavior in GWW. The resident non-breeding season (wintering season or Neotropical stationary non-breeding season) can last over seven months, with some individuals arriving as early as late September and maintaining territories until early May. Although the resident non-breeding season is the longest portion of the annual cycle, until very recently very little was known about the ecology and conservation status of GWW during this important period (Roth et al., 2019).

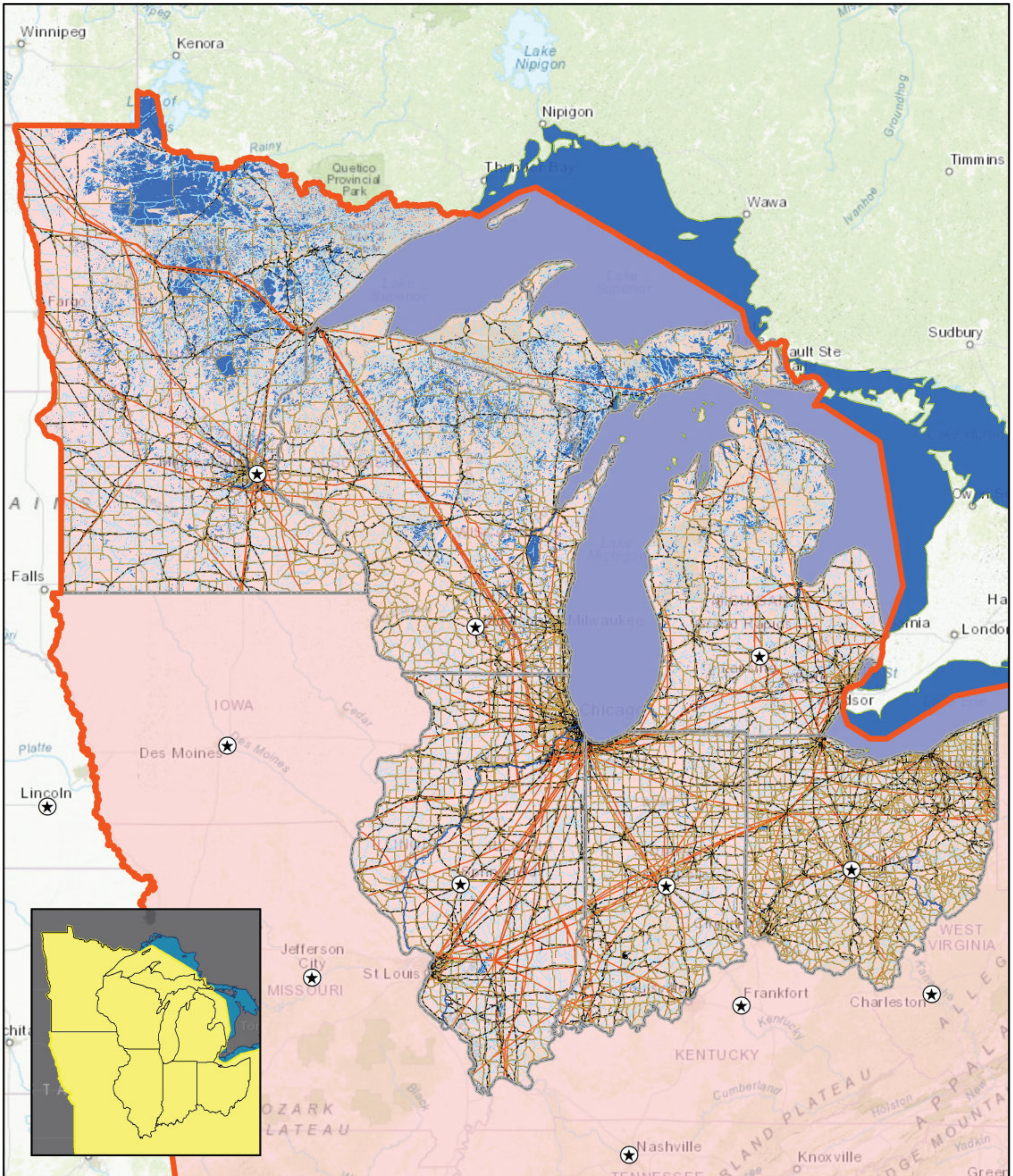
Current Stressors and Threats
Golden-Winged Warbler population declines have been attributed to a variety of potential sources, including loss of breeding season habitat, interactions with Blue-Winged Warbler (both competition and hybridization), Brown-Headed Cowbird brood parasitism, and land use changes on the Neotropical wintering grounds. All of these threats, with the possible exception of cowbird parasitism, likely contribute to population-level declines, and the relative impact of each as a limiting factor remains unclear. Threats to the species appear to vary considerably across regions, although loss of early successional habitat has been identified as the principal rangewide breeding season threat, compounded in some areas by hybridization with Blue-Winged Warbler (Roth et al., 2019). Threats are thoroughly explored in Roth et al., 2019 and include:

- Natural succession and disturbance regime change
- Development and land use change
- Public and private forested land policy
- Interactions with Blue-Winged Warbler
- Brood parasitism

- Climate change
- Migratory obstacles
- Non-breeding season habitat loss

List of References

Roth, A.M., Rohrbaugh, R.W., Will, T., Barker Swarthout, S., & Buehler, D.A., editors. 2019. Golden-Winged Warbler Status Review and Conservation Plan. 2nd Edition. 91pp + appendices.



0 30 60 120 180
Miles
0 30 60 120 180 240
Kilometers

GOLDEN-WINGED WARBLER (*VERMIVORA CHRYSOPTERA*)
ACTION AREA OVERVIEW MAP

SCALE 1:10,000,000

Petroleum Pipeline
Major Road
Railroad
Commercial Navigable Waterway
Rivers & Streams
Lakes & Ponds
1-Mile Coastal Inland Buffer
Action Area
Golden-winged Warbler (*Vermivora chrysoptera*)

N

Basemap courtesy of Esri.
Date: 5/25/2021
Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS
Projection: WGS 1984 Web Mercator

Piping Plover (*Charadrius melodus*)

Federal Listing: Endangered (Great Lakes watershed DPS), Threatened (Atlantic Coast and Northern Great Plains populations)
State Listing within the AA: Endangered in Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin

Species Description
The Piping Plover, named for its melodic call, is a small North American shorebird approximately 17 cm (6.7 in) in length that weighs 40-65 g (1.4-2.3 oz) and has a wing span measuring about 38 cm (15 in). Light sand-colored upper plumage and white undersides blend in well with the Piping Plover's principal beach habitats. During the breeding season, the legs and bill are bright orange and the bill has a black tip. Other distinctive markings include a single black band across the upper breast and a smaller black band across the forehead. In adult females, the breast band is often thin or incomplete, and plumage is frequently duller than in adult males. During winter, the legs pale, the bill turns black, and darker markings are lost. Chicks have speckled gray, buff, brown, and white down. The coloration of fledged young resembles that of adults in winter. Juveniles acquire adult plumage the spring after they fledge (USFWS, 2003).

Species Distribution
Piping Plovers use numerous areas within breeding and wintering habitats for foraging, including wet sand in the wash zone, intertidal ocean beach, wrack lines, washover passes, mud, sand and algal flats, and shorelines of streams, ephemeral ponds, lagoons, and salt marshes Areas used by Piping Plovers for foraging depend on availability of habitat types, prey abundance, stage of breeding cycle, and human disturbance. Piping Plovers select open, sparsely vegetated sandy habitats for nesting, foraging, and rearing young throughout their breeding range. On Lake Michigan, Piping Plover nest sites occur on sand spits or sand beaches associated with wide, unforested systems of dunes and swales or in the flat pans located behind the primary dune. Michigan breeding areas on Lake Superior are generally simpler morphologically, consisting of a single, large dune dominated by marram grass associated with a beach more than 30 m (100 ft) wide. Nesting on both Great Lakes often occurs adjacent to rivers or ephemeral ponds that function as alternate feeding sites for chicks (USFWS, 2003).

Piping Plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario, Canada. Historically, Michigan may have had 215 pairs or more; Ontario and Illinois likely supported the next largest populations (152-162 and 125-130, respectively). Indiana, Ohio, and Wisconsin were estimated to have 100 or fewer breeding pairs each, and Minnesota, New York, and Pennsylvania fewer than 30. Piping Plovers were extirpated from Great Lakes beaches in Illinois, Indiana, New York, Ohio, Pennsylvania and Ontario by the late 1970s, although occasional nesting has occurred since then. In 2017, the Great Lakes Piping Plover population reached a high since listing, at 76 breeding pairs (152 breeding individuals). Of these, 52 pairs were found nesting in Michigan and 24 were found in other Great Lakes states (and provinces) - including eight pairs in Wisconsin and fourteen in Ontario, Canada. Outside the core Great Lakes Piping Plover breeding areas in Michigan, Wisconsin and Ontario, a pair was discovered at Illinois Beach State Park, Lake County, Illinois in 2009 but unfortunately was unsuccessful. However, birds returned to Illinois, breeding successfully in 2015. Great Lakes Piping Plovers returned to New York in 2015 and 2016 as well but had limited breeding success. Breeding pairs of Great Lakes Piping Plovers returned to Pennsylvania in 2017 and nested again in 2018 (USFWS, 2020).

The wintering ranges of the three breeding populations of the Piping Plover overlap and extend from North Carolina to Florida on the Atlantic Coast and from the Florida Gulf Coast west to Texas and into Mexico, the West Indies and the Bahamas. The amount of population mixing that occurs on the wintering grounds is not known. Piping Plovers banded in Michigan have been sighted in both Atlantic and Gulf coast states, suggesting a strong eastward component to migration and dispersal throughout the wintering range by this population. Other recent sightings of plovers banded in Michigan have been made in southern Virginia and the Bahamas.

Distribution within Action Area
The Piping Plover is known or believed to occur in the Great Lakes watershed in all states within the Action Area, with critical habitat occurring in all states as well.

Critical Habitat
Designated May 7, 2001 (66 FR 22938). Includes 35 units along approximately 201 miles of shoreline in Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania, and New York.

Life History
In the Great Lakes region, Piping Plovers breed and raise young on the shores of the Great Lakes. They migrate along an unknown flight path to the Atlantic and Gulf coasts of southern North America and Central America. Piping Plovers are migratory shorebirds that spend approximately 3-4 months a year on breeding grounds. In the Great Lakes region, birds begin arriving on breeding grounds in late April, and most nests are initiated by mid to late May. Courtship behavior includes aerial displays, digging of several nest scrapes, and a ritualized stone-tossing display. Finished nest cups are shallow depressions approximately 6 cm (2.3 in) in diameter and 2 cm (0.8 in) deep, usually lined with light-colored pebbles and shell fragments less than 1 cm (0.4 in) in diameter. Nest territories are actively defended by both adults. Females lay an egg approximately every other day; clutches are complete at three or four eggs. Both sexes share incubation duties that last 25-31 days. Adults may re-nest up to four times if nests are destroyed, but in the Great Lakes region, they usually re-nest only once per breeding season. At Great Lakes nesting sites, eggs typically hatch from late May to late July. Precocial chicks usually hatch within one half to one day of each other and are able to feed themselves within a few hours. Brooding responsibilities are shared by both parents, although females may desert broods as soon as 1-2 weeks after eggs hatch. Adults and chicks rely on their cryptic coloration to avoid predators. Adults also use distraction displays (feigning injury, false brooding) to lure intruders away from their territories. In Michigan, chicks fledge approximately 21-30 days after hatching. Although Piping Plovers typically produce one brood per year, they have produced two broods at some Atlantic Coast sites and in the Great Lakes. Piping Plovers depart Great Lakes breeding areas from mid-July to early September. Adult females typically depart first, followed in order by unpaired males, males with fledglings, and unaccompanied young. Piping Plovers begin arriving on the wintering grounds in July, with some late-nesting birds arriving in September. A few individuals can be found on the wintering grounds throughout the year, but sightings are rare in late May, June, and early July. Migration is poorly understood, but most Piping Plovers probably migrate non-stop from interior breeding areas to wintering grounds. Piping Plovers begin departing the wintering grounds in mid-February, although peak migration departure occurs in March. Males and females may migrate separately, although they arrive simultaneously at major breeding sites. Males may then disperse to satellite breeding areas alone or accompanied by a female. Piping Plovers feed primarily on exposed beach substrates by pecking for invertebrates one centimeter (0.4 in) or less below the surface. Diet generally consists of invertebrates, including insects, marine worms, crustaceans, and mollusks (USFWS, 2003).

Current Stressors and Threats
Hunting during the late 19th and early 20th centuries likely led to initial declines of the Atlantic Piping Plover population. The role hunting played in the decline of Piping Plovers in the Great Lakes region remains uncertain. Increasing habitat loss, recreational pressure, predation, and contaminants are likely responsible for continued population declines since the 1940s. Scientific collecting may also have contributed to reduction of breeding pairs in the early 1940s. These factors, with the exception of scientific collecting, are among those that presently threaten the Great Lakes population throughout its range (USFWS, 2003). The Recovery Plan discusses these threats:

- Habitat destruction and modification (shoreline development, inlet dredging and artificial structures)
- Predation (nest failure)
- Disturbance by humans and pets (motorized vehicles and other recreation on beaches)
- Contaminants

List of References

U.S. Fish & Wildlife Service (USFWS). (2003). Recovery plan for the Great Lakes Piping Plover (*Charadrius melodus*). Fort Snelling, Minnesota. 141pp.

U.S. Fish & Wildlife Service (USFWS). (2009). Piping Plover (*Charadrius melodus*) 5-year review: summary and evaluation. Hadley, Massachusetts and East Lansing, Michigan. 206pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Piping Plover (*Charadrius melodus*) 5-year review: summary and evaluation. East Lansing, Michigan and Hadley, Massachusetts. 163pp.

0 25 50 100 150
Miles
0 25 50 100 150 200
Kilometers

PIPING PLOVER (*CHARADRIUS MELODUS*)
ACTION AREA OVERVIEW MAP

SCALE 1:8,000,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Piping Plover (*Charadrius melodus*) Critical Habitat
- Piping Plover (*Charadrius melodus*) Counties of Occurrence

N

**** Critical Habitat is designated for this species; however, data is unavailable.***

Basemap courtesy of Esri. Date: 5/24/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Rufa Red Knot (*Calidris canutus rufa*)

Federal Listing: Threatened
State Listing within the AA: Endangered in Indiana; Threatened in Illinois and Ohio

Subspecies Description

The RRK is a medium-sized shorebird about 9 to 11 in (23 to 28 cm) in length. The Red Knot is easily recognized during the breeding season by its distinctive rufous (red) plumage (feathers). The face, prominent stripe above the eye, breast, and upper belly are a rich rufous-red to a brick or salmon red, sometimes with a few scattered light feathers mixed in. The feathers of the lower belly and under the tail are whitish with dark flecks. Upperparts are dark brown with white and rufous feather edges; outer primary feathers are dark brown to black. Females are similar in color to males, though the rufous colors are typically less intense, with more buff or light gray on the dorsal (back) parts (USFWS, 2020).

Species Distribution

The RRK migrates annually between its breeding grounds in the central Canadian Arctic and four wintering regions: the Southeast United States and through the Caribbean; the Western Gulf of Mexico from Mississippi through Central America; northern Brazil and extending west along the northern coast of South America; and Tierra del Fuego at the southern tip of South America (mainly in Chile) and extending north along the Patagonian coast of Argentina (USFWS, 2020). The RRK is a regular, normally “rare” (near-annual but usually single individuals or very small flocks of 2 to 5 birds) spring and fall migrant along the shores of the Great Lakes, and a “casual” (less than annual) migrant inland throughout the Mississippi Flyway. Information for states in the AA from the listing supplemental document are summarized below (USFWS, 2014).

Distribution within Action Area

Minnesota

The Red Knot is a rare, low-density migrant annually recorded somewhere in the State, most frequently at Park Point, Duluth and along the larger inland lakeshores such as Upper Red Lake, Leech Lake, Mille Lacs, and Lake of the Woods. Occasionally, this species appears at sewage treatment plants in the southern third of the State and at other wetlands in the prairie region.

Wisconsin

The Red Knot is an annual but rare to “uncommon” (annual occurrence but not always encountered daily, seldom more than 10 birds) migrant, mainly recorded from the Great Lakes shorelines in spring, and from both the Great Lakes shorelines and inland sites in fall, mainly on State or Federal wildlife refuges. Although annually found along the Lake Michigan shoreline in fall, no one locale regularly concentrates the birds.

Michigan

The Red Knot is a regular, low-density spring migrant on the shores of the Great Lakes, more frequently recorded in fall on Lakes Erie and Lake Michigan. The only specific site where the species is recorded annually is at the Point Mouillee State Game Area on the western shore of Lake Erie. Another likely regular site, but not birded as frequently, is Tawas Point State Park.

Illinois

The Red Knot is an “irregular” (less than annual) spring migrant and a regular, low-density fall migrant along the shores of Lake Michigan. Inland, this species is a casual spring migrant and an irregular, low-density fall migrant, occurring mainly in the vicinity of major reservoirs such as Rend Lake and Carlyle Lake and at refuges in the Illinois River Valley.

Indiana

The Red Knot is a regular, low-density fall migrant along the Lake Michigan shoreline from Michigan City to Gary and casual inland. It is a very rare spring migrant in the northern two-thirds of the State with only a handful of records in 100 years.

Ohio

The Red Knot is usually a rare spring migrant with most records clustered in the two western Lake Erie counties of Ottawa and Lucas. Although most reports document 2 to 8 birds, on rare occasions significant numbers have occurred including, 150 at Bay Point, Ottawa County, and 49 at Ottawa NWR on May 17, 1980. It is possible that both Gulf coast wintering birds and Atlantic coast migrants mix in Ohio in the July to September period. Fall migration is more widespread along the southern Lake Erie shoreline, with birds occurring along the entire shoreline from Toledo in the west to the Pennsylvania line in the east.

Critical Habitat

No critical habitat has been designated for the Rufa Red Knot.

Life History

Detailed information on the life history, biology, and current status of the RRK is found in the supplemental listing document (USFWS, 2014) and summarized here. During both the northbound (spring) and southbound (fall) migrations, Red Knots use key staging and stopover areas to rest and feed. The RRKs typical life span is at least 7 years, with the oldest known wild bird at least 21 years old. Age of first breeding is at least 2 years. Red Knots generally nest in dry, slightly elevated tundra locations, often on windswept slopes with little vegetation. Best available information indicates nest sites are within 600 feet of a freshwater wetland, and, although nests are typically within 31 miles (50 kilometers [km]) of the ocean, knots do not typically use saltwater habitats on the breeding grounds. However, the total number of RRK studied to date is small and highly concentrated on just one island. Thus, it is possible that a greater diversity of nesting and foraging habitats is utilized across the breeding range but not yet documented. Nests may be scraped into patches of mountain avens (*Dryas octopetala*) plants, or in low spreading vegetation on hummocky ground containing lichens, leaves, and moss. After the eggs hatch, Red Knot chicks and adults quickly move away from high nesting terrain to lower, freshwater wetland habitats. On the breeding grounds, the Red Knot's diet consists mostly of terrestrial invertebrates such as insects and other arthropods. However, early in the breeding season, before insects and other macroinvertebrates are active and accessible, RRK will eat grass shoots, seeds, and other vegetable matter. Pair bonds form soon after the birds arrive on the breeding grounds, in late May or early June, and remain intact until shortly after the eggs hatch. Female RRK lay only one clutch per season and, as far as is known, do not lay a replacement clutch if the first is lost. Some knots are thought to be able to lay a second clutch if the first is lost early in incubation, though not later. The usual clutch size is four eggs, though three-egg clutches have been recorded. The incubation period lasts approximately 22 days from the last egg laid to the last egg hatched, and both sexes participate equally in egg incubation. Young are precocial, leaving the nest within 24 hours of hatching and foraging for themselves. Females are thought to leave the breeding grounds and start moving south soon after the chicks hatch in mid-July. Thereafter, parental care is provided solely by the males, but about 25 days later (around August 10) males also abandon the newly fledged juveniles and move south. Not long after, they are followed by the juveniles. Each year some Red Knots make one of the longest distance migrations known in the animal kingdom, traveling up to 19,000 miles (30,000 km) annually. Red Knots undertake long flights that may span thousands of miles without stopping. As RRK prepare to depart on long migratory flights, they undergo several physiological changes. Before takeoff, the birds accumulate and store large amounts of fat to fuel migration and undergo substantial changes in metabolic rates. In addition, the leg muscles, gizzard, stomach, intestines, and liver all decrease in size, while the pectoral (chest) muscles and heart increase in size. Due to these physiological changes, RRK arriving from lengthy migrations are not able to feed maximally until their digestive systems regenerate, a process that may take several days. Because stopovers are time-constrained, RRK requires stopovers rich in easily digested food to achieve adequate weight gain that fuels both the next migratory flight and, upon arrival in the Arctic, a body transformation to breeding condition. At some stages of migration, very high proportions of entire shorebird populations may use a single migration staging site to prepare for long flights. Large proportions of the RRK rangewide population can occur together at a small number of nonbreeding locations, leaving populations vulnerable to loss of key resources. For example, Delaware Bay provides the final Atlantic coast stopover for an estimated 50 to 80 percent of all RRK making their way to the arctic breeding grounds each spring. Although birds from all four wintering populations mix in Delaware Bay, several lines of evidence suggest that birds from the Southern wintering region are more reliant on this staging area relative to birds that winter elsewhere across the range. Individual Red Knots show moderate fidelity to particular migration staging areas between years. Coastal habitats used by RRK in migration and wintering areas are similar in character, generally coastal marine and estuarine habitats with large areas of exposed intertidal sediments. Migration and wintering habitats include both high-energy ocean- or bayfront areas, as well as tidal flats in more sheltered bays and lagoons. Preferred wintering and migration habitats are muddy or sandy coastal areas, specifically, bays and estuaries, tidal flats, and unimproved tidal inlets. Across all six subspecies, RRK is a specialized molluscivore, eating hard-shelled mollusks, sometimes supplemented with easily accessed softer invertebrate prey, such as shrimp- and crab-like organisms, marine worms, and horseshoe crab eggs (USFWS, 2014).

Current Stressors and Threats
In the final listing rule, the Service determined that the RRK is threatened under the ESA due to the following primary threats (USFWS, 2020):

- Loss of breeding and nonbreeding habitat (including sea level rise, coastal engineering, coastal development, and arctic ecosystem change)
- Likely effects related to disruption of natural predator cycles on the breeding grounds
- Reduced prey availability throughout the nonbreeding range
- Increasing frequency and severity of asynchronies (mismatches) in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions

Secondary threats include:

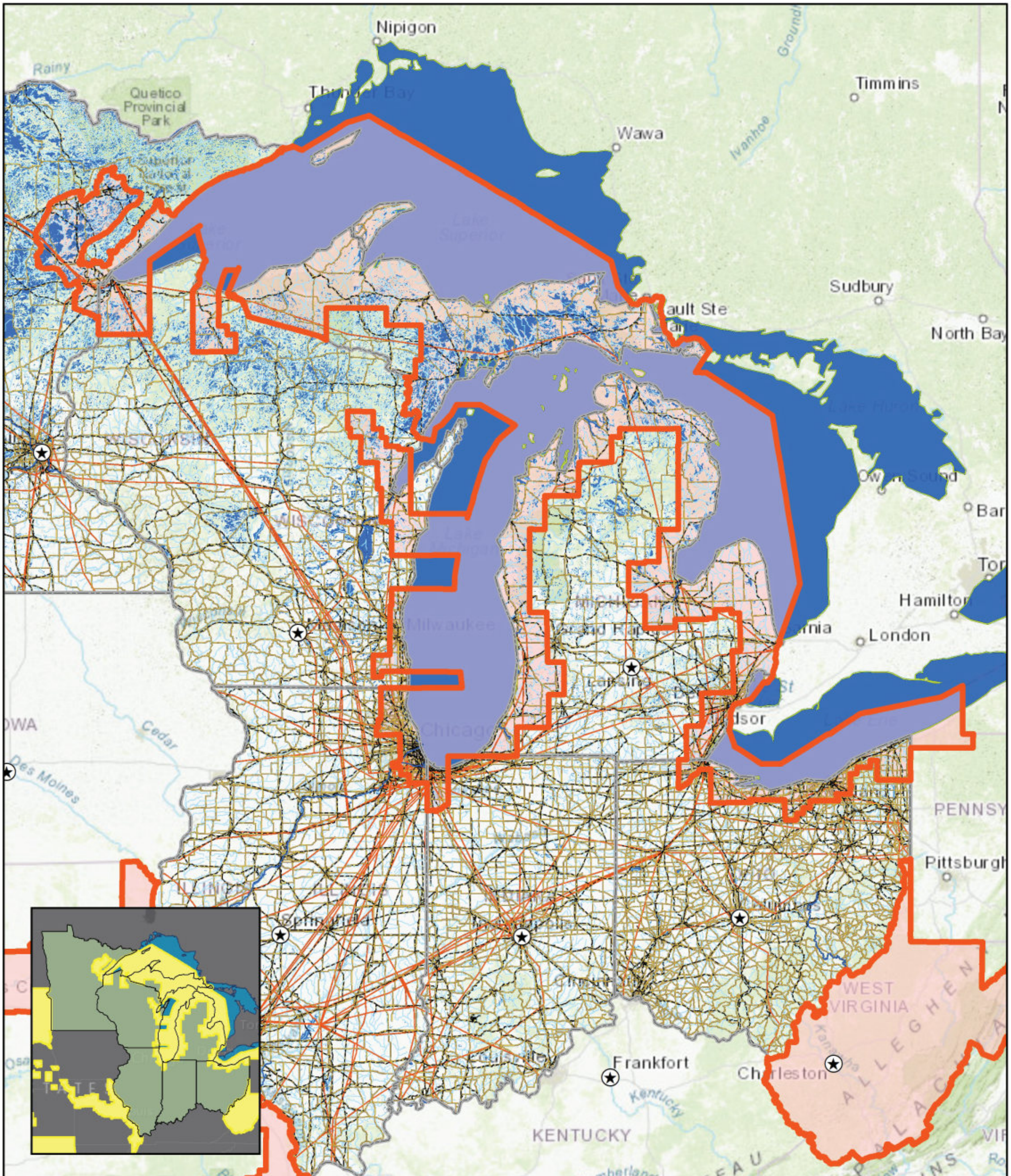
- Hunting in nonbreeding areas
- Predation in nonbreeding areas
- Harmful algal blooms
- Human disturbance
- Oil spills
- Wind energy development, especially near the coasts.

List of References

U.S. Fish & Wildlife Service (USFWS). (2014). Rufa Red Knot background information and threats assessment. Supplement to Endangered and Threatened Wildlife and Plants; Final Threatened Status for the Rufa Red Knot (*Calidris canutus rufa*) (79 FR 73706). Pleasantville, New Jersey. 383pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Recovery outline for the Rufa Red Knot (*Calidris canutus rufa*). Galloway, New Jersey. 33pp.

U.S. Fish & Wildlife Service (USFWS). (2020). Species status assessment report for the Rufa Red Knot (*Calidris canutus rufa*). Version 1.1. Galloway, New Jersey. 55pp.



0 25 50 100 150
Miles
0 25 50 100 150 200
Kilometers

RUFA RED KNOT (*CALIDIRIS CANUTUS RUFA*)
ACTION AREA OVERVIEW MAP

SCALE 1:8,500,000

- Petroleum Pipeline
- Major Road
- Railroad
- Commercial Navigable Waterway
- Rivers & Streams
- Lakes & Ponds
- 1-Mile Coastal Inland Buffer
- Action Area
- Rufa Red Knot (*Calidiris canutus rufa*) Counties of Occurrence

N

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Whooping Crane (*Grus americana*)

Federal Listing: Endangered (Wherever found, except where listed as an experimental population)
State Listing within the AA: Endangered in Indiana

Endangered (32 FR 4001)
Florida Experimental Population (58 FR 5561)
Rocky Mountain Experimental Population (62 FR 3892)
Eastern Migratory Experimental Population (66 FR 14107)

All cranes within the Rocky Mountain, Florida non-migratory and Eastern migratory non-essential, experimental population areas are fully protected as a threatened species (instead of endangered), but other provisions of the Endangered Species Act are relaxed to allow for greater management flexibility as well as positive public support (USFWS, 2019)

Species Description
The Whooping Crane is the tallest North American bird. Males, which may approach 1.5 m in height, are larger than females. Adults are snowy white except for black primary feathers on the wings and a bare red face and crown. The bill is a dark olive-gray, which becomes lighter during the breeding season. The eyes are yellow and the legs and feet are gray-black. Immature cranes are a reddish cinnamon color that results in a mottled appearance as the white feather bases extend. The juvenile plumage is gradually replaced through the winter months and becomes predominantly white by the following spring as the dark red crown and face appear. Yearlings achieve the typical adult appearance by late in their second summer or fall (USFWS, 2019)

Species Distribution
Historic: The historic range of the Whooping Crane once extended from the Arctic coast south to central Mexico, and from Utah east to New Jersey, into South Carolina, Georgia, and Florida. The historic breeding range once extended across the north-central United States and in the Canadian provinces, Manitoba, Saskatchewan, and Alberta. A separate non-migratory breeding population occurred in southwestern Louisiana. Aransas/Wood Buffalo Population**:** The current nesting range of the self-sustaining natural wild population is restricted to Wood Buffalo National Park in Saskatchewan, Canada and the current wintering grounds of this population are restricted to the Texas Gulf Coast at Aransas National Wildlife Refuge and vicinity. is experiencing a gradual positive population trend overall, although some years exhibit stationary or negative results. Rocky Mountain Experiment: In 1975, an effort to establish a second, self-sustaining migratory flock was initiated by transferring wild Whooping Crane eggs from Wood Buffalo National Park to the nests of greater sandhill cranes at Grays Lake National Wildlife Refuge in Idaho. This Rocky Mountain population peaked at only 33 birds in 1985. The experiment terminated in 1989 because the birds were not pairing and the mortality rate was too high to establish a self-sustaining population. In 1997, the remaining birds in the population were designated as experimental, non-essential to allow for greater management flexibility and to begin pilot studies on developing future reintroduction methods. In 2001, there were only two remaining Whooping Cranes in this population. Captive Populations: As of March, 2001, there were 120 captive Whooping Cranes held at six facilities. Four facilities: Patuxent Wildlife Research Center, International Crane Foundation, Calgary Zoo, and San Antonio Zoo have successful breeding programs. Currently, the remaining facilities, Lowry Park Zoo and Audubon Institute house cranes for rehabilitative and educational purposes. Chicks produced at the captive facility either remain in captivity to maintain the health and genetic diversity of the captive flock, or are reared for release to the wild in the experimental reintroduction programs. Florida Experimental Nonessential Population: An experimental reintroduction of Whooping Cranes in Florida was initiated in 1993 to establish a non-migratory population at Kissimmee Prairie. A nonmigratory population avoids the hazards of migration, and by inhabiting a more geographically limited area than migratory cranes, individuals can more easily find compatible mates.

Distribution within Action Area

Eastern Migratory Population: A second experimental non-essential population was reintroduced to eastern North America in 2001. The intent was establish a migratory flock which would summer and breed in central Wisconsin, migrate across the seven states and winter in west-central Florida. The birds are taught the migration route after being conditioned to follow costumed pilots in ultralight aircraft. Following this success with Sandhill Cranes, the first attempt to lead Whooping Cranes was made in 2001. The program has been successful, and approximately 90 Whooping Cranes now make the trip between Florida and Wisconsin annually. Some of these cranes can be found in the AA as they migrate (USFWS 2019).

Critical Habitat

Critical Habitat for the Whooping Crane was designated on May 15, 1978 (43 FR 20938) for nine locations in the U.S.: Alamosa and Monte Vista NWRs in CO; Grays Lake NWR in ID; Bosque del Apache NWR in NM; Quivira NWR and Cheyenne Bottoms SWMA in KS; an 80-mile (mi) stretch of the Platte River in NE; Salt Plains NWR in OK; and ANWR and vicinity in TX. With the extirpation of the Rocky Mountain re-introduced Whooping Crane population, the four locations in CO, ID, and NM were removed from the list of designated critical habitat areas on July 21, 1997 (62 FR 38932-38939) (USFWS, 2012).

Life History

Whooping Crane life span is estimated to be 22 to 24 years in the wild. They are omnivorous feeders, feeding on insects, frogs, rodents, small birds, minnows, and berries in the summer. In the winter, they focus on predominantly animal foods, especially blue crabs and clams. They also forage for acorns, snails, crayfish and insects in upland areas. Whooping Cranes are monogamous and form life-long pair bonds but will remate following the death of a mate. Wild, non-experimental, Whooping Cranes return to the same breeding territory in Wood Buffalo National Park, Canada, in April and nest in the same general area each year. They construct nests of bulrush and lay one to three eggs, (usually two) in late April and early May. The incubation period is about 29 to 31 days. Whooping Cranes will renest if the first clutch is lost or destroyed before mid-incubation. Both sexes share incubation and brood-rearing duties. Despite the fact that most pairs lay two eggs, seldom does more than one chick reach fledging. Autumn migration begins in mid-September, and most birds arrive on the wintering grounds of Aransas National Wildlife Refuge on the Texas Gulf Coast by late-October to mid-November. Whooping Cranes migrate singly, in pairs, in family groups or in small flocks, and are sometimes accompanied by sandhill cranes. They are diurnal migrants, stopping regularly to rest and feed, and use traditional migration staging areas. On the wintering grounds, pairs and family groups occupy and defend territories. Subadults and unpaired adult Whooping Cranes form separate flocks that use the same habitat but remain outside occupied territories. Subadults tend to winter in the area where they were raised their first year, and paired cranes often locate their first winter territories near their parents' winter territory. Spring migration is preceded by dancing, unison calling, and frequent flying. Family groups and pairs are the first to leave the refuge in late-March to mid-April. Juveniles and subadults return to summer in the vicinity of their natal area, but are chased away by the adults during migration or shortly after arrival on the breeding grounds. Only one out of four hatched chicks survive to reach the wintering grounds. Whooping Cranes generally do not produce fertile eggs until age 4 (USFWS, 2019)

The nesting area in Wood Buffalo National Park is a poorly drained region interspersed with numerous potholes. Bulrush is the dominant emergent in the potholes used for nesting. On the wintering grounds at Aransas National Wildlife Refuge in Texas, Whooping Cranes use the salt marshes that are dominated by salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye. They also forage in the interior portions of the refuge, which are gently rolling, sandy, and are characterized by oak brush, grassland, swales, and ponds. Typical plants include live oak, redbay, Bermuda grass, and bluestem. The non-migratory, Florida release site at Kissimmee Prairie includes flat, open palmetto prairie interspersed with shallow wetlands and lakes. The primary release site has shallow wetlands characterized by pickerel weed, nupher, and maiden cane. Other habitats include dry prairie and flatwoods with saw palmetto, various grasses, scattered slash pine, and scattered strands of cypress. Areas selected for the proposed eastern migratory experimental population closely mimic habitat of the naturally occurring wild population in Canada and Texas (USFWS, 2019).

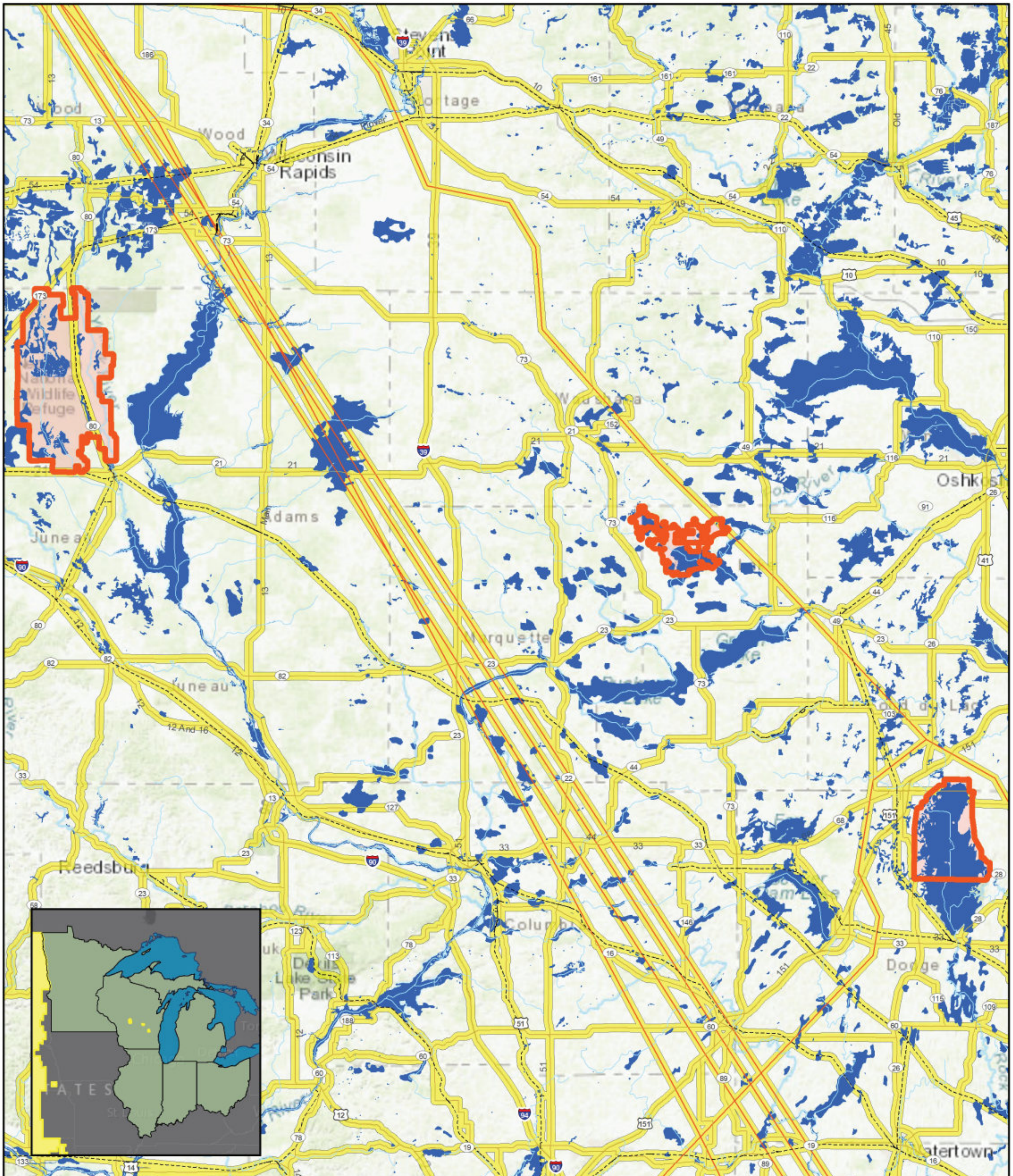
Current Stressors and Threats

The Whooping Crane population, estimated at 500 to 700 individuals in 1870 declined to only 16 individuals in the migratory population by 1941 as a consequence of hunting and specimen collection, human disturbance, and conversion of the primary nesting habitat to hay, pastureland, and grain production. The main threat to Whooping Cranes in the wild is the potential of a hurricane or contaminant spill destroying their wintering habitat on the Texas coast. Collisions with power lines and fences are known hazards to wild Whooping Cranes. The primary threats to captive birds are disease and parasites. Bobcat predation has been the main cause of mortality in the Florida experimental population (USFWS, 2019)

List of References

U.S. Fish & Wildlife Service (USFWS). (2012). Whooping Crane (*Grus americana*) 5-year review: summary and evaluation. Austwell, Texas and Corpus Christi, Texas. 44pp.

U.S. Fish & Wildlife Service (USFWS). (2019). Whooping Crane (*Grus americana*) species status and fact sheet. Retrieved from https://www.fws.gov/northflorida/whoopingcrane/whoopingcrane-fact-2001.htm



WHOOPING CRANE (*GRUS AMERICANA*) ACTION AREA OVERVIEW MAP

SCALE 1:1,000,000

Basemap courtesy of Esri. Date: 5/25/2021 Spatial data courtesy of: USEPA, HIFLD, ESRI, NPMS Projection: WGS 1984 Web Mercator

Document Purpose:
This document may be used for multiple purposes. It has been developed to primarily serve as a planning tool to help initiate and encourage conversations between the USFWS and the Action Agencies (USCG and EPA) on how oil spill response activities may impact listed species within Region 5. The document may also serve as an internal planning document for working together on oil spill response planning. Ounce fully developed by the regions, the document may be used during all stages of a spill as a reference and guide for the decision making process.

The potential impacts shown on this matrix represent cumulative information across all regions, seasons, and spill types. During coordination/consultation on an actual spill response, USFWS may determine that the impact level (color) is different than shown in the matrix. See below for the matrix color-coding key.

Layout:
1) Information Tab: This tab provides details on purpose and layout of the document.

2) F-1 Tab provides a Species Response Matrix Summary by Habitat within Action Area of Region 5. This table is useful in providing an overview of expectations of what species groups are most likely encountered in the defined environments where a spill may occur.

3) F-2 through F-8 Tabs are the ESA Species versus Response Actions. Tabs 1 through 10 include the different types of environments where spill response activities can occur. Within each of these tabs, the user will find the various types of spill response activities that may occur in that environment. Column A includes USFWS listed species (common names). Regions may also choose to include proposed species and candidate species (as a method to save time in the future; however, please note that the USFWS cannot make a determination on candidate species as part of a biological opinion.

Row 1, displays the environment that the activity is occurring in (i.e., shoreline, coastal nearshore, etc.) The response options beginning in Column M include all the tools available to the USCG, EPA and oil spill responders to clean up oil and effectively conduct a response. The empty white boxes colored boxes (beginning in Row 10 and Colum M) are to be filled in following Regional-level workgroup discussion regarding the level of impact we might expect each particular response option to have on each particular species. There are 3 "impact colors" represented on the spreadsheet. See the color explanations below.

COLOR CODING KEY for potential effects to species and habitats due to actions listed	
	No effect due to no overlap between species and action or no impacts on species from action.
	This applied to individuals whose habitat did not overlap with the action area habitats defined in Section 3.1 and 3.2 and was not identified for the response action. Example: Freshwater mussels do not occur nor are individuals found along shorelines (per the definition in Section 3.1); therefore, all response actions and interrelated actions occurring on Shoreline Habitat would not affect mussels due to no overlap.
	May affect, not likely to adversely affect due to insignificant or discountable effects
	May affect, not likely to adversely affect due to implementation of BMPs to minimize impact; For example, birds whose habitat for feeding, nesting, or otherwise includes Shoreline Habitat, may be affected by the response action occurring in Shoreline Habitats, but impacts are reduced by utilizing BMP's (color coded as orange on Species Action Matrix).
	May affect, likely to adversely affect - discuss possible BMPs with Services
!	Special considerations needed, high level of concern. This consideration and concern is due to the variability of the action and habitat and/or species response.

The Species Action Matrix provided in Appendix F2 through F8 presents the outcome for which the effects analysis was derived. For each species within each habitat type, the exposure, individual response to the action, and risk of injury or death to the individual were considered. Habitat pursuant to the known information on the species range was weighed heavily in the Species Action Matrix and the categorization used for effects determination. Exposure was considered as the individuals' behavior and/or distribution within the Action Area and their likelihood of exposure and response to the action. Risk to the individual accounted for their rehabilitation potential post exposure to an action. Responses of species to actions within the defined habitat types were assigned to categories based on the following:

Appendix F-1. Species Response Matrix Summary by Environment within Action Area of Region 5

			Occurrence in Action Area							Habit		Environment within Action Area of Response Action						
Common Name	Scientific name	Status	IL	IN	MI	MN	OH	WI	Critical Habitat	Terrestrial	Aquatic	1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Plants																		
American Hart's-tongue Fern	*Asplenium scolopendrium var. americanum*	T			X					X								X
Decurrent False Aster	*Boltonia decurrens*	T	X							X				X			X	X
Dwarf Lake Iris	*Iris lacustris*	T			X			X		X		X					X	X
Eastern Prairie Fringed Orchid	*Platanthera leucophaea*	T	X	X	X		X	X		X				X			X	X
Fassett's Locoweed	*Oxytropis campestris var. chartacea*	T						X		X		X				X		X
Houghton's Goldenrod	*Solidago houghtonii*	T			X					X		X		X		X	X	
Lakeside Daisy	*Hymenoxys herbacea*	T	X		X		X			X								X
Leafy Prairie-clover	*Dalea foliosa*	E	X							X								X
Leedy's Roseroot	*Rhodiola integrifolia ssp. leedyi*	T				X				X								X
Mead's Milkweed	*Asclepias meadii*	T	X	X				X		X								X
Michigan Monkey Flower	*Mimulus michiganensis*	E			X					X				X			X	
Minnesota Dwarf Trout Lily	*Erythronium propullans*	E				X				X				X				X
Northern Wild Monkshood	*Aconitun noveboracense*	T					X	X		X				X				X
Pitcher's thistle	*Cirsium pitcheri*	T	X	X	X			X		X		X						X
Prairie Bush-clover	*Lespedeza leptostachya*	T	X			X		X		X								X
Short's Bladderpod	*Physaria globosa*	E		X					D	X				X				X
Short's Goldenrod	*Solidago shortii*	E		X						X								X
Small whorled pogonia	*Isotria medeoloides*	T	X		X		X			X								X
Tennessee Pondweed	*Potamogeton tennesseensis*	UR					X				X			X			X	
Virginia Sneezeweed	*Helenium virginicum*	T					X			X							X	
Virginia Spiraea	*Spirea virginiana*	T					X			X				X				
Western Prairie Fringed Orchid	*Platanthera praeclara*	T				X				X								X
Snails																		
Iowa Pleistocene Snail	*Discus macclintocki*	E	X							X								X
Clams (Freshwater Mussels)																		
Clubshell	*Pleurobema clava*	E	X	X	X		X				X		X	X	X	X		
Fanshell	*Cyprogenia stegaria*	E	X	X			X				X		X	X		X		
Fat Pocketbook	*Potamilus capax*	E	X	X							X		X	X		X		
Higgins' Eye Pearlymussel	*Lampsilis higginsii*	E	X			X		X			X		X	X		X		
Longsolid	*Fusconaia subrotunda*	P	X	X			X		PCH		X		X	X		X		
Northern Riffleshell	*Epioblasma torulosa rangiana*	E	X	X	X		X				X		X	X	X	X		
Orangefoot Pimpleback	*Plethobasus cooperianus*	E	X								X		X	X		X		
Pink Mucket	*Lampsilis abrupta*	E	X	X			X				X		X	X		X		
Purple Cat's Paw Pearlymussel	*Epioblasma obliquata obliquata*	E					X				X			X		X		
Pyramid (Pink) Pigtoe	*Pleurobema rubrum*	UR					X				X		X	X		X		
Rabbitsfoot	*Quadrula cylindrica cylindrica*	T	X	X			X		D		X		X	X		X		
Rayed Bean	*Villosa fabalis*	E		X	X		X		PCH		X		X	X	X	X		
Rough Pigtoe	*Pleurobema plenum*	E		X							X		X	X		X		
Round Hickorynut	*Obovaria subrotunda*	P	X	X	X		X		PCH		X		X	X	X	X		
Salamander mussel	*Simpsonaias ambigua*	UR	X	X	X	X	X	X			X		X	X	X	X		
Scaleshell	*Leptodea leptodon*	E	X								X		X	X		X		

Appendix F-1. Species Response Matrix Summary by Environment within Action Area of Region 5

Common Name	Scientific name	Status	Occurrence in Action Area: IL	IN	MI	MN	OH	WI	Critical Habitat	Habit: Terrestrial	Aquatic	Environment within Action Area of Response Action: 1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Sheepnose	*Plethobasus cyphyus*	E	X	X		X	X	X	PCH		X		X	X		X		
Snuffbox	*Epioblasma triquetra*	E	X	X	X		X	X	PCH		X		X	X	X	X		
Spectaclecase	*Cumberlandia monodonta*	E	X			X		X	PCH		X		X	X		X		
White Catspaw	*Epioblasma obliquata perobliqua*	E		X			X				X			X		X		
Winged Mapleleaf	*Quadrula fragosa*	E				X		X			X		X	X		X		
Crustaceans																		
Illinois Cave amphipod	*Gammarus acherondytes*	E	X								X			X				X
Insects																		
American Burying Beetle	*Nicrophorus americanus*	T			X		X			X							X	X
Bog Buckmoth	*Hemileuca sp.*	UR						X		X							X	
Dakota Skipper	*Hesperia dacotae*	T				X			D	X								X
Frosted Elfin Butterfly	*Callophrys irus*	UR	X	X	X		X	X		X								X
Hine's Emerald Dragonfly	*Somatochlora hineana*	E	X		X			X	D	X						X	X	
Hungerford's Crawling Water Beetle	*Brychius hungerfordi*	E			X						X			X				
Karner Blue Butterfly	*Lycaeides melissa samuelis*	E	X	X	X	X	X	X		X								X
Linda's Roadside Skipper	*Amblyscirtes linda*	UR	X							X				X			X	X
Mitchell's Satyr Butterfly	*Neonympha mitchellii mitchellii*	E		X	X		X			X							X	
Monarch Butterfly	*Danaus plexippus plexippus*	C	X	X	X	X	X	X		X				X			X	X
Poweshiek Skipperling	*Oarisma poweshiek*	E			X	X		X	D	X							X	X
Rattlesnake-master Borer Moth	*Papaipema eryngii*	UR	X							X								X
Regal Fritillary	*Speyeria idalia*	UR	X	X	X	X	X	X		X				X			X	X
Rusty Patched Bumble Bee	*Bombus affinis*	E	X	X		X	X	X		X				X			X	X
Fish																		
Lake Sturgeon	*Acipenser fulvescens*	UR	X	X	X	X	X	X			X		X	X	X	X		
Pallid Sturgeon	*Scaphirhynchus albus*	E	X								X		X	X				
Popeye Shiner	*Notropis ariommus*	UR					X				X			X				
Scioto Madtom	*Noturus trautmani*	E					X				X			X				
Sicklefin Chub	*Macrhybopsis meeki*	UR	X								X		X	X				
Sturgeon Chub	*Macrhybopsis gelida*	UR	X								X		X	X				
Topeka Shiner	*Notropis topeka*	E				X			D		X			X		X		
Herptiles																		
Alligator Snapping Turtle	*Macroclemys temmincki*	UR	X	X							X	X	X	X		X		
Blanding's Turtle	*Emydoidea blandingii*	UR	X	X	X	X	X	X		*X	X	X		X	X	X	X	X
Copperbelly Watersnake, N. DPS	*Nerodia erythrogaster neglecta*	T		X	X		X			X	X					X	X	X
Eastern Massasauga	*Sistrurus catenatus*	T	X	X	X		X	X		X	X					X	X	X
Illinois Chorus Frog	*Pseudacris illinoensis*	UR	X							X	X			X		X	X	X
Spotted Turtle	*Clemmys guttata*	UR	X	X	X		X			X*	X			X	X	X	X	X
Streamside Salamander	*Ambystoma barbouri*	UR		X			X			X	X			X			X	X
Wood Turtle	*Glyptemys insculpta*	UR			X	X	X	X		X	X			X			X	X

Appendix F-1. Species Response Matrix Summary by Environment within Action Area of Region 5

			Occurrence in Action Area							Habit		Environment within Action Area of Response Action						
Common Name	Scientific name	Status	IL	IN	MI	MN	OH	WI	Critical Habitat	Terrestrial	Aquatic	1) Shoreline (beach/land)	2) Ports, Canals, Industrial Areas	3) Rivers and Streams	4) Bays and Estuaries	5) Ponds and Lakes	6) Wetlands	7) Upland Areas
Mammals																		
Canada Lynx	*Lynx canadensis*	T			X	X		X	D	X								X
Gray Bat	*Myotis grisescens*	E	X	X						X				X		X		X
Gray Wolf	*Canis lupus*	DR			X	X		X		X								X
Indiana Bat	*Myotis sodalis*	E	X	X	X		X		D	X							X	X
Little Brown Bat	*Myotis lucifugus*	UR	X	X	X	X	X	X		X								X
Northern Bog Lemming	*Synaptomys borealis*	UR				X				X							X	
Northern Long-eared Bat	*Myotis septentrionalis*	T	X	X	X	X	X	X		X							X	X
Plains Spotted Skunk	*Spilogale putorius interrupta*	UR				X				X								X
Prairie Gray Fox	*Urocyon cinereoargenteus ocythous*	UR				X		X		X								X
Tricolored Bat	*Perimyotis subflavus*	UR	X	X	X	X	X	X		X				X		X		X
Birds																		
Eastern Black Rail	*Laterallus jamaicensis ssp. jamaicensis*	T	X	X	X	X	X	X		X							X	
Golden-winged Warbler	*Vermivora chrysoptera*	UR	X	X	X	X	X	X		X							X	X
Piping Plover, Great Lakes Population	*Charadrius melodus*	E	X	X	X	X	X	X	D	X		X		X	X	X		
Rufa Red Knot	*Calidiris canutus rufa*	T	X	X	X	X	X	X	PCH	X		X		X	X	X		
Whooping Crane, Non-essential Experimental Pop.	*Grus americana*	E	X	X	X	X	X	X		X							X	X

[1] Status designations: E = endangered, T = threatened, UR = under review, P = proposed for listing, DR = delisted due to recovery, D = designated critical habitat, PCH = proposed critial habitat under review (USFWS, 2021; USFWS, 2022)

[2] Primary habitat occupied by the species. Species denoted with an asterisk are those that can occupy both terrestrial and aquatic habitats.

Appendix F-2. Species Response Matrix for Responses Occurring in Shoreline Habitat within Action Area of Region 5

Shoreline (beach/land)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																																						
Dwarf Lake Iris			X			X																										!		!					
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																										!		!					
Houghton's Goldenrod			X																													!		!					
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																																				
Minnesota Dwarf Trout Lily				X																																			
Northern Wild Monkshood					X	X																																	
Pitcher's thistle	X	X	X			X																										!		!					
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																																					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																																		
Fanshell	X	X			X																																		
Fat Pocketbook	X	X																																					
Higgins' Eye Pearlymussel	X			X		X																																	
Longsolid	X	X			X																																		
Northern Riffleshell	X	X	X		X																																		
Orangefoot Pimpleback	X																																						
Pink Mucket	X	X			X																																		

Appendix F-2. Species Response Matrix for Responses Occurring in Shoreline Habitat within Action Area of Region 5

Shoreline (beach/land)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																																		
Pyramid (Pink) Pigtoe					X																																		
Rabbitsfoot	X	X			X																																		
Rayed Bean		X	X		X																																		
Rough Pigtoe		X																																					
Round Hickorynut	X	X	X		X																																		
Salamander mussel	X	X	X	X	X	X																																	
Scaleshell	X																																						
Sheepnose	X	X		X	X	X																																	
Snuffbox	X	X	X		X	X																																	
Spectaclecase	X			X		X																																	
White Catspaw		X			X																																		
Winged Mapleleaf				X		X																																	
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																																		
Bog Buckmoth						X																																	
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine’s Emerald Dragonfly	X		X			X																																	
Hungerford’s Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																																						
Mitchell’s Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																																	
Poweshiek Skipperling			X	X		X																																	
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																																	
Rusty Patched Bumble Bee	X	X		X	X	X																																	
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																																	
Pallid Sturgeon	X																																						
Popeye Shiner					X																																		

Appendix F-2. Species Response Matrix for Responses Occurring in Shoreline Habitat within Action Area of Region 5

Shoreline (beach/land)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																																			
Sicklefin Chub	X																																							
Sturgeon Chub	X																																							
Topeka Shiner				X																																				
Herptiles																																								
Alligator Snapping Turtle	X	X																															!		!					
Blanding's Turtle	X	X	X	X	X	X																											!		!					
Copperbelly Watersnake, N. DPS		X	X		X																																			
Eastern Massasauga	X	X	X		X	X																																		
Illinois Chorus Frog	X																																							
Spotted Turtle	X	X	X		X																																			
Streamside Salamander		X			X																																			
Wood Turtle			X	X	X	X																																		
Mammals																																								
Canada Lynx			X	X		X																																		
Gray Bat	X	X																																						
Gray Wolf			X	X		X																																		
Indiana Bat	X	X	X		X																																			
Little Brown Bat	X	X	X	X	X	X																																		
Northern Bog Lemming				X																																				
Northern Long-eared Bat	X	X	X	X	X	X																																		
Plains Spotted Skunk				X																																				
Prairie Gray Fox				X		X																																		
Tricolored Bat	X	X	X	X	X	X																																		
Birds																																								
Eastern Black Rail	X	X	X	X	X	X																																		
Golden-winged Warbler	X	X	X	X	X	X																																		
Piping Plover, Great Lakes	X	X	X	X	X	X																											!		!					
Rufa Red Knot	X	X	X	X	X	X																											!		!					
Whooping Crane, Non-essential Experimental Pop.	X	X	X	X	X	X																																		

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE

Appendix F-3. Species Response Matrix for Responses Occurring in Ports, Canals, and Industrial Areas within Action Area of Region 5

Ports, Canals, Industrial Areas (Structures and water)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																																						
Dwarf Lake Iris			X			X																																	
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																																	
Houghton's Goldenrod			X																																				
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																																				
Minnesota Dwarf Trout Lily				X																																			
Northern Wild Monkshood					X	X																																	
Pitcher's thistle	X	X	X			X																																	
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																																					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																												!		!					
Fanshell	X	X			X																												!		!					
Fat Pocketbook	X	X																															!		!					
Higgins' Eye Pearlymussel	X			X		X																											!		!					
Longsolid	X	X			X																												!		!					
Northern Riffleshell	X	X	X		X																												!		!					
Orangefoot Pimpleback	X																																!		!					
Pink Mucket	X	X			X																												!		!					

Appendix F-3. Species Response Matrix for Responses Occurring in Ports, Canals, and Industrial Areas within Action Area of Region 5

Ports, Canals, Industrial Areas (Structures and water)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																																		
Pyramid (Pink) Pigtoe					X																											!		!					
Rabbitsfoot	X	X			X																											!		!					
Rayed Bean		X	X		X																											!		!					
Rough Pigtoe		X																														!		!					
Round Hickorynut	X	X	X		X																											!		!					
Salamander mussel	X	X	X	X	X	X																										!		!					
Scaleshell	X																															!		!					
Sheepnose	X	X		X	X	X																										!		!					
Snuffbox	X	X	X		X	X																										!		!					
Spectaclecase	X			X		X																										!		!					
White Catspaw		X			X																																		
Winged Mapleleaf				X		X																										!		!					
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																																		
Bog Buckmoth						X																																	
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine's Emerald Dragonfly	X		X			X																																	
Hungerford's Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																																						
Mitchell's Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																																	
Poweshiek Skipperling			X	X		X																																	
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																																	
Rusty Patched Bumble Bee	X	X		X	X	X																																	
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																										!		!					
Pallid Sturgeon	X																															!		!					
Popeye Shiner					X																																		

Appendix F-3. Species Response Matrix for Responses Occurring in Ports, Canals, and Industrial Areas within Action Area of Region 5

Ports, Canals, Industrial Areas (Structures and water)

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																																		
Sicklefin Chub	X																															!		!					
Sturgeon Chub	X																															!		!					
Topeka Shiner				X																																			
Herptiles																																							
Alligator Snapping Turtle	X	X																														!		!					
Blanding's Turtle	X	X	X	X	X	X																																	
Copperbelly Watersnake, N. DPS		X	X		X																																		
Eastern Massasauga	X	X	X		X	X																																	
Illinois Chorus Frog	X																																						
Spotted Turtle	X	X	X		X																																		
Streamside Salamander		X			X																																		
Wood Turtle			X	X	X	X																																	
Mammals																																							
Canada Lynx			X	X		X																																	
Gray Bat	X	X																																					
Gray Wolf			X	X		X																																	
Indiana Bat	X	X	X		X																																		
Little Brown Bat	X	X	X	X	X	X																																	
Northern Bog Lemming				X																																			
Northern Long-eared Bat	X	X	X	X	X	X																																	
Plains Spotted Skunk				X																																			
Prairie Gray Fox				X		X																																	
Tricolored Bat	X	X	X	X	X	X																																	
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																																	
Golden-winged Warbler	X	X	X	X	X	X																																	
Piping Plover, Great Lakes	X	X	X	X	X	X																																	
Rufa Red Knot	X	X	X	X	X	X																																	
Whooping Crane, Non-essential Experimental Pop.	X	X	X	X	X	X																																	

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE

Appendix F-4. Species Response Matrix for Responses Occurring in Rivers and Streams within Action Area of Region 5

Rivers and Streams

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																															!							
Dwarf Lake Iris			X			X																																	
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																																	
Houghton's Goldenrod			X																																				
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																													!		!					
Minnesota Dwarf Trout Lily				X																												!		!					
Northern Wild Monkshood					X	X																										!		!					
Pitcher's thistle	X	X	X			X																																	
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																														!		!					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																											!		!					
Fanshell	X	X			X																											!		!					
Fat Pocketbook	X	X																														!		!					
Higgins' Eye Pearlymussel	X			X		X																										!		!					
Longsolid	X	X			X																											!		!					
Northern Riffleshell	X	X	X		X																											!		!					
Orangefoot Pimpleback	X																															!		!					
Pink Mucket	X	X			X																											!		!					

Appendix F-4. Species Response Matrix for Responses Occurring in Rivers and Streams within Action Area of Region 5

Rivers and Streams

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																											!		!					
Pyramid (Pink) Pigtoe					X																											!		!					
Rabbitsfoot	X	X			X																											!		!					
Rayed Bean		X	X		X																											!		!					
Rough Pigtoe		X																														!		!					
Round Hickorynut	X	X	X		X																											!		!					
Salamander mussel	X	X	X	X	X	X																										!		!					
Scaleshell	X																															!		!					
Sheepnose	X	X		X	X	X																										!		!					
Snuffbox	X	X	X		X	X																										!		!					
Spectaclecase	X			X		X																										!		!					
White Catspaw		X			X																											!		!					
Winged Mapleleaf				X		X																										!		!					
Crustaceans																																							
Illinois Cave amphipod	X																															!		!					
Insects																																							
American Burying Beetle			X		X																																		
Bog Buckmoth						X																																	
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine's Emerald Dragonfly	X		X			X																																	
Hungerford's Crawling Water Beetle			X																													!		!					
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																															!		!					
Mitchell's Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																										!		!					
Poweshiek Skipperling			X	X		X																																	
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																										!		!					
Rusty Patched Bumble Bee	X	X		X	X	X																										!		!					
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																										!		!					
Pallid Sturgeon	X																															!		!					
Popeye Shiner					X																											!		!					

Appendix F-4. Species Response Matrix for Responses Occurring in Rivers and Streams within Action Area of Region 5

Rivers and Streams

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																											!		!					
Sicklefin Chub	X																															!		!					
Sturgeon Chub	X																															!		!					
Topeka Shiner				X																												!		!					
Herptiles																																							
Alligator Snapping Turtle	X	X																!	!													!		!					
Blanding's Turtle	X	X	X	X	X	X												!	!													!		!					
Copperbelly Watersnake, N. DPS		X	X		X			!						!				!	!																				
Eastern Massasauga	X	X	X		X	X		!						!				!	!																				
Illinois Chorus Frog	X							!						!				!	!																				
Spotted Turtle	X	X	X		X													!	!													!		!					
Streamside Salamander		X			X																											!		!					
Wood Turtle			X	X	X	X																										!		!					
Mammals																																							
Canada Lynx			X	X		X																																	
Gray Bat	X	X																														!		!					
Gray Wolf			X	X		X																																	
Indiana Bat	X	X	X		X																																		
Little Brown Bat	X	X	X	X	X	X																																	
Northern Bog Lemming				X																																			
Northern Long-eared Bat	X	X	X	X	X	X																																	
Plains Spotted Skunk				X																																			
Prairie Gray Fox				X		X																																	
Tricolored Bat	X	X	X	X	X	X																										!		!					
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																																	
Golden-winged Warbler	X	X	X	X	X	X																																	
Piping Plover, Great Lakes	X	X	X	X	X	X																										!		!					
Rufa Red Knot	X	X	X	X	X	X																										!		!					
Whooping Crane, Non-essential	X	X	X	X	X	X																																	

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE.

Appendix F-5. Species Response Matrix for Responses Occurring in Bays and Estuaries within Action Area of Region 5

Bays and Estuaries

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																																						
Dwarf Lake Iris			X			X																																	
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																																	
Houghton's Goldenrod			X																																				
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																																				
Minnesota Dwarf Trout Lily				X																																			
Northern Wild Monkshood					X	X																																	
Pitcher's thistle	X	X	X			X																																	
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																																					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																											!		!					
Fanshell	X	X			X																																		
Fat Pocketbook	X	X																																					
Higgins' Eye Pearlymussel	X			X		X																																	
Longsolid	X	X			X																																		
Northern Riffleshell	X	X	X		X																											!		!					
Orangefoot Pimpleback	X																																						
Pink Mucket	X	X			X																																		

Appendix F-5. Species Response Matrix for Responses Occurring in Bays and Estuaries within Action Area of Region 5

Bays and Estuaries

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																																		
Pyramid (Pink) Pigtoe					X																																		
Rabbitsfoot	X	X			X																																		
Rayed Bean		X	X		X																											!		!					
Rough Pigtoe		X																																					
Round Hickorynut	X	X	X		X																											!		!					
Salamander mussel	X	X	X	X	X	X																										!		!					
Scaleshell	X																																						
Sheepnose	X	X		X	X	X																																	
Snuffbox	X	X	X		X	X																										!		!					
Spectaclecase	X			X		X																																	
White Catspaw		X			X																																		
Winged Mapleleaf				X		X																																	
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																																		
Bog Buckmoth						X																																	
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine's Emerald Dragonfly	X		X			X																																	
Hungerford's Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																																						
Mitchell's Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																																	
Poweshiek Skipperling			X	X		X																																	
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																																	
Rusty Patched Bumble Bee	X	X		X	X	X																																	
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																										!		!					
Pallid Sturgeon	X																																						
Popeye Shiner					X																																		

Appendix F-5. Species Response Matrix for Responses Occurring in Bays and Estuaries within Action Area of Region 5

Bays and Estuaries

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																																		
Sicklefin Chub	X																																						
Sturgeon Chub	X																																						
Topeka Shiner				X																																			
Herptiles																																							
Alligator Snapping Turtle	X	X																																					
Blanding's Turtle	X	X	X	X	X	X																										!		!					
Copperbelly Watersnake, N. DPS		X	X		X																																		
Eastern Massasauga	X	X	X		X	X																																	
Illinois Chorus Frog	X																																						
Spotted Turtle	X	X	X		X																											!		!					
Streamside Salamander		X			X																																		
Wood Turtle			X	X	X	X																																	
Mammals																																							
Canada Lynx			X	X		X																																	
Gray Bat	X	X																																					
Gray Wolf			X	X		X																																	
Indiana Bat	X	X	X		X																																		
Little Brown Bat	X	X	X	X	X	X																																	
Northern Bog Lemming				X																																			
Northern Long-eared Bat	X	X	X	X	X	X																																	
Plains Spotted Skunk				X																																			
Prairie Gray Fox				X		X																																	
Tricolored Bat	X	X	X	X	X	X																																	
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																																	
Golden-winged Warbler	X	X	X	X	X	X																																	
Piping Plover, Great Lakes	X	X	X	X	X	X																										!		!					
Rufa Red Knot	X	X	X	X	X	X																										!		!					
Whooping Crane, Non-essential Experimental Pop.	X	X	X	X	X	X																																	

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE.

Appendix F-6. Species Response Matrix for Responses Occurring in Pons and Lakes within Action Area of Region 5

Ponds and Lakes

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																																						
Dwarf Lake Iris			X			X																																	
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																										!		!					
Houghton's Goldenrod			X																													!		!					
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																																				
Minnesota Dwarf Trout Lily				X																																			
Northern Wild Monkshood					X	X																																	
Pitcher's thistle	X	X	X			X																																	
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																																					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																											!		!					
Fanshell	X	X			X																											!		!					
Fat Pocketbook	X	X																														!		!					
Higgins' Eye Pearlymussel	X			X		X																										!		!					
Longsolid	X	X			X																											!		!					
Northern Riffleshell	X	X	X		X																											!		!					
Orangefoot Pimpleback	X																															!		!					
Pink Mucket	X	X			X																											!		!					

Appendix F-6. Species Response Matrix for Responses Occurring in Pons and Lakes within Action Area of Region 5

Ponds and Lakes

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																											!		!					
Pyramid (Pink) Pigtoe					X																											!		!					
Rabbitsfoot	X	X			X																											!		!					
Rayed Bean		X	X		X																											!		!					
Rough Pigtoe		X																														!		!					
Round Hickorynut	X	X	X		X																											!		!					
Salamander mussel	X	X	X	X	X	X																										!		!					
Scaleshell	X																															!		!					
Sheepnose	X	X		X	X	X																										!		!					
Snuffbox	X	X	X		X	X																										!		!					
Spectaclecase	X			X		X																										!		!					
White Catspaw		X			X																											!		!					
Winged Mapleleaf				X		X																										!		!					
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																																		
Bog Buckmoth						X																																	
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine's Emerald Dragonfly	X		X			X																										!		!					
Hungerford's Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																																						
Mitchell's Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																																	
Poweshiek Skipperling			X	X		X																																	
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																																	
Rusty Patched Bumble Bee	X	X		X	X	X																																	
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																										!		!					
Pallid Sturgeon	X																																						
Popeye Shiner					X																																		

Appendix F-6. Species Response Matrix for Responses Occurring in Pons and Lakes within Action Area of Region 5

Ponds and Lakes

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																																		
Sicklefin Chub	X																																						
Sturgeon Chub	X																																						
Topeka Shiner				X																												!		!					
Herptiles																																							
Alligator Snapping Turtle	X	X																!	!													!		!					
Blanding's Turtle	X	X	X	X	X	X												!	!													!		!					
Copperbelly Watersnake, N. DPS		X	X		X													!	!																				
Eastern Massasauga	X	X	X		X	X												!	!																				
Illinois Chorus Frog	X																	!	!													!		!					
Spotted Turtle	X	X	X		X													!	!													!		!					
Streamside Salamander		X			X																																		
Wood Turtle			X	X	X	X																																	
Mammals																																							
Canada Lynx			X	X		X																																	
Gray Bat	X	X																														!		!					
Gray Wolf			X	X		X																																	
Indiana Bat	X	X	X		X																																		
Little Brown Bat	X	X	X	X	X	X																																	
Northern Bog Lemming				X																																			
Northern Long-eared Bat	X	X	X	X	X	X																																	
Plains Spotted Skunk				X																																			
Prairie Gray Fox				X		X																																	
Tricolored Bat	X	X	X	X	X	X																										!		!					
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																																	
Golden-winged Warbler	X	X	X	X	X	X																																	
Piping Plover, Great Lakes	X	X	X	X	X	X																										!		!					
Rufa Red Knot	X	X	X	X	X	X																										!		!					
Whooping Crane, Non-essential	X	X	X	X	X	X																																	

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE

Appendix F-7. Species Response Matrix for Responses Occurring in Wetlands within Action Area of Region 5

Wetlands

Common Name	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																																				
Decurrent False Aster	X																															!							
Dwarf Lake Iris			X			X																										!		!					
Eastern Prairie Fringed Orchid	X	X	X		X	X		!																															
Fassett's Locoweed						X																																	
Houghton's Goldenrod			X																													!		!					
Lakeside Daisy	X		X		X																																		
Leafy Prairie-clover	X																																						
Leedy's Roseroot				X																																			
Mead's Milkweed	X	X				X																																	
Michigan Monkey Flower			X																													!		!					
Minnesota Dwarf Trout Lily				X																																			
Northern Wild Monkshood					X	X																																	
Pitcher's thistle	X	X	X			X																																	
Prairie Bush-clover	X			X		X																																	
Short's Bladderpod		X																																					
Short's Goldenrod		X																																					
Small whorled pogonia	X		X		X																																		
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																											!		!					
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																																			
Snails																																							
Iowa Pleistocene Snail	X																																						
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																																		
Fanshell	X	X			X																																		
Fat Pocketbook	X	X																																					
Higgins' Eye Pearlymussel	X			X		X																																	
Longsolid	X	X			X																																		
Northern Riffleshell	X	X	X		X																																		
Orangefoot Pimpleback	X																																						
Pink Mucket	X	X			X																																		

Appendix F-7. Species Response Matrix for Responses Occurring in Wetlands within Action Area of Region 5

Wetlands

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Purple Cat's Paw Pearlymussel					X																																		
Pyramid (Pink) Pigtoe					X																																		
Rabbitsfoot	X	X			X																																		
Rayed Bean		X	X		X																																		
Rough Pigtoe		X																																					
Round Hickorynut	X	X	X		X																																		
Salamander mussel	X	X	X	X	X	X																																	
Scaleshell	X																																						
Sheepnose	X	X		X	X	X																																	
Snuffbox	X	X	X		X	X																																	
Spectaclecase	X			X		X																																	
White Catspaw		X			X																																		
Winged Mapleleaf				X		X																																	
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																												!		!					
Bog Buckmoth						X																											!		!					
Dakota Skipper				X																																			
Frosted Elfin Butterfly	X	X	X		X	X																																	
Hine's Emerald Dragonfly	X		X			X																											!		!					
Hungerford's Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																																	
Linda's Roadside Skipper	X																																!		!					
Mitchell's Satyr Butterfly		X	X		X																												!		!					
Monarch Butterfly	X	X	X	X	X	X																											!		!					
Poweshiek Skipperling			X	X		X																											!		!					
Rattlesnake-master Borer Moth	X																																						
Regal Fritillary	X	X	X	X	X	X																											!		!					
Rusty Patched Bumble Bee	X	X		X	X	X																											!		!					
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																																	
Pallid Sturgeon	X																																						
Popeye Shiner					X																																		

Appendix F-7. Species Response Matrix for Responses Occurring in Wetlands within Action Area of Region 5

	Occurrence in Action Area						Wetlands: Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Scioto Madtom					X																																		
Sicklefin Chub	X																																						
Sturgeon Chub	X																																						
Topeka Shiner				X																																			
Herptiles																																							
Alligator Snapping Turtle	X	X																																					
Blanding's Turtle	X	X	X	X	X	X																										!		!					
Copperbelly Watersnake, N. DPS		X	X		X																											!		!					
Eastern Massasauga	X	X	X		X	X																										!		!					
Illinois Chorus Frog	X																															!		!					
Spotted Turtle	X	X	X		X																											!		!					
Streamside Salamander		X			X																																		
Wood Turtle			X	X	X	X																										!		!					
Mammals																																							
Canada Lynx			X	X		X																																	
Gray Bat	X	X																																					
Gray Wolf			X	X		X																																	
Indiana Bat	X	X	X		X																											!		!					
Little Brown Bat	X	X	X	X	X	X																																	
Northern Bog Lemming				X																												!		!					
Northern Long-eared Bat	X	X	X	X	X	X																										!		!					
Plains Spotted Skunk				X																																			
Prairie Gray Fox				X		X																																	
Tricolored Bat	X	X	X	X	X	X																																	
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																										!		!					
Golden-winged Warbler	X	X	X	X	X	X																										!		!					
Piping Plover, Great Lakes	X	X	X	X	X	X																																	
Rufa Red Knot	X	X	X	X	X	X																																	
Whooping Crane, Non-essential Experimental Pop.	X	X	X	X	X	X																										!		!					

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE.

Appendix F-8. Species Response Matrix for Responses Occurring in Uplands within Action Area of Region 5

Uplands

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Plants																																							
American Hart's-tongue Fern			X																													!		!					
Decurrent False Aster	X																																						
Dwarf Lake Iris			X			X																										!		!					
Eastern Prairie Fringed Orchid	X	X	X		X	X																																	
Fassett's Locoweed						X																										!		!					
Houghton's Goldenrod			X																																				
Lakeside Daisy	X		X		X																											!		!					
Leafy Prairie-clover	X																															!		!					
Leedy's Roseroot				X																												!		!					
Mead's Milkweed	X	X				X																										!		!					
Michigan Monkey Flower			X																																				
Minnesota Dwarf Trout Lily				X																												!		!					
Northern Wild Monkshood					X	X																										!		!					
Pitcher's thistle	X	X	X			X																										!		!					
Prairie Bush-clover	X			X		X																										!		!					
Short's Bladderpod		X																														!		!					
Short's Goldenrod		X																														!		!					
Small whorled pogonia	X		X		X																											!		!					
Tennessee Pondweed					X																																		
Virginia Sneezeweed					X																																		
Virginia Spiraea					X																																		
Western Prairie Fringed Orchid				X																												!		!					
Snails																																							
Iowa Pleistocene Snail	X																															!		!					
Clams (Freshwater Mussels)																																							
Clubshell	X	X	X		X																																		
Fanshell	X	X			X																																		
Fat Pocketbook	X	X																																					
Higgins' Eye Pearlymussel	X			X		X																																	
Longsolid	X	X			X																																		
Northern Riffleshell	X	X	X		X																																		

Appendix F-8. Species Response Matrix for Responses Occurring in Uplands within Action Area of Region 5

Uplands

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Orangefoot Pimpleback	X																																						
Pink Mucket	X	X			X																																		
Purple Cat's Paw Pearlymussel					X																																		
Pyramid (Pink) Pigtoe					X																																		
Rabbitsfoot	X	X			X																																		
Rayed Bean		X	X		X																																		
Rough Pigtoe		X																																					
Round Hickorynut	X	X	X		X																																		
Salamander mussel	X	X	X	X	X	X																																	
Scaleshell	X																																						
Sheepnose	X	X		X	X	X																																	
Snuffbox	X	X	X		X	X																																	
Spectaclecase	X			X		X																																	
White Catspaw		X			X																																		
Winged Mapleleaf				X		X																																	
Crustaceans																																							
Illinois Cave amphipod	X																																						
Insects																																							
American Burying Beetle			X		X																											!		!					
Bog Buckmoth						X																																	
Dakota Skipper				X																												!		!					
Frosted Elfin Butterfly	X	X	X		X	X																										!		!					
Hine's Emerald Dragonfly	X		X			X																																	
Hungerford's Crawling Water Beetle			X																																				
Karner Blue Butterfly	X	X	X	X	X	X																										!		!					
Linda's Roadside Skipper	X																															!		!					
Mitchell's Satyr Butterfly		X	X		X																																		
Monarch Butterfly	X	X	X	X	X	X																										!		!					
Unoccupied Cricital Habitat - Poweshiek Skipperling																																							
Adjacent to occupied wetland - Poweshiek Skipperling			X	X		X																										!		!					

Appendix F-8. Species Response Matrix for Responses Occurring in Uplands within Action Area of Region 5

Uplands

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Rattlesnake-master Borer Moth	X																															!		!					
Regal Fritillary	X	X	X	X	X	X																										!		!					
Rusty Patched Bumble Bee	X	X		X	X	X																										!		!					
Fish																																							
Lake Sturgeon	X	X	X	X	X	X																																	
Pallid Sturgeon	X																																						
Popeye Shiner					X																																		
Scioto Madtom					X																																		
Sicklefin Chub	X																																						
Sturgeon Chub	X																																						
Topeka Shiner				X																																			
Herptiles																																							
Alligator Snapping Turtle	X	X																																					
Blanding's Turtle	X	X	X	X	X	X																										!		!					
Copperbelly Watersnake, N. DPS		X	X		X																											!		!					
Eastern Massasauga	X	X	X		X	X																										!		!					
Illinois Chorus Frog	X																															!		!					
Spotted Turtle	X	X	X		X																											!		!					
Streamside Salamander		X			X																											!		!					
Wood Turtle			X	X	X	X																										!		!					
Mammals																																							
Canada Lynx			X	X		X																										!		!					
Gray Bat	X	X																														!		!					
Gray Wolf			X	X		X																										!		!					
Indiana Bat	X	X	X		X																											!		!					
Little Brown Bat	X	X	X	X	X	X																										!		!					
Northern Bog Lemming				X																																			
Northern Long-eared Bat	X	X	X	X	X	X																										!		!					
Plains Spotted Skunk				X																												!		!					
Prairie Gray Fox				X		X																										!		!					
Tricolored Bat	X	X	X	X	X	X																										!		!					

Appendix F-8. Species Response Matrix for Responses Occurring in Uplands within Action Area of Region 5

Uplands

	Occurrence in Action Area						Deflection and containment Activities				Recovery Activities			Removal/cleanup Activities							Submerged Oil Activities			Wildlife Protection Activities		Locating, Tracking, and Support Activities										Waste Management Activities*			
Common Name	IL	IN	MI	MN	OH	WI	Booming	Dikes or Berms	Construction barriers, dams, pits, and trenches	Culvert blocking	Skimming	Vacuuming	Sorbents	Flooding	Flushing	Steam Cleaning	Sandblasting	Mechanical (non-chemical) sand cleaning (surface, <1 inch)	Mechanical (non-chemical) sand cleaning and excavation (>1 inch)	Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation	Detection of non-floating or submerged oil	Recovery of non-floating or submerged oil	Containment of non-floating or submerged oil	Deterrence and Hazing	Capture and care of contaminated species or recovery of contaminated carcasses	Use of Aircraft	Use of Vessels	Use of Vehicles	Use of machinery/supporting equipment	Creation/Use of New Access Points	Creation/use of Staging Areas (on land)	Natural attenuation - allow habitat to recover naturally while monitoring	Deployment of buoys	Locating, Sampling and monitoring: Air, land, water (includes SCAT)	Access of personnel by foot traffic	Waste Handling	Temporary Storage (on water)	Temporary Storage (on land)	Decontamination
Birds																																							
Eastern Black Rail	X	X	X	X	X	X																																	
Golden-winged Warbler	X	X	X	X	X	X																										!		!					
Piping Plover, Great Lakes	X	X	X	X	X	X																																	
Rufa Red Knot	X	X	X	X	X	X																																	
Whooping Crane, Non-essential	X	X	X	X	X	X																																	

* Decanting is addressed in the NRT's guidance and in the RAM; however, it is not a response utilized within R5 nor accounted for in this BE.

Appendix G

High-Risk Response Actions and Activities in *SHORELINES* ***Associated Vulnerable Habitats:*** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, and Sedge Meadow			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Dwarf Lake Iris *(Reference Description Page/Link)*	Dikes or berms	MI, WI	
Pitcher's Thistle	Dikes or berms	IL, IN, MI, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, WI	
Fassett's Locoweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	WI	
Hall's Bulrush	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Pitcher's Thistle	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, WI	
Alligator Snapping Turtle	Booming Dikes or berms	IL, IN	
Blanding's Turtle	Booming Dikes or berms	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Booming Dikes or berms	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Rufa Red Knot	Booming Dikes or berms	IL, IN, MI, OH, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Vacuuming Sorbents	IL, IN, MI, WI	
Fassett's Locoweed	Vacuuming Sorbents	WI	
Hall's Bulrush	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Skimming Vacuuming Sorbents	MI	
Pitcher's Thistle	Vacuuming Sorbents	IL, IN, MI, WI	
Alligator Snapping Turtle	Skimming	IL, IN	

	Vacuuming Sorbents		
Blanding's Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Rufa Red Knot	Skimming Vacuuming	IL, IN, MI, OH, WI	USFWS Contact
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Flooding Flushing Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	IL, IN, MI, WI	
Fassett's Locoweed	Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	WI	
Hall's Bulrush	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	MI	
Pitcher's Thistle	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	IL, IN, MI, WI	
Alligator Snapping Turtle	Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN	
Blanding's Turtle	Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning	IL, IN, MI, OH, WI	
Rufa Red Knot	Flooding Flushing Steam cleaning Sandblasting	IL, IN, MI, OH, WI	

	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning		
May affect, not likely to adversely affect due to insignificant or discountable effects			
Fassett's Locoweed	Flooding	WI	
Alligator Snapping Turtle	Flooding Flushing	IL, IN	
Blanding's Turtle	Flooding Flushing	IL, IN, MI, OH, WI	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Hall's Bulrush	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall's Bulrush	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Detection of non-floating/submerged oil	MI	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Alligator Snapping Turtle	Capture and care of contaminated species	IL, IN	
Blanding's Turtle	Capture and care of contaminated species	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Rufa Red Knot	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Fassett's Locoweed	Deterrence and hazing Capture and care of contaminated species	WI	
Hall's Bulrush	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Deterrence and hazing Capture and care of contaminated species	MI	
Pitcher's Thistle	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, WI	
Alligator Snapping Turtle	Deterrence and hazing	IL, IN	
Blanding's Turtle	Deterrence and hazing	IL, IN, MI, OH, WI	
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Use of vehicles	IL, IN, MI, WI	

	Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic		
Fassett's Locoweed	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	WI	
Hall's Bulrush	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	MI	
Pitcher's Thistle	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	IL, IN, MI, WI	
Alligator Snapping Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	IL, IN	
Blanding's Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land)	IL, IN, MI, OH, WI	

	Access of personnel by foot traffic		
Piping Plover *Critical Habitat*	Use of aircraft Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Deployment of buoys Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Rufa Red Knot	Use of aircraft Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Deployment of buoys	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Use of aircraft	IL, IN	
Blanding's Turtle	Use of aircraft	IL, IN, MI, OH, WI	
Rufa Red Knot	Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Special considerations needed, high level of concern			
Dwarf Lake Iris	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, WI	
Fassett’s Locoweed	Natural attenuation Locating, sampling, and monitoring air, land, and water, and water	WI	
Hall’s Bulrush	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Houghton’s Goldenrod	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Pitcher’s Thistle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, WI	
Alligator Snapping Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Blanding's Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Rufa Red Knot	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	

Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Waste handling Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN, MI, WI	
Eastern Prairie Fringed Orchid	Temporary storage (on land)	IL, IN, MI, OH, WI	
Fassett's Locoweed	Waste handling Temporary storage (on land) Decontamination	WI	
Hall's Bulrush	Waste handling Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Waste handling Temporary storage (on land) Decontamination	MI	
Michigan Monkey Flower	Temporary storage (on land)	MI	
Minnesota Dwarf Trout Lily	Temporary storage (on land)	MN	
Northern Wild Monkshood	Temporary storage (on land)	OH, WI	
Pitcher's Thistle	Temporary storage (on land) Decontamination	IL, IN, MI, WI	
Alligator Snapping Turtle	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN	
Blanding's Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Rufa Red Knot	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall's Bulrush	Temporary storage (on water)	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Temporary storage (on water)	MI	
Pitcher's Thistle	Waste handling	IL, IN, MI, WI	
Alligator Snapping Turtle	Waste handling	IL, IN	
Blanding's Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH, WI	
Piping Plover *Critical Habitat*	Waste handling	IL, IN, MI, OH, WI	
Rufa Red Knot	Waste handling	IL, IN, MI, OH, WI	

High-Risk Response Actions and Activities in *PORTS, CANALS, AND INDUSTRIAL AREAS* ***Associated Vulnerable Habitats:*** Beach and Sand Bar, Mudflats, Rooted Floating Aquatics, Open Water, and Submersed Vegetation			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell *(Reference Description Page/Link)*	Booming	IL, IN, MI, OH	
Orangefoot Pimpleback	Booming	IL	
Pyramid (Pink) Pigtoe	Booming	OH	
Rough Pigtoe	Booming	IN	
Scaleshell	Booming	IL	
Winged Mapleleaf	Booming	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Booming	IL, IN, MI, OH	
Fanshell	Booming	IL, IN, OH	
Fat Pocketbook	Booming	IL, IN	
Higgins' Eye Pearlymussel	Booming	IL, MN, WI	
Longsolid	Booming	IL, IN, OH	
Pink Mucket	Booming	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Booming	IL, IN, OH	
Rayed Bean	Booming	IN, MI, OH	
Round Hickorynut	Booming	IL, IN, MI, OH	
Salamander Mussel	Booming	IL, IN, MI, MN, OH, WI	
Sheepnose	Booming	IL, IN, MN, OH, WI	
Snuffbox	Booming	IL, IN, MI, OH, WI	
Spectaclecase	Booming	IL, MN, WI	
Lake Sturgeon	Booming	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Booming	IL	
Sicklefin Chub	Booming	IL	
Sturgeon Chub	Booming	IL	
Alligator Snapping Turtle	Booming	IL, IN	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Orangefoot Pimpleback	Skimming Vacuuming Sorbents	IL	
Pyramid (Pink) Pigtoe	Skimming Vacuuming Sorbents	OH	
Rough Pigtoe	Skimming Vacuuming Sorbents	IN	
Scaleshell	Skimming Vacuuming Sorbents	IL	
Winged Mapleleaf	Skimming Vacuuming Sorbents	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Skimming	IL, IN, MI, OH	

	Vacuuming Sorbents		
Fanshell	Skimming Vacuuming Sorbents	IL, IN, OH	
Fat Pocketbook	Skimming Vacuuming Sorbents	IL, IN	
Higgins' Eye Pearlymussel	Skimming Vacuuming Sorbents	IL, MN, WI	
Longsolid	Skimming Vacuuming Sorbents	IL, IN, OH	
Pink Mucket	Skimming Vacuuming Sorbents	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, OH	
Rayed Bean	Skimming Vacuuming Sorbents	IN, MI, OH	
Round Hickorynut	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Salamander Mussel	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Sheepnose	Skimming Vacuuming Sorbents	IL, IN, MN, OH, WI	
Snuffbox	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Spectaclecase	Skimming Vacuuming Sorbents	IL, MN, WI	
Lake Sturgeon	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Skimming Vacuuming	IL	
Sicklefin Chub	Skimming Vacuuming	IL	
Sturgeon Chub	Skimming Vacuuming	IL	
Alligator Snapping Turtle	Skimming Vacuuming Sorbents	IL, IN	
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Pyramid (Pink) Pigtoe	Flushing Steam cleaning Sandblasting	OH	

	Manual removal/cleaning of oil		
Rough Pigtoe	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN	
Scaleshell	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Winged Mapleleaf	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Fanshell	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Fat Pocketbook	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN	
Higgins' Eye Pearlymussel	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Longsolid	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Pink Mucket	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Rayed Bean	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN, MI, OH	
Round Hickorynut	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Salamander Mussel	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	

Sheepnose	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Snuffbox	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Spectaclecase	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Lake Sturgeon	Flushing Steam cleaning Sandblasting	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Flushing Steam cleaning Sandblasting	IL	
Sicklefin Chub	Flushing Steam cleaning Sandblasting	IL	
Sturgeon Chub	Flushing Steam cleaning Sandblasting	IL	
Alligator Snapping Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Flushing	IL, IN	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Pyramid (Pink) Pigtoe	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Rough Pigtoe	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN	
Scaleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	

Winged Mapleleaf	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Fanshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Fat Pocketbook	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	
Higgins' Eye Pearlymussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Longsolid	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Pink Mucket	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Rayed Bean	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, MI, OH	
Round Hickorynut	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Salamander Mussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Sheepnose	Detection of non-floating/submerged oil	IL, IN, MN, OH, WI	

	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil		
Snuffbox	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Spectaclecase	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Lake Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sicklefin Chub	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sturgeon Chub	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Alligator Snapping Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Lake Sturgeon	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Deterrence and hazing	IL	
Sicklefin Chub	Deterrence and hazing	IL	
Sturgeon Chub	Deterrence and hazing	IL	
Alligator Snapping Turtle	Capture and care of contaminated species	IL, IN	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Deterrence and hazing	IL, IN	
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Deployment of buoys	IL, IN, MI, OH	

Orangefoot Pimpleback	Deployment of buoys	IL	
Pyramid (Pink) Pigtoe	Deployment of buoys	OH	
Rough Pigtoe	Deployment of buoys	IN	
Scaleshell	Deployment of buoys	IL	
Winged Mapleleaf	Deployment of buoys	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Deployment of buoys	IL, IN, MI, OH	
Fanshell	Deployment of buoys	IL, IN, OH	
Fat Pocketbook	Deployment of buoys	IL, IN	
Higgins' Eye Pearlymussel	Deployment of buoys	IL, MN, WI	
Longsolid	Deployment of buoys	IL, IN, OH	
Pink Mucket	Deployment of buoys	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Deployment of buoys	IL, IN, OH	
Rayed Bean	Deployment of buoys	IN, MI, OH	
Round Hickorynut	Deployment of buoys	IL, IN, MI, OH	
Salamander Mussel	Deployment of buoys	IL, IN, MI, MN, OH, WI	
Sheepnose	Deployment of buoys	IL, IN, MN, OH, WI	
Snuffbox	Deployment of buoys	IL, IN, MI, OH, WI	
Spectaclecase	Deployment of buoys	IL, MN, WI	
Lake Sturgeon	Use of vessels Deployment of buoys	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Use of vessels Deployment of buoys	IL	
Sicklefin Chub	Use of vessels Deployment of buoys	IL	
Sturgeon Chub	Use of vessels Deployment of buoys	IL	
Alligator Snapping Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas (on land) Access of personnel by foot traffic	IL, IN	
Blanding's Turtle	Access of personnel by foot traffic	IL, IN, MI, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Use of aircraft Deployment of buoys	IL, IN	
Special considerations needed, high level of concern			
Clubshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Fanshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Fat Pocketbook	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Higgins' Eye Pearlymussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Longsolid	Natural attenuation	IL, IN, OH	

	Locating, sampling, and monitoring air, land, and water		
Northern Riffleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Orangefoot Pimpleback	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Pink Mucket	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Pyramid (Pink) Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
Rabbitsfoot *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Rayed Bean	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Rough Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Round Hickorynut	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Salamander Mussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Scaleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Sheepnose	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Snuffbox	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Spectaclecase	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Winged Mapleleaf	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN, WI	
Lake Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Sicklefin Chub	Natural attenuation	IL	

	Locating, sampling, and monitoring air, land, and water		
Sturgeon Chub	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Alligator Snapping Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Temporary storage (on water)	IL, IN, MI, OH	
Orangefoot Pimpleback	Temporary storage (on water)	IL	
Pyramid (Pink) Pigtoe	Temporary storage (on water)	OH	
Rough Pigtoe	Temporary storage (on water)	IN	
Scaleshell	Temporary storage (on water)	IL	
Winged Mapleleaf	Temporary storage (on water)	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Temporary storage (on water)	IL, IN, MI, OH	
Fanshell	Temporary storage (on water)	IL, IN, OH	
Fat Pocketbook	Temporary storage (on water)	IL, IN	
Higgins' Eye Pearlymussel	Temporary storage (on water)	IL, MN, WI	
Longsolid	Temporary storage (on water)	IL, IN, OH	
Pink Mucket	Temporary storage (on water)	IL, IN, OH	
Rabbitsfoot *Critical Habitat*	Temporary storage (on water)	IL, IN, OH	
Rayed Bean	Temporary storage (on water)	IN, MI, OH	
Round Hickorynut	Temporary storage (on water)	IL, IN, MI, OH	
Salamander Mussel	Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Sheepnose	Temporary storage (on water)	IL, IN, MN, OH, WI	
Snuffbox	Temporary storage (on water)	IL, IN, MI, OH, WI	
Spectaclecase	Temporary storage (on water)	IL, MN, WI	
Lake Sturgeon	Decanting	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Decanting	IL	
Sicklefin Chub	Decanting	IL	
Sturgeon Chub	Decanting	IL	
Alligator Snapping Turtle	Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	IL, IN	

May affect, not likely to adversely affect due to insignificant or discountable effects			
Clubshell	Waste handling	IL, IN, MI, OH	
Fanshell	Waste handling	IL, IN, OH	
Fat Pocketbook	Waste handling	IL, IN	
Higgins' Eye Pearlymussel	Waste handling	IL, MN, WI	
Longsolid	Waste handling	IL, IN, OH	
Northern Riffleshell	Waste handling	IL, IN, MI, OH	
Orangefoot Pimpleback	Waste handling	IL	
Pink Mucket	Waste handling	IL, IN, OH	
Pyramid (Pink) Pigtoe	Waste handling	OH	
Rabbitsfoot *Critical Habitat*	Waste handling	IL, IN, OH	
Rayed Bean	Waste handling	IN, MI, OH	
Rough Pigtoe	Waste handling	IN	
Round Hickorynut	Waste handling	IL, IN, MI, OH	
Salamander Mussel	Waste handling	IL, IN, MI, MN, OH, WI	
Scaleshell	Waste handling	IL	
Sheepnose	Waste handling	IL, IN, MN, OH, WI	
Snuffbox	Waste handling	IL, IN, MI, OH, WI	
Spectaclecase	Waste handling	IL, MN, WI	
Winged Mapleleaf	Waste handling	MN, WI	
Lake Sturgeon	Waste handling Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Waste handling Temporary storage (on water)	IL	
Sicklefin Chub	Waste handling Temporary storage (on water)	IL	
Sturgeon Chub	Waste handling Temporary storage (on water)	IL	
Alligator Snapping Turtle	Waste handling	IL, IN	

High-Risk Response Actions and Activities in *RIVERS AND STREAMS (INLAND)* ***Associated Vulnerable Habitats:*** Beach and Sand Bar, Mudflats, Floodplain Forest, Rooted Floating Aquatics, Open Water, and Submersed Vegetation			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Eastern Prairie Fringed Orchid	Dikes or berms	IL, IN, MI, OH, WI	
Western Prairie Fringed Orchid	Dikes or berms	MN	
Clubshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Fanshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Fat Pocketbook	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN	
Higgins' Eye Pearlymussel	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MN, WI	
Longsolid	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Northern Riffleshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Orangefoot Pimpleback	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Pink Mucket	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Pyramid (Pink) Pigtoe	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Rabbitsfoot *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Rayed Bean	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, MI, OH	
Rough Pigtoe	Booming Dikes or berms	IN	

	Construction barriers, dams, pits, and trenches Culvert blocking		
Round Hickorynut	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Salamander Mussel	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Scaleshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Sheepnose	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MN, OH, WI	
Snuffbox	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Spectaclecase	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MN, WI	
Winged Mapleleaf	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MN, WI	
Illinois Cave Amphipod	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Popeye Shiner	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Scioto Madtom	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Topeka Shiner *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Eastern Prairie Fringed Orchid	Booming Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	

Hall's Bulrush	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Booming Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Lakeside Daisy	Booming Construction barriers, dams, pits, and trenches Culvert blocking	IL, MI, OH	
Michigan Monkey Flower	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Minnesota Dwarf Trout Lily	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MN	
Northern Wild Monkshood	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH, WI	
Running Buffalo Clover	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, OH	
Short's Bladderpod *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN	
Tennessee Pondweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Virginia Spiraea	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Western Prairie Fringed Orchid	Booming Construction barriers, dams, pits, and trenches Culvert blocking	MN	
Hungerford's Crawling Water Beetle	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Linda's Roadside Skipper	Dikes or berms Construction barriers, dams, pits, and trenches	IL	
Monarch Butterfly	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MN, OH, WI	

Lake Sturgeon	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Sicklefin Chub	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Sturgeon Chub	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Alligator Snapping Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN	
Blanding's Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Booming Construction barriers, dams, pits, and trenches	IL	
Spotted Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
Streamside Salamander	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, OH	
Wood Turtle	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Linda's Roadside Skipper	Booming Culvert blocking	IL	
Monarch Butterfly	Booming Culvert blocking	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Booming Culvert blocking	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Booming Culvert blocking	IL, IN, MN, OH, WI	
Alligator Snapping Turtle	Dikes or berms Culvert blocking	IL, IN	
Blanding's Turtle	Dikes or berms Culvert blocking	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Culvert blocking	IL	
Spotted Turtle	Dikes or berms Culvert blocking	IL, IN, MI, OH	
Gray Bat	Booming Dikes or berms	IL, IN	

	Construction barriers, dams, pits, and trenches Culvert blocking		
Tricolored Bat	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Booming	IL, IN, MI, MN, OH, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Fanshell	Skimming Vacuuming Sorbents	IL, IN, OH	
Fat Pocketbook	Skimming Vacuuming Sorbents	IL, IN	
Higgins' Eye Pearlymussel	Skimming Vacuuming Sorbents	IL, MN, WI	
Longsolid	Skimming Vacuuming Sorbents	IL, IN, OH	
Northern Riffleshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Orangefoot Pimpleback	Skimming Vacuuming Sorbents	IL	
Pink Mucket	Skimming Vacuuming Sorbents	IL, IN, OH	
Pyramid (Pink) Pigtoe	Skimming Vacuuming Sorbents	OH	
Rabbitsfoot *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, OH	
Rayed Bean	Skimming Vacuuming Sorbents	IN, MI, OH	
Rough Pigtoe	Skimming Vacuuming Sorbents	IN	
Round Hickorynut	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Salamander Mussel	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Scaleshell	Skimming Vacuuming Sorbents	IL	
Sheepnose	Skimming Vacuuming Sorbents	IL, IN, MN, OH, WI	
Snuffbox	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Spectaclecase	Skimming Vacuuming	IL, MN, WI	

	Sorbents		
Winged Mapleleaf	Skimming Vacuuming Sorbents	MN, WI	
Illinois Cave Amphipod	Skimming Vacuuming	IL	
Popeye Shiner	Skimming Vacuuming	OH	
Scioto Madtom	Skimming Vacuuming	OH	
Topeka Shiner *Critical Habitat*	Skimming Vacuuming	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Vacuuming Sorbents	IL	
Hall’s Bulrush	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Skimming Vacuuming Sorbents	MI	
Minnesota Dwarf Trout Lily	Vacuuming Sorbents	MN	
Northern Wild Monkshood	Vacuuming Sorbents	OH, WI	
Running Buffalo Clover	Vacuuming Sorbents	IN, OH	
Short’s Bladderpod *Critical Habitat*	Vacuuming Sorbents	IN	
Tennessee Pondweed	Skimming Vacuuming Sorbents	OH	
Virginia Spiraea	Vacuuming Sorbents	OH	
Hungerford’s Crawling Water Beetle	Skimming Vacuuming	MI	
Lake Sturgeon	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Skimming Vacuuming	IL	
Sicklefin Chub	Skimming Vacuuming	IL	
Sturgeon Chub	Skimming Vacuuming	IL	
Alligator Snapping Turtle	Skimming Vacuuming Sorbents	IL, IN	
Blanding’s Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Skimming Vacuuming Sorbents	IL	
Spotted Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Streamside Salamander	Skimming Vacuuming Sorbents	IN, OH	
Wood Turtle	Skimming Vacuuming Sorbents	MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Sorbents	IL, IN, MI, MN, OH, WI	

May affect, not likely to adversely affect due to insignificant or discountable effects			
Minnesota Dwarf Trout Lily	Skimming	MN	
Northern Wild Monkshood	Skimming	OH, WI	
Running Buffalo Clover	Skimming	IN, OH	
Short's Bladderpod *Critical Habitat*	Skimming	IN	
Gray Bat	Skimming Vacuuming Sorbents	IL, IN	
Tricolored Bat	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Fanshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Fat Pocketbook	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN	
Higgins' Eye Pearlymussel	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Longsolid	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Northern Riffleshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Pink Mucket	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	

Pyramid (Pink) Pigtoe	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	OH	
Rabbitsfoot *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Rayed Bean	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN, MI, OH	
Rough Pigtoe	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN	
Round Hickorynut	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Salamander Mussel	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Scaleshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Sheepnose	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Snuffbox	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Spectaclecase	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Winged Mapleleaf	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	MN, WI	
Illinois Cave Amphipod	Flooding Flushing Steam cleaning	IL	

	Sandblasting Manual removal/cleaning of oil		
Popeye Shiner	Flooding Flushing Steam cleaning Sandblasting	OH	
Scioto Madtom	Flooding Flushing Steam cleaning Sandblasting	OH	
Topeka Shiner *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Hall’s Bulrush	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Minnesota Dwarf Trout Lily	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MN	
Northern Wild Monkshood	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	OH, WI	
Running Buffalo Clover	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IN, OH	
Short’s Bladderpod *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting	IN	

	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil		
Tennessee Pondweed	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	OH	
Virginia Spiraea	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	OH	
Hungerford's Crawling Water Beetle	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Linda's Roadside Skipper	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL	
Monarch Butterfly	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MN, OH, WI	
Lake Sturgeon	Flooding Flushing Steam cleaning Sandblasting	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Flooding Flushing Steam cleaning Sandblasting	IL	
Sicklefin Chub	Flooding Flushing Steam cleaning Sandblasting	IL	
Sturgeon Chub	Flooding Flushing Steam cleaning Sandblasting	IL	
Alligator Snapping Turtle	Steam cleaning	IL, IN	

	Sandblasting Manual removal/cleaning of oil		
Blanding's Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Spotted Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Streamside Salamander	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IN, OH	
Wood Turtle	Flooding Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI, MN, OH, WI	
Gray Bat	Sandblasting	IL, IN	
Tricolored Bat	Sandblasting	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Linda's Roadside Skipper	Manual removal/cleaning of oil	IL	
Monarch Butterfly	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Alligator Snapping Turtle	Flushing	IL, IN	
Blanding's Turtle	Flushing	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Flushing	IL, IN, MI, OH	
Wood Turtle	Flushing	MI, MN, OH, WI	
Gray Bat	Flooding Flushing Steam cleaning	IL, IN	

	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil		
Tricolored Bat	Flooding Flushing Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Fanshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Fat Pocketbook	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	
Higgins' Eye Pearlymussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Longsolid	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Northern Riffleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Pink Mucket	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Pyramid (Pink) Pigtoe	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	OH	

	Containment of non-floating/submerged oil		
Rabbitsfoot *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Rayed Bean	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, MI, OH	
Rough Pigtoe	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN	
Round Hickorynut	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Salamander Mussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Scaleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sheepnose	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MN, OH, WI	
Snuffbox	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Spectaclecase	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Winged Mapleleaf	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MN, WI	
Illinois Cave Amphipod	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Popeye Shiner	Detection of non-floating/submerged oil	OH	

	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil		
Scioto Madtom	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Topeka Shiner *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Hall's Bulrush	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
Tennessee Pondweed	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Virginia Spiraea	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Hungerford's Crawling Water Beetle	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
Lake Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sicklefin Chub	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sturgeon Chub	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Alligator Snapping Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	

Blanding's Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Spotted Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Streamside Salamander	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, OH	
Wood Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Decurrent False Aster	Detection of non-floating/submerged oil	IL	
Eastern Prairie Fringed Orchid	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Hall's Bulrush	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Detection of non-floating/submerged oil	MI	
Lakeside Daisy	Detection of non-floating/submerged oil	IL, MI, OH	
Michigan Monkey Flower	Detection of non-floating/submerged oil	MI	
Minnesota Dwarf Trout Lily	Detection of non-floating/submerged oil	MN	
Northern Wild Monkshood	Detection of non-floating/submerged oil	OH, WI	
Running Buffalo Clover	Detection of non-floating/submerged oil	IN, OH	
Short's Bladderpod *Critical Habitat*	Detection of non-floating/submerged oil	IN	
Virginia Spiraea	Detection of non-floating/submerged oil	OH	
Western Prairie Fringed Orchid	Detection of non-floating/submerged oil	MN	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**

May affect, likely to adversely affect - discuss possible BMPs with Services			
Popeye Shiner	Deterrence and hazing	OH	
Scioto Madtom	Deterrence and hazing	OH	
Topeka Shiner *Critical Habitat*	Deterrence and hazing	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Tennessee Pondweed	Deterrence and hazing Capture and care of contaminated species	OH	
Virginia Spiraea	Deterrence and hazing Capture and care of contaminated species	OH	
Lake Sturgeon	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Deterrence and hazing	IL	
Sicklefin Chub	Deterrence and hazing	IL	
Sturgeon Chub	Deterrence and hazing	IL	
Alligator Snapping Turtle	Capture and care of contaminated species	IL, IN	
Blanding’s Turtle	Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Deterrence and hazing Capture and care of contaminated species	IL	
Spotted Turtle	Capture and care of contaminated species	IL, IN, MI, OH	
Streamside Salamander	Deterrence and hazing Capture and care of contaminated species	IN, OH	
Wood Turtle	Capture and care of contaminated species	MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall’s Bulrush	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Deterrence and hazing Capture and care of contaminated species	MI	
Minnesota Dwarf Trout Lily	Deterrence and hazing Capture and care of contaminated species	MN	
Northern Wild Monkshood	Deterrence and hazing Capture and care of contaminated species	OH, WI	
Running Buffalo Clover	Deterrence and hazing Capture and care of contaminated species	IN, OH	
Short’s Bladderpod *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	IN	
Alligator Snapping Turtle	Deterrence and hazing	IL, IN	
Blanding’s Turtle	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Deterrence and hazing	IL, IN, MI, OH	
Wood Turtle	Deterrence and hazing	MI, MN, OH, WI	
Gray Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN	
Tricolored Bat	Deterrence and hazing	IL, IN, MI, MN, OH, WI	

	Capture and care of contaminated species		
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Fanshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Fat Pocketbook	Use of vessels Use of vehicles Deployment of buoys	IL, IN	
Higgins' Eye Pearlymussel	Use of vessels Use of vehicles Deployment of buoys	IL, MN, WI	
Longsolid	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Northern Riffleshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Orangefoot Pimpleback	Use of vessels Use of vehicles Deployment of buoys	IL	
Pink Mucket	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Pyramid (Pink) Pigtoe	Use of vessels Use of vehicles Deployment of buoys	OH	
Rabbitsfoot *Critical Habitat*	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Rayed Bean	Use of vessels Use of vehicles Deployment of buoys	IN, MI, OH	
Rough Pigtoe	Use of vessels Use of vehicles Deployment of buoys	IN	
Round Hickorynut	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Salamander Mussel	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, MN, OH, WI	
Scaleshell	Use of vessels Use of vehicles Deployment of buoys	IL	
Sheepnose	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MN, OH, WI	
Snuffbox	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH, WI	
Spectaclecase	Use of vessels Use of vehicles Deployment of buoys	IL, MN, WI	
Winged Mapleleaf	Use of vessels Use of vehicles Deployment of buoys	MN, WI	
Illinois Cave Amphipod	Deployment of buoys	IL	
Popeye Shiner	Use of vessels Deployment of buoys	OH	
Scioto Madtom	Use of vessels	OH	

	Deployment of buoys		
Topeka Shiner *Critical Habitat*	Use of vessels Deployment of buoys	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	IL	
Hall's Bulrush	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI	
Minnesota Dwarf Trout Lily	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	MN	
Northern Wild Monkshood	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	OH, WI	
Running Buffalo Clover	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IN, OH	
Short's Bladderpod *Critical Habitat*	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IN	

Tennessee Pondweed	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Natural attenuation Deployment of buoys Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	OH	
Virginia Spiraea	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Natural attenuation Deployment of buoys Locating, sampling, and monitoring air, land, and water	OH	
Hungerford's Crawling Water Beetle	Use of vehicles Use of machinery/supporting equipment Deployment of buoys	MI	
Linda's Roadside Skipper	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL	
Monarch Butterfly	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MN, OH, WI	
Lake Sturgeon	Use of vessels Deployment of buoys	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Use of vessels	IL	

	Deployment of buoys		
Sicklefin Chub	Use of vessels Deployment of buoys	IL	
Sturgeon Chub	Use of vessels Deployment of buoys	IL	
Alligator Snapping Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN	
Blanding's Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Natural attenuation Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	IL	
Spotted Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, OH	
Streamside Salamander	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IN, OH	
Wood Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	MI, MN, OH, WI	
Gray Bat	Use of aircraft Use of vessels Use of vehicles	IL, IN	

	Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas		
Tricolored Bat	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Use of aircraft Deployment of buoys	IL, IN	
Blanding's Turtle	Use of aircraft Deployment of buoys	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Deployment of buoys	IL	
Spotted Turtle	Use of aircraft Deployment of buoys	IL, IN, MI, OH	
Streamside Salamander	Use of vessels Deployment of buoys	IN, OH	
Wood Turtle	Use of aircraft Deployment of buoys	MI, MN, OH, WI	
Special considerations needed, high level of concern			
Decurrent False Aster	Natural attenuation	IL	
Hall’s Bulrush	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Minnesota Dwarf Trout Lily	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Northern Wild Monkshood	Natural attenuation	OH, WI	

	Locating, sampling, and monitoring air, land, and water		
Running Buffalo Clover	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, OH	
Short's Bladderpod *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Clubshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Fanshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Fat Pocketbook	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Higgins' Eye Pearlymussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Longsolid	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Northern Riffleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Orangefoot Pimpleback	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Pink Mucket	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Pyramid (Pink) Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
Rabbitsfoot *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Rayed Bean	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Rough Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Round Hickorynut	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Salamander Mussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Scaleshell	Natural attenuation	IL	

	Locating, sampling, and monitoring air, land, and water		
Sheepnose	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Snuffbox	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Spectaclecase	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Winged Mapleleaf	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN, WI	
Illinois Cave Amphipod	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Hungerford’s Crawling Water Beetle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Linda’s Roadside Skipper	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Monarch Butterfly	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Lake Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Popeye Shiner	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
Scioto Madtom	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
Sicklefin Chub	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Sturgeon Chub	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Topeka Shiner *Critical Habitat*	Natural attenuation	MN	

	Locating, sampling, and monitoring air, land, and water		
Alligator Snapping Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Blanding's Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Spotted Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Streamside Salamander	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, OH	
Wood Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, OH, WI	
Gray Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Tricolored Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Temporary storage (on water)	IL, IN, MI, OH	
Fanshell	Temporary storage (on water)	IL, IN, OH	
Fat Pocketbook	Temporary storage (on water)	IL, IN	
Higgins' Eye Pearlymussel	Temporary storage (on water)	IL, MN, WI	
Longsolid	Temporary storage (on water)	IL, IN, OH	
Northern Riffleshell	Temporary storage (on water)	IL, IN, MI, OH	
Orangefoot Pimpleback	Temporary storage (on water)	IL	
Pink Mucket	Temporary storage (on water)	IL, IN, OH	
Pyramid (Pink) Pigtoe	Temporary storage (on water)	OH	
Rabbitsfoot *Critical Habitat*	Temporary storage (on water)	IL, IN, OH	
Rayed Bean	Temporary storage (on water)	IN, MI, OH	
Rough Pigtoe	Temporary storage (on water)	IN	

Round Hickorynut	Temporary storage (on water)	IL, IN, MI, OH	
Salamander Mussel	Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Scaleshell	Temporary storage (on water)	IL	
Sheepnose	Temporary storage (on water)	IL, IN, MN, OH, WI	
Snuffbox	Temporary storage (on water)	IL, IN, MI, OH, WI	
Spectaclecase	Temporary storage (on water)	IL, MN, WI	
Winged Mapleleaf	Temporary storage (on water)	MN, WI	
Popeye Shiner	Decanting	OH	
Scioto Madtom	Decanting	OH	
Topeka Shiner *Critical Habitat*	Decanting	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Temporary storage (on land) Decontamination	IL	
Hall's Bulrush	Waste handling Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Waste handling Temporary storage (on land) Decontamination	MI	
Minnesota Dwarf Trout Lily	Temporary storage (on land) Decontamination	MN	
Northern Wild Monkshood	Temporary storage (on land) Decontamination	OH, WI	
Running Buffalo Clover	Temporary storage (on land) Decontamination	IN, OH	
Short's Bladderpod *Critical Habitat*	Temporary storage (on land) Decontamination	IN	
Tennessee Pondweed	Waste handling Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	OH	
Virginia Spiraea	Waste handling Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	OH	
Hungerford's Crawling Water Beetle	Decanting	MI	
Linda's Roadside Skipper	Temporary storage (on land) Decontamination	IL	
Monarch Butterfly	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Temporary storage (on land)	IL, IN, MN, OH, WI	

	Decontamination		
Lake Sturgeon	Decanting	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Decanting	IL	
Sicklefin Chub	Decanting	IL	
Sturgeon Chub	Decanting	IL	
Alligator Snapping Turtle	Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	IL, IN	
Blanding's Turtle	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Waste handling Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	IL	
Spotted Turtle	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, OH	
Streamside Salamander	Waste handling Temporary storage (on land) Decanting Decontamination	IN, OH	
Wood Turtle	Temporary storage (on land) Decanting Decontamination	MI, MN, OH, WI	
Gray Bat	Temporary storage (on land) Decontamination	IL, IN	
Tricolored Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Decurrent False Aster	Waste handling	IL	
Hall's Bulrush	Temporary storage (on water)	IL, IN, MI, OH, WI	
Michigan Monkey Flower	Temporary storage (on water)	MI	
Minnesota Dwarf Trout Lily	Waste handling	MN	
Northern Wild Monkshood	Waste handling	OH, WI	
Running Buffalo Clover	Waste handling	IN, OH	
Short's Bladderpod *Critical Habitat*	Waste handling	IN	
Clubshell	Waste handling	IL, IN, MI, OH	
Fanshell	Waste handling	IL, IN, OH	

Fat Pocketbook	Waste handling	IL, IN	
Higgins' Eye Pearlymussel	Waste handling	IL, MN, WI	
Longsolid	Waste handling	IL, IN, OH	
Northern Riffleshell	Waste handling	IL, IN, MI, OH	
Orangefoot Pimpleback	Waste handling	IL	
Pink Mucket	Waste handling	IL, IN, OH	
Pyramid (Pink) Pigtoe	Waste handling	OH	
Rabbitsfoot *Critical Habitat*	Waste handling	IL, IN, OH	
Rayed Bean	Waste handling	IN, MI, OH	
Rough Pigtoe	Waste handling	IN	
Round Hickorynut	Waste handling	IL, IN, MI, OH	
Salamander Mussel	Waste handling	IL, IN, MI, MN, OH, WI	
Scaleshell	Waste handling	IL	
Sheepnose	Waste handling	IL, IN, MN, OH, WI	
Snuffbox	Waste handling	IL, IN, MI, OH, WI	
Spectaclecase	Waste handling	IL, MN, WI	
Winged Mapleleaf	Waste handling	MN, WI	
Illinois Cave Amphipod	Waste handling Temporary storage (on water)	IL	
Hungerford's Crawling Water Beetle	Waste handling Temporary storage (on water)	MI	
Linda's Roadside Skipper	Waste handling	IL	
Monarch Butterfly	Waste handling	IL, IN, MI, MN, OH, WI	
Regal Fritillary	Waste handling	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Waste handling	IL, IN, MN, OH, WI	
Lake Sturgeon	Waste handling Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Pallid Sturgeon	Waste handling Temporary storage (on water)	IL	
Popeye Shiner	Waste handling Temporary storage (on water)	OH	
Scioto Madtom	Waste handling Temporary storage (on water)	OH	
Sicklefin Chub	Waste handling Temporary storage (on water)	IL	
Sturgeon Chub	Waste handling Temporary storage (on water)	IL	
Topeka Shiner *Critical Habitat*	Waste handling Temporary storage (on water)	MN	
Alligator Snapping Turtle	Waste handling	IL, IN	
Blanding's Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH, WI	

Spotted Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH	
Streamside Salamander	Temporary storage (on water)	IN, OH	
Wood Turtle	Waste handling Temporary storage (on water)	MI, MN, OH, WI	
Gray Bat	Waste handling	IL, IN	
Tricolored Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Waste handling	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Waste handling	IL, IN, MI, MN, OH, WI	

High-Risk Response Actions and Activities in *BAYS AND ESTUARIES* ***Associated Vulnerable Habitats:*** Beach and Sand Bar, Rooted Floating Aquatics, Open Water, and Sedge Meadow			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
Rayed Bean	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IN, MI, OH	
Round Hickorynut	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
Salamander Mussel	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Snuffbox	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH, WI	
Lake Sturgeon	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Dikes or berms	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Dikes or berms	IL, IN, MI, OH	
Rufa Red Knot	Booming	IL, IN, MI, MN, OH, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Rayed Bean	Skimming Vacuuming Sorbents	IN, MI, OH	
Round Hickorynut	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Salamander Mussel	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Snuffbox	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Lake Sturgeon	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Sorbents	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Rufa Red Knot	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Flooding Manual removal/cleaning of oil	IL, IN, MI, OH	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Flooding Manual removal/cleaning of oil	IL, IN, MI, OH	
Rayed Bean	Flooding Manual removal/cleaning of oil	IN, MI, OH	
Round Hickorynut	Flooding Manual removal/cleaning of oil	IL, IN, MI, OH	
Salamander Mussel	Flooding Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Snuffbox	Flooding Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Lake Sturgeon	Flooding	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Manual removal/cleaning of oil	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Flooding Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	

	Manual removal/cleaning of oil		
Rufa Red Knot	Flooding Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Flooding Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Flooding Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, OH	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Northern Riffleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Rayed Bean	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, MI, OH	
Round Hickorynut	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Salamander Mussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Snuffbox	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Lake Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	

	Containment of non-floating/submerged oil		
Spotted Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Lake Sturgeon	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Capture and care of contaminated species	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Deterrence and hazing	IL, IN, MI, OH	
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect – discuss possible BMPs with Services			
Northern Riffleshell	Deployment of buoys	IL, IN, MI, OH	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Clubshell	Deployment of buoys	IL, IN, MI, OH	
Rayed Bean	Deployment of buoys	IN, MI, OH	
Round Hickorynut	Deployment of buoys	IL, IN, MI, OH	
Salamander Mussel	Deployment of buoys	IL, IN, MI, MN, OH, WI	
Snuffbox	Deployment of buoys	IL, IN, MI, OH, WI	
Lake Sturgeon	Use of vessels Deployment of buoys	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Spotted Turtle	Use of vessels Use of vehicles	IL, IN, MI, OH	

	Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic		
Piping Plover *Critical Habitat*	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Use of aircraft Deployment of buoys	IL, IN, MI, OH, WI	
Spotted Turtle	Use of aircraft Deployment of buoys	IL, IN, MI, OH	
Special considerations needed, high level of concern			
Clubshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Northern Riffleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Rayed Bean	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Round Hickorynut	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Salamander Mussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Snuffbox	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Lake Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Natural attenuation	IL, IN, MI, OH, WI	

	Locating, sampling, and monitoring air, land, and water		
Spotted Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Lake Sturgeon	Decanting	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, OH, WI	
Spotted Turtle	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Temporary storage (on land) Decanting Decontamination	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Clubshell	Waste handling	IL, IN, MI, OH	
Northern Riffleshell	Waste handling	IL, IN, MI, OH	
Rayed Bean	Waste handling	IN, MI, OH	
Round Hickorynut	Waste handling	IL, IN, MI, OH	
Salamander Mussel	Waste handling	IL, IN, MI, MN, OH, WI	
Snuffbox	Waste handling	IL, IN, MI, OH, WI	
Lake Sturgeon	Waste handling	IL, IN, MI, MN, OH, WI	
Blanding's Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH, WI	
Spotted Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Waste handling	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Waste handling	IL, IN, MI, MN, OH, WI	

High-Risk Response Actions and Activities in *PONDS AND LAKES (INLAND)* ***Associated Vulnerable Habitats:*** Beach and Sand Bar, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Open Water, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrubs), and Submersed Vegetation			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Fanshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Fat Pocketbook	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN	
Higgins' Eye Pearlymussel	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MN, WI	
Longsolid	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Northern Riffleshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Orangefoot Pimpleback	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Pink Mucket	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Pyramid (Pink) Pigtoe	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Rabbitsfoot *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, OH	
Rayed Bean	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, MI, OH	
Rough Pigtoe	Booming Dikes or berms	IN	

	Construction barriers, dams, pits, and trenches Culvert blocking		
Round Hickorynut	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH	
Salamander Mussel	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Scaleshell	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Sheepnose	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MN, OH, WI	
Snuffbox	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Spectaclecase	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MN, WI	
Winged Mapleleaf	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MN, WI	
Topeka Shiner *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Fassett's Locoweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	WI	
Hall's Bulrush	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Hine's Emerald Dragonfly *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MI, WI	
Lake Sturgeon	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	

Alligator Snapping Turtle	Booming Construction barriers, dams, pits, and trenches	IL, IN	
Blanding's Turtle	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Dikes or berms	IN, MI, OH	
Eastern Massasauga	Dikes or berms	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	
Spotted Turtle	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Dikes or berms	IL, IN	
Gray Bat	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN	
Tricolored Bat	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Booming	IL, IN, MI, MN, OH, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Fanshell	Skimming Vacuuming Sorbents	IL, IN, OH	
Fat Pocketbook	Skimming Vacuuming Sorbents	IL, IN	
Higgins' Eye Pearlymussel	Skimming Vacuuming Sorbents	IL, MN, WI	
Longsolid	Skimming Vacuuming Sorbents	IL, IN, OH	
Northern Riffleshell	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Orangefoot Pimpleback	Skimming Vacuuming Sorbents	IL	
Pink Mucket	Skimming Vacuuming Sorbents	IL, IN, OH	
Pyramid (Pink) Pigtoe	Skimming Vacuuming	OH	

	Sorbents		
Rabbitsfoot *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, OH	
Rayed Bean	Skimming Vacuuming Sorbents	IN, MI, OH	
Rough Pigtoe	Skimming Vacuuming Sorbents	IN	
Round Hickorynut	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Salamander Mussel	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Scaleshell	Skimming Vacuuming Sorbents	IL	
Sheepnose	Skimming Vacuuming Sorbents	IL, IN, MN, OH, WI	
Snuffbox	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Spectaclecase	Skimming Vacuuming Sorbents	IL, MN, WI	
Winged Mapleleaf	Skimming Vacuuming Sorbents	MN, WI	
Topeka Shiner *Critical Habitat*	Skimming Vacuuming	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Fassett's Locoweed	Vacuuming Sorbents	WI	
Hall's Bulrush	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Skimming Vacuuming Sorbents	MI	
Lake Sturgeon	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Alligator Snapping Turtle	Skimming Vacuuming Sorbents	IL, IN	
Blanding's Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Skimming Vacuuming Sorbents	IL	
Spotted Turtle	Skimming Vacuuming Sorbents	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Skimming Vacuuming Sorbents	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Sorbents	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Gray Bat	Skimming Vacuuming Sorbents	IL, IN	
Tricolored Bat	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	

	Sorbents		
Rufa Red Knot	Skimming Vacuuming	IL, IN, MI, MN, OH, WI	
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Fanshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Fat Pocketbook	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN	
Higgins' Eye Pearlymussel	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Longsolid	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Northern Riffleshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Pink Mucket	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	
Pyramid (Pink) Pigtoe	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	OH	
Rabbitsfoot *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, OH	

Rayed Bean	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN, MI, OH	
Rough Pigtoe	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IN	
Round Hickorynut	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Salamander Mussel	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Scaleshell	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Sheepnose	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Snuffbox	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Spectaclecase	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, MN, WI	
Winged Mapleleaf	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	MN, WI	
Topeka Shiner *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Fassett's Locoweed	Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	WI	
Hall's Bulrush	Flooding Flushing Steam cleaning	IL, IN, MI, OH, WI	

	Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil		
Houghton's Goldenrod	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Hine's Emerald Dragonfly *Critical Habitat*	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, MI, WI	
Lake Sturgeon	Flooding Flushing Steam cleaning Sandblasting	IL, IN, MI, MN, OH, WI	
Alligator Snapping Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN	
Blanding's Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Flooding Flushing Steam cleaning Sandblasting Manual removal/cleaning of oil	IL	
Spotted Turtle	Steam cleaning Sandblasting Manual removal/cleaning of oil	IL, IN, MI, OH	
Gray Bat	Sandblasting	IL, IN	
Tricolored Bat	Sandblasting	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Fassett's Locoweed	Flooding	WI	
Alligator Snapping Turtle	Flushing	IL, IN	
Blanding's Turtle	Flushing	IL, IN, MI, MN, OH, WI	
Spotted Turtle	Flushing	IL, IN, MI, OH	
Gray Bat	Flooding Flushing	IL, IN	

	Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil		
Tricolored Bat	Flooding Flushing Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Fanshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Fat Pocketbook	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	
Higgins' Eye Pearlymussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Longsolid	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Northern Riffleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Orangefoot Pimpleback	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Pink Mucket	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Pyramid (Pink) Pigtoe	Detection of non-floating/submerged oil	OH	

	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil		
Rabbitsfoot *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, OH	
Rayed Bean	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, MI, OH	
Rough Pigtoe	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN	
Round Hickorynut	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Salamander Mussel	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Scaleshell	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Sheepnose	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MN, OH, WI	
Snuffbox	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Spectaclecase	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, MN, WI	
Winged Mapleleaf	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MN, WI	
Topeka Shiner *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	MN	

	Containment of non-floating/submerged oil		
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Hall's Bulrush	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
Lake Sturgeon	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Alligator Snapping Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN	
Blanding's Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Spotted Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall's Bulrush	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Detection of non-floating/submerged oil	MI	

Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Topeka Shiner *Critical Habitat*	Deterrence and hazing	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Lake Sturgeon	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Alligator Snapping Turtle	Capture and care of contaminated species	IL, IN	

Blanding's Turtle	Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Capture and care of contaminated species	IL	
Spotted Turtle	Capture and care of contaminated species	IL, IN, MI, OH	
Piping Plover *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Fassett's Locoweed	Deterrence and hazing Capture and care of contaminated species	WI	
Hall's Bulrush	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Deterrence and hazing Capture and care of contaminated species	MI	
Alligator Snapping Turtle	Deterrence and hazing	IL, IN	
Blanding's Turtle	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Deterrence and hazing	IL	
Spotted Turtle	Deterrence and hazing	IL, IN, MI, OH	
Gray Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN	
Tricolored Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Fanshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Fat Pocketbook	Use of vessels Use of vehicles Deployment of buoys	IL, IN	
Higgins' Eye Pearlymussel	Use of vessels Use of vehicles Deployment of buoys	IL, MN, WI	
Longsolid	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Northern Riffleshell	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Orangefoot Pimpleback	Use of vessels Use of vehicles Deployment of buoys	IL	
Pink Mucket	Use of vessels Use of vehicles Deployment of buoys	IL, IN, OH	
Pyramid (Pink) Pigtoe	Use of vessels Use of vehicles Deployment of buoys	OH	
Rabbitsfoot *Critical Habitat*	Use of vessels Use of vehicles	IL, IN, OH	

	Deployment of buoys		
Rayed Bean	Use of vessels Use of vehicles Deployment of buoys	IN, MI, OH	
Rough Pigtoe	Use of vessels Use of vehicles Deployment of buoys	IN	
Round Hickorynut	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH	
Salamander Mussel	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, MN, OH, WI	
Scaleshell	Use of vessels Use of vehicles Deployment of buoys	IL	
Sheepnose	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MN, OH, WI	
Snuffbox	Use of vessels Use of vehicles Deployment of buoys	IL, IN, MI, OH, WI	
Spectaclecase	Use of vessels Use of vehicles Deployment of buoys	IL, MN, WI	
Winged Mapleleaf	Use of vessels Use of vehicles Deployment of buoys	MN, WI	
Topeka Shiner *Critical Habitat*	Use of vessels Deployment of buoys	MN	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Fassett's Locoweed	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	WI	
Hall's Bulrush	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI	
Hine's Emerald Dragonfly *Critical Habitat*	Creation/use of new access points Access of personnel by foot traffic	IL, MI, WI	
Lake Sturgeon	Use of vessels Deployment of buoys	IL, IN, MI, MN, OH, WI	

Alligator Snapping Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN	
Blanding's Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Access of personnel by foot traffic	IN, MI, OH	
Eastern Massasauga	Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Spotted Turtle	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, OH	
Gray Bat	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN	
Tricolored Bat	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Use of aircraft Use of vessels Use of vehicles	IL, IN, MI, MN, OH, WI	

	Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys		
Rufa Red Knot	Use of aircraft Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Deployment of buoys	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Alligator Snapping Turtle	Use of aircraft	IL, IN	
Blanding's Turtle	Use of aircraft	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Use of vessels	IL	
Spotted Turtle	Use of aircraft	IL, IN, MI, OH	
Special considerations needed, high level of concern			
Fassett's Locoweed	Natural attenuation Locating, sampling, and monitoring air, land, and water	WI	
Hall's Bulrush	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Clubshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Fanshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Fat Pocketbook	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Higgins' Eye Pearlymussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Longsolid	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Northern Riffleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Orangefoot Pimpleback	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Pink Mucket	Natural attenuation	IL, IN, OH	

	Locating, sampling, and monitoring air, land, and water		
Pyramid (Pink) Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
Rabbitsfoot *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, OH	
Rayed Bean	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Rough Pigtoe	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Round Hickorynut	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Salamander Mussel	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Scaleshell	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Sheepnose	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Snuffbox	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Spectaclecase	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Winged Mapleleaf	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN, WI	
Hine’s Emerald Dragonfly *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MI, WI	
Lake Sturgeon	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Topeka Shiner *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Alligator Snapping Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Blanding’s Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Natural attenuation	IL	

	Locating, sampling, and monitoring air, land, and water		
Spotted Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Gray Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Tricolored Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Clubshell	Temporary storage (on water)	IL, IN, MI, OH	
Fanshell	Temporary storage (on water)	IL, IN, OH	
Fat Pocketbook	Temporary storage (on water)	IL, IN	
Higgins' Eye Pearlymussel	Temporary storage (on water)	IL, MN, WI	
Longsolid	Temporary storage (on water)	IL, IN, OH	
Northern Riffleshell	Temporary storage (on water)	IL, IN, MI, OH	
Orangefoot Pimpleback	Temporary storage (on water)	IL	
Pink Mucket	Temporary storage (on water)	IL, IN, OH	
Pyramid (Pink) Pigtoe	Temporary storage (on water)	OH	
Rabbitsfoot *Critical Habitat*	Temporary storage (on water)	IL, IN, OH	
Rayed Bean	Temporary storage (on water)	IN, MI, OH	
Rough Pigtoe	Temporary storage (on water)	IN	
Round Hickorynut	Temporary storage (on water)	IL, IN, MI, OH	
Salamander Mussel	Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Scaleshell	Temporary storage (on water)	IL	
Sheepnose	Temporary storage (on water)	IL, IN, MN, OH, WI	
Snuffbox	Temporary storage (on water)	IL, IN, MI, OH, WI	
Spectaclecase	Temporary storage (on water)	IL, MN, WI	
Winged Mapleleaf	Temporary storage (on water)	MN, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			

Fassett's Locoweed	Waste handling Temporary storage (on land) Decontamination	WI	
Hall's Bulrush	Waste handling Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Waste handling Temporary storage (on land) Decontamination	MI	
Hine's Emerald Dragonfly *Critical Habitat*	Decanting Decontamination	IL, MI, WI	
Lake Sturgeon	Decanting	IL, IN, MI, MN, OH, WI	
Alligator Snapping Turtle	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN	
Blanding's Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Waste handling Temporary storage (on land) Decanting Decontamination	IL	
Spotted Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH	
Gray Bat	Temporary storage (on land) Decontamination	IL, IN	
Tricolored Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Temporary storage (on water) Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall's Bulrush	Temporary storage (on water)	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Temporary storage (on water)	MI	
Clubshell	Waste handling	IL, IN, MI, OH	
Fanshell	Waste handling	IL, IN, OH	
Fat Pocketbook	Waste handling	IL, IN	
Higgins' Eye Pearlymussel	Waste handling	IL, MN, WI	
Longsolid	Waste handling	IL, IN, OH	
Northern Riffleshell	Waste handling	IL, IN, MI, OH	
Orangefoot Pimpleback	Waste handling	IL	
Pink Mucket	Waste handling	IL, IN, OH	
Pyramid (Pink) Pigtoe	Waste handling	OH	
Rabbitsfoot *Critical Habitat*	Waste handling	IL, IN, OH	
Rayed Bean	Waste handling	IN, MI, OH	

Rough Pigtoe	Waste handling	IN	
Round Hickorynut	Waste handling	IL, IN, MI, OH	
Salamander Mussel	Waste handling	IL, IN, MI, MN, OH, WI	
Scaleshell	Waste handling	IL	
Sheepnose	Waste handling	IL, IN, MN, OH, WI	
Snuffbox	Waste handling	IL, IN, MI, OH, WI	
Spectaclecase	Waste handling	IL, MN, WI	
Winged Mapleleaf	Waste handling	MN, WI	
Hine's Emerald Dragonfly *Critical Habitat*	Waste handling	IL, MI, WI	
Lake Sturgeon	Waste handling Temporary storage (on water)	IL, IN, MI, MN, OH, WI	
Topeka Shiner *Critical Habitat*	Waste handling Temporary storage (on water)	MN	
Alligator Snapping Turtle	Waste handling	IL, IN	
Blanding's Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Temporary storage (on water)	IL	
Spotted Turtle	Waste handling Temporary storage (on water)	IL, IN, MI, OH	
Gray Bat	Waste handling	IL, IN	
Tricolored Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Piping Plover *Critical Habitat*	Waste handling	IL, IN, MI, MN, OH, WI	
Rufa Red Knot	Waste handling	IL, IN, MI, MN, OH, WI	

High-Risk Response Actions and Activities in *WETLANDS* ***Associated Vulnerable Habitats:*** Bog, Calcareous Fen, Deep Marsh Vegetation (Annuals, Perennials, Shrubs), Floodplain Forest, Mudflats, Rooted Floating Aquatics, Sedge Meadow, Shallow Marsh Vegetation (Annuals, Perennials, Shrubs), Submersed Vegetation, and Wet Meadow			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Dwarf Lake Iris	Dikes or berms	MI, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL	
Dwarf Lake Iris	Booming	MI, WI	
Eastern Prairie Fringed Orchid	Booming Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Hall's Bulrush	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Michigan Monkey Flower	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI	
Tennessee Pondweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Virginia Sneezeweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	OH	
Western Prairie Fringed Orchid	Booming Construction barriers, dams, pits, and trenches Culvert blocking	MN	
American Burying Beetle	Booming	MI, OH	
Bog Buckmoth	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	WI	
Hine's Emerald Dragonfly *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, MI, WI	
Linda's Roadside Skipper	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	

	Culvert blocking		
Mitchell's Satyr Butterfly	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, MI, OH	
Monarch Butterfly	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	MI, MN, WI	
Regal Fritillary	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IL, IN, MN, OH, WI	
Blanding's Turtle	Booming	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IN, MI, OH	
Eastern Massasauga	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	
Spotted Turtle	Booming	IL, IN, MI, OH	
Wood Turtle	Booming	MI, MN, OH, WI	
Indiana Bat	Booming	IL, IN, MI, OH	
Northern Bog Lemming	Booming	MN	
Northern Long-Eared Bat	Booming	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Booming	IL, IN, MI, MN, OH, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Vacuuming Sorbents	IL	
Dwarf Lake Iris	Vacuuming Sorbents	MI, WI	
Hall's Bulrush	Skimming Vacuuming Sorbents	IL, IN, MI, OH, WI	

Houghton's Goldenrod	Skimming Vacuuming Sorbents	MI	
Michigan Monkey Flower	Skimming Vacuuming Sorbents	MI	
Tennessee Pondweed	Skimming Vacuuming Sorbents	OH	
Virginia Sneezeweed	Skimming Vacuuming Sorbents	OH	
Blanding's Turtle	Skimming	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Skimming	IN, MI, OH	
Eastern Massasauga	Skimming	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Skimming Vacuuming Sorbents	IL	
Spotted Turtle	Skimming	IL, IN, MI, OH	
Wood Turtle	Skimming	MI, MN, OH, WI	
Indiana Bat	Skimming	IL, IN, MI, OH	
Northern Bog Lemming	Skimming	MN	
Northern Long-Eared Bat	Skimming	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Skimming	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Skimming	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Skimming	IL, IN, MI, MN, OH, WI	
Removal/Cleanup Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Linda's Roadside Skipper	Mechanical sand cleaning (<1 inch and >1 inch)	IL	
Mitchell's Satyr Butterfly	Mechanical sand cleaning (<1 inch and >1 inch)	IN, MI, OH	
Monarch Butterfly	Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Mechanical sand cleaning (<1 inch and >1 inch)	MI, MN, WI	
Regal Fritillary	Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Mechanical sand cleaning (<1 inch and >1 inch)	IL, IN, MN, OH, WI	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Dwarf Lake Iris	Flooding Flushing Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI, WI	
Hall's Bulrush	Flooding Flushing	IL, IN, MI, OH, WI	

	Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil		
Houghton's Goldenrod	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Michigan Monkey Flower	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Tennessee Pondweed	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	OH	
Virginia Sneezeweed	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	OH	
American Burying Beetle	Manual removal/cleaning of oil	MI, OH	
Bog Buckmoth	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	WI	
Hine's Emerald Dragonfly *Critical Habitat*	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, MI, WI	
Linda's Roadside Skipper	Flooding Flushing Manual removal/cleaning of oil	IL	
Mitchell's Satyr Butterfly	Flooding Flushing Manual removal/cleaning of oil	IN, MI, OH	
Monarch Butterfly	Flooding Flushing Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Flooding Flushing Manual removal/cleaning of oil	MI, MN, WI	

Regal Fritillary	Flooding Flushing Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Flooding Flushing Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Blanding's Turtle	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IN, MI, OH	
Eastern Massasauga	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Spotted Turtle	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH	
Wood Turtle	Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI, MN, OH, WI	
Northern Bog Lemming	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MN	
Eastern Black Rail	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Flooding Flushing Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Indiana Bat	Manual removal/cleaning of oil	IL, IN, MI, OH	
Northern Long-Eared Bat	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			

Hall's Bulrush	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
Michigan Monkey Flower	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI	
Tennessee Pondweed	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Virginia Sneezeweed	Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	OH	
Blanding's Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IN, MI, OH	
Eastern Massasauga	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
Spotted Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL, IN, MI, OH	
Wood Turtle	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	MI, MN, OH, WI	
Eastern Black Rail	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Detection of non-floating/submerged oil	IL, IN, MI, MN, OH, WI	

	Recovery of non-floating/submerged oil		
May affect, not likely to adversely affect due to insignificant or discountable effects			
Decurrent False Aster	Detection of non-floating/submerged oil	IL	
Eastern Prairie Fringed Orchid	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Hall's Bulrush	Detection of non-floating/submerged oil	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Detection of non-floating/submerged oil	MI	
Lakeside Daisy	Detection of non-floating/submerged oil	IL, MI, OH	
Michigan Monkey Flower	Detection of non-floating/submerged oil	MI	
Virginia Sneezeweed	Detection of non-floating/submerged oil	OH	
Western Prairie Fringed Orchid	Detection of non-floating/submerged oil	MN	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Tennessee Pondweed	Deterrence and hazing Capture and care of contaminated species	OH	
Linda's Roadside Skipper	Deterrence and hazing Capture and care of contaminated species	IL	
Mitchell's Satyr Butterfly	Deterrence and hazing Capture and care of contaminated species	IN, MI, OH	
Monarch Butterfly	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	MI, MN, WI	
Regal Fritillary	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Deterrence and hazing Capture and care of contaminated species	IL, IN, MN, OH, WI	
Blanding's Turtle	Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Capture and care of contaminated species	IN, MI, OH	
Eastern Massasauga	Capture and care of contaminated species	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Capture and care of contaminated species	IL	
Spotted Turtle	Capture and care of contaminated species	IL, IN, MI, OH	
Wood Turtle	Capture and care of contaminated species	MI, MN, OH, WI	
Indiana Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH	
Northern Bog Lemming	Deterrence and hazing Capture and care of contaminated species	MN	
Northern Long-Eared Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	

Eastern Black Rail	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Hall's Bulrush	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Deterrence and hazing Capture and care of contaminated species	MI	
Michigan Monkey Flower	Deterrence and hazing Capture and care of contaminated species	MI	
Virginia Sneezeweed	Deterrence and hazing Capture and care of contaminated species	OH	
Blanding's Turtle	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Deterrence and hazing	IN, MI, OH	
Eastern Massasauga	Deterrence and hazing	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Deterrence and hazing	IL	
Spotted Turtle	Deterrence and hazing	IL, IN, MI, OH	
Wood Turtle	Deterrence and hazing	MI, MN, OH, WI	

Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	IL	
Dwarf Lake Iris	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, WI	
Hall's Bulrush	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, OH, WI	

	Access of personnel by foot traffic		
Houghton's Goldenrod	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI	
Michigan Monkey Flower	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI	
Tennessee Pondweed	Use of vessels Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Natural attenuation Deployment of buoys Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	OH	
Virginia Sneezeweed	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	OH	
American Burying Beetle	Creation/use of new access points Access of personnel by foot traffic	MI, OH	
Bog Buckmoth	Creation/use of new access points Access of personnel by foot traffic	WI	
Hine's Emerald Dragonfly *Critical Habitat*	Creation/use of new access points Access of personnel by foot traffic	IL, MI, WI	
Linda's Roadside Skipper	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic	IL	
Mitchell's Satyr Butterfly	Use of vehicles	IN, MI, OH	

	Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic		
Monarch Butterfly	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic	MI, MN, WI	
Regal Fritillary	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Access of personnel by foot traffic	IL, IN, MN, OH, WI	
Blanding's Turtle	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IN, MI, OH	
Eastern Massasauga	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Spotted Turtle	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH	

Wood Turtle	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, MN, OH, WI	
Indiana Bat	Use of aircraft Creation/use of new access points Creation/use of new staging areas Access of personnel by foot traffic	IL, IN, MI, OH	
Northern Bog Lemming	Use of aircraft Use of vessels Creation/use of new access points Access of personnel by foot traffic	MN	
Northern Long-Eared Bat	Use of aircraft Creation/use of new access points Creation/use of new staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Use of aircraft Use of vessels Creation/use of new access points Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Use of aircraft Use of vessels Creation/use of new access points Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Use of aircraft Use of vessels Creation/use of new access points Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Use of aircraft Use of vessels	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Use of vessels	IN, MI, OH	
Eastern Massasauga	Use of vessels	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Use of vessels	IL	
Spotted Turtle	Use of aircraft Use of vessels	IL, IN, MI, OH	
Streamside Salamander	Use of vessels	IN, OH	
Wood Turtle	Use of aircraft Use of vessels	MI, MN, OH, WI	
Indiana Bat	Use of vehicles	IL, IN, MI, OH	
Northern Long-Eared Bat	Use of vehicles	IL, IN, MI, MN, OH, WI	
Special considerations needed, high level of concern			
Decurrent False Aster	Natural attenuation	IL	
Dwarf Lake Iris	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, WI	
Hall's Bulrush	Natural attenuation	IL, IN, MI, OH, WI	

	Locating, sampling, and monitoring air, land, and water		
Houghton’s Goldenrod	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Michigan Monkey Flower	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Virginia Sneezeweed	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH	
American Burying Beetle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, OH	
Bog Buckmoth	Natural attenuation Locating, sampling, and monitoring air, land, and water	WI	
Hine’s Emerald Dragonfly *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MI, WI	
Linda’s Roadside Skipper	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Mitchell’s Satyr Butterfly	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Monarch Butterfly	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, WI	
Regal Fritillary	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Blanding's Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Eastern Massasauga	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Spotted Turtle	Natural attenuation	IL, IN, MI, OH	

	Locating, sampling, and monitoring air, land, and water		
Wood Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, OH, WI	
Indiana Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Northern Bog Lemming	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Northern Long-Eared Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Decurrent False Aster	Temporary storage (on land) Decontamination	IL	
Dwarf Lake Iris	Waste handling Temporary storage (on water) Temporary storage (on land) Decontamination	MI, WI	
Hall's Bulrush	Waste handling Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Waste handling Temporary storage (on land) Decontamination	MI	
Michigan Monkey Flower	Waste handling Temporary storage (on land) Decontamination	MI	
Tennessee Pondweed	Waste handling Temporary storage (on water) Temporary storage (on land) Decanting Decontamination	OH	
Virginia Sneezeweed	Waste handling Temporary storage (on land) Decontamination	OH	

American Burying Beetle	Decontamination	MI, OH	
Bog Buckmoth	Decanting	WI	
Hine's Emerald Dragonfly *Critical Habitat*	Decanting Decontamination	IL, MI, WI	
Linda's Roadside Skipper	Decanting	IL	
Mitchell's Satyr Butterfly	Decanting	IN, MI, OH	
Monarch Butterfly	Decanting	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Decanting	MI, MN, WI	
Regal Fritillary	Decanting	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Decanting	IL, IN, MN, OH, WI	
Blanding's Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Decontamination	IN, MI, OH	
Eastern Massasauga	Decontamination	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Decanting Decontamination	IL	
Spotted Turtle	Decontamination	IL, IN, MI, OH	
Wood Turtle	Temporary storage (on land) Decontamination	MI, MN, OH, WI	
Indiana Bat	Temporary storage (on land) Decontamination	IL, IN, MI, OH	
Northern Long-Eared Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Decontamination	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Decontamination	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Decontamination	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Decurrent False Aster	Waste handling	IL	
Hall's Bulrush	Temporary storage (on water)	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Temporary storage (on water)	MI	
Michigan Monkey Flower	Temporary storage (on water)	MI	
Virginia Sneezeweed	Temporary storage (on water)	OH	
American Burying Beetle	Waste handling	MI, OH	
Bog Buckmoth	Waste handling	WI	
Hine's Emerald Dragonfly *Critical Habitat*	Waste handling	IL, MI, WI	
Linda's Roadside Skipper	Waste handling	IL	
Mitchell's Satyr Butterfly	Waste handling	IN, MI, OH	
Monarch Butterfly	Waste handling	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Waste handling	MI, MN, WI	
Regal Fritillary	Waste handling	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Waste handling	IL, IN, MN, OH, WI	
Blanding's Turtle	Waste handling	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Waste handling	IN, MI, OH	
Eastern Massasauga	Waste handling	IL, IN, MI, OH, WI	

Spotted Turtle	Waste handling	IL, IN, MI, OH	
Wood Turtle	Waste handling	MI, MN, OH, WI	
Indiana Bat	Waste handling	IL, IN, MI, OH	
Northern Bog Lemming	Waste handling	MN	
Northern Long-Eared Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Eastern Black Rail	Waste handling	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Waste handling	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Waste handling	IL, IN, MI, MN, OH, WI	

High-Risk Response Actions and Activities in *UPLANDS* ***Associated Vulnerable Habitats:*** None			
Deflection and Containment Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Dwarf Lake Iris	Dikes or berms	MI, WI	
Iowa Pleistocene Snail	Booming	IL	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
American Hart's-tongue Fern	Booming	MI	
Dwarf Lake Iris	Booming	MI, WI	
Fassett's Locoweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	WI	
Lakeside Daisy	Booming	IL, MI, OH	
Leafy Prairie-clover	Booming	IL	
Leedy's Roseroot	Booming	MN	
Mead's Milkweed	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, WI	
Minnesota Dwarf Trout Lily	Booming	MN	
Northern Wild Monkshood	Booming	OH, WI	
Pitcher's Thistle	Booming	IL, IN, MI, WI	
Prairie Bush-clover	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, MN, WI	
Running Buffalo Clover	Booming Dikes or berms Construction barriers, dams, pits, and trenches Culvert blocking	IN, OH	
Short's Bladderpod *Critical Habitat*	Booming	IN	
Short's Goldenrod	Booming	IN	
Small Whorled Pogonia	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, MI, OH	
Western Prairie Fringed Orchid	Booming	MN	
American Burying Beetle	Booming Dikes or berms	MI, OH	
Dakota Skipper *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	MN	
Frosted Elfin Butterfly	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	

Monarch Butterfly	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Booming Dikes or berms Construction barriers, dams, pits, and trenches	MI, MN, WI	
Rattlesnake-master Borer Moth	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	
Regal Fritillary	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MN, OH, WI	
Blanding's Turtle	Booming	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Booming	IN, MI, OH	
Eastern Massasauga	Booming	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL	
Spotted Turtle	Booming	IL, IN, MI, OH	
Streamside Salamander	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IN, OH	
Wood Turtle	Booming	MI, MN, OH, WI	
Gray Bat	Booming	IL, IN	
Indiana Bat	Booming	IL, IN, MI, OH	
Little Brown Bat	Booming	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Booming	IL, IN, MI, MN, OH, WI	
Tricolored Bat	Booming	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Booming Dikes or berms Construction barriers, dams, pits, and trenches	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Canada Lynx	Booming	MI, MN, WI	
Gray Wolf	Booming	MI, MN, WI	
Plains Spotted Skunk	Booming	MN	
Prairie Gray Fox	Booming	MN, WI	
Recovery Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Vacuuming Sorbents	MI, WI	
Fassett's Locoweed	Vacuuming Sorbents	WI	
Pitcher's Thistle	Skimming	IL, IN, MI, WI	
Blanding's Turtle	Skimming	IL, IN, MI, MN, OH, WI	
Illinois Chorus Frog	Skimming Vacuuming	IL	

	Sorbents		
Spotted Turtle	Skimming	IL, IN, MI, OH	
Wood Turtle	Skimming	MI, MN, OH, WI	
Gray Bat	Skimming	IL, IN	
Indiana Bat	Skimming	IL, IN, MI, OH	
Little Brown Bat	Skimming	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Skimming	IL, IN, MI, MN, OH, WI	
Tricolored Bat	Skimming	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Skimming	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Minnesota Dwarf Trout Lily	Skimming	MN	
Running Buffalo Clover	Skimming	IN, OH	
Copperbelly Watersnake, Northern DPS	Skimming	IN, MI, OH	
Eastern Massasauga	Skimming	IL, IN, MI, OH, WI	
Streamside Salamander	Skimming	IN, OH	
Canada Lynx	Skimming	MI, MN, WI	
Gray Wolf	Skimming	MI, MN, WI	
Plains Spotted Skunk	Skimming	MN	
Prairie Gray Fox	Skimming	MN, WI	

Removal/Cleanup Activities

Species	Specific Activity	States of Occurrence	BMPs[1]
May affect, likely to adversely affect - discuss possible BMPs with Services			
American Hart's-tongue Fern	Sandblasting Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI	
Iowa Pleistocene Snail	Manual removal/cleaning of oil	IL	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Dwarf Lake Iris	Flooding Flushing Steam cleaning Mechanical sand cleaning (<1 inch and >1 inch) Manual removal/cleaning of oil	MI, WI	
Fassett's Locoweed	Flushing Steam cleaning Sandblasting Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	WI	
Lakeside Daisy	Manual removal/cleaning of oil	IL, MI, OH	
Leafy Prairie-clover	Manual removal/cleaning of oil	IL	
Leedy's Roseroot	Manual removal/cleaning of oil	MN	
Mead's Milkweed	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, WI	
Minnesota Dwarf Trout Lily	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	MN	

Northern Wild Monkshood	Manual removal/cleaning of oil	OH, WI	
Pitcher's Thistle	Manual removal/cleaning of oil	IL, IN, MI, WI	
Prairie Bush-clover	Manual removal/cleaning of oil	IL, MN, WI	
Running Buffalo Clover	Manual removal/cleaning of oil	IN, OH	
Short's Bladderpod *Critical Habitat*	Manual removal/cleaning of oil	IN	
Short's Goldenrod	Manual removal/cleaning of oil	IN	
Small Whorled Pogonia	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, MI, OH	
Western Prairie Fringed Orchid	Manual removal/cleaning of oil	MN	
Iowa Pleistocene Snail	Flooding Flushing Steam cleaning Sandblasting Mechanical sand cleaning (<1 inch and >1 inch)	IL	
Illinois Cave Amphipod	Flooding Flushing	IL	
American Burying Beetle	Manual removal/cleaning of oil	MI, OH	
Dakota Skipper *Critical Habitat*	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	MN	
Frosted Elfin Butterfly	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Monarch Butterfly	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Manual removal/cleaning of oil	MI, MN, WI	
Rattlesnake-master Borer Moth	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Regal Fritillary	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MN, OH, WI	
Blanding's Turtle	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Mechanical sand removal (<1 inch and >1 inch)	IN, MI, OH	

	Manual removal/cleaning of oil		
Eastern Massasauga	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Flooding Flushing Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL	
Spotted Turtle	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, OH	
Streamside Salamander	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IN, OH	
Wood Turtle	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	MI, MN, OH, WI	
Golden-Winged Warbler	Mechanical sand removal (<1 inch and >1 inch) Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Canada Lynx	Manual removal/cleaning of oil	MI, MN, WI	
Gray Bat	Manual removal/cleaning of oil	IL, IN	
Gray Wolf	Manual removal/cleaning of oil	MI, MN, WI	
Indiana Bat	Manual removal/cleaning of oil	IL, IN, MI, OH	
Little Brown Bat	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Plains Spotted Skunk	Manual removal/cleaning of oil	MN	
Prairie Gray Fox	Manual removal/cleaning of oil	MN, WI	
Tricolored Bat	Manual removal/cleaning of oil	IL, IN, MI, MN, OH, WI	
Submerged Oil Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Illinois Chorus Frog	Detection of non-floating/submerged oil Recovery of non-floating/submerged oil Containment of non-floating/submerged oil	IL	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Running Buffalo Clover	Detection of non-floating/submerged oil	IN, OH	
Wildlife Protection Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			

Blanding's Turtle	Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Capture and care of contaminated species	IN, MI, OH	
Eastern Massasauga	Capture and care of contaminated species	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Capture and care of contaminated species	IL	
Spotted Turtle	Capture and care of contaminated species	IL, IN, MI, OH	
Streamside Salamander	Capture and care of contaminated species	IN, OH	
Wood Turtle	Capture and care of contaminated species	MI, MN, OH, WI	
Gray Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN	
Indiana Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH	
Little Brown Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Tricolored Bat	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Whooping Crane, Non-Essential Population	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Fassett's Locoweed	Deterrence and hazing Capture and care of contaminated species	WI	
Mead's Milkweed	Deterrence and hazing Capture and care of contaminated species	IL, IN, WI	
Minnesota Dwarf Trout Lily	Deterrence and hazing Capture and care of contaminated species	MN	
Pitcher's Thistle	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, WI	
Prairie Bush-clover	Deterrence and hazing Capture and care of contaminated species	IL, MN, WI	
Running Buffalo Clover	Deterrence and hazing Capture and care of contaminated species	IN, OH	
Small Whorled Pogonia	Deterrence and hazing Capture and care of contaminated species	IL, MI, OH	
Dakota Skipper *Critical Habitat*	Deterrence and hazing Capture and care of contaminated species	MN	
Frosted Elfin Butterfly	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Deterrence and hazing	IL	

	Capture and care of contaminated species		
Monarch Butterfly	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rattlesnake-master Borer Moth	Deterrence and hazing Capture and care of contaminated species	IL	
Regal Fritillary	Deterrence and hazing Capture and care of contaminated species	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Deterrence and hazing Capture and care of contaminated species	IL, IN, MN, OH, WI	
Blanding's Turtle	Deterrence and hazing	IL, IN, MI, MN, OH, WI	
Copperbelly Watersnake, Northern DPS	Deterrence and hazing	IN, MI, OH	
Eastern Massasauga	Deterrence and hazing	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Deterrence and hazing	IL	
Spotted Turtle	Deterrence and hazing	IL, IN, MI, OH	
Streamside Salamander	Deterrence and hazing	IN, OH	
Wood Turtle	Deterrence and hazing	MI, MN, OH, WI	
Canada Lynx	Deterrence and hazing Capture and care of contaminated species	MI, MN, WI	
Gray Wolf	Deterrence and hazing Capture and care of contaminated species	MI, MN, WI	
Plains Spotted Skunk	Deterrence and hazing Capture and care of contaminated species	MN	
Prairie Gray Fox	Deterrence and hazing Capture and care of contaminated species	MN, WI	
Locating, Tracking, and Support Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Iowa Pleistocene Snail	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
American Hart's-tongue Fern	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI	
Dwarf Lake Iris	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, WI	
Fassett's Locoweed	Use of vehicles Use of machinery/supporting equipment	WI	

	Creation/use of new access points Creation/use of staging areas Access of personnel by foot		
Lakeside Daisy	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, MI, OH	
Leafy Prairie-clover	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Leedy's Roseroot	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MN	
Mead's Milkweed	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, WI	
Minnesota Dwarf Trout Lily	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	MN	
Northern Wild Monkshood	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	OH, WI	
Pitcher's Thistle	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, WI	
Prairie Bush-clover	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, MN, WI	
Running Buffalo Clover	Use of vehicles	IN, OH	

	Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas		
Short's Bladderpod *Critical Habitat*	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IN	
Short's Goldenrod	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IN	
Small Whorled Pogonia	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, MI, OH	
Western Prairie Fringed Orchid	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MN	
American Burying Beetle	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, OH	
Dakota Skipper *Critical Habitat*	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MN	
Frosted Elfin Butterfly	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	

	Access of personnel by foot traffic		
Linda's Roadside Skipper	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Monarch Butterfly	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, MN, WI	
Rattlesnake-master Borer Moth	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Regal Fritillary	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Use of vehicles Use of machinery/supporting equipment Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MN, OH, WI	
Blanding's Turtle	Use of vehicles Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Use of vehicles Creation/use of new access points	IN, MI, OH	

	Creation/use of staging areas Access of personnel by foot traffic		
Eastern Massasauga	Use of vehicles Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL	
Spotted Turtle	Use of vehicles Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH	
Streamside Salamander	Use of vehicles Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IN, OH	
Wood Turtle	Use of vehicles Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, MN, OH, WI	
Canada Lynx	Use of aircraft Use of vehicles	MI, MN, WI	
Gray Bat	Use of aircraft Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN	
Gray Wolf	Use of aircraft Use of vehicles	MI, MN, WI	
Indiana Bat	Use of aircraft Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, OH	
Little Brown Bat	Use of aircraft Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Use of aircraft Creation/use of new access points Creation/use of staging areas	IL, IN, MI, MN, OH, WI	

	Access of personnel by foot traffic		
Plains Spotted Skunk	Use of aircraft Use of vehicles	MN	
Prairie Gray Fox	Use of aircraft Use of vehicles	MN, WI	
Tricolored Bat	Use of aircraft Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Use of aircraft Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
Blanding's Turtle	Use of aircraft	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Use of vessels	IL	
Spotted Turtle	Use of aircraft	IL, IN, MI, OH	
Wood Turtle	Use of aircraft	MI, MN, OH, WI	
Canada Lynx	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, MN, WI	
Gray Wolf	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MI, MN, WI	
Indiana Bat	Use of vehicles	IL, IN, MI, OH	
Northern Long-Eared Bat	Use of vehicles	IL, IN, MI, MN, OH, WI	
Plains Spotted Skunk	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MN	
Prairie Gray Fox	Creation/use of new access points Creation/use of staging areas Access of personnel by foot traffic	MN, WI	
Tricolored Bat	Use of vehicles	IL, IN, MI, MN, OH, WI	
Special considerations needed, high level of concern			
American Hart's-tongue Fern	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI	
Dwarf Lake Iris	Natural attenuation Locating, sampling, and monitoring air, land, and water Access of personnel by foot traffic	MI, WI	
Fassett's Locoweed	Natural attenuation	WI	

	Locating, sampling, and monitoring air, land, and water		
Lakeside Daisy	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MI, OH	
Leafy Prairie-clover	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Leedy's Roseroot	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Mead's Milkweed	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, WI	
Minnesota Dwarf Trout Lily	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Northern Wild Monkshood	Natural attenuation Locating, sampling, and monitoring air, land, and water	OH, WI	
Pitcher's Thistle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, WI	
Prairie Bush-clover	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MN, WI	
Running Buffalo Clover	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, OH	
Short's Bladderpod *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Short's Goldenrod	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN	
Small Whorled Pogonia	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, MI, OH	
Western Prairie Fringed Orchid	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Iowa Pleistocene Snail	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
American Burying Beetle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, OH	
Dakota Skipper *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Frosted Elfin Butterfly	Natural attenuation	IL, IN, MI, OH, WI	

	Locating, sampling, and monitoring air, land, and water		
Karner Blue Butterfly	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Monarch Butterfly	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, WI	
Rattlesnake-master Borer Moth	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Regal Fritillary	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MN, OH, WI	
Blanding's Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, MI, OH	
Eastern Massasauga	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL	
Spotted Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Streamside Salamander	Natural attenuation Locating, sampling, and monitoring air, land, and water	IN, OH	
Wood Turtle	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, OH, WI	
Canada Lynx	Natural attenuation Locating, sampling, and monitoring air, land, and water	MI, MN, WI	
Gray Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN	
Gray Wolf	Natural attenuation	MI, MN, WI	

	Locating, sampling, and monitoring air, land, and water		
Indiana Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, OH	
Little Brown Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Plains Spotted Skunk	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN	
Prairie Gray Fox	Natural attenuation Locating, sampling, and monitoring air, land, and water	MN, WI	
Tricolored Bat	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Natural attenuation Locating, sampling, and monitoring air, land, and water	IL, IN, MI, MN, OH, WI	
Waste Management Activities			
Species	**Specific Activity**	**States of Occurrence**	**BMPs[1]**
May affect, likely to adversely affect - discuss possible BMPs with Services			
Iowa Pleistocene Snail	Temporary storage (on land) Decontamination	IL	
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
American Hart's-tongue Fern	Temporary storage (on land) Decontamination	MI	
Decurrent False Aster	Temporary storage (on land)	IL	
Dwarf Lake Iris	Waste handling Temporary storage (on water) Temporary storage (on land) Decontamination	MI, WI	
Eastern Prairie Fringed Orchid	Temporary storage (on land)	IL, IN, MI, OH, WI	
Fassett's Locoweed	Waste handling Temporary storage (on land) Decontamination	WI	
Hall's Bulrush	Temporary storage (on land)	IL, IN, MI, OH, WI	
Houghton's Goldenrod	Temporary storage (on land)	MI	
Lakeside Daisy	Temporary storage (on land) Decontamination	IL, MI, OH	
Leafy Prairie-clover	Temporary storage (on land) Decontamination	IL	

Leedy's Roseroot	Temporary storage (on land) Decontamination	MN	
Mead's Milkweed	Temporary storage (on land) Decontamination	IL, IN, WI	
Michigan Monkey Flower	Temporary storage (on land)	MI	
Minnesota Dwarf Trout Lily	Temporary storage (on land) Decontamination	MN	
Northern Wild Monkshood	Temporary storage (on land) Decontamination	OH, WI	
Pitcher's Thistle	Temporary storage (on land) Decontamination	IL, IN, MI, WI	
Prairie Bush-clover	Temporary storage (on land) Decontamination	IL, MN, WI	
Running Buffalo Clover	Temporary storage (on land) Decontamination	IN, OH	
Short's Bladderpod *Critical Habitat*	Temporary storage (on land) Decontamination	IN	
Short's Goldenrod	Temporary storage (on land) Decontamination	IN	
Small Whorled Pogonia	Temporary storage (on land) Decontamination	IL, MI, OH	
Western Prairie Fringed Orchid	Temporary storage (on land) Decontamination	MN	
American Burying Beetle	Temporary storage (on land) Decontamination	MI, OH	
Dakota Skipper *Critical Habitat*	Temporary storage (on land) Decontamination	MN	
Frosted Elfin Butterfly	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Temporary storage (on land) Decontamination	IL	
Monarch Butterfly	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Temporary storage (on land) Decontamination	MI, MN, WI	
Rattlesnake-master Borer Moth	Temporary storage (on land) Decontamination	IL	
Regal Fritillary	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Temporary storage (on land) Decontamination	IL, IN, MN, OH, WI	
Blanding's Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	

Copperbelly Watersnake, Northern DPS	Temporary storage (on land) Decontamination	IN, MI, OH	
Eastern Massasauga	Temporary storage (on land) Decontamination	IL, IN, MI, OH, WI	
Illinois Chorus Frog	Waste handling Decanting Decontamination	IL	
Spotted Turtle	Temporary storage (on land) Decontamination	IL, IN, MI, OH	
Streamside Salamander	Waste handling Temporary storage (on land) Decontamination	IN, OH	
Wood Turtle	Temporary storage (on land) Decontamination	MI, MN, OH, WI	
Gray Bat	Temporary storage (on land) Decontamination	IL, IN	
Indiana Bat	Temporary storage (on land) Decontamination	IL, IN, MI, OH	
Little Brown Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Tricolored Bat	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Temporary storage (on land) Decontamination	IL, IN, MI, MN, OH, WI	
May affect, not likely to adversely affect due to insignificant or discountable effects			
American Hart's-tongue Fern	Waste handling	MI	
Lakeside Daisy	Waste handling	IL, MI, OH	
Leafy Prairie-clover	Waste handling	IL	
Leedy's Roseroot	Waste handling	MN	
Mead's Milkweed	Waste handling	IL, IN, WI	
Minnesota Dwarf Trout Lily	Waste handling	MN	
Northern Wild Monkshood	Waste handling	OH, WI	
Pitcher's Thistle	Waste handling	IL, IN, MI, WI	
Prairie Bush-clover	Waste handling	IL, MN, WI	
Running Buffalo Clover	Waste handling	IN, OH	
Short's Bladderpod *Critical Habitat*	Waste handling	IN	
Short's Goldenrod	Waste handling	IN	
Small Whorled Pogonia	Waste handling	IL, MI, OH	
Western Prairie Fringed Orchid	Waste handling	MN	
Iowa Pleistocene Snail	Waste handling	IL	
American Burying Beetle	Waste handling	MI, OH	
Dakota Skipper *Critical Habitat*	Waste handling	MN	
Frosted Elfin Butterfly	Waste handling	IL, IN, MI, OH, WI	
Karner Blue Butterfly	Waste handling	IL, IN, MI, MN, OH, WI	
Linda's Roadside Skipper	Waste handling	IL	
Monarch Butterfly	Waste handling	IL, IN, MI, MN, OH, WI	
Poweshiek Skipperling *Critical Habitat*	Waste handling	MI, MN, WI	

Rattlesnake-master Borer Moth	Waste handling	IL	
Regal Fritillary	Waste handling	IL, IN, MI, MN, OH, WI	
Rusty Patched Bumble Bee	Waste handling	IL, IN, MN, OH, WI	
Blanding's Turtle	Waste handling	IL, IN, MI, OH, WI	
Copperbelly Watersnake, Northern DPS	Waste handling	IN, MI, OH	
Eastern Massasauga	Waste handling	IL, IN, MI, OH, WI	
Spotted Turtle	Waste handling	IL, IN, MI, OH	
Wood Turtle	Waste handling	MI, MN, OH, WI	
Canada Lynx	Waste handling	MI, MN, WI	
Gray Bat	Waste handling	IL, IN	
Gray Wolf	Waste handling	MI, MN, WI	
Indiana Bat	Waste handling	IL, IN, MI, OH	
Little Brown Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Northern Long-Eared Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Plains Spotted Skunk	Waste handling	MN	
Prairie Gray Fox	Waste handling	MN, WI	
Tricolored Bat	Waste handling	IL, IN, MI, MN, OH, WI	
Golden-Winged Warbler	Waste handling	IL, IN, MI, MN, OH, WI	

American Hart's-tongue Fern	**Status**	**Threatened (1989)**	54 FR 29726

Scientific Name	*Asplenium scolopendrium var. americanum*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
		X			

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Creation/Use of New Access Points
- Creation/Use of Staging Areas (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

May affect, likely to adversely affect – discuss possible BMP's to minimize impact

Upland Areas

- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Decurrent False Aster	**Status**	**Threatened (1988)**	55 FR 45858
Scientific Name	*Boltonia decurrens*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands
• • Waste Handling • Detection of non-floating or submerged oil	• Waste Handling • Detection of non-floating or submerged oil

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Locating, Sampling, and monitoring: Air, Land, water (includes SCAT) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Locating, Sampling, and monitoring: Air, Land, water (includes SCAT) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Temporary Storage (on land)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring

BMPs

1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats. .
USFWS Lead Office Contact:

Dwarf Lake Iris	**Status**	**Threatened (1988)**	53 FR 37972
Scientific Name	*Iris lacustris*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	No	No	No	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
		X			X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on water)
- Temporary Storage (on land)
- Decontamination

May affect, likely to adversely affect – discuss possible BMP's with Services

All Habitats of Occurrence

Dikes or Berms

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Eastern Prairie Fringed Orchid	Status	Threatened (1988)	53 FR 37972

Scientific Name	*Platanthera leucophaea*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Stream	Wetlands
Detection of non-floating or submerged oil	

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Booming • Construction barriers, pits, and trenches • Culvert Blocking		• Temporary Storage (on land)

May affect, likely to adversely affect – discuss possible BMP's with Services

Rivers and Stream	Wetlands
Dikes or Berms	

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Fassett's Locoweed	**Status**	**Threatened (1988)**	53 FR 37970

Scientific Name	*Oxytropis campestris var. chartacea*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	No	No	Yes	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
					X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Flooding
- Deterrence and Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Houghton's Goldenrod	**Status**	**Threatened (1988)**	53 FR 27134
Scientific Name	*Solidago houghtonii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	Yes	No	Yes	Yes	No

States Relevant

IL	IN	MI	MN	OH	WI
		X			

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	All Other Habitats of Occurrence
• Detection of non-floating or submerged oil	• Detection of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Stream	All Other Habitats of Occurrence
• Booming • Construction barriers, pits, and trenches • Culvert Blocking	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Waste Handling • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

Rivers and Stream	All Other Habitats of Occurrence
N/A	Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure construction/deconstruction/removal plans are in place and are scheduled/implemented to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Lakeside Daisy	Status	Threatened (1988)	53 FR 23742
Scientific Name	*Hymenoxys herbacea*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X		X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Uplands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Uplands

- Booming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

Uplands

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Leafy Prairie-clover		**Status**		**Endangered (1991)**		56 FR 19953
Scientific Name	*Dalea foliosa*		**Critical Habitat**	N/A		

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Uplands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Uplands

- Booming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

Uplands

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Leedy's Roseroot		**Status**		**Threatened (2010)**		75 FR 55686
Scientific Name	*Rhodiola integrifolia ssp. leedyi*		**Critical Habitat**	N/A		

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

-
- Booming
- Creation/Use of New Access Points
- Creation/Use of Staging Areas (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Upland Areas

- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Mead's Milkweed	**Status**	**Threatened (1988)**	53 FR 33992

Scientific Name	*Asclepias meadii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X				X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Michigan Monkey-Flower	**Status**	**Endangered (2010)**	75 FR 55686

Scientific Name	*Mimulus michiganensis*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	No

States Relevant

IL	IN	MI	MN	OH	WI
		X			

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Detection of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Minnesota Dwarf Trout Lily	**Status**	**Endangered (1986)**	51 FR 10521

Scientific Name	*Erythronium propullans*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Upland Areas
• Skimming • Detection of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Skimming • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Northern Wild Monkshood	**Status**	**Threatened (1978)**	43 FR 17910

Scientific Name	*Aconitum noveboracense*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
				X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Upland Areas
• Skimming • Detection of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Creation/Use of New Access Points • Creation/Use of Staging Areas (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, likely to adversely affect – discuss possible BMP's to minimize impact

Upland Areas

- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats. .
USFWS Lead Office Contact:

Pitcher's Thistle	**Status**	**Threatened (1988)**	53 FR 27137

Scientific Name	*Cirsium pitcheri*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X			X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Shorelines

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Shorelines

- Booming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Upland Areas

- Booming
- Skimming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

May affect, likely to adversely affect – discuss possible BMPs with Services

Shorelines

Dikes or Berms

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure construction/deconstruction/removal plans are in place and are scheduled/implemented to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Prairie Bush-Clover	**Status**	**Threatened (1987)**	52 FR 781

Scientific Name	*Lespedeza leptostachya*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X			X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Running Buffalo Clover	**Status**	**Endangered (1987)**	52 FR 21478

Scientific Name	*Trifolium stolonifera*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams

- Skimming
- Detection of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

Upland Areas

- Skimming
- Detection of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Temporary Storage (on land)
- Decontamination

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Short's Bladderpod	**Status**	**Endangered (2014)**	79 FR 44712
Scientific Name *Physaria globosa*		**Critical Habitat**	Designated

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Upland Areas
• Skimming • Detection of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Creation/Use of New Access Points • Creation/Use of Staging Areas (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, likely to adversely affect – discuss possible BMP's to minimize impact

Upland Areas

- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats. .
USFWS Lead Office Contact:

Short's Goldenrod	**Status**	**Endangered (1985)**	50 FR 36085

Scientific Name	*Solidago shortii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Small Whorled Pogonia	**Status**	**Threatened (1994)**	59 FR 50852

Scientific Name	*Isotria medeoloides*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X		X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Tennessee Pondweed	**Status**	**Under Review**	Unlisted

Scientific Name	*Potamogeton tennesseensis*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Vessels
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Natural Attenuation – allow habitat to recover naturally while monitoring
- Deployment of buoys
- Locating, Sampling, and monitoring: Air, Land, water (includes SCAT)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on water)
- Temporary Storage (on land)
- Decanting
- Decontamination

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Virginia Sneezeweed	**Status**	**Threatened (1998)**	63 FR 59239
Scientific Name	*Helenium virginicum*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

- Detection of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

Wetlands

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.

4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats. .
USFWS Lead Office Contact:

Virginia Spiraea	**Status**	**Threatened (1990)**	55 FR 24241
Scientific Name	*Spirea virginiana*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	No

States Relevant

IL	IN	MI	MN	OH	WI
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Natural Attenuation – allow habitat to recover naturally while monitoring
- Deployment of buoys
- Locating, Sampling, and monitoring: Air, Land, water (includes SCAT)
- Waste Handling
- Temporary Storage (on water)
- Temporary Storage (on land)
- Decanting
- Decontamination

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Western Prairie Fringed Orchid	**Status**	**Threatened (1989)**	54 FR 39857
Scientific Name	*Platanthera praeclara*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams / Wetlands	Upland Areas
Detection of non-floating or submerged oil	Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams / Wetlands	Upland Areas
• Booming • Construction barriers, pits, and trenches • Culvert Blocking	• Booming • Manual removal / Cleaning of oil sediment, debris, or vegetation • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of Personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, likely to adversely affect – discuss possible BMPs with Services

Rivers and Streams / Wetlands

Dikes or Berms

Special considerations needed, high level of concern

Upland Areas

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Iowa Pleistocene Snail	**Status**	**Endangered (1978)**	43 FR 28932

Scientific Name	*Discus macclintocki*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Upland Areas

- Booming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Clubshell	**Status**	**Endangered (1993)**	58 FR 5638

Scientific Name	*Pleurobema clava*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Fanshell	**Status**	**Endangered (1990)**	55 FR 25591

Scientific Name	*Cyprogenia stegaria*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Fat Pocketbook	**Status**	**Endangered (1976)**	41 FR 24062
Scientific Name	*Potamilus capax*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Higgins Eye Pearlymussel		**Status**		**Endangered (1976)**	41 FR 24062
Scientific Name	*Lampsilis higginsii*		**Critical Habitat**	N/A	

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X			X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Longsolid	**Status**	**Petitioned (2021)**	Unlisted

Scientific Name	*Fusconaia subrotunda*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Northern Riffleshell	**Status**	**Endangered (1993)**	58 FR 5638

Scientific Name	*Pleurobema clava*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Orangefoot Pimpleback	**Status**	**Endangered (1976)**	41 FR 24062

Scientific Name	*Plethobasus cooperianus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Pink Mucket	**Status**	**Endangered (1976)**	41 FR 24062

Scientific Name	*Lampsilis abrupta*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Purple Cat's Paw Pearlymussel	**Status**	**Endangered (1990)**	55 FR 28209

Scientific Name	*Epioblasma obliquata obliquata*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

<table>
<tr><td colspan="2"><u>Pyramid Pigtoe</u></td><td colspan="2">Status</td><td colspan="2">Unlisted</td><td>Unlisted</td></tr>
<tr><td>Scientific Name</td><td colspan="2">Pleurobema rubrum</td><td colspan="2">Critical Habitat</td><td colspan="2">N/A</td></tr>
<tr><td colspan="7">Habitat[1]</td></tr>
<tr><td>Shoreline (beach/land)</td><td>Ports, Canals, Industrial Areas</td><td>Rivers and Streams</td><td>Bays and Estuaries</td><td>Ponds and Lakes</td><td>Wetlands</td><td>Upland Areas</td></tr>
<tr><td>No</td><td>Yes</td><td>Yes</td><td>No</td><td>Yes</td><td>No</td><td>No</td></tr>
</table>

<table>
<tr><td colspan="6">States Relevant</td></tr>
<tr><td>IL</td><td>IN</td><td>MI</td><td>MN</td><td>OH</td><td>WI</td></tr>
<tr><td></td><td></td><td></td><td></td><td>X</td><td></td></tr>
</table>

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

<table>
<tr><td>Ports, Canals, Industrial Areas</td><td>Rivers and Streams</td><td>Ponds and Lakes</td></tr>
<tr><td>• Booming
• Skimming
• Vacuuming
• Sorbents
• Flushing
• Steam Cleaning
• Sandblasting
• Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
• Detection of non-floating or submerged oil
• Recovery of non-floating or submerged oil
• Containment of non-floating or submerged oil
• Deployment of buoys
• Temporary Storage (on water)</td><td>• Booming
• Dikes or Berms
• Construction barriers, dams, pits, and trenches
• Culvert blocking
• Skimming
• Vacuuming
• Sorbents
• Flooding
• Flushing
• Steam Cleaning
• Sandblasting
• Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
• Detection of non-floating or submerged oil
• Recovery of non-floating or submerged oil
• Containment of non-floating or submerged oil
• Use of Vessels
• Use of Vehicles
• Deployment of buoys</td><td>• Booming
• Dikes or Berms
• Construction barriers, dams, pits, and trenches
• Culvert blocking
• Skimming
• Vacuuming
• Sorbents
• Flooding
• Flushing
• Steam Cleaning
• Sandblasting
• Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
• Detection of non-floating or submerged oil
• Recovery of non-floating or submerged oil
• Containment of non-floating or submerged oil
• Use of Vessels
• Use of Vehicles
• Deployment of buoys
• Temporary Storage (on water)</td></tr>
</table>

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Rabbitsfoot	**Status**	**Threatened (2013)**	78 FR 57076
Scientific Name	*Quadrula cylindrica cylindrica*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Rayed Bean	Status	Endangered (2012)	77 FR 8632
Scientific Name	*Villosa fabalis*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Rough Pigtoe

Rough Pigtoe	Status	Endangered (1976)	41 FR 24062
Scientific Name	*Pleurobema plenum*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Round Hickorynut	Status	Petitioned (2021)	Unlisted

Scientific Name	*Obovaria subrotunda*	Critical Habitat	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant					
IL	IN	MI	MN	OH	WI
X	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Salamander Mussel	**Status**	**Under Review**	Unlisted
Scientific Name	*Simpsonaias ambigua*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Scaleshell	**Status**	**Endangered (2001)**	66 FR 51322

Scientific Name	*Leptodea leptodon*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Ports, Canals, Industrial Areas	Rivers and Streams	Ponds and Lakes
• Booming • Skimming • Vacuuming • Sorbents • Flushing • Steam Cleaning • Sandblasting • Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deployment of buoys • Temporary Storage (on water)	• Booming • Dikes or Berms • Construction barriers, dams, pits, and trenches • Culvert blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Use of Vessels • Use of Vehicles • Deployment of buoys	• Booming • Dikes or Berms • Construction barriers, dams, pits, and trenches • Culvert blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Use of Vessels • Use of Vehicles • Deployment of buoys • Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Sheepnose	Status	Endangered (2012)	77 FR 14914

Scientific Name	*Plethobasus cyphyus*	Critical Habitat	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X		X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Snuffbox	**Status**	**Endangered (2012)**	77 FR 8632
Scientific Name	*Epioblasma triquetra*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Spectaclecase	**Status**	**Endangered (2012)**	77 FR 14914

Scientific Name	*Cumberlandia monodonta*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X			X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

White Catspaw Pearlymussel	**Status**	**Endangered (1976)**	41 FR 24062

Scientific Name	*Epioblasma obliquata perobliqua*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams	Ponds and Lakes
• Booming • Dikes or Berms • Construction barriers, dams, pits, and trenches • Culvert blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Use of Vessels • Use of Vehicles • Deployment of buoys • Temporary Storage (on water)	• Booming • Dikes or Berms • Construction barriers, dams, pits, and trenches • Culvert blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Use of Vessels • Use of Vehicles • Deployment of buoys • Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Winged Mapleleaf	**Status**	Endangered (2001)	56 FR 28345

Scientific Name	*Quadrula fragosa*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
			X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Sorbents
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys
- Temporary Storage (on water)

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, dams, pits, and trenches
- Culvert blocking
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vessels
- Use of Vehicles
- Deployment of buoys
- Temporary Storage (on water)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Illinois Cave Amphipod	**Status**	**Endangered (1998)**	63 FR 46900

Scientific Name	*Gammarus acherondytes*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams

- Waste Handling
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMP's to minimize impact

Upland Areas

- Flooding
- Flushing

May affect, likely to adversely affect – discuss possible BMPs to minimize impact

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deployment of buoys

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

American Burying Beetle	**Status**	**Threatened (1989)**	54 FR 29652

Scientific Name	*Nicrophorus americanus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant

IL	**IN**	**MI**	**MN**	**OH**	**WI**
		X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands	Upland Areas
• Booming • Manual removal / Cleaning of oil sediment, debris, or vegetation • Creation/Use of New Access Points • Access of personnel by foot traffic • Decontamination	• Booming • Dikes or Berms • Manual removal / Cleaning of oil sediment, debris, or vegetation • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Bog Buckmoth	**Status**	**Under Review**	Not Listed

Scientific Name	*Hemileuca sp.*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
					X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Flooding
- Flushing
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Creation/Use of New Access Points
- Access of personnel by foot traffic
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Dakota Skipper	**Status**	**Threatened (2014)**	79 FR 63671

Scientific Name	*Hesperia dacotae*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Frosted Elfin Butterfly

Frosted Elfin Butterfly	Status	Under Review	Unlisted
Scientific Name	*Callophrys irus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Hine's Emerald Dragonfly	**Status**	**Endangered (1995)**	60 FR 5267
Scientific Name	*Somatochlora hineana*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	Yes	Yes	No

States Relevant

IL	IN	MI	MN	OH	WI
X		X			X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Flooding
- Flushing
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Creation/Use of New Access Points
- Access of personnel by foot traffic
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Hungerford's Crawling Water Beetle	**Status**	**Endangered (1994)**	59 FR 10580

Scientific Name	*Brychius hungerfordi*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	No

States Relevant

IL	IN	MI	MN	OH	WI
		X			

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Waste Handling
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Use of Vehicles
- Use of machinery/supporting equipment
- Deployment of buoys
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Karner Blue Butterfly	**Status**	**Endangered (1992)**	57 FR 59236

Scientific Name	*Lycaeides melissa samuelis*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Linda's Roadside Skipper		**Status**		**Under Review**		Unlisted
Scientific Name	*Amblyscirtes linda*		**Critical Habitat**	N/A		

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Booming • Culver Blocking • Manual removal / Cleaning of oil sediment, debris, or vegetation • Waste Handling	• Waste Handling	• Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Dikes or Berms • Construction barriers, pits, and trenches • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Access of personnel by foot traffic • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Mitchell's Satyr Butterfly	**Status**	**Endangered (1992)**	57 FR 21564

Scientific Name	*Neonympha mitchellii metchellii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	No

States Relevant

IL	IN	MI	MN	OH	WI
	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Flooding
- Flushing
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Access of personnel by foot traffic
- Decanting

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Monarch Butterfly	**Status**	Candidate (2020)	Unlisted

Scientific Name	*Danaus plexippus plexippus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Booming • Culver Blocking • Manual removal / Cleaning of oil sediment, debris, or vegetation • Waste Handling	• Waste Handling	• Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Dikes or Berms • Construction barriers, pits, and trenches • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equip. • Creation/Use of New Access Points • Access of personnel by foot traffic • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

Mechanical (non-chemical) sand cleaning (surface, <1 inch)
Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Poweshiek Skipperling	**Status**	**Endangered (2014)**	79 FR 63671
Scientific Name	*Oarisma poweshiek*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
		X	X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands	Upland Areas (Unoccupied Critical Habitat)	Upland Areas (Adjacent to occupied wetland)
Waste Handling	Waste Handling	Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands	Wetlands	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Access of personnel by foot traffic • Decanting	• Booming • Manual removal / Cleaning of oil sediment, debris, or vegetation • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Creation/Use of New Access Points • Access of personnel by foot traffic • Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

Mechanical (non-chemical) sand cleaning (surface, <1 inch)
Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Rattlesnake-master Borer Moth	**Status**	**Under Review**	Unlisted

Scientific Name	*Papaipema eryngii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Regal Fritillary	**Status**	**Under Review**	Unlisted
Scientific Name	*Speyaria idalia*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Booming • Culver Blocking • Manual removal / Cleaning of oil sediment, debris, or vegetation • Waste Handling	• Waste Handling	• Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Dikes or Berms • Construction barriers, pits, and trenches • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Access of personnel by foot traffic • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

Mechanical (non-chemical) sand cleaning (surface, <1 inch)
Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Rusty Patched Bumble Bee	**Status**	**Endangered (2017)**	82 FR 3186

Scientific Name	*Bombus affinis*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X		X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Booming • Culver Blocking • Manual removal / Cleaning of oil sediment, debris, or vegetation • Waste Handling	• Waste Handling	• Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Dikes or Berms • Construction barriers, pits, and trenches • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Flooding • Flushing • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Access of personnel by foot traffic • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Lake Sturgeon	**Status**	**Under Review**	Unlisted

Scientific Name	*Acipenser fulvescens*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Ports, Canals, Industrial Areas	Rivers and Streams / Ponds and Lakes	Bays and Estuaries
• Waste Handling • Temporary Storage (on water)	• Waste Handling • Temporary Storage (on water)	• Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas	Rivers and Streams / Ponds and Lakes	Bays and Estuaries
• Booming • Skimming • Vacuuming • Flushing • Steam Cleaning • Sandblasting • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Use of Vessels • Deployment of buoys • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Flooding • Flushing • Steam Cleaning • Sandblasting • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Use of Vessels • Deployment of buoys • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Flooding • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Use of Vessels • Deployment of buoys • Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Pallid Sturgeon	**Status**	**Endangered (1990)**	55 FR 36641

Scientific Name	*Scaphirhynchus albus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	No	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X					

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Waste Handling
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas	Rivers and Streams
• Booming • Skimming • Vacuuming • Flushing • Steam Cleaning • Sandblasting • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Use of Vessels • Deployment of buoys • Decanting	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Flooding • Flushing • Steam Cleaning • Sandblasting • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Use of Vessels • Deployment of buoys • Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Popeye Shiner	**Status**	**Under Review**	Unlisted

Scientific Name	*Notropis ariommus*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams

- Waste Handling
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs with Services

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Scioto Madtom	Status	Endangered (1975)	40 FR 44149
Scientific Name	*Noturus trautmani*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	No	No

States Relevant

IL	IN	MI	MN	OH	WI
				X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams

- Waste Handling
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs with Services

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Sicklefin Chub	**Status**	**Under Review**	Unlisted

Scientific Name	*Macrhybopsis meeki*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	No	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Waste Handling
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Sturgeon Chub	**Status**	**Under Review**	Unlisted

Scientific Name	*Macrhybopsis gelida*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	Yes	Yes	No	No	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Waste Handling
- Temporary Storage (on water)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ports, Canals, Industrial Areas

- Booming
- Skimming
- Vacuuming
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Topeka Shiner	**Status**	**Endangered (1998)**	63 FR 69008
Scientific Name	*Notropis topeka*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Waste Handling
- Temporary Storage (on water)

May affect, likely to adversely affect – discuss possible BMPs with Services

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Culvert Blocking
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys
- Decanting

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Vacuuming
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Deterrence or Hazing
- Use of Vessels
- Deployment of buoys

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Alligator Snapping Turtle	**Status**	**Under Review**	Unlisted

Scientific Name	*Macroclemys temmincki*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	Yes	Yes	No	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Shorelines	Ports, Canals, Industrial Areas	Rivers and Streams	Ponds and Lakes
• Flooding • Flushing • Deterrence and Hazing • Use of Aircraft • Waste Handling	• Flushing • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling	• Dikes or Berms • Culvert Blocking • Flushing • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling	• Dikes or Berms • Flushing • Deterrence and Hazing • Use of Aircraft • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Shorelines	Ports, Canals, Industrial Areas	Rivers and Streams	Ponds and Lakes
• Booming • Dikes or Berms • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic	• Booming • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on water)	• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on water)	• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic

• Temporary Storage (on water) • Temporary Storage (on land)	• Temporary Storage (on land) • Decanting • Decontamination	• Temporary Storage (on land) • Decanting • Decontamination	• Temporary Storage (on water) • Temporary Storage (on land) • Decontamination
Special considerations needed, high level of concern			
All Habitats of Occurrence			
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)			
BMPs			
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats. .			
USFWS Lead Office Contact:			

Blanding's Turtle	**Status**	**Under Review**	Unlisted
Scientific Name	*Emydoidea blandingii*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	Yes	Yes	Yes	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Shorelines	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
• Flooding • Flushing • Deterrence and Hazing • Use of Aircraft • Waste Handling • Temporary Storage (on water)	• Dikes or Berms • Culvert Blocking • Flushing • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling • Temporary Storage (on water)	• Dikes or Berms • Flooding • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling • Temporary Storage (on water)	• Flushing • Deterrence and Hazing • Use of Aircraft • Waste Handling • Temporary Storage (on water)	• Deterrence and Hazing • Use of Aircraft • Use of Vessels • Waste Handling	• Deterrence and Hazing • Use of Aircraft • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Shorelines	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
• Booming • Dikes or Berms • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation	• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil	• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation

• Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land)	• Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decanting • Decontamination	• Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decanting • Decontamination	• Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination
Special considerations needed, high level of concern					
All Habitats of Occurrence					
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)					
BMPs					
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.					
USFWS Lead Office Contact:					

Copperbelly Watersnake, N. DPS	**Status**	Threatened (1997)	62 FR 4183

Scientific Name	*Nerodia erythrogaster neglecta*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	Yes	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

- Deterrence and Hazing
- Use of Vessels
- Waste Handling

Upland Areas

- Deterrence and Hazing
- Use of Aircraft
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ponds and Lakes

- Dikes or Berms
- Access of personnel by foot traffic

Wetlands

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Containment of non-floating or submerged oil
- Capture and care of contaminated species or recovery of contaminated carcasses
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Decontamination

Upland Areas

- Booming
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Vehicles
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.

4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Eastern Massasauga	Status	Threatened (2016)	81 FR 67193
Scientific Name	*Sistrurus catenatus*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	Yes	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands	Upland Areas
• Deterrence and Hazing • Use of Vessels • Waste Handling	• Deterrence and Hazing • Use of Aircraft • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Ponds and Lakes	Wetlands	Upland Areas
• Dikes or Berms • Access of personnel by foot traffic	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Decontamination	• Booming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

<u>Illinois Chorus Frog</u>	**Status**	**Under Review**	Unlisted
Scientific Name	*Pseudacris illinoensis*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X					

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects		
Rivers and Stream	Ponds and Lakes	Wetlands/Upland Areas
• Culvert Blocking • Deployment of buoys	• Deterrence and Hazing • Use of Vessels • Temporary storage (on water)	• Deterrence and Hazing • Use of Vessels

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact		
Rivers and Streams	Ponds and Lakes	Wetlands/ Upland Areas
• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Flushing • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence and Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Natural Attenuation – allow habitat to recover naturally while monitoring • Locating, Sampling, and monitoring: Air, Land, water (includes SCAT) • Access of personnel by foot traffic • Waste Handling • Temporary Storage (on water) • Temporary Storage (on land) • Decanting • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Waste Handling • Temporary Storage (on land) • Decanting • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Waste Handling • Decanting • Decontamination

Special considerations needed, high level of concern
Ponds and Lakes / Wetlands / Upland Areas
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Spotted Turtle		Status		Under Review	Unlisted
Scientific Name	*Clemmys guttata*		**Critical Habitat**	N/A	

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	Yes	Yes	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects				
Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
• Dikes or Berms • Culvert Blocking • Flushing • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling • Temporary Storage (on water)	• Dikes or Berms • Flooding • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Deterrence and Hazing • Use of Aircraft • Deployment of buoys • Waste Handling • Temporary Storage (on water)	• Flushing • Deterrence and Hazing • Use of Aircraft • Waste Handling • Temporary Storage (on water)	• Deterrence and Hazing • Use of Aircraft • Use of Vessels • Waste Handling	• Deterrence and Hazing • Use of Aircraft • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact				
Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil	• Booming • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Steam Cleaning • Sandblasting • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles

• Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decanting • Decontamination	species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decanting • Decontamination	• Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Decontamination	• Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination
Special considerations needed, high level of concern				
All Habitats of Occurrence				
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)				
BMPs				
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.				
USFWS Lead Office Contact:				

Streamside Salamander	**Status**	**Under Review**	Unlisted
Scientific Name	*Ambystoma barbouri*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
	X			X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Use of Vessels • Deployment of buoys • Temporary Storage (on water)	• Use of Vessels	• Skimming • Deterrence and Hazing

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Waste Handling • Temporary Storage (on land) • Decanting • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Waste Handling • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Wood Turtle	**Status**	**Under Review**	Unlisted

Scientific Name	*Glyptemys insculpta*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
		X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Wetlands	Upland Areas
• Flushing • Deterrence or Hazing • Use of Aircraft • Deployment of buoys • Waste Handling • Temporary Storage (on water)	• Deterrence or Hazing • Use of Aircraft • Use of Vessels • Waste Handling	• Deterrence or Hazing • Use of Aircraft • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Wetlands	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decanting	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Containment of non-floating or submerged oil • Capture and care of contaminated species or recovery of contaminated carcasses • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination	• Booming • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Vehicles • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern
All Habitats of Occurrence
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Canada Lynx	**Status**	Threatened (2000)	65 FR 16053

Scientific Name	*Lynx canadensis*	**Critical Habitat**	Designated

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
		X	X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Booming
- Skimming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Decontamination
- Temporary Storage (on land)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Use of Aircraft
- Use of Vehicles

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Gray Bat	**Status**	**Endangered (1976)**	41 FR 17736
Scientific Name	*Myotis grisescens*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X				

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Ponds and Lakes	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Manual removal / Cleaning of oil sediment, debris, or vegetation • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Ponds and Lakes	Upland Areas
• Sandblasting • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Sandblasting • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Skimming • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)
BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Gray Wolf		**Status**	**Delisted Due to Recovery**	Unlisted
Scientific Name	*Canis lupus*	**Critical Habitat**	N/A	

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
		X	X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Booming
- Skimming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Decontamination
- Temporary Storage (on land)

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Use of Aircraft
- Use of Vehicles

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Indiana Bat	**Status**	**Endangered (1967)**	32 FR 4001
Scientific Name	*Myotis sodalis*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X		X	

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Skimming
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Little Brown Bat	**Status**	**Under Review**	Unlisted

Scientific Name	*Myotis lucifugus*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Booming
- Skimming
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Northern Bog Lemming	**Status**	**Under Review**	Unlisted

Scientific Name	*Synaptomys borealis*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Booming
- Culvert Blocking
- Flooding
- Flushing
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vessels
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Northern Long-eared Bat	Status	Threatened (2015)	80 FR 17973

Scientific Name	*Myotis septentrionalis*	Critical Habitat	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Use of Vehicles
- Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

All Habitats of Occurrence

- Booming
- Skimming
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Temporary Storage (on land)
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

<u>Plains Spotted Skunk</u>	**Status**	**Under Review**	Unlisted

Scientific Name	*Spilogale puturius interrupta*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
			X		

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Booming
- Skimming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on land)
- Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Use of Aircraft
- Use of Vehicles

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Prairie Gray Fox	**Status**	**Under Review**	Unlisted

Scientific Name	*Urocyon cinereoargenteus ocythous*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	No	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
			X		X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Upland Areas

- Booming
- Skimming
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Access of personnel by foot traffic
- Waste Handling
- Temporary Storage (on land)
- Decontamination

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Upland Areas

- Use of Aircraft
- Use of Vehicles

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover naturally while monitoring
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan.
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Tricolored Bat		Status	Under Review	Unlisted
Scientific Name	*Perimyotis subflavus*	**Critical Habitat**	N/A	

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	Yes	No	Yes	No	Yes

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High-Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Rivers and Streams	Ponds and Lakes	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Culvert Blocking • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Vacuuming • Sorbents • Flooding • Flushing • Steam Cleaning • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Waste Handling	• Manual removal / Cleaning of oil sediment, debris, or vegetation • Use of Vehicles • Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Rivers and Streams	Ponds and Lakes	Upland Areas
• Sandblasting • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Sandblasting • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Temporary Storage (on land) • Decontamination	• Booming • Skimming • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence
Natural attenuation: allow habitat to recover naturally while monitoring Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs
1. A wildlife monitoring plan. 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.
USFWS Lead Office Contact:

Birds

Eastern Black Rail	Status	Threatened (2020)	85 FR 63764

Scientific Name	*Laterallus jamaicensis ssp. jamaicensis*	Critical Habitat	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	No

States Relevant					
IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Flooding
- Flushing
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vessels
- Creation/Use of New Access Points
- Access of personnel by foot traffic
- Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Golden-winged Warbler	**Status**	**Under Review**	Unlisted
Scientific Name	*Vermivora chrysoptera*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands	Upland Areas
Waste Handling	Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands	Upland Areas
• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Flooding • Flushing • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Creation/Use of New Access Points • Access of personnel by foot traffic • Decontamination	• Booming • Dikes or Berms • Construction barriers, pits, and trenches • Skimming • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Access of personnel by foot traffic • Temporary Storage (on land) • Decontamination

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Piping Plover	**Status**	**Endangered (1985)**	50 FR 50726
Scientific Name	*Charadrius melodus*	**Critical Habitat**	Designated

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	Yes	Yes	Yes	No	No

States Relevant

IL	IN	MI	MN	OH	WI
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

All Habitats of Occurrence

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Shorelines

- Booming
- Dikes or Berms
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Deployment of buoys
- Access of personnel by foot traffic
- Temporary Storage (on water)
- Temporary Storage (on land)

Rivers and Streams

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vessels
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)

Bays and Estuaries

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vessels
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)
- Deployment of buoys
- Temporary Storage (on land)

Ponds and Lakes

- Booming
- Dikes or Berms
- Construction barriers, pits, and trenches
- Skimming
- Vacuuming
- Sorbents
- Flooding
- Flushing
- Steam Cleaning
- Sandblasting
- Mechanical (non-chemical) sand cleaning (surface, <1 inch)
- Mechanical (non-chemical) sand cleaning and excavation (>1 inch)
- Manual removal / Cleaning of oil sediment, debris, or vegetation
- Detection of non-floating or submerged oil
- Recovery of non-floating or submerged oil
- Deterrence or Hazing
- Capture and care of contaminated species or recovery of contaminated carcasses
- Use of Aircraft
- Use of Vessels
- Use of Vehicles
- Use of machinery/supporting equipment
- Creation/Use of New Access Points
- Creation/Use of Staging Area (on land)

<table>
<tr>
<td>• Decontamination</td>
<td>• Deployment of buoys
• Temporary Storage (on water)
• Temporary Storage (on land)
• Decanting
• Decontamination</td>
<td>• Decanting
• Decontamination</td>
<td>• Deployment of buoys
• Temporary Storage (on water)
• Temporary Storage (on land)
• Decontamination</td>
</tr>
<tr><td colspan="4">Special considerations needed, high level of concern</td></tr>
<tr><td colspan="4">All Habitats of Occurrence</td></tr>
<tr><td colspan="4">Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)</td></tr>
<tr><td colspan="4">BMPs</td></tr>
<tr><td colspan="4">1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.</td></tr>
<tr><td colspan="4">USFWS Lead Office Contact:</td></tr>
</table>

Rufa Red Knot	Status	Threatened (2014)	79 FR 73705
Scientific Name	*Calidiris canutus rufa*	**Critical Habitat**	N/A

Habitat[1]						
Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
Yes	No	Yes	Yes	Yes	No	No

States Relevant					
IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High Risk Response Actions and Activities			
May affect, not likely to adversely affect due to insignificant or discountable effects			
Shorelines	Rivers and Streams	Bays and Estuaries	Ponds and Lakes
Booming Dikes or Berms Skimming Vacuuming Access of personnel by foot traffic Waste Handling	Booming Skimming Vacuuming Waste Handling	Booming Skimming Vacuuming Waste Handling	Booming Skimming Vacuuming Waste Handling
May affect, not likely to adversely affect due to implementation of BMPs to minimize impact			
Shorelines	Rivers and Streams	Bays and Estuaries	Ponds and Lakes
• Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vehicles • Use of machinery/ supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Deployment of buoys • Temporary Storage (on water) • Temporary Storage (on land) • Decontamination	• Dikes or Berms • Construction barriers, pits, and trenches • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points	• Dikes or Berms • Construction barriers, pits, and trenches • Sorbents • Flooding • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/supporting equipment • Creation/Use of New Access Points • Creation/Use of Staging Area (on land) • Deployment of buoys	• Dikes or Berms • Construction barriers, pits, and trenches • Sorbents • Flooding • Flushing • Steam Cleaning • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Use of Vehicles • Use of machinery/ supporting equipment • Creation/Use of New Access Points

	• Creation/Use of Staging Area (on land) • Deployment of buoys • Temporary Storage (on water) • Temporary Storage (on land) • Decanting • Decontamination	• Temporary Storage (on land) • Decanting • Decontamination	• Creation/Use of Staging Area (on land) • Deployment of buoys • Temporary Storage (on water) • Temporary Storage (on land) • Decontamination
Special considerations needed, high level of concern			
All Habitats of Occurrence			
Natural attenuation: allow habitat to recover while monitoring naturally Locating, sampling, and monitoring: air, land, water (includes SCAT)			
BMPs			
1. A wildlife monitoring plan 2. Buffer zones with the concurrence of USFWS. 3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance. 4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.			
USFWS Lead Office Contact:			

Whooping Crane (Non-essential)	**Status**	**Endangered (1978)**	35 FR 8491

Scientific Name	*Grus americana*	**Critical Habitat**	N/A

Habitat[1]

Shoreline (beach/land)	Ports, Canals, Industrial Areas	Rivers and Streams	Bays and Estuaries	Ponds and Lakes	Wetlands	Upland Areas
No	No	No	No	No	Yes	Yes

States Relevant

IL	**IN**	**MI**	**MN**	**OH**	**WI**
X	X	X	X	X	X

High Risk Response Actions and Activities

May affect, not likely to adversely affect due to insignificant or discountable effects

Wetlands

Waste Handling

May affect, not likely to adversely affect due to implementation of BMPs to minimize impact

Wetlands	Upland Areas
• Booming • Skimming • Flooding • Flushing • Sandblasting • Mechanical (non-chemical) sand cleaning (surface, <1 inch) • Mechanical (non-chemical) sand cleaning and excavation (>1 inch) • Manual removal / Cleaning of oil sediment, debris, or vegetation • Detection of non-floating or submerged oil • Recovery of non-floating or submerged oil • Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses • Use of Aircraft • Use of Vessels • Creation/Use of New Access Points • Access of personnel by foot traffic • Decontamination	• Deterrence or Hazing • Capture and care of contaminated species or recovery of contaminated carcasses

Special considerations needed, high level of concern

All Habitats of Occurrence

Natural attenuation: allow habitat to recover while monitoring naturally
Locating, sampling, and monitoring: air, land, water (includes SCAT)

BMPs

1. A wildlife monitoring plan
2. Buffer zones with the concurrence of USFWS.
3. Spill Response Plan that has pre-identified staging areas for personnel and equipment that minimize disturbance.
4. When installing or placing temporary structures or material (i.e., booms, berms, dikes, culvert blocks, or other oil collection equipment/material/structures), ensure that construction/deconstruction/removal plans are in place and are scheduled/implemented in a way to eliminate or minimize impacts to threatened and endangered species and their habitats.

USFWS Lead Office Contact:

Document Endnotes

Document Endnotes

[i] Site available through the RRT5 website (**www.rrt5.org**) and accessed through the Tools tab.
[ii] The RRT 5 Roster is accessed through the website RRT Home tab (**www.rrt5.org**).
[iii] Appendix IV Disinfection Procedures for Invasive Species in Vessels and Water Wetted Equipment can be retrieved from the RRT5 website and accessed from the RCP/Inland Zone ACP, Appendices tab.
[iv] The Inland Tactics Manual is available through the RRT5 website (**www.rrt5.org**) and accessed through the Tools tab.
[v] Refer to the NRT Guidance, Technical Assistance and Planning, Pre-spill Planning Resources, Outline for Biological Evaluations (2018) available from the NRT website (**www.nrt.org)** and accessing the Resources menu and selecting Endangered Species Act (ESA) Section 7.
[vi] Habitat Fact Sheets are available through the RRT5 website (**www.rrt5.org**) and accessed via the Tools tab