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

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.

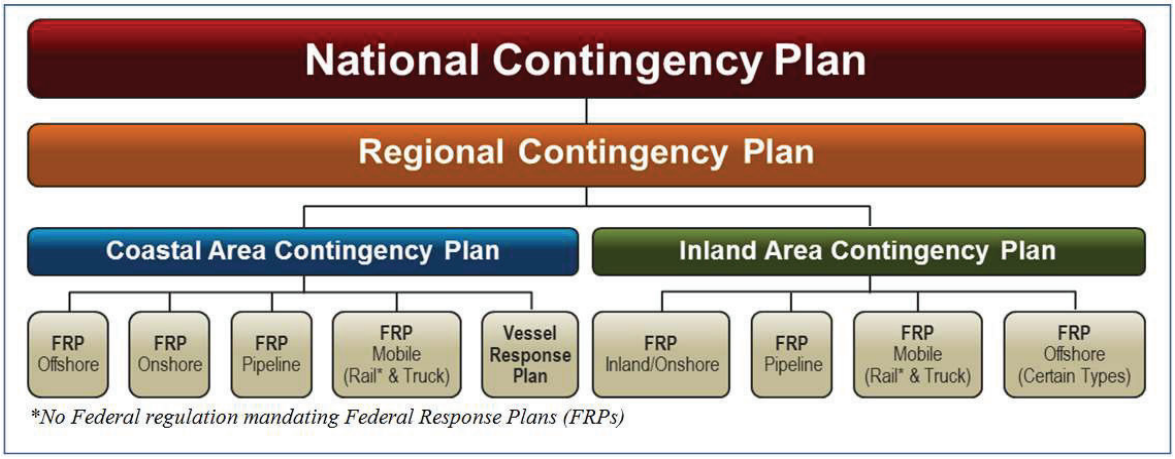
4. If, after the pre-spill planning process **Appendix C of the MOA** has been followed, it cannot be determined that adverse effects will not occur during a response action, the USCG or USEPA, as appropriate, will initiate formal consultation using the information gathered in **Appendix C of the MOA**; 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.

- Average most probable discharge is a discharge of the lesser of 50 barrels or 1 percent of the volume of the worst-case discharge.
- Maximum most probable discharge means a discharge of the lesser of 1,200 barrels or 10 percent of the volume of a worst-case discharge.
- Worst-case discharge 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.

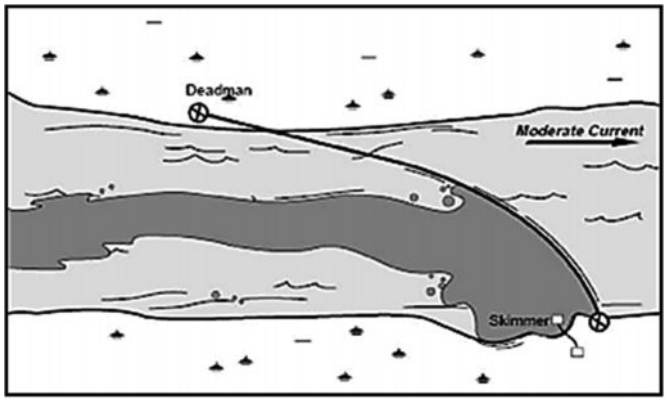
2.2 Primary Response Actions

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?

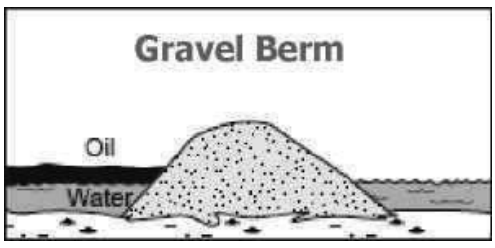
Direct and indirect effects of booming activities to listed, proposed, and other species of concern and habitat include wildlife disturbance by the presence of people and boom; crushing; destruction of benthic habitat and organisms by anchors or the anchor chain; entanglement in lines; exposure of perching 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
Mudflats
Rooted Floating Aquatics

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.

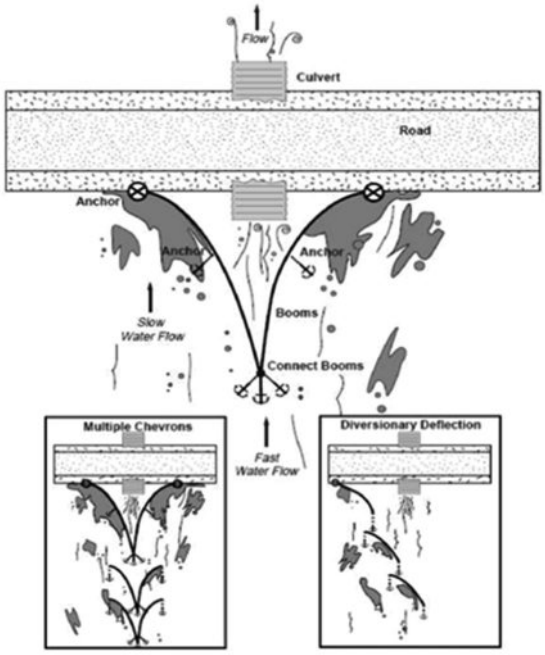
Habitats within the Action Area where construction barriers, dams, pits, and trenches are most likely to occur:

Rivers and Streams
Ponds and Lakes
Bays and Estuaries
Wetlands

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

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

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:

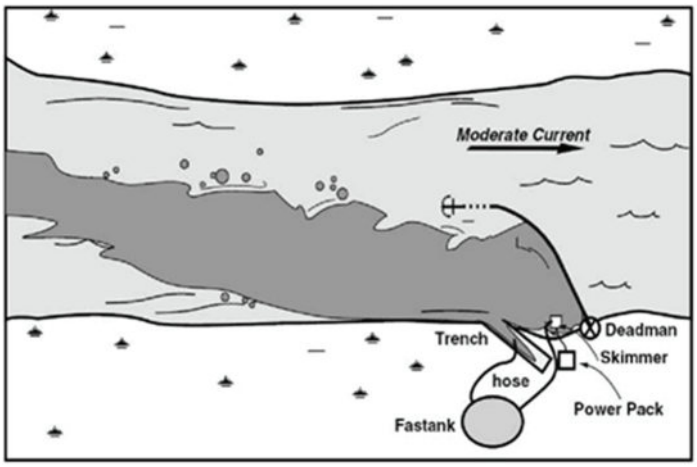
Rivers and Streams

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?

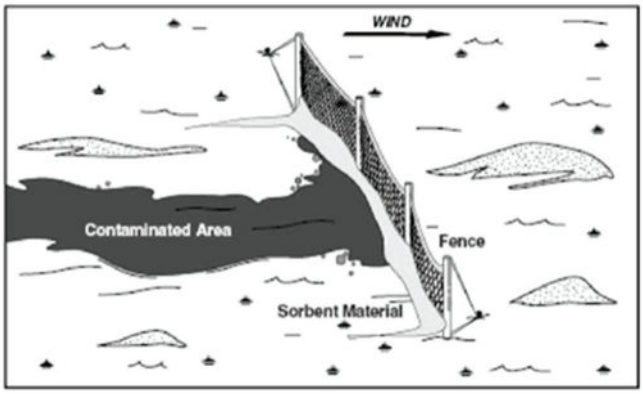
Direct and indirect effects of vacuuming activities to listed, proposed, and other species of concern species and habitat are associated with the operation of the vacuum. Effects could include entrainment, habitat, and wildlife disturbance (e.g., noise). Species potentially affected include entrainment 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.

Considerations for consultation include:

- 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.

Considerations for consultation include:

- 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)?
- How long will this method be utilized? Would length of time have a greater or lesser effect on certain species?
- 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.

Considerations for consultation include:

- 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.

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

- 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	Bays and Estuaries
Rivers and Streams	Wetlands
Ponds and Lakes	

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

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

Beach and Sand Bar	Deep Marsh Vegetation
Floodplain Forest	Mudflats
Open Water	Rooted Floating Aquatics
Sedge Meadow	Shallow Marsh Vegetation
Submersed 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	Ports, Canals, and Industrial Areas
Rivers and Streams	Bays and Estuaries
Ponds and Lakes	Uplands

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

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

Considerations for consultation include:

- 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
Ports, Canals, and Industrial Areas
Upland Areas

Vulnerable habitats within the Action Area potentially affected by natural attenuation 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

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.

Considerations for consultation include:

- 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
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 locating, sampling, and monitoring 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

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	Ports, Canals, 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 waste handling 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	

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

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 (Booming; Dikes or Berms; Construction of Barriers, Dams, Pits, and Trenches; and Culvert Blocking).

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 Skimming 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.

Section 3.0

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.

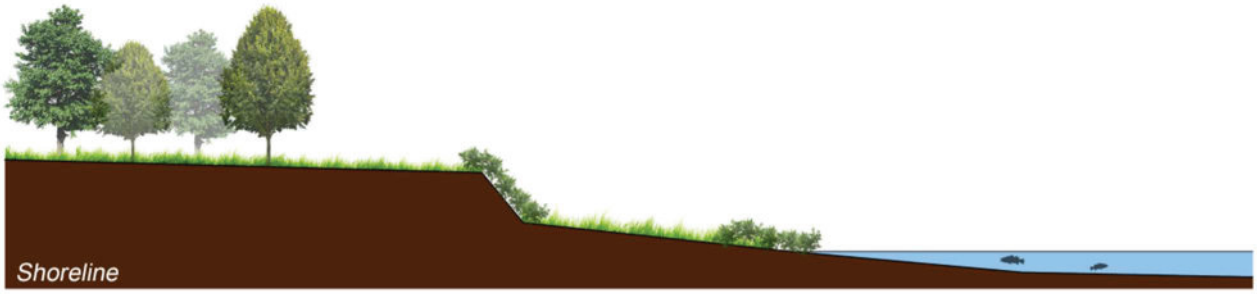
This BE addresses effects analysis for spill responses that occur within pre-defined habitat types. The environments (or general habitat types) described below are based on the RAM and habitat categories suggested by the NRT. There are seven primary environments defined for the Species Response Matrix (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**.

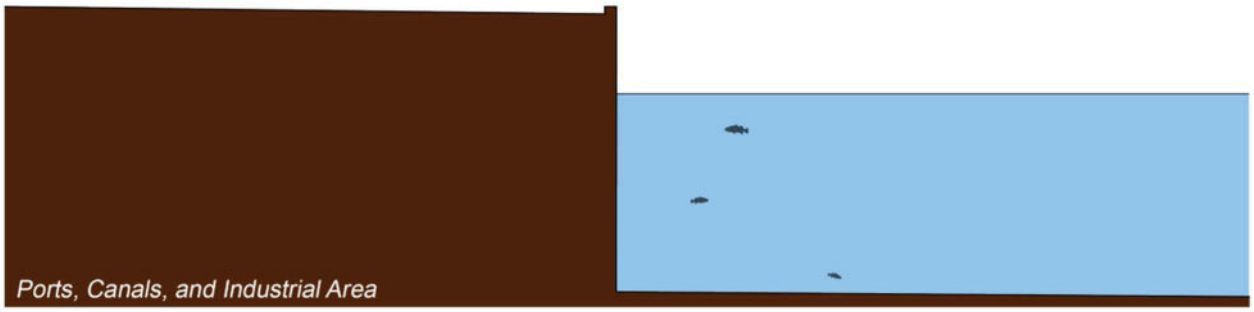
Shoreline (Beach/Land)



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

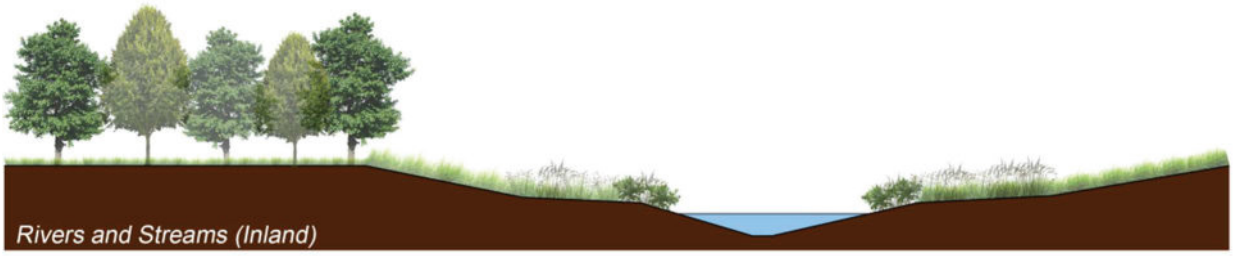


Ports and canals primarily occur along the Great Lakes and Navigable Waterways (e.g., Ohio River, Upper Mississippi River) within R5. Industrial areas are most often correlated with population centers within the Action Area. Ports are usually built near natural harbors, but they can also be located up 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.

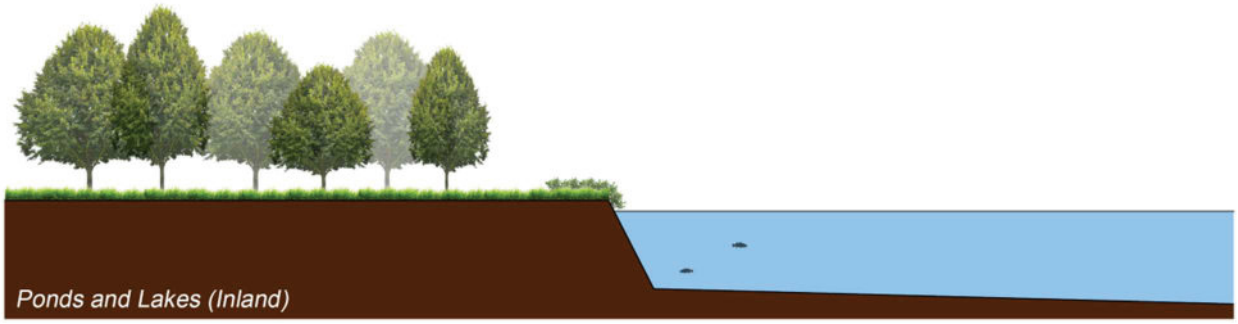
Bays and Estuaries

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

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.

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

Deep Marsh Annuals 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

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 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

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. 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

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. 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.

Round Hickorynut (Proposed Critical Habitat) 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]*).

Dakota Skipper (Designated Critical Habitat) 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.

Hine's Emerald Dragonfly (Designated Critical Habitat) 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).

Poweshiek Skipperling (Designated Critical Habitat) 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.

Topeka Shiner (Designated Critical Habitat) 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.

Canada Lynx (Designated Critical Habitat) 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.

Indiana Bat (Designated Critical Habitat) 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.

Piping Plover – Great Lakes population (Designated Critical Habitat) 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

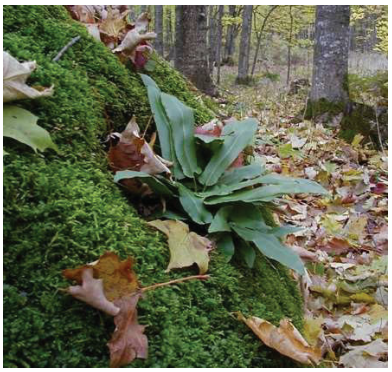
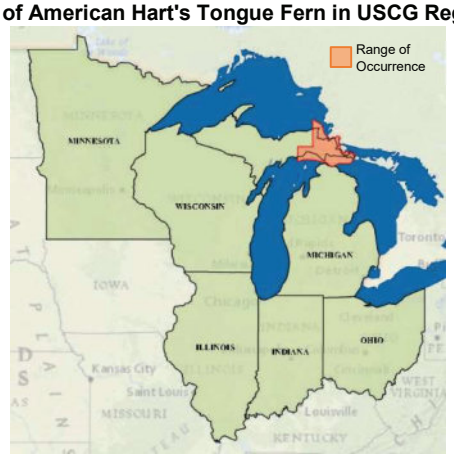


Photo: U.S. Forest Service

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

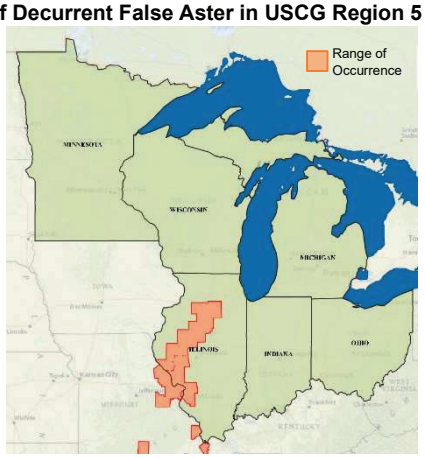
Scientific Name	*Boltonia decurrens*	**Critical Habitat**	N/A

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

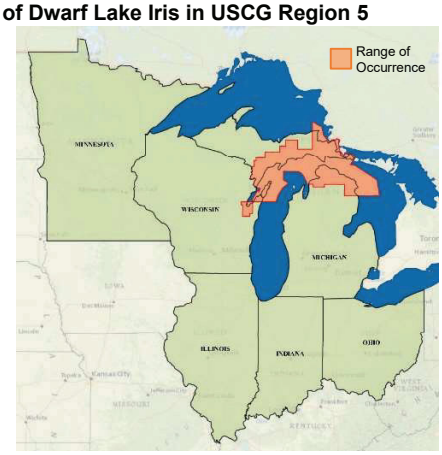
Scientific Name	*Iris lacustris*	**Critical Habitat**	N/A

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

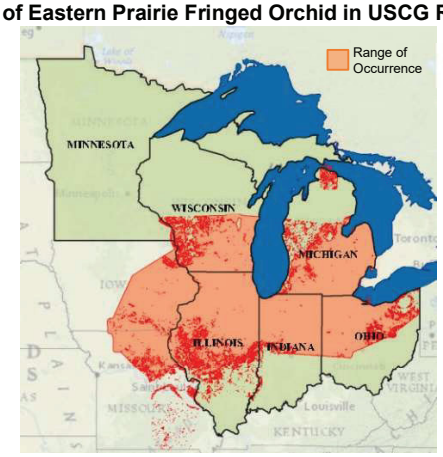
Scientific Name	*Platanthera leucophaea*	**Critical Habitat**	N/A

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

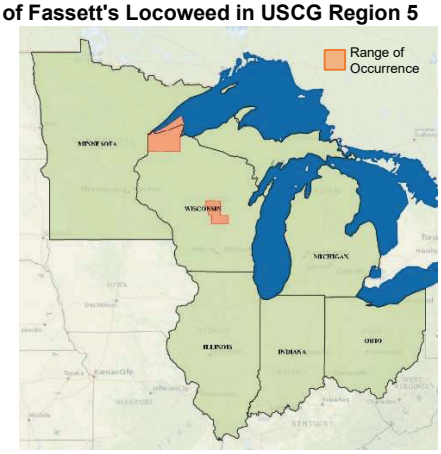
Scientific Name	*Oxytropis campestris* var. *chartacea*	**Critical Habitat**	N/A

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

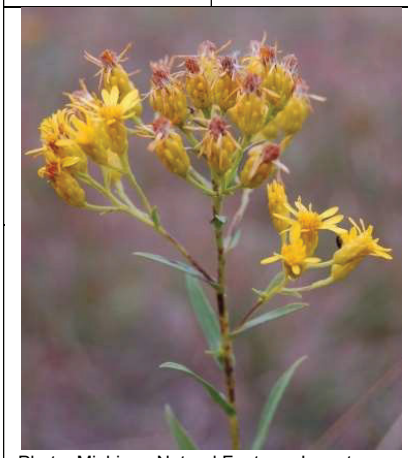


Photo: Michigan Natural Features Inventory

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

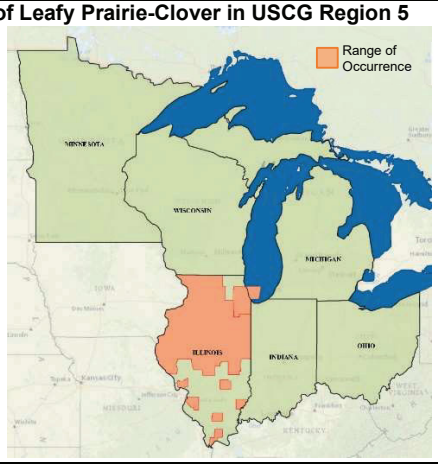
Scientific Name	*Dalea foliosa*	**Critical Habitat**	N/A

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

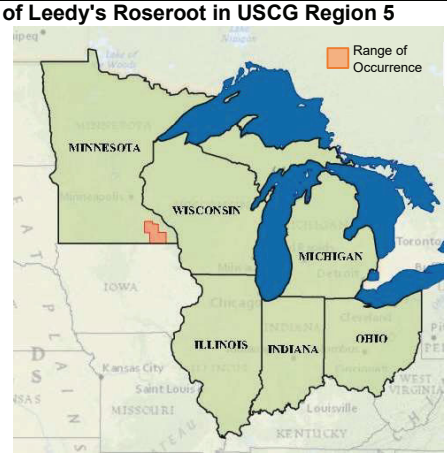
Scientific Name	*Rhodiola integrifolia* ssp. *leedyi*	**Critical Habitat**	N/A

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

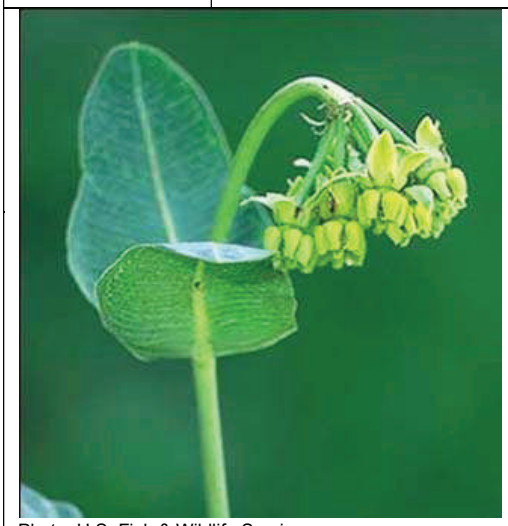
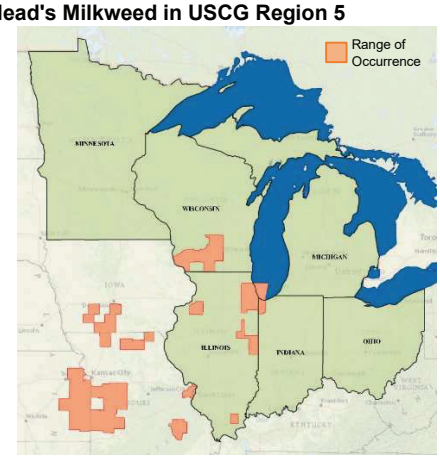


Photo: U.S. Fish & Wildlife Service

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

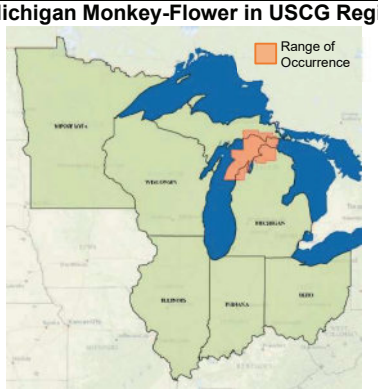
Scientific Name	*Mimulus michiganensis*	**Critical Habitat**	N/A

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

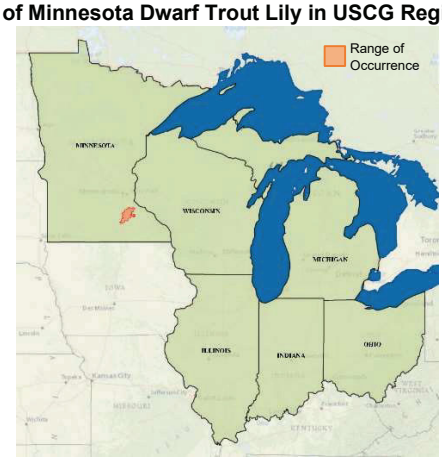
Scientific Name	*Erythronium propullans*	**Critical Habitat**	N/A

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)*

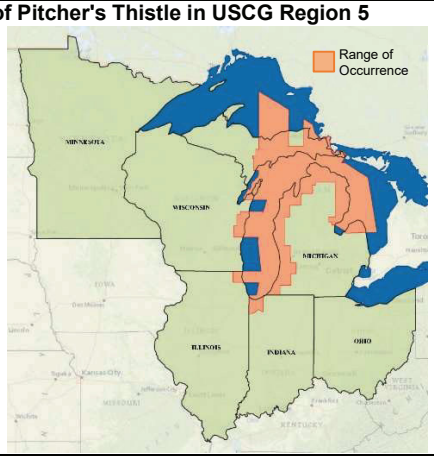
Pitcher's Thistle	**Status**	**Threatened (1988)**	53 FR 27137
Scientific Name	*Cirsium pitcheri*	**Critical Habitat**	N/A

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

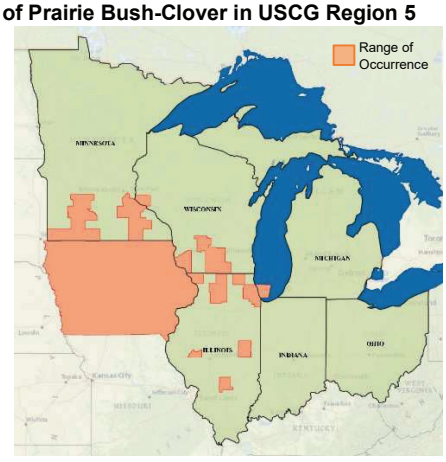
Scientific Name	*Lespedeza leptostachya*	**Critical Habitat**	N/A

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

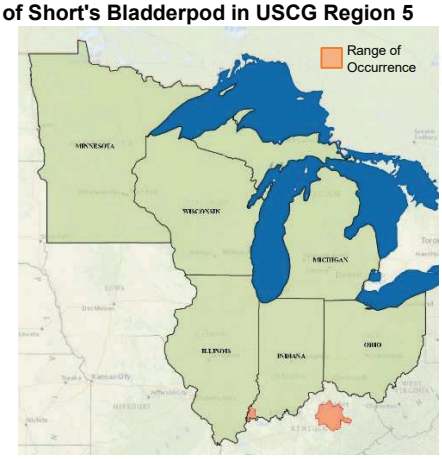
Scientific Name	*Physaria globosa*	**Critical Habitat**	79 FR 50989

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

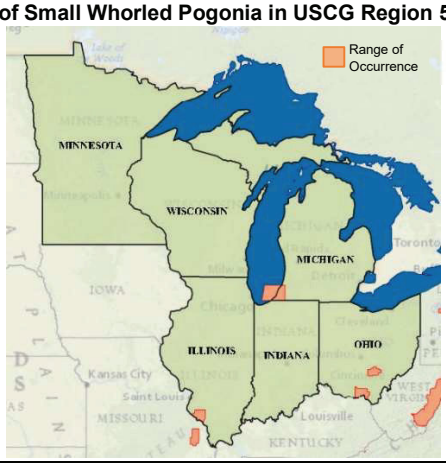
Scientific Name	*Isotria medeoloides*	**Critical Habitat**	N/A

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

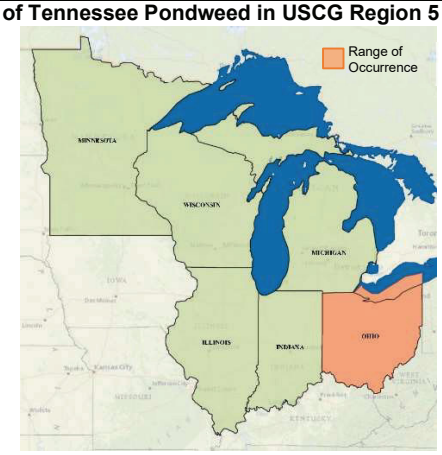
Scientific Name	*Potamogeton tennesseensis*	**Critical Habitat**	N/A

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)*

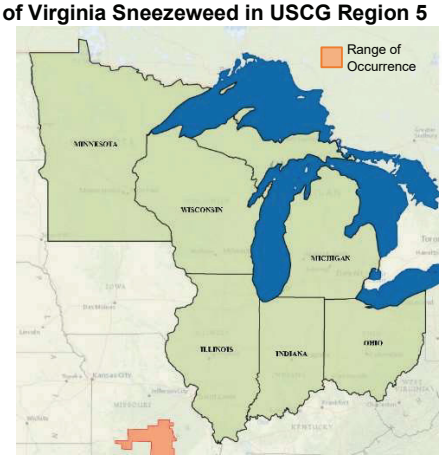
Virginia Sneezeweed	**Status**	**Threatened (1998)**	63 FR 59239
Scientific Name	*Helenium virginicum*	**Critical Habitat**	N/A

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

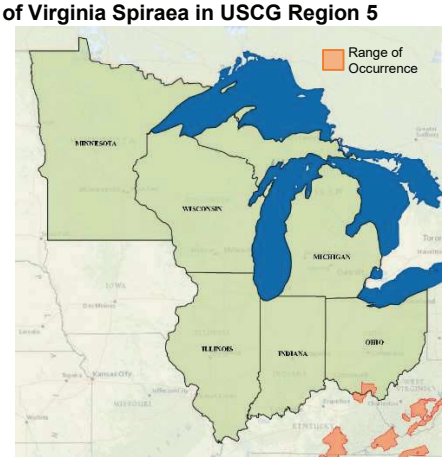
Scientific Name	*Spiraea virginiana*	**Critical Habitat**	N/A

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

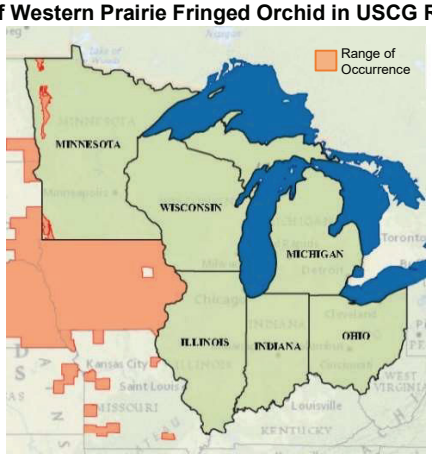
Scientific Name	*Platanthera praeclara*	**Critical Habitat**	N/A

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

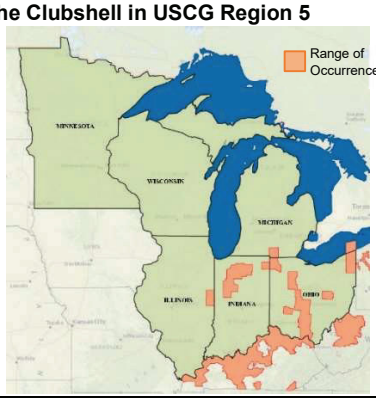
Scientific Name	*Pleurobema clava*	**Critical Habitat**	N/A

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*

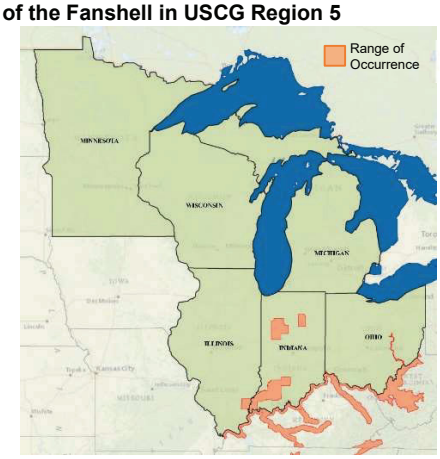
Fanshell	**Status**	**Endangered (1990)**	55 FR 25591
Scientific Name	*Cyprogenia stegaria*	**Critical Habitat**	N/A

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

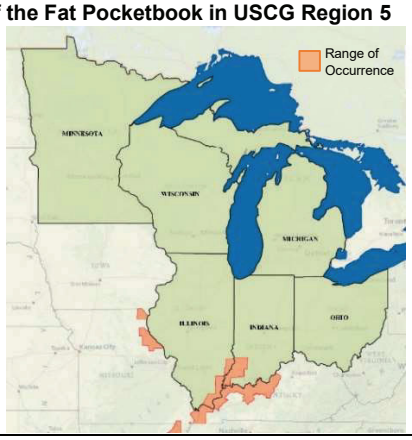
Scientific Name	*Potamilus capax*	**Critical Habitat**	N/A

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

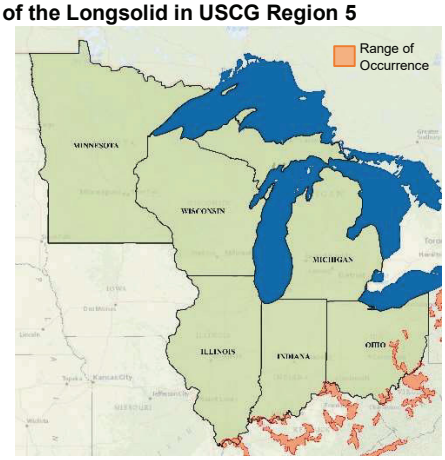
Scientific Name	*Fusconaia subrotunda*	**Critical Habitat**	N/A

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

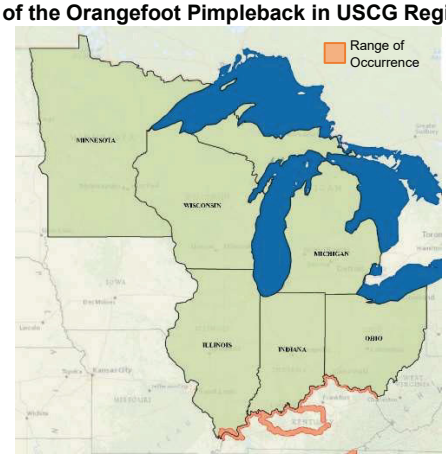
Scientific Name	*Plethobasus cooperianus*	**Critical Habitat**	N/A

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

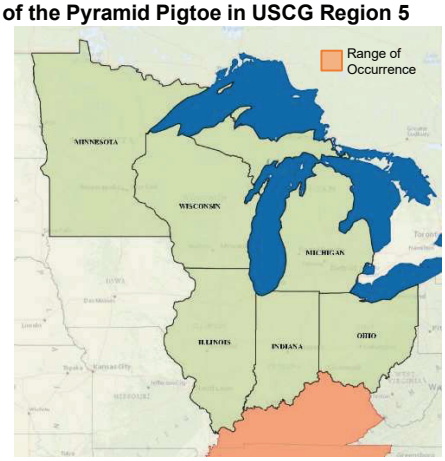
Scientific Name	*Pleurobema rubrum*	**Critical Habitat**	N/A

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

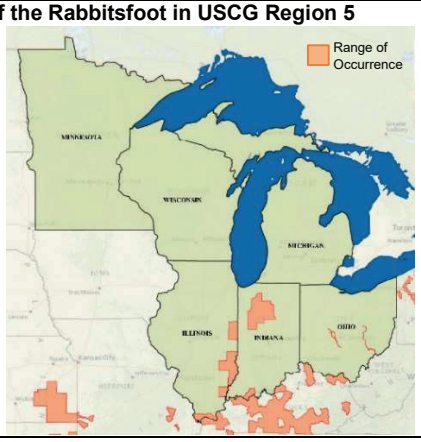
Scientific Name	*Quadrula cylindrica cylindrica*	**Critical Habitat**	80 FR 24692

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

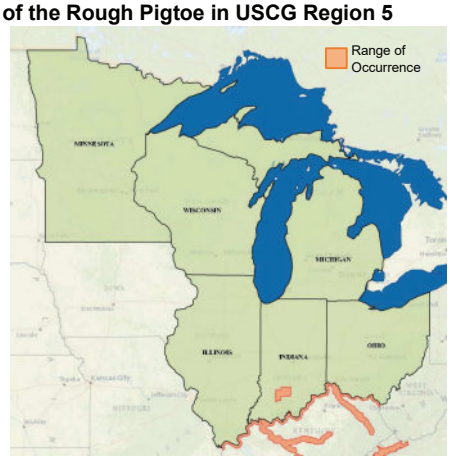
Scientific Name	*Pleurobema plenum*	**Critical Habitat**	N/A

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

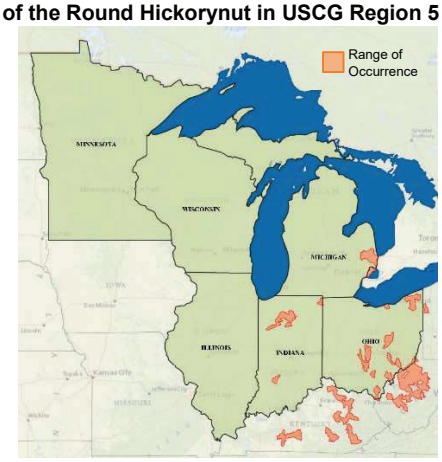
Scientific Name	*Obovaria subrotunda*	**Critical Habitat**	N/A

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

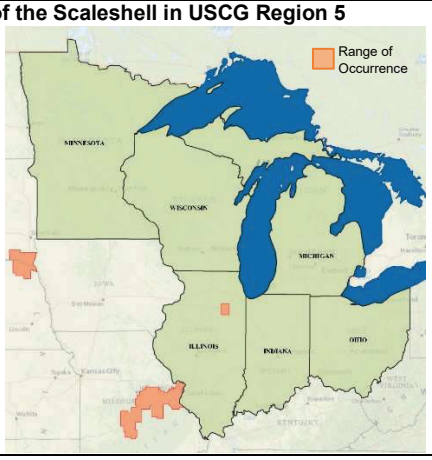
Scientific Name	*Leptodea leptodon*	**Critical Habitat**	N/A

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

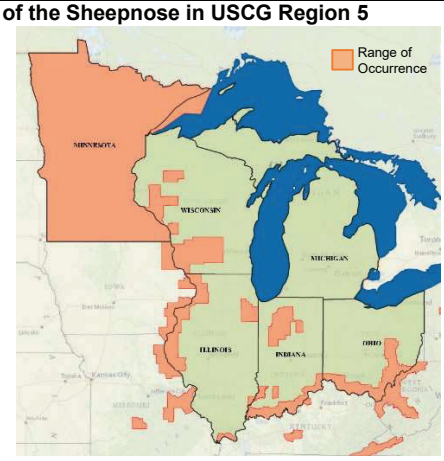
Scientific Name	*Plethobasus cyphyus*	**Critical Habitat**	N/A

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

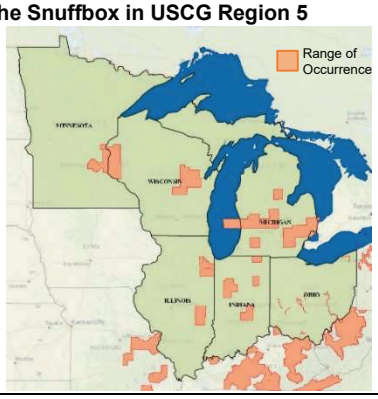
Scientific Name	*Epioblasma triquetra*	**Critical Habitat**	N/A

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

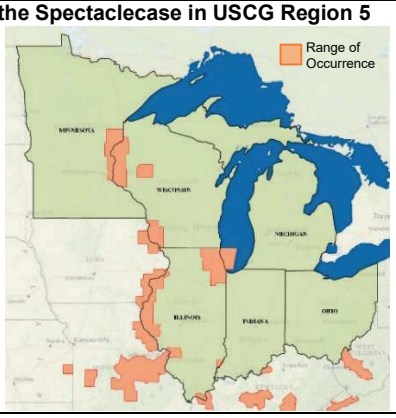
Scientific Name	*Cumberlandia monodonta*	**Critical Habitat**	N/A

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 (*Amplolites 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

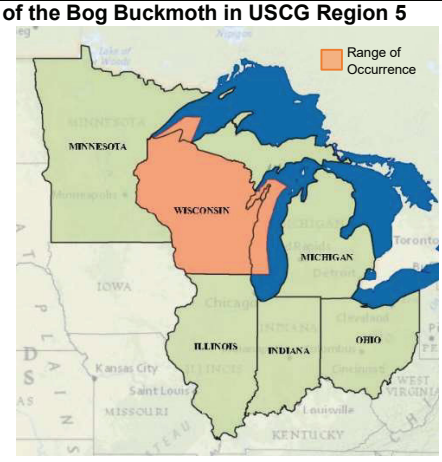
Scientific Name	*Hemileuca sp.*	**Critical Habitat**	N/A

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**	

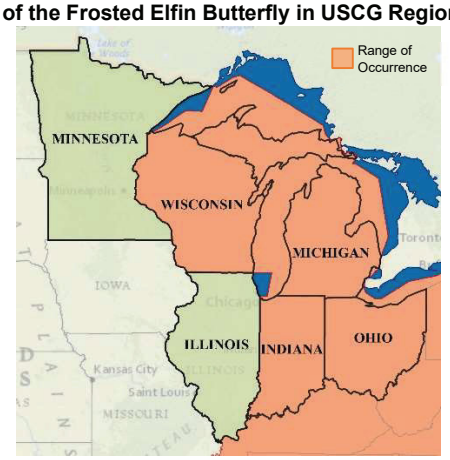
Scientific Name	*Callophrys irus*	**Critical Habitat**	N/A

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

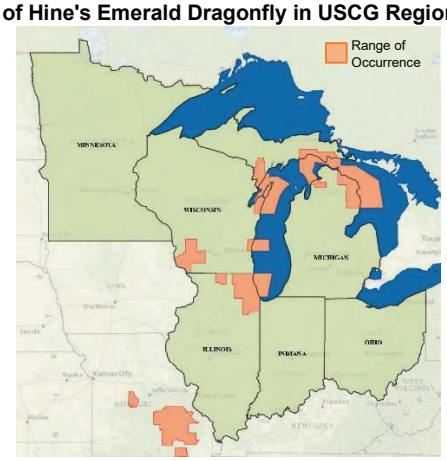
Scientific Name	*Somatochlora hineana*	**Critical Habitat**	72 FR 51102, 75 FR 21394

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 *Somatachlora* 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

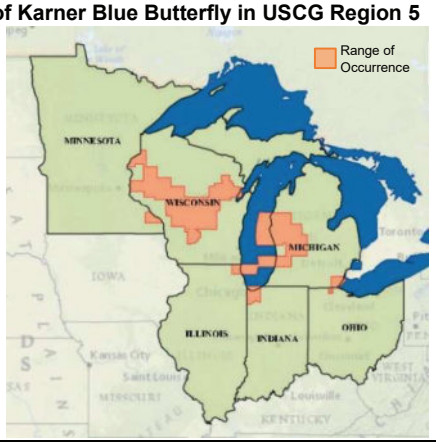
Scientific Name	*Lycaeides melissa samuelis*	**Critical Habitat**	N/A

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

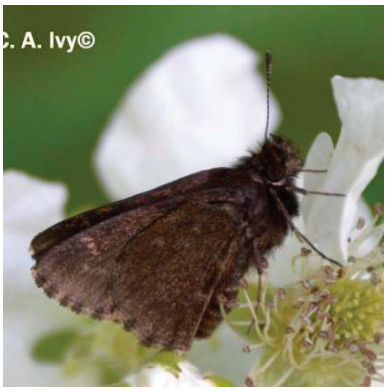


Photo: C.A. Ivy via butterfliesandmoths.org

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

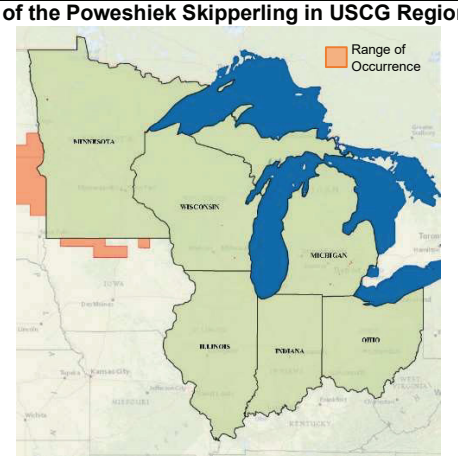
Scientific Name	*Oarisma poweshiek*	**Critical Habitat**	80 FR 59247

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

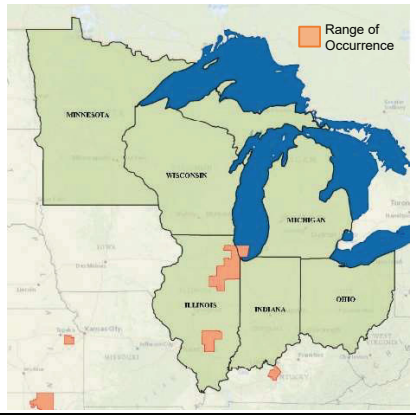
Scientific Name	*Papaipema eryngii*	**Critical Habitat**	N/A

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

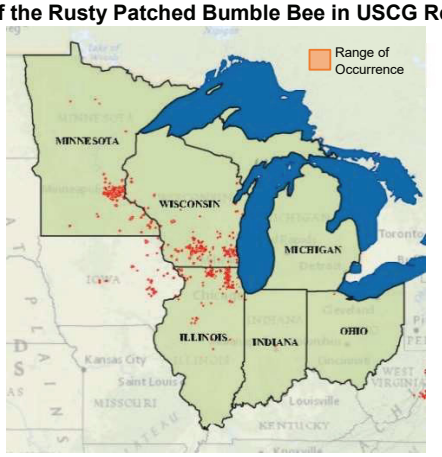
Scientific Name	*Bombus affinis*	**Critical Habitat**	N/A

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

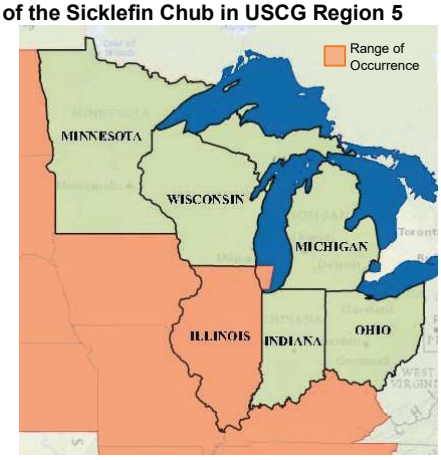
Scientific Name	*Macrhybopsis meeki*	**Critical Habitat**	N/A

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*

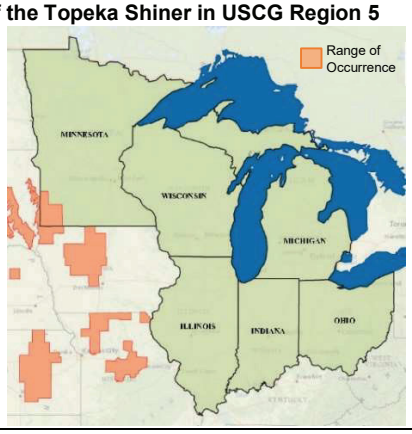
Topeka Shiner	**Status**	**Endangered (1998)**	63 FR 69008
Scientific Name	*Notropis topeka*	**Critical Habitat**	69 FR 44736

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, 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

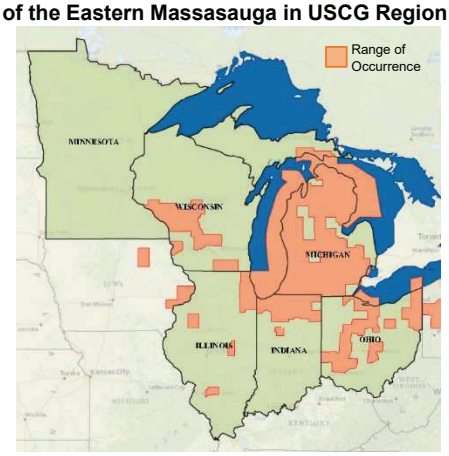
Scientific Name	*Sistrurus catenatus*	**Critical Habitat**	N/A

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

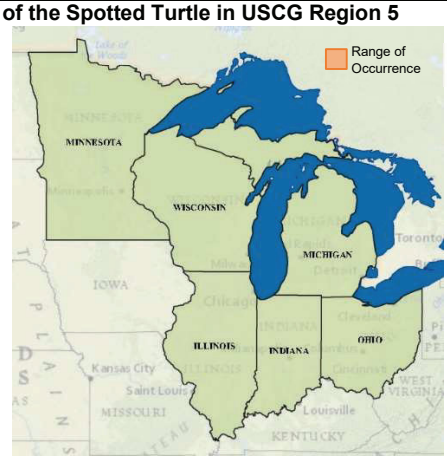
Scientific Name	*Clemmys guttata*	**Critical Habitat**	N/A

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

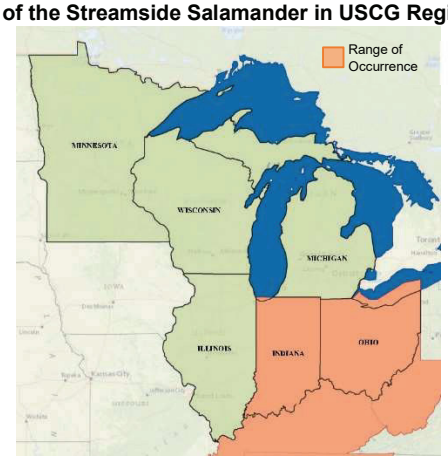
Scientific Name	*Ambystoma barbouri*	**Critical Habitat**	N/A

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

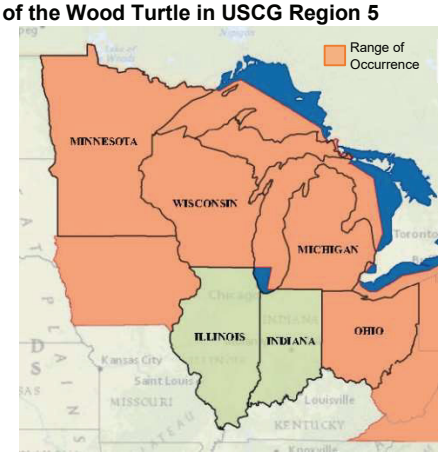
Scientific Name	*Glyptemys insculpta*	**Critical Habitat**	N/A

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

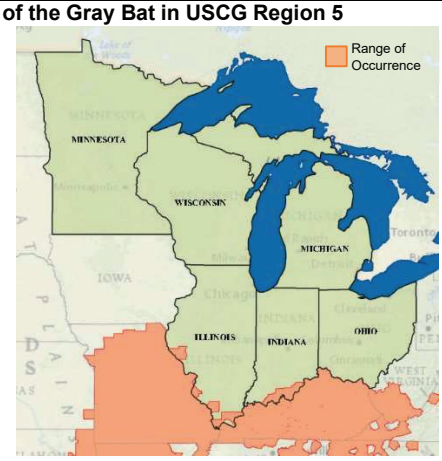
Scientific Name	*Myotis grisescens*	**Critical Habitat**	N/A

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

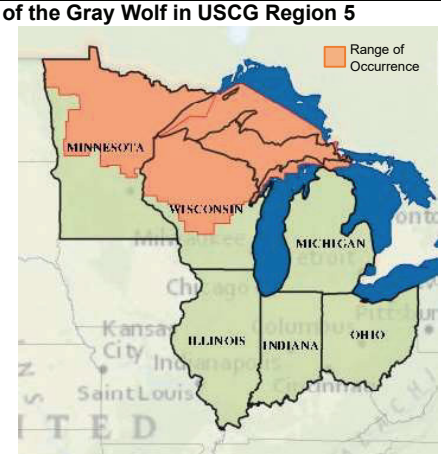
Scientific Name	*Canis lupus*	**Critical Habitat**	N/A

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*

Indiana Bat	**Status**	**Endangered (1967)**	32 FR 4001

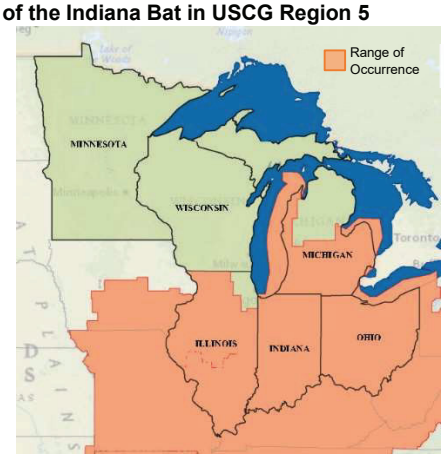
Scientific Name	*Myotis sodalis*	**Critical Habitat**	41 FR 41914

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	

Additional References:

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

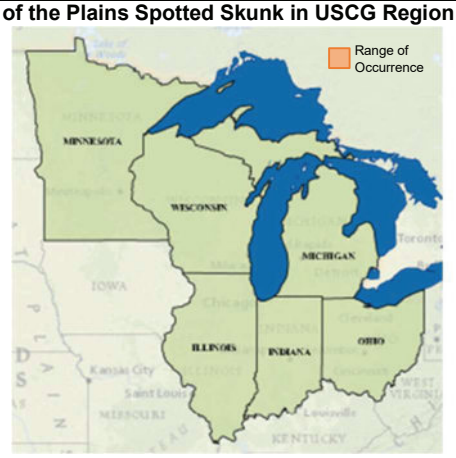
Scientific Name	*Spilogale putorius interrupta*	**Critical Habitat**	N/A

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

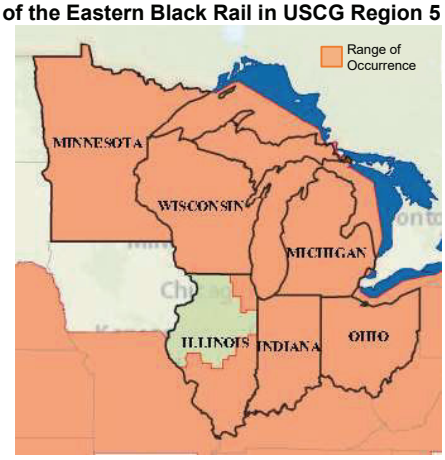
Eastern Black Rail	**Status**	**Threatened (2020)**	85 FR 63764
Scientific Name	*Laterallus jamaicensis ssp. jamaicensis*	**Critical Habitat**	N/A

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

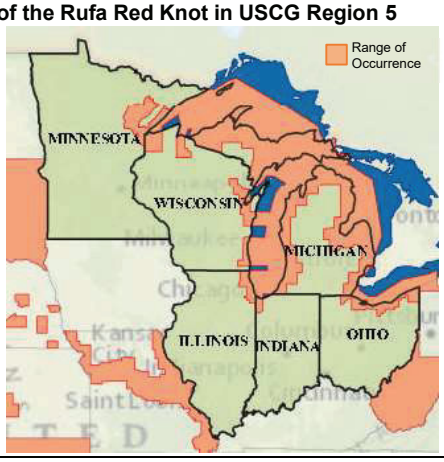
Scientific Name	*Calidris canutus rufa*	**Critical Habitat**	N/A

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

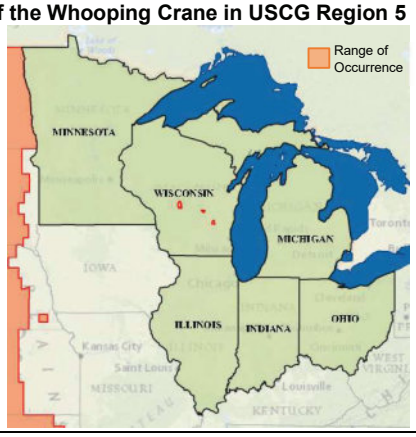
Scientific Name	*Grus americana*	**Critical Habitat**	43 FR 20938

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*

Section 5.0

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":

- Exposure: 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."

- Response: 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."

- Risk: 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:

- Deflection and Containment: Booming
- Recovery Activities: Skimming, Vacuuming, and Sorbents
- Removal/Cleanup Activities: 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
- Locating, Tracking, and Support Activities: Deployment of buoys
- Waste Management Activities: 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