





**Appendix C-1. Region 5 Response Action Matrix - Deflection and Containment - Version: August 5, 2022 (EnviroScience)**

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column 1) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Deflection and containment Activities</b>										
<b>Booming</b>	<p>A boom specifically designed for pollution response is a floating, physical barrier, placed on the water to contain, divert, deflect, or exclude oil. 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 boom to prevent oil from reaching sensitive areas. Booms must be properly deployed and maintained (including removing accumulated debris), and re-adjusted to changing water flow directions, water levels, and wave conditions. Proper deployment involves use of mooring systems (e.g., anchors, land lines) and skilled teams. Tidal-seal boom is a special type of boom designed to be deployed in the intertidal zone (NOAA, 2010). Boom has four basic components: flotation, skirt, tension members, and ballast. Freeboard and draft are the portions of a boom's flotation and skirt above and below the waterline, respectively.</p> <p>In terms of quantity, regulations require vessel and facility response plan holders to have a specific amount of boom available for shoreline protection purposes for maximum most probable and worst case discharges. EPA, USCG and BSEE regulations vary. For example, for skimming operations covered by USCG OSRO guidelines, there are typically 300' of boom deployed per skimming system (USCG, 2016). The minimum boom properties include: 1) nearshore/offshore: boom height (draft plus freeboard) ≥ 42" for containment, capable of withstanding 6' waves; boom height ≥ 18" for shoreline protection; 2) rivers and canals: boom height 6-18", capable of operating in 1' wave heights; 3) inland: boom height 18-42", capable of operating in 3' wave heights; 4) Great Lakes: boom height 18-42", capable of operating in 4' wave heights (USCG, 2016).</p>	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Uplands		Bog Calcareous Fen Deep Marsh Annuals/Perennials/Shrub Open Water Rooted Floating Aquatics Shallow Marsh Annuals/Perennials/Shrub Submersed Vegetation	Less effective in rough water. Less effective in high winds. Less effective in fast currents.  Weather affects booming (e.g., booms begin to fail by entrainment when the effective current or towing speed exceeds 0.7 knots perpendicular to the boom). Waves, wind, debris, and ice contribute to boom failure (NOAA, 2010).	What type of boom will be used? (There are four basic types - internal foam flotation, self-inflating, pressure-inflatable, fence.) (Exxon Mobil, 2014). Will the boom be anchored, and if so, what is the anchoring system include? Where will the boom be anchored? How is the boom being used, i.e., for containment, deflection, or protection? How long is boom left in place? Where is oil-contaminated boom disposed of? What machinery (vessels, trucks, etc.) are used to recover boom? What size is the boom? Why might the boom fail? (There are 5 basic types of boom failure: entrainment, drainage, splash over, submergence, planning. Exxon Mobil, 2014.) Is there netting or skirting and what is the size and material? *Note: Sorbent boom is discussed separately below.	Use of Vehicles Use of Vessels Use of Machinery Access by foot Use of Staging Areas Skimming Sorbents Decontamination Demobilization Waste Handling and Storage	Securing/Deploying/ Removing boom - uses anchors, anchor chain and lines, shoreline structures.  Presence of boom and aggregation of oil.	Wildlife disturbance by presence of people and boom; crushing; destruction of benthic habitat/ organisms by anchors or anchor chain; entanglement in lines.  Exposure of perching birds or mammals to oiled boom; effects on wading and surface wildlife due to aggregation of oil; risk of entanglement.	Plants, small mammals, insects, wading birds, nesting birds, fish, molluscs, reptiles, and amphibians could all be affected by Booming activities.
<b>Dikes or berms</b>	A dike or berm is constructed along the upper intertidal zone to prevent incoming tides from depositing oil onto back-shore areas. (Exxon Mobil, 2014). Motor graders can be used to build the dikes or berms if the beach can sustain motor traffic well. If the beach cannot sustain motor traffic well, front-end loaders or bulldozers can be used (Exxon Mobil, 2014). Typically disturbs upper 2 ft of beach sediments (Exxon Mobil, 2014).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Only constructed along the upper intertidal zone.	What types of equipment will be used to build the dikes or berms? (Motor graders, if beach can sustain motor traffic well.) What are digging and building and access ramifications?	Use of vehicles Use of machinery associated w/ constructing / disassembly Access by foot	Construction/ Deconstruction; presence of the dike/berm.	Crushing, noise, habitat disturbance; loss of access to essential resources (e.g., food, refuge, nesting area).	Small coastal land animals, coastal plants, birds that forage in or nest near shorelines and beaches; invertebrates; and fish would most likely be affected by habitat disturbance and loss of access to essential resources.
<b>Construction barriers, dams, pits, and trenches</b>	Land based tactic, with the objective of containing spilled oil and limiting spreading of oil slicks when the oil threatens sensitive habitats and other barrier options (e.g., boom, skimmers, less invasive barriers, etc.) are not feasible (NOAA, 2010). A physical barrier (other than a boom) is placed across an area to prevent oil from passing. Barriers can consist of earthen berms, trenching, or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used (NOAA, 2010). These physical barriers are typically used in conjunction with skimming or other recovery techniques (e.g., sorbents, vacuuming). Alaska Clean Seas (2010), ADEC's STAR Manual (Nuka Research, 2006) provide in-depth descriptions of these response actions. (Windward LLC, 2014).	Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used at the mouths of creeks or streams (to prevent oil from entering or being released from a certain location) (NOAA, 2010).	Are permits required for the construction of dike, berm, or dam? Where will disposal of construction material take place? What tools are being used to construct the barriers or dams (soil, gravel, sand, dump truck, equipment operator, front-end loader, excavator, hand tools, and shovels)?	Use of machinery Skimming Vacuuming (when applicable) Waste handling and storage Access by foot	Manual construction/ deconstruction using heavy equipment, and placement of components (i.e., sandbags).  Personnel activity associated with construction (WindWard LLC, 2014).	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil); loss of aquatic organisms (if in streams, wetlands, or intertidal areas); wildlife disturbance (noise, trampling); restriction of wildlife access to resources (WindWard LLC, 2014). Note: Obstruction to movement applies to both the listed species themselves as well as predators and prey (which could lead to indirect effects to listed species).	Small coastal land animals, coastal plants, birds that forage in or nest near water, invertebrates (aquatic and terrestrial), fish, reptiles and amphibians may be affected.
<b>Culvert blocking</b>	A culvert is a drain or a pipe that allows water to flow under a road or railroad (Merriam-Webster, 2017 web). Open culverts present a potential route for spilled oil to enter otherwise unaffected areas (WindWard LLC, 2014). Culvert blocking typically involves placing a physical barrier across the opening.	Rivers and Streams		Beach and Sand Bar Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Submersed Vegetation	Land based tactic.	What are current water levels? Will the culvert be blocked with a temporary or permanent fixture (plywood, plug, plastic sheeting, sandbags)? Will deflection booming be used to block the culvert? (WindWard LLC, 2014) Is there a particular size of culvert which this is useful or when should you move to making a dam, for example? Is there a potential for water chemistry to change as a result of the culvert being blocked (indirect effects)?	Use of Machinery, New Access Points ( <i>applicable when added as a response tool</i> ) Access points and staging areas Access by foot	Construction, placement of barrier, replumbing of outlet (WindWard LLC, 2014).	Wildlife habitat disturbance, alteration of stream hydrology, obstruction to migration or general movement (WindWard LLC, 2014). Note: Obstruction to movement applies to both the listed species themselves as well as predators and prey (which could lead to indirect effects to listed species).	Species potentially affected include fish, insects, aquatic invertebrates, plants, amphibians, reptiles, and small land animals.

**Appendix C-2. Region 5 Response Action Matrix - Recovery Activities - Version: August 5, 2022 (EnviroScience)**

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Recovery Activities</b>										
<b>Skimming</b>	Skimmers are mechanical devices that physically remove the free or contained oil from the surface of the water. There are many different types of skimmers but they can be grouped into four categories based on oil recovery principles (Exxon Mobil, 2014). The main types (with examples) are 1) weir (Simple, self-leveling, integral screw auger, advancing and boom/weir systems); 2) hydrodynamic (water jet, submersion plane/belt, and rotating vane); 3) oleophilic (drum, disc, rope mop, sorbent lifting belt, and brush); and 4) other (paddle belt, trawl/boom skimmers) (Exxon Mobil, 2014). They are placed at the oil/water interface to recover, or skim, oil from the water's surface and may be operated independently from shore, be mounted on vessels, or be completely self-propelled (NOAA, 2010). Exxon-Mobil (2014) also rated the expected performance of 15 generic types of skimmers according to 12 performance criteria (p. 9-4), which helps responders determine the most effective type during a spill and provides a detailed description of 15 types of skimmers.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Shallow Marsh Vegetation Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather impacts skimming; generally less effective in rough water (waves beyond 2-3 ft in height) and strong currents. Rising wind and waves, debris, seaweed, kelp, and ice will reduce efficiency. Skimmers can be used in all water depths. Skimming vessels are slow moving, aimed at surface water, and typically deployed in areas where the floating oil is aggregated, either naturally or by other response activities.	What type of skimmer and ancillary support/storage capabilities are needed? Availability/size/quantity/mobility of storage devices for recovered oil? Does the discharged product present a hazard to people operating equipment? Access for support equipment (e.g., power, pumps, storage bladders, hydraulic power units, vessels)? How many vessels will be used during skimming (e.g., booming, towing)? What is the size of the vessels? What is the operational speed of the vessels? Traffic to and from skimming sites could cause harm. What type of skimmer is used (based on water depth and product type)? Where/how will skimmed oil be disposed of? Is boom utilized for skimming operations? What are the operating requirements for the skimmer (e.g., duration, frequency)? Is it an area where boats normally transit? How will the skimmer be transported to the site (vessel, vehicle, foot)?	Booming Dikes or Berms Construction Barriers, Dams, Pits, and Trenches Culvert Blocking Vacuuming Use of vessels Use of vehicles Waste handling and storage	Operation of skimmer  Shore-Based: Stationary.  Open Water: Mobile (in transit).	Wildlife disturbance (Noise), entrapment in skimmer system.	Species potentially affected include food resources (e.g.: plankton), larval fish, invertebrates, juvenile turtles, birds, and plants smaller than 3" and at the water surface.
<b>Vacuuuming</b>	A vacuum unit attached via a hose to a truck, mounted on vessels for water-based operations, or hand-carried to remote sites; used to remove oil accumulations on water in the absence of skimmers and to recover oil pooled against a shoreline, concentrated in trenches, trapped in vegetation or pooled in natural depressions on all shoreline types (except where inaccessible). Unsafe for recovery of gasoline. Primary equipment includes a vacuum unit with a 2-3 inch suction hose and skimming head. Suction rates vary depending on the equipment, but be 50-100 gallons per minute for pooled oil and 25-50 gallons per minute for oil on water. Supporting equipment may include boom, low-pressure water hoses, leaf blowers/air movers. Typically requires shoreline access or road access for heavy equipment, barge or landing craft. Support personnel include 1 worker per suction hose, 1-2 workers for containing/herding the oil and 1 foreman for every 10 workers (Exxon Mobil, 2014). The equipment can range from small, portable units that can fill 55 gallon drums to large supersuckers that can be mounted to a truck or vessel, and can generate enough suction to lift large rocks (NOAA, 2010). Depending on the thickness of the slick, a mixture of oil and water enters the collection chamber; positioning of the intake end of the hose is critical to minimize the amount of water collected.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sandbar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Typically requires shoreline access points, but can be used in any accessible habitat type. Less effective in areas with waves and tidal energy.	Where will the vacuuming take place (shore-based or in open water)? How will the vacuuming equipment be transported to the site? Will decanting take place (via permit)? What supporting equipment (boom, water hoses, leaf blowers, etc.) will also be used? What type of vacuum and ancillary support/storage capabilities are needed (e.g., vac truck, other pumps, portable vacuum)? Availability/size/quantity/mobility of storage devices for recovered oil? What support equipment is needed? Access for support equipment (e.g., power, storage bladders, vessels)? What is the size of the vessels? What is the operational speed of the vessel? Traffic to and from vacuuming sites could cause harm. Where/how will vacuumed oil be disposed of? Is boom utilized for vacuuming operations? What are the operating requirements for the vacuum (e.g., duration, frequency)?	Booming Construction Barriers, Dams, Pits, and Trenches Culvert Blocking Use of Vessels Use of Vehicles Use of Skimmers Access by foot traffic	Operation of vacuum.	Entrapment, habitat and wildlife disturbance (noise).	Species potentially affected include entrainment of plankton, larval fish, small fish, juvenile turtles, invertebrates, plants, nesting/foraging birds, and small mammals

**Appendix C-2. Region 5 Response Action Matrix - Recovery Activities - Version: August 5, 2022 (EnviroScience)**

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Recovery Activities</b>										
<b>Sorbents</b>	<p>Sorbents are used when oil is free floating or stranded on shore or as a secondary treatment method after gross oil removal or in sensitive habitats where access is restricted. Sorbents can recover small amounts of oil through absorption (the penetration of oil into the sorbent material) and/or adsorption (the adherence of oil onto the surface of sorbent material). To enhance recovery, most sorbents are both oleophilic (attract oil) and hydrophobic (repel water) (Exxon Mobil, 2014). Sorbents are defined in the National Oil and Hazardous Substance Contingency Plan (40 CFR 300 series). Sorbents that have been reviewed by EPA and meet the regulatory definition of a sorbent in Subpart J should have an official letter from the EPA to be shared with the federal On Scene Coordinator. The composition of sorbents can include synthetic, organic, and inorganic materials. Synthetic materials include polyethylene/polyurethane foams and pads, and polypropylene fabric - which are generally the most effective, can absorb up to 25 times their weight, and available in many forms such as rolls, sheets, blankets, pom-poms, and loose (Exxon Mobil, 2014, p. 10-5). Organic sorbents are made biodegradable materials such as straw, peat moss, sawdust, coconut fiber, chicken feathers, corn cobs, wool, and wood chips (Exxon Mobil, 2014). Sinking agents are prohibited per the NCP (40 CFR 300.910 (e)). Inorganic sorbents include materials such as perlite, glass wool, and volcanic rock (rarely used) and difficult to apply. (Exxon Mobil, 2014). Deployment/removal of sorbents is labor intensive and typically done by hand by personnel in light motor vehicle or shallow water craft.</p> <p>Most disposal involves placing the sorbents into a plastic bag for disposal. Sorbents may be reused (by extracting adsorbed liquids) and can help to suppress waves and prevent splash over. Types of adsorbents include: 1) Type I - (roll, film, sheet, pad, blanket, web) - a material with length and width much greater than thickness and has both linear form and strength sufficient to be handled either saturated or unsaturated; 2) Type II - (loose) - an unconsolidated, particulate material without sufficient form and strength to be handled except with scoops and similar equipment; 3) Type III - (enclosed) - III(a), pillows - adsorbent material contained by an outer fabric or netting which has permeability to oil, but with small openings to substantially retain the sorbent material within the fabric or netting; III(b), adsorbent booms - adsorbent material contained by an outer fabric or netting which has permeability to or is permeable to oil but with small openings to substantially retain the sorbent material within the fabric or netting. The lengthwise dimension substantially exceeds other dimensions and with strength members running parallel with length. Booms are also provided with connections for coupling adsorbent booms together; 4) Type IV - agglomeration unit - an assemblage of strands, open netting, or other physical forms giving an open structure that minimally impedes the intrusion into itself of high viscosity oils. Normally for use with viscous oils, typically above 10 000 cP viscosity. Said oils are then held in this structure permitting the composite oil/structure to be handled (pompoms) (ASTM, 2012).</p> <p>Additional info on usage: Ex- 1) Adsorbent booms - some have ballasted skirts and a flotation core; typically are most effective on thin films of oil; may need to be rotated or tended; 2) Pads - available in various shapes/colors. They can be placed in confined areas to collect small quantities of oil (left for several hours); 3) Pillows - can be easily handled and placed in confined areas; 4) Pom-poms - can be strung together on a rope as a snare boom; most effective on viscous or weathered oil; can be used on-shore or in the water; can be used as a composite barrier inside a containment boom to limit the escape of oil; 5) Rolls - continuous sheet of sorbent material; can be used as a lining or for protection of walkways, boat decks, etc. 6) Sweeps - long sheets of sorbent material, reinforced with rope and stitching; 7) Loose fill/particulate - not recommended for use on water; mainly used to stabilize stranded oil in remote locations (Exxon Mobil, 2014).</p>	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sandbar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather impacts sorbent use; lightweight sorbents can be blown off the surface in windy conditions. Wave and tidal energy affect efficacy as well as the oil type and stickiness (NOAA, 2010).	Is there enough oil product to present to be absorbed? What kind of sorbent is applied and how buoyant is it? How is it being tended (based on saturation)? How often? Have dispersants been applied? (Dispersant use typically prevents oil from sticking to a sorbent's surface.) How will sorbents be disposed? Minimum size/diameter of sorbent material used. Will placement or use of sorbent booms create concentrations of oil that could lead to additional exposure? Are sorbents being used as a first response tool? Note: Sorbents should be removed from the environment after use.	Use of Vessels Use of Vehicles Booming Disposal Decontamination Access by foot traffic	Placement of Sorbents in water or on land.  Tending sorbents - improper tending can lead to sorbent material breaking down (NOAA, 2010).	Secondary Ingestion or Coating.  Disturbance of habitat; high traffic, frequent trips to site. Direct contact: Crushing or smothering. Exposure route disturbance (noise); exposure from personnel moving around (product placement).	Species potentially affected include small land animals, birds, nesting/juvenile turtles on beach, plants, and freshwater mussels.

Appendix C-3. Region 5 Response Action Matrix - Removal/Cleanup Activities Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Removal/cleanup Activities</b>										
<b>Flooding</b>	The washing of oil stranded on land to the water's edge for collection via the use of a perforated header pipe or hose and ambient water pumped at low or high pressure. The oil is typically contained by booms and recovered via a skimmer or other equipment. Best used in heavily oiled areas when the oil is still fluid and only loosely adheres to the substrate, or where oil has penetrated into gravel sediments (NOAA, 2010).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Applicable on all shoreline types where equipment can be effectively deployed. However, not recommended for steep intertidal or shorelines with fine grains or muddy substrates.	What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? What is being used to collect the freed oil? How many personnel are required at the site? How will the site be accessed (vehicle, shallow craft, barge)? Describe the method or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system (by fire hose or header pipe)). Are there concerns with introduction of invasive species from the source of the water and impacts to local species? Will the use of flooding increase turbidity in the area?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Access by foot traffic Use of Vehicles Staging	Flooding operation. Re-mobilization (or refloating) of the oil to facilitate collection.	Sediment loss, erosion of the shoreline and shallow rooted vegetation, physical removal of organisms (by water pressure), smothered by sediments washed down the slope, high temperature water could harm (or kill) organisms, noise. Short Term: Oiled sediment may be transported to nearshore and down coast areas, contaminating them and burying benthic organisms (NOAA, 2010). Ingestion of transported oil. Direct contact with or ingestion of transported oil.	Species potentially affected by the use of Flooding include invertebrates, nearshore aquatic organisms, aquatic vegetation, amphibians, plants, nesting/wading/foraging birds, mammals, turtles, and fish.
<b>Flushing</b>	To remove fluid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation via ambient water temperature sprayed at low pressures, usually from hand-held hoses. Typically recovered by skimmers, vacuum or sorbents and used with a flooding system to prevent released oil from moving downstream (NOAA, 2010). Higher temperatures may be used to mobilize oil when appropriate for the area.	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Low-pressure flushing is best used on substrates, riprap, and solid, man-made structures, where the oil is still fluid, and in wetlands and along vegetated banks where oil is trapped in vegetation (NOAA, 2010).  High-pressure flushing is typically used on bedrock, man-made structures, and gravel substrates when low-pressure flushing is not effective. Not normally used in rich, intertidal areas or where algae is present (NOAA, 2010).	What is being used to collect the freed oil? What temperature water will be used? How many personnel are required at the site? How will the site be accessed (vehicle, shallow craft, barge)? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Describe the method or procedures for flooding (i.e., flow rates, temperature, volume, chemicals, delivery system (by fire hose or header pipe)). Are there concerns with introduction of invasive species from the source of the water and impacts to local species? Will the use of flushing increase turbidity in the area?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Access by foot traffic Staging	Operation of flushing unit.  Re-mobilization (or refloating) of the oil to facilitate collection.	If containment methods are not sufficient, oil and oiled sediments may be flushed into adjacent areas. May cause sediment loss, erosion of shoreline and shallow rooted vegetation. High pressure flushing may drive oil deeper into the substrate. May physically displace benthic organisms (NOAA, 2010). Thermal effects.  Direct contact with or ingestion of transported oil. Mobilized sediments may affect intertidal habitats/further oiling of adjacent areas (NOAA, 2010).	Species affected include invertebrates, fish, nearshore aquatic organisms, submerged aquatic vegetation, amphibians, plants, fish, mammals, and birds.
<b>Steam cleaning</b>	Steam or very hot water (171 deg F to 212 deg F) is sprayed with hand-held wands at high pressure (2,000 psi) to remove heavy residual oil from solid substrates or man-made structures (NOAA, 2010). Typically used when heavy oil residue must be removed for aesthetic reasons, hot water flushing is not effective, and few or little to no living resources are present (NOAA, 2010). (Higher temperatures and higher pressures may be used to mobilize oil where environmental conditions allow.)	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used on solid substrates or man-made structures.	What is used to collect the oil in conjunction with the steam cleaning operation? How will personnel access the area? How many personnel are involved (typically 2 operators per unit)? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Where is the hot water going?	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Access by Foot traffic Staging	Spraying.  Re-mobilization (or refloating) of oil to facilitate collection.	Direct contact of hot water/steam at high pressure; noise; thermal effects. If containment methods are not sufficient, oil and oiled sediments may be flushed into adjacent areas. Direct contact and ingestion of re-mobilized oil. Mobilized sediments may affect intertidal habitats/further oiling of adjacent areas (NOAA, 2010).	Species affected include invertebrates, nearshore aquatic organisms, submerged aquatic vegetation, mammals, turtles, birds, fish, amphibians, and plants.
<b>Sandblasting</b>	Removal of heavy residual oil from solid substrates or man-made structures via sand moving at high velocity. May also be used to establish an exclusion zone. (Exxon Mobil, 2014). Utilized when heavy oil residue must be cleaned (typically for aesthetic reasons), and steam-cleaning is not effective (NOAA, 2010).	Shoreline Ports, Canals, Industrial Areas Coastal Zone Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used on solid or man-made structures. This is a tool that needs to be used on dry land, and not over water.	Do operations involve a sand supply truck and/or front end loader? What materials are being used to cover the ground? What type of substrate is it being used on? What ancillary equipment is being used (i.e., pump, hoses, trucks)? Are you sure there are no other suitable methods? Issues of potential erosion, scouring, pushing oil deeper into crevices, etc.? How is sandblasted material collected/recovered? Will oil be flushed into adjacent areas? Do you anticipate using a medium other than sand? (If so, seek emergency consultation).	Booming Skimming Sorbents Flushing Disposal Decontamination Waste Handling and Storage Use of Vessels Use of Vehicles Staging Access by foot traffic New Access Points	Sandblasting Operations.	Destruction of organisms and habitat in sandblasting zone (direct contact); oil may be channeled to a recovery area downstream (NOAA, 2010, Exxon Mobil, 2014). Noise. Ingestion of re-mobilized oil. Unrecovered used sand (adds sand to the environment), could cause deeper oil penetration.	Species affected include birds, mammals, reptiles and amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans

Appendix C-3. Region 5 Response Action Matrix - Removal/Cleanup Activities Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>Mechanical (non-chemical) sand cleaning (surface, &lt;1 inch)</b>	Different types of equipment can be used to promote evaporation and weathering or collecting oiled material off of a beach. Most of this type of activity involves a tractor or similar vehicle to pull the equipment or conduct the activity. Examples include: 1) Beach cleaner - Can be used on lightly oiled (tar balls or patties) sand or gravel beaches and is pulled by a tractor or self-propelled across a beach. Typically operates a 4 mph taking a skim cut 6 ft wide (Exxon Mobil, 2014). 2) Lightly oiled sediment mixing-discer - track-type tractor preferred with 8-12 ft wide discer. Tractor pulls discing equipment along an oiled area to promote evaporation and weathering by shoreline processes; typically used on lightly oiled, non-recreational sand and gravel beaches (Exxon Mobil, 2014). 3) Mechanical surface cleaner - elevating scraper - used to remove surface oil, tar balls, and patties on sand and gravel beaches (causes disturbance of upper sediments (<1 in) (Exxon Mobil, 2014).	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Typically used in sand, gravel, cobble, or mud flats (Exxon Mobil, 2014). Used where surface sediments are amenable to, and accessible by, heavy equipment; should remove sediments only to the depth of oil penetration (NOAA, 2010).	What is the degree of oiling? What equipment will be used? What is the substrate type? Is there access to the beach for heavy equipment, or can access be constructed? Is the oil in form of tar balls? Can oil remain on the beach or in the area without causing problems? Will mixing the sediments expose subsurface organisms to undue hazards? Will tide cycles affect re-worked sediments? Can rubber-tired and/or track vehicle equipment operate on the beach? If tilling/discing sediments, how deep will equipment penetrate?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel	Working sand/sediment.	Habitat and/or wildlife disturbance or loss from noise, crushing, presence of people; Can distribute the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to PAHs if contaminated sediments are moved deeper into the beach).	Species affected include birds, mammals, reptiles , amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans
<b>Mechanical (non-chemical) sand cleaning and excavation (&gt;1 inch)</b>	There is mechanical equipment available to clean or remove sand/sediments that impacts > 1 inch deep (may go to 10 inches). Examples include: 1) Heavily Oiled Sediment Mixing-Tractor/Ripper - tractor fitted with a ripper or tines operated up and down the beach (so sediments remain and erosion is minimized to promote evaporation and weathering by shoreline processes 2) Bulldozer - pushes oiled substrate into the surf zone to accelerate natural cleaning while causing minimal erosion (Exxon Mobil, 2014). 3) Front-end loader - removes oiled material directly off beach and hauls it to a loading area.	Shoreline	Margins of: Rivers and Streams Bays and Estuaries Ponds and Lakes	Beach and Sand Bar Mudflats Rooted Floating Aquatics	Typically used in sand, gravel, cobble, or mud flats (Exxon Mobil, 2014). Used where surface sediments are amenable to, and accessible by, heavy equipment; should remove sediments only to the depth of oil penetration (NOAA, 2010).	What is the degree of oiling? What equipment will be used? What is the substrate type? Is there access to the beach for heavy equipment, or can access be constructed? Is the oil in form of tar balls? Can oil remain on the beach or in the area without causing problems? Will mixing the sediments expose subsurface organisms to undue hazards? Will tide cycles affect re-worked sediments? Can tracked equipment be used on beach? What is the risk of sediment loss to water bodies? What is the risk of additional erosion due to substrate disturbance? How deep into sediment will cleaner or excavator operate?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel	Working sand/sediment.	Habitat and/or wildlife disturbance or loss from noise, crushing, presence of people; Can distribute the contamination deeper into sediments and across the shoreline (including long-term, low-level exposure to PAHs if contaminated sediments are moved deeper into the beach).	Species affected include birds, mammals, reptiles , amphibians, invertebrates (insects) on the beach, plants, snails, and crustaceans
<b>Manual removal /Cleaning of oil, oiled sediment, debris, or vegetation</b>	Oiled sediment and debris are removed by hand, shovels, rakes, etc. Could also involve trailers or wheel barrows, debris boxes/bags, and ATVs with trailers. Typically used on mud, sand, gravel, and cobble when oiling is light, sporadic, and/or at or near the beach surface (stranded), or on beaches where there is little to no access for heavy equipment (Exxon Mobil, 2014).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Used on mud, sand, gravel, cobble when oil is light, sporadic, and/or at or near the beach surface, or when there is no beach access for heavy equipment (Exxon Mobil, 2014). Manual labor is highly impacted by weather conditions (e.g., heavy weather, thunderstorms, snow and ice, extreme temperatures).	Is area concentrated on one area of the beach? What is the degree of oiling? What is the substrate type? What is oiled and what methods of cleaning will be used? Can oil remain on beach without causing environmental problems? What equipment (non-mechanical) will be used to physically remove the oil/oiled material? How will the oiled material be collected/transported? How many workers will be needed? How will the site be accessed (i.e., foot traffic)? What logistical support will be necessary in order to support workers (e.g., facilities, utilities)? Will any additional ground cover be used for initially capturing oil?	Use of Vehicles Use of Vessels Use of Machinery Deterrence and Hazing Waste Handling and Storage Staging Mobilization/Demobilization of Personnel Access by foot traffic	Removal of oil/oiled material.	Disturbance from presence of people (noise, movement); trampling of small animals and vegetation; penetration of oil deeper into sediments.  Removal of sediment/wrack removal (note - only removed if oiled).	Species affected include birds, mammals, beach invertebrates (insects), plants, reptiles, crustaceans, snails, and freshwater mussels.

**Appendix C-4. Region 5 Response Action Matrix - Submerged Oil Activities - Version: August 5, 2022 (EnviroScience)**

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Submerged Oil Activities</b>										
<b>Detection of non-floating or submerged oil</b>	<p>"Non-floating oil" can be used to describe oils that have become either submerged or sunken. "Submerged oil" includes spilled oil that has neutral or near-neutral buoyancy and is below the water surface and in the water column. "Sunken oil" includes spilled oil that has negative buoyancy and sinks to the bottom of the water body. In some circumstances involving low current conditions, sunken oil in shallow waters may pool in depressions on the seabed or be moved along the seabed by prevailing currents. (RRT 10 Northwest Area Contingency Plan, 2016; API, 2016.)</p> <p>Examples of detection capabilities include: 1) Sonar systems - side-scan sonar, multi-beam echo sounder, sub-bottom profiler and 3D scanning sonar; 2) Underwater visualization systems - cameras and video; 3) Diver observations - with or without submersibles; 4) Towed or stationary sorbents - examples include sorbents attached to chains that are dragged on the bottom -typically 1' swath- and sorbents suspended in the water column or in cages; 5) Laser fluorosensors - a unit that is towed close to the bottom; 6) Visual observations by trained observers; 7) Bottom sampling - taking a sediment grab, core samplers, or wading-depth shovel pits; or 8) Water sampling in-situ analysis - flurometers and mass spectrometers are towed in the water column (USCG, 2016).</p>	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact detection.	What type of detection capability will be used? How deep is the water? What type of substrate is the bottom? What is the nature of the oil? Will dragging of sorbent material be used? Will sediment disturbance to occur?	Use of Vessels Use of Machinery/supporting equipment Access of Personnel via foot traffic	Use of people/ equipment in water column (to detect oil).	Sediment disturbance, Underwater sound (Sonar signals), strikes from equipment in the water.	Species affected include freshwater mussels, fish, reptiles, amphibians, aquatic plants, and birds.
<b>Recovery of non-floating or submerged oil</b>	<p>Due to a large range of densities and properties of non-floating oils, recovery operations will be unique to the type of event, location, and availability of equipment and logistical support. Non-floating oil recovery has been successful when there are low current speeds and wave conditions, the oil is pumpable, the water is relatively shallow, and the oil is concentrated in natural collection areas (RRT 10 Northwest Area Contingency Plan, 2016).</p> <p>Recovery techniques include: 1) Suction dredge - dredging through use of pumps to hydraulically remove and transport the oil; 2) Diver-directed pumping and vacuuming - pumping capabilities refer to the use of a centrifugal or positive displacement pump at or below the water surface with a diver-directed suction hose. Vacuuming refers to a vacuum truck or unit above the water surface/on a barge that creates a vacuum, with a diver-directed hose attached; 3) Mechanical removal - excavators, clamshell dredges, environmental dredge buckets or other machinery used to grab, scoop, or pick up the sunken oil/oiled debris/oiled sediment; 4) Sorbent and V-SORS - sorbents attached to chains that are dragged on the bottom to recover liquid oil; 5) Trawls and nets - towed in the water column or on the bottom to recover viscous oil; 6) Manual removal - physical removal of viscous oil using hand tools (by wading in shallow water or divers); 7) Agitation/refloat/poling - agitation of oil on the bottom to get the oil to float to the surface for recovery (USCG, 2016).</p>	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact removal. Surface conditions may impact effectiveness of removal equipment.	What type of recovery equipment will be used? How deep is the water? What type of substrate is the bottom? How deep does the submerged oil penetrate? How will the oil/sediments be contained; what type of equipment will be used? What is the nature of the oil? Will divers be used to assess the progress? Will vacuuming be used? Will dredging via clamshell or a surface-suction device be used? Will dragging of sorbent material be conducted? Will sediment disturbance to remove oil occur?	Use of Vessels Use of Machinery Creation of Staging Areas Waste Handling and Storage Vacuuming	Working sediment.	Physical removal of substrate/habitat and species and/or disturbance of the water column.	Species affected include freshwater mussels, snails, aquatic insects, submerged aquatic vegetation, fish, reptiles, amphibians, plants, and birds
<b>Containment of non-floating or submerged oil</b>	<p>Equipment and methods used to contain non-floating oil or reduce spreading on the bottom. Examples include: 1) Nets or curtains attached to the bottom and/or suspended from the surface; 2) Physical barriers such as artificial depressions (e.g., trenching); 3) Bottom boom; 4) Sheet piling; or 5) Sorbents in filter fences or cages (USCG, 2016).</p>	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Water depth; substrate type; water visibility; strong currents or waves may impact removal. Surface conditions may impact effectiveness of containment equipment.	What type of equipment will be used? How deep is the water? How deep does the submerged oil penetrate? What is the bottom substrate? What is the nature of the oil, i.e., will it refloat? Will divers be used to assess or aid in the process? Will sediment disturbance occur? How will containment/barrier structures be secured in place? How long will these structures be deployed? Will a bubble curtain be used to contain the oil?	Use of Vessels Use of Machinery Creation of Staging Areas Waste Handling and Storage	Containment of oily wastes below the surface.	Habitat disturbance from insertion of physical barriers or boom into sediment - crushing and turbidity, restriction of movement; direct contact with species (entanglement), noise.	Species affected include freshwater mussels, aquatic vegetation, fish, aquatic insects, amphibians, and reptiles.

**Appendix C-5. Region 5 Response Action Matrix - Wildlife Protection Activities - Version: August 5, 2022 (EnviroScience)**

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Wildlife Protection Activities</b>										
<b>Deterrence and hazing</b>  <b>*To determine whether deterrence and hazing needs to be included in the consultation, evaluate the extent to which wildlife deterrence is already covered within designated oil spill response activities or other plans.</b>	Techniques that can be used to move wildlife from locations that are in the predicted path of the spilled oil. These techniques are intentionally used to deter wildlife from entering into areas that have been previously oiled or depart an area that has been or could be oiled to prevent harm. This does not include unintentional behavioral responses resulting from use of vessels, vehicles, and aircraft in support of other response activities. Deterrence and hazing includes techniques such as: 1) noise deterrence - including pyrotechnics, shotgun, or pistol-launched projectiles, air horns, motorized equipment, propane cannons, and recorded bird alarm sounds 2) scare devices, including deployment of reflective tape, helium-filled balloons, and scarecrows on oiled beaches 3) herding wildlife using aircraft, boats, or other vehicles 4) hazing by human presence (Exxon Mobil, 2014)	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Site specific activity - methods can be modified for site specific conditions depending on the location, movement of the oil, or presence and movement of the animals. Weather may impact use.	What are the potential effects of human activity and disturbance on the habitat? Are any nesting, rookery, or haulout sites nearby? Which devices will be used? How long/often will the devices be used? What animals are the target of the hazing*?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access by foot traffic Staging	Operation of the equipment - with the purpose to disturb the species so that they avoid the oiled area.	Habitat disruption, noise, human presence, activity.	Species affected include birds, small land animals, and mobile aquatic organisms (e.g.: fish).
<b>Capture and care of contaminated species or recovery of contaminated carcasses</b>  <small>*To determine whether capture and care needs to be included in the consultation, evaluate the extent to which it is already covered within designated oil spill response activities or other plans.</small>	During some spills, wildlife may become oiled, or die due to oiling. Capture, care for or recovery of the animals' carcass may need to be carried out by responders to help an animal's chances for survival or prevent other animals from further oil exposure. Capture and care for oiled wildlife can be a hazardous activity and requires specially trained personnel, equipment and facilities (Exxon Mobil, 2014). The sooner oiled wildlife are captured and rehabilitated, the better their chance for survival (Exxon Mobil, 2014).  Note: Pre-emptive capture of unoiled animals requires a separate permitting action (under ESA Section 10) and is therefore not in the scope of this matrix.	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather, terrain, presence of species.	What did the carcasses result from? What federal agency supports coordination of the removal? Who provides assistance? Where should the carcasses be taken to? Is there a Wildlife Branch Director to help coordinate efforts? What species are being recovered*? Are any permits necessary**?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access by foot Staging	Capture and care as directed by federal/state/territorial wildlife agencies and rescue centers.	Stress, transport, physical harm, application of cleaning products.	Species affected include birds, small land animals, reptiles and amphibians.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>PRIMARY AND SUPPORT RESPONSE ACTIVITIES - activities or supporting activities used to locate, contain, and recover discharged oil and/or prevent natural resources from oil contamination</b>										
<b>Locating, Tracking, and Support Activities</b>										
<b>Use of aircraft</b>	Aircraft (various types including fixed wing and helicopters) may be used during an oil spill to conduct overflights to track or monitor the location of the spill or transport responders to the site. The Coast Guard's MH65 is frequently used, which has a max speed of 175 kts with two turbine engines. In some cases (i.e., when a spill is offshore), a longer range aircraft may be used such as the Coast Guard C-130H, which has a cruising speed of 374 mph, a wingspan of 132', and has four turboprop engines - can be used to drop pumps, etc. to a site).	Shoreline Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather is limiting: cloud ceiling, visibility affect use. Choice of aircraft may depend on availability, time needed on scene, and range.	Which type of aircraft will be used (airplanes, helicopters, drones, balloons, etc.)? How often will overflights take place? Can other remote sensing operations be used in its place? Are these aircraft carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? At what altitude will the aircraft be flying? Is there a known flight path? Will aircraft fly over sensitive habitat? Are there any existing restrictions in place? In emergency response situation, it may be possible to use permitting process through resource trustees to fly lower than would otherwise be allowed. Would you expect any air quality, water quality or noise concerns above background?	Use of vehicles Use of vessels	Conducting flights over the impacted spill area.	Wildlife disruption (noise), bird strikes.	Species can be affected by disruption (noise) and bird strikes. Species affected include birds and land animals.
<b>Use of vessels</b>	Various types of vessels may be used during an oil spill to locate, monitor, conduct operations, or transport people and equipment to the site. Vessel size typically depends on the water body environment and what is available from the Oil Spill Removal Organization or Coast Guard vessels in the area; however, the most commonly utilized vessels during spill responses include 12' punt boats, 14' Jon boats, 32' support vessels, rigged hulled inflatable boats (approximately 5-11'), and approximately 21' work boats. In some cases (i.e., larger spills, deeper water), larger vessels may be utilized such as a 46' fast response vessel, 200' oil spill response vessel (can travel 12 kts and has 4,000 barrel storage capacity), or 225' Sea Going Buoy Tender (13' draft, has Spilled Oil Recovery System onboard).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used based on capabilities; weather may impact use (thunderstorms, low visibility); draft of vessel may impact use.	Which type of vessels will be used (autonomous vessels, air boats, etc.)? How often will the vessels transit the area and at what speeds? How many vessels will be in the area? Where will fueling take place? Where will decontamination take place, if necessary? Where will vessels launch? Are these vessels carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? Are vessels being operated in atypical locations? Would you expect any air quality, water quality or noise concerns above background?	Use of vehicles Use of machinery Booming Skimming Decontamination	Vessel operation.	Wildlife disruption (noise), vessel strikes.	Species affected include birds, land animals, and fish.
<b>Use of vehicles</b>	Various types of vehicles and equipment (with wheels or tracks) may be used during oil spills to track spills, deploy equipment, and transport responders to the site (pick up trucks, atvs, etc. are often used).	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain and vehicle weight impact use. Used based on capabilities; weather may impact use (thunderstorms, low visibility).	What type of vehicle will be used (car, semi-tractor trailers, RVs, hover craft, backhoe, bulldozer, ATV, off-road vehicles, etc.)? What type of substrates will the vehicle be working on? How many vehicles will be used? How will they be re-filled (with gasoline, etc.)? How will vehicle be decontaminated if necessary? How will vehicle access sites? Are these vehicles carrying hazardous materials or waste to or from the response site? Are they permitted to carry hazardous materials? Are vehicles being operated in atypical locations? Would you expect any air quality, water quality or noise concerns above background?	Decontamination	Operation of vehicles.	Wildlife disruption (noise, lights), vehicle strikes, crushing/compaction.	Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans, and gastropods.
<b>Use of machinery/supporting equipment</b>	Various forms of machinery and equipment are used to support oil spill response activities (e.g., generators, pumps, 2-3" hoses, hydraulic power packs, lighting). For example, a CCN-150 is a submersible offloading pump with a max capacity with seawater of 3,500 gallons per minute at 98 ft, weighs 187 lbs, and is designed to fit into a 12.5 in diameter opening. The Coast Guard supplies a Deutz Hydraulic Power Unit which is used to drive hydraulic pumps (creates suction) and is capable of developing 3500 psi at 45-55 gallons per minute hydraulic flow. It weighs 1,735 lbs (USCG, 2006).	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain and machinery weight impact use as well as weather conditions.	What type of substrates will the machinery be working on? How many will be used? How will they be re-filled (with gasoline, etc.)? How will the machinery be decontaminated if necessary? How will machinery access sites? Would you expect any air quality, water quality or noise concerns above background?	Decontamination	Deployment/ presence of machinery in atypical locations.	Habitat disruption (noise, lighting), soil compaction.	Species affected include small land mammals, turtles, nesting/foraging birds, insects, plants, amphibians, crustaceans and gastropods.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>Creation/Use of New Access Points</b>	Responders may need to create new access points in order to get people, equipment, vessels, and vehicles to a site to monitor, contain, or recover oil. This activity can range from putting a piece of wood down (4 by 6") to creating a new road for vehicle access. (*May need to define scope for purposes of consultation.)	Shorelines Ports, Canals, Industrial Areas Coastal Nearshore Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Terrain, accessibility to response site. Size of new access point will depend on what needs to pass through.	What is the access point being created for (people, machine, or vessel)? Are other options available to access location? Can location be accessed through a less sensitive area? What kind of equipment and materials will be needed to create new access point? What will happen to access point after response concludes ("demobilization" of access point)?	Use of Machinery Use of Vehicles	Construction and use of new access point.	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil); wildlife disturbance (noise, trampling).	Species affected include small land animals, insects, plants, amphibians, reptiles, crustaceans, gastropods, and nesting/foraging birds.
<b>Creation/Use of Staging Areas (on land)</b>	Responders may need to create new staging areas or convert certain existing areas into an area to store, set up, and transport people and equipment needed to conduct the oil spill response. This activity can range from using an existing parking lot to bringing in trailers/constructing a semi-permanent building. *Note: Services may need to discuss what is in the scope of pre-planning consultation for this activity.	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Limited by terrain type, accessibility to response site. Size/footprint will depend on the number of responders or types of equipment and tools that need to be staged.	How many personnel and what type of resources will be found at the staging area? When will the staging area be accessed? Will the staging area require lights? How/what kind of equipment will be used to access the staging area? Are responders using existing areas or creating a new staging area in an undeveloped area? Is flooring being created for responders to walk on/store equipment - i.e., pallets, boards, or carpet? How long will equipment be stored on site? Will oil or hazardous materials be stored on site (in frac tanks, or other types of containers)?	Use of Vehicles Use of Vessels New Access Points Use of Machinery Use of Aircraft	Construction and use of new staging area.	Habitat disturbance or destruction - (disturbance of soil and vegetation, compaction of soil from storage of large equipment); wildlife disturbance (noise, trampling from large numbers of people, light - if applicable).	Species affected include small land animals, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, and gastropods.
<b>Natural attenuation - allow habitat to recover naturally while monitoring</b>	The reliance on natural processes (including biodegradation, dispersion, dilution, sorption, evaporation, etc.) to achieve site-specific remedial objectives within a timeframe that is reasonable compared to that offered by other response activities (EPA, 1999), i.e., there is no attempt to remove stranded oil or minimize impacts to the environment. *For areas in which a spill is logistically inaccessible for reasons of remoteness (e.g., the Arctic), stormy weather, or lack of equipment and manpower, natural attenuation might be the only option available" (National Research Council, 2013). The decision to use natural attenuation may take place for cases in which: 1) oil is not accessible; 2) when oiling has occurred on high-energy beaches or shorelines where wave action will remove a majority of the oil in a short period; 3) when there is a human health or worker safety issue (e.g., fast-moving water, rocky coastline, high-energy environment); or 4) when it is determined (e.g., through a Net Environmental Benefit Analysis) that responding to the oil may do more harm than good.	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Used when other response techniques are not practical, natural removal rates are fast (e.g., gasoline evaporation, high energy coastlines) (USCG, 2011), or when areas are inaccessible and/or present a safety hazard to responders. May not be appropriate for areas with high numbers of people, mobile animals, or endangered species (NOAA, 2010).	Will effects manifest at the ecosystem level, resulting in radical changes in ecosystem structure and function? Are important ecological resources or human activities/resources threatened? Will stranded oil remobilize?	Use of Vessels (for tracking and surveillance) Use of Vehicles (for tracking and surveillance) Sample Collection Access of Personnel by Foot Traffic Deterrence and Hazing	If natural attenuation is a prescribed response action in a referenced ACP, then the BE should include a discussion of specific decision processes/criteria for these sites where "no response" is an option. (The decision process can be consulted on.)  The natural attenuation option will most likely need to be addressed during the emergency response consultation.	Variable and incident-specific.	Most likely not able to determine species and habitats prior to a response unless specific sites are already identified for "natural attenuation" in the ACP. During a response, this will be discussed and identified within the Environmental Unit.
<b>Deployment of buoys</b> <b>NOTE: Applies to small buoys, not navigation aids.</b>	Tracking buoys can be used to study current patterns. This information can be useful in predicting the trajectory of an oil spill. Several designs are used such as radio- and satellite-tracking units (Exxon Mobil, 2014). Drift (unanchored) buoys and static buoys may be utilized. Used for tracking and surveillance of spilled product, or for marking the boundaries of environmentally sensitive areas or specially designated on-water zones potentially in the path of spilled product. Used to mark anchors or hazardous areas. An example is: the Orion Tracking Buoy, which is 9.8 in diameter, 6 in high and has a split globe with an outer ring, weighs 4 lbs and tracks spills via a single coplanar stripline transmission line (free-floating) (Fingas, 2011).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Adverse weather conditions could impact deployment and use of the buoys.	Are they static or drifting buoys? What will the buoys look like (how big, are they lighted, etc.)? How long will they remain at the deployment location? How will they be deployed? Will they be anchored? How will they be used? Will drift buoys be recovered? Are they large enough for birds to perch on? Are buoys grounded (i.e., at high/low tide)? Is there any rope or chain drag that could impact the benthic habitats? How is grounding avoided (particularly for environmentally sensitive areas)? What is the anchoring mechanism and the habitat that is being anchored into?	Use of Vessels Use of Aircraft New Access Points Staging	Deployment/anchoring/ presence of the buoys (including recovery) Light (or sounds) emitting from buoy.	Wildlife disturbance from buoy's signal (light, sound).  Direct contact with chain or chain scour.	Species affected include waterfowl, nesting/foraging birds, insects, plants, amphibians, reptiles, crustaceans, mollusks, and fish.

Appendix C-6. Region 5 Response Action Matrix - Locating, Tracking, and Support Activities -Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>Locating, Sampling and monitoring: Air, land, water (includes Shoreline Cleanup Assessment Technique - SCAT)</b>	<p>During spills, responders collect samples of the spilled product and clean water (as a background), in order to determine or confirm the source of the spill. Typically, at least three samples are collected at the leading edge, the center of the spill, and clean water. Grab sampling involves lowering the sample jar into the water and skimming the oil layer or globules from the water surface into the jar; sheen net sampling involves slowly dragging a sheen net through an oil sheen and using its natural affinity to collect the oil (then placing in jar). Oil samples are sent to the United States Coast Guard Marine Safety Laboratory for analysis via established procedures.</p> <p>Shoreline Cleanup and Assessment Technique (SCAT) is a systematic approach to surveying an area during an oil spill response (begins early in the response and continues to ensure cleanup endpoints are met). During SCAT assessment, a team of people (including representatives from federal agencies [USCG, NOAA], the state, the responsible party, and other applicable stakeholders) walk the impacted area to verify shoreline oiling, cleanup effectiveness, and final evaluations (NOAA SCAT, 2016).</p> <p>Special Monitoring of Applied Response Technologies (SMART) is a cooperatively designed</p>	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather, landscape, remoteness, accessibility, sea state.	What type of sampling will be conducted (grab sampling, sheen net sampling)? How will sampling be conducted (via foot, vessel, aircraft)? Where will sampling take place? What other equipment will be used during the sampling? How often will sampling take place, is there a sampling plan? Is your sample methodology destructive (e.g., will it impact sediment, species, etc.)? What is the duration of the sampling (e.g., will sampling device be left in the environment for continuous sampling or monitoring)? If sampling and monitoring will be long term, will noise be a factor? What kind of noise or other type of disturbance may the monitoring and sampling equipment produce?	Use of Vessels Use of Vehicles Use of Aircraft New Access Points Access of personnel by foot traffic Staging	Sampling (all other activities are interrelated and covered in other activities).	Physical contact and/or containment in collection device.	Species affected include any that are targeted for sampling and monitoring.
<b>Access of personnel by foot traffic</b>	Personnel are deployed to the oil spill site to conduct visual observations, track oil, and conduct cleanup operations.	Shorelines Ports, Canals, Industrial Areas Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Weather, terrain, remoteness, accessibility.	How many personnel are necessary to complete the job? How much area will be affected by responders traveling to the incident site? Where will they operate out of (a facility, or temporary structure)? How will people get to the site (aircraft, vehicle, vessel)?	Use of Vessels Use of Vehicles Use of Machinery Use of Aircraft Staging	Accessing the site by foot.	Habitat disturbance (e.g., soil compaction, erosion from foot traffic); wildlife disturbance (e.g., noise, presence of people); Direct contact.	Species affected include plants, amphibians, reptiles, small land mammals, nesting birds, insects, and gastropods.

Appendix C-7. Region 5 Response Action Matrix - Secondary Response Activities/Waste Management Activities Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>SECONDARY RESPONSE ACTIVITIES - occurs only because a primary or support activity has occurred</b>										
<b>Waste Management Activities</b>										
<b>Waste Handling</b>	<p>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).</p> <p>Non-oily wastes (e.g., sewage, domestic waste) that are generated during cleanup operations can be disposed of at local wastewater treatment plants and municipal landfills; oiled and hazardous wastes disposal can be disposed of via industrial landfilling, landfarming, open burning, portable incineration, commercial incineration- waste to energy facilities, reprocessing, reclaiming/recycling and further information regarding these options can be found in Exxon Mobil, 2014, p. 14-18 to 14-23.</p>	Shorelines Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather conditions and topography may impact waste handling. Waste handling is also impacted by the type of equipment or materials used to recover the oil and the type, location, and amount of oil.	What is the size of the spill and the location of the spill? Are there local or regional regulatory requirements impact where waste handling takes place? What equipment will be needed to handle the waste? Is the waste a listed hazardous waste or exhibit characteristics of a hazardous waste? How will it be labeled? Are operations being carried out according to the waste management plan? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? What regulations apply? How will waste be transported to storage? How will waste be transported off site? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)? How will recovered oil be handled? Is there a potential for secondary releases and/or a need for secondary containment; if so, how will they be addressed? Is the waste being handled near a sensitive area?	Use of Vessels Use of Vehicles Use of Machinery Deterrence and Hazing Mobilization/Demobilization of personnel Booming Staging	Collection and movement of waste.	Accidental release of oil or oiled materials in a previously unaffected area (on water or land).	Species affected include all T&E species in areas of waste handling. Potential impacts are likely already covered by the activity that generated the waste.
<b>Temporary Storage (on water)</b>	<p>There are numerous types of storage devices for waste and debris associated with oil spills; selection may depend on the type and amount of oil spilled and availability at the time of the spill. When oil recovery and transfer is conducted on-water, there are mainly two options: 1) towable on-water storage; and 2) onboard tanks (USCG, 2011).</p> <p>Barges are the preferred on water storage devices, especially tank barges which are designed to take on fluids. (Note: When barges contain less than 250 barrels of storage volume, they are considered equipment and do not require a US Coast Guard inspection or Tankerman's document.) Deck barges may also be used with a tote or tank on top. Other types of towable on-water storage include inflatable bladders and tanks (also called dracones) which are typically made out of rubber and flexible, but designed to store flammable or combustible liquids and be towed at slow rates. Additionally, there are inflatable, towable barges with open-top storage that can provide some freeboard and protection from seas (USCG, 2011).</p> <p>Tank vessels are an option for larger spills and when lightering may be necessary. Drawbacks may include a high freeboard, deep draft, and lack of availability - depending on the vessel size. The other type of onboard system is deck tanks. Use of these onboard systems may require extreme caution due to altering of vessel stability (USCG, 2011).</p> <p>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' in length, 9.2' in diameter, 6.7' draft, 2,870 lbs, and has a capacity of 26,400 gallons.</p>	Shorelines Upland Areas Shorelines of Rivers and Streams, Bays and Estuaries, Ponds and Lakes		Beach and Sand Bar Mudflats Rooted Floating Aquatics	Weather conditions could impact temporary storage integrity; best operating conditions are in protected and calm water, however operation may occur in open and fast water. In calm water, vessels can work in depths as shallow as 3 ft, seas 1 ft and winds up to 15 kts. On water storage systems are not recommended in fast water over .8 kts due to potential for secondary spills and the difficulty of anchoring. Additionally, on water storage is difficult in broken ice conditions due to potential damage and loss to ice encounters (USCG, 2011).	What is the duration of storage (days, weeks, months)? What storage options are available/how will the oil or hazardous material be handled or transferred (tanks, barges, etc)? What is the storage capacity? What material is being stored? Is the waste being stored a listed hazardous waste or exhibit characteristics of a hazardous waste? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? Is there a potential for a secondary release? What regulations apply? Will security be provided to prevent unauthorized dumping? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)?	Use of Vessels Use of Machinery Booming Staging Decanting	Containment of oily wastes.	Secondary spillage from container failure or overflow (on water); Crushing substrate and turbidity from anchoring or spudding down of the temporary storage vessel/barge; Direct exposure (if open top, or uncovered), Exposure to off gassing (VOC's like BTEX, and other associated oil vapors).	Species affected include small land mammals, birds, insects, reptiles, and amphibians.

Appendix C-7. Region 5 Response Action Matrix - Secondary Response Activities/Waste Management Activities Version: August 5, 2022 (EnviroScience)

<b>Spill response activity</b> <small>Note: This column lists the most common activities performed during spill response and recovery operations (i.e., those actions that are federally funded, authorized, or carried out). Activities listed in this column may need to be modified based on regional practices.</small>	<b>Definition</b> <small>Note: This column provides a detailed explanation of the oil spill response activity. Any pre-established conservation measures carried out with the specific spill response activity (as prescribed in Regional or Area Contingency Plans) should be included as part of the definition as applicable.</small>	<b>Typical locations in the Region 5 action area where the response activity is implemented</b>	<b>Secondary Locations Factored into Species Response Matrix and Effects Analysis</b>	<b>Associated Vulnerable Habitats within Region 5</b>	<b>Environmental conditions that limit where or when to use the response activity</b> <small>Note: This information is being used to inform 1) the species affected (column I) and 2) assess feasibility of potential conservation measures.</small>	<b>Discussion questions/ Considerations</b> <small>Note: These are questions or discussion points that may be considered during consultation; the answers to these questions are not necessarily known in advance or required for each situation. The questions help bring to light unknowns, highly variable situations, problem situations, and assumptions or parameters of the activity or details of the use (scale, time, duration, volume, personnel, application, methods).</small>	<b>Potential inter-related and inter-dependent response activities</b> <small>Note: In a spill response, some activities are often used in conjunction with others to affect an efficient and coordinated response. The activities listed below are commonly used with the response activity listed in column A. Each of the inter-related or inter-dependent activities listed is also defined within this matrix.</small>	<b>Aspects of spill response activity that are in scope of consultation</b> <small>Note: This column denotes the specific characteristic or feature of the response activity that may cause concern for T&amp;E species.</small>	<b>Potential impacts considered on ESA-listed species or their habitat</b> <small>Note: This column describes potential direct and indirect impacts from the response activity that should be considered in an effect analysis for a T&amp;E species. Includes physical, chemical, and/or biological exposure routes.</small>	<b>Associated Animal Groups Affected</b> <small>Note: The general groups of species listed below are intended to give an idea of what types of species may be affected by the response activities.</small>
<b>Temporary Storage (on land)</b>	<p>There are numerous options for storage of wastes and debris associated with oil spills. The selection of appropriate storage equipment and methods is based on the type and volume of material to be stored (Exxon Mobil, 2014). Descriptions of storage options (such as 55-gallon drums, containers, barges, and trucks) and estimated timeframes for their use can be found in Exxon Mobil, 2014, p. 14-6.</p> <p>Examples of more commonly used temporary storage devices (in larger spills, used on land) is a 30 cubic yard dumpster with open top or sealed top (22 ft long, 8 ft wide, 6 ft high), and a frac tank which can be used to store waste liquids (holds 21,000 gallons), which is made of steel, has a 516" by 96" by 141" footprint, and weighs 26,000 lbs - empty.</p>	Shorelines Ports/Canals Coastal Nearshore Rivers and Streams Ponds and Lakes		Beach and Sand Bar Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation	Weather conditions could impact temporary storage integrity due to risk of flooding, storm water runoff. Terrain and accessibility may also impact temporary storage options.	What is the duration of storage (days, weeks, months)? What storage options are available/how will the oil or hazardous material be stored (dumpsters, tanks, barges, etc)? What is the storage capacity? What material is being stored? How will recovered oil be handled and stored? Is the waste being stored a listed hazardous waste or exhibit characteristics of a hazardous waste? Will odor or vapors be released into the atmosphere? Could any chemical reactions take place with the wastes? Are permits needed? What regulations apply? How will waste be transported to storage? Will security be provided to prevent unauthorized dumping? What utilities and associated logistical support are needed at the response site (electricity, water, response equipment)? Is there a potential for a secondary release?  *Note: The Oil Spill Response Field Manual (Exxon Mobil, 2014), lists 25 types of storage and the estimated timeframe (days, weeks, months) for use to consider.	Use of Vessels Use of Vehicles Use of Machinery Deterrence and Hazing Booming Staging Dikes and berms Decanting	Establishment of temporary storage; Containment of oily wastes.	Secondary spillage from container failure or overflow (on water).  Compaction/crushing from set up of storage containers (or applicable storage method).  Direct exposure (if open top, or uncovered), Exposure to off gassing (VOC's like BTEX, and other associated oil vapors).	Species affected include birds, aquatic plants (submerged/rooted), insects, and benthic organisms.
<b>Decanting</b>	The process of removing or discharging recovered water from temporary storage devices (i.e., portable tanks, internal tanks, collection wells, or other storage containers) in order to maximize the use of available storage capacity for recovered oil. This is typically done during large spills in open water when large volumes of water are recovered along with the oil during the mechanical recovery process. (Mechanical recovery is often restricted by factors such as the skimming system's oil/water recovery rate and the amount of tank space available on the recovery unit. Additionally, the longer the oil remains in the water, the more it has the opportunity to emulsify (form a highly mixed oil/water liquid or mousse), necessitating more storage space.) There are often additional decision-making entities involved with the decision to decant such as the State On Scene Coordinator or the Unified Command to ensure that the discharged water will not cause additional harm. In addition to offshore areas, decanting may be necessary wherever available temporary storage capacity is insufficient to hold the total volume of recovered oil/water mixtures. (Alaska Department of Environmental Conservation, 2012).	Ports, Canals, Industrial Areas Rivers and Streams Bays and Estuaries		Beach and Sand Bar Mudflats Open Water Submersed Vegetation Rooted Floating Aquatics	Not typically conducted on land. Sensitive habitats also impact use of decanting. (*Use of decanting may vary depending on region, additional conditions may be found in Area Contingency Plans.)	Is there a pre-approved area for decanting? Is a permit required? Has the State been contacted regarding decanting in State waters? Is there sufficient storage to prevent decanting? How will decanting aid the efficiency of the response? What type of product (i.e., Group 3 or 4 oils)? Is there booming set up in the area where decanting is occurring? How much decanting will occur (i.e., how many gallons - how long will it need to be done)?	Booming Skimming Use of Vessels Vacuuming	Re-introducing recovered contact water into the environment.	Direct exposure, ingestion of potentially oil contaminated water.	Species affected include fish, reptiles, amphibians, and birds.
<b>Decontamination</b>	Removal of oil from personnel, vessels, and equipment as necessary during oil spill responses. Personnel decontamination is required throughout the response; decontamination units can be fabricated on site or via commercial modular units (Exxon Mobile, 2014). Vessels may accumulate oil on their hulls and at the waterline and should not be brought into uncontaminated areas without being cleaned; therefore, hulls may be manually washed from a low-freeboard pontoon float inside a protected area (Exxon Mobil, 2014). Equipment decontamination will be necessary before equipment is moved to uncontaminated areas (i.e., boom, skimmers, etc.). if the cleaning station location does not have direct access to shore facilities, a barge may need to be procured to provide supplies, communications, shelter, and sanitary facilities (Exxon Mobil, 2014).	Shorelines Ports, Canals, Industrial Areas  Rivers and Streams Bays and Estuaries Ponds and Lakes Wetlands Upland Areas		Beach and Sand Bar Bog Calcareous Fen Deep Marsh Vegetation Floodplain Forest Mudflats Open Water Rooted Floating Aquatics Sedge Meadow Shallow Marsh Vegetation Submersed Vegetation Wet Meadow	Wind, weather, accessibility to oil recovery site.	Where will the decontamination procedures occur? Is there established infrastructure for environmental decontamination? What will be decontaminated? Will support equipment need to be brought in? Are there options for avoiding critical habitat? Is there potential for water contamination and terrestrial contamination? What will be used to decontaminate the people/equipment?	Use of Vehicles Use of Vessels Use of Machinery New access points Access of personnel by foot traffic Staging Waste handling Temporary storage	Setup and use of decon area. Breach of containment/runoff.	Habitat and wildlife disturbance; compaction of substrate. Oil remobilizing into previously uncontaminated water/land, compromise of water quality; chemical cleaning agents.	Species affected include small land mammals, birds, insects, amphibians, plants, and reptiles.

**Appendix C-8. Region 5 Response Action Matrix - References-Version: 11 May 2017; 18 June 2021 (EnviroScience)**

40 CFR 300.915 (g)
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