
APPENDIX D

Great Black Swamp Inland Zone Sub-Area Habitat and Species Fact Sheets

Habitat Fact Sheets

Habitat Fact Sheets contain information regarding responses within a particular habitat. These fact sheets were developed by the Region 5 Regional Response Team and are available on rrt5.org under “[RCP/ACP Tools Habitat Fact Sheets](#)”. A complete list of available Habitat Fact Sheets is listed below and those specific to the Great Black Swamp Inland Zone Sub-Area are included in this appendix.

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

The following habitat fact sheets are included in this appendix:

Deep Marsh Annuals

Deep Marsh Perennials

Open Water

Rooted Floating Aquifer

Sedge Meadow

Shallow Marsh Annuals

Shallow Marsh Perennials

Submersed Vegetation

Wet Meadow

Species Fact Sheets

Species Fact Sheets contain information regarding responses that may impact a particular species. These fact sheets are available on rrt5.org under “[RCP/ACP Tools Species Factsheets](#)”. A complete list of available Species Fact Sheets is listed below and those specific to the Great Black Swamp Inland Zone Sub-Area are included in this appendix.

Beavers	Frogs and Toads	Toxic Plants
Freshwater Mussels	River Otters	Waterfowl

The following species fact sheets are included in this appendix:

Beavers

Freshwater Mussels

Frogs and Toads

River Otters

Toxic Plants

Waterfowl

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Deep Marsh Annual

I. Habitat Description

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



Wild rice beds in Northern Minnesota. Image: Ducks Unlimited



Wild rice in floating-leaf stage. Image: 1854 Treaty Organization

II. Sensitivity to Oil Spills

The deep marsh annuals habitat is highly sensitive to oil spills. This habitat is valuable to a variety of birds, amphibian, reptile, and mammal species as well as micro and macro invertebrates, many of which are extremely sensitive to chemical exposure. During normal water levels, oil would be less likely to penetrate water-saturated soils; during floods, oil could be deposited in areas that dry out after the flood, and penetrate the loose, organic-rich surface soils. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants. Flowering or seeded annuals are more vulnerable to contamination. It is difficult for more viscous oils to penetrate densely vegetated areas.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)
 Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)
 NatureServe (natureserve.org)
 Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)
 The U.S. National Vegetation Classification (<http://usnvc.org/>)
 Wetland Plants and Plant Communities of MN & WI, 3rd Edition (http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)

Wild Rice *Zizania* spp.



Merel R. Black



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Deep Marsh Annual

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Exclusion or Deflection Booming

- Boom can be used to exclude or deflect the spill away from sensitive resources.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed.

Sorbents/Sorbent Boom

- In areas with vegetation at or above water, sorbents are most effective in water surrounding vegetation (as opposed to within/on top of vegetated areas).
- Care is necessary during placement and recovery to minimize disturbance of vegetation. Work in boats to avoid driving oil into the sediment.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Flooding

- This tactic is only applicable in areas where the water level can be controlled, such as near locks and dams or in a small pond/marsh. Contact the U.S. Army Corps of Engineers water control regarding lock and dam operation.
- Can be used selectively to remove localized heavy oiling. This tactic is useful to remove oil trapped in vegetation, which can otherwise be difficult to herd toward recovery devices in open water. However, some oil may remain stranded in vegetation and will need to be removed through other means.

Low-Pressure, Ambient-Water Flushing

- Maintain low output pressures (less than 50 psi) to avoid disrupting the substrate and vegetation.
- Effectiveness increases with lighter oils because less residual oil is left in the environment.
- This tactic can be used with flooding to prevent re-deposition of oil.
- Use for spot removal of oil because of the limited area of effectiveness.

In-Situ Burning

- Presence of a water layer on marsh surface can protect roots.
- “Heavy ends” of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- The amount and placement of natural fuel in the surrounding area may present challenges to constraining the fire only to oiled areas.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.
- May be one of the least physically damaging means of moderate and heavy oil removal as it leaves plant roots intact.
- May be difficult to protect riparian vegetation.

Debris/Vegetation Removal

- Most appropriate for oils that form a persistent, thick, sticky coating on the vegetation, such as medium and heavy oils.
- Removal will release trapped oil and speed natural flushing rates.
- Debris may be associated with nests or living areas (e.g., beaver and muskrat lodges), therefore impacts on resident animal habitat need to be considered.
- If oil is trapped in floating vegetation, removal may be the only way to recover the oil in the absence of water currents.
- May be appropriate to prevent secondary oiling of wildlife.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Because wild rice is an attractive food source, leaving oiled zizania plants could harm birds and other wildlife that come to the marsh to feed. If that is not an issue, this tactic has few adverse effects.
- Lesser impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- Damage to vegetation and substrate may be reduced by controlling access routes, using pontoons or mats, or using a helicopter to bring in equipment.
- May be needed where oil has heavily contaminated bottom sediments.

Sediment Removal

- Vacuum/dredge sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment.
- Significant sediment removal may result in a change in the area’s hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE: Deep Marsh Perennial



Indicator Species



Arrowhead
Sagittaria spp.



Bur-Reed
Sparganium spp.



Pickerelweed
Pontederia spp.

I. Habitat Description

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



Deep marsh perennials. Image: Ben Kimball



Invasive hybrid cattail. Image: WI DNR

II. Sensitivity to Oil Spills

The deep marsh perennials habitat is high sensitive to oil spills. This habitat is valuable to a variety of birds, amphibian, reptile, and mammal species as well as micro and macro invertebrates, many of which are extremely sensitive to chemical exposure. During normal water levels, oil would be less likely to penetrate water-saturated soils; during floods, oil could be deposited in areas that dry out after the flood, and penetrate the loose, organic-rich surface soils. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants. Heavier oils tend to coat vegetation, which may survive if oil coats only the stems or if the roots are unaffected. It is difficult for more viscous oils to penetrate densely vegetated areas.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

NatureServe (natureserve.org)

Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Deep Marsh Perennial

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Exclusion or Deflection Booming

- Boom can be used to exclude or deflect the spill away from sensitive resources.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed.

Sorbents/Sorbent Boom

- In areas with vegetation at or above water, sorbents are most effective in water surrounding vegetation (as opposed to within/on top of vegetated areas).
- Care is necessary during placement and recovery to minimize disturbance of vegetation. Work in boats to avoid driving oil into the sediment.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Flooding

- This tactic is only applicable in areas where the water level can be controlled, such as near locks and dams or in a small pond/marsh. Contact the U.S. Army Corps of Engineers water control regarding lock and dam operation.
- Can be used selectively to remove localized heavy oiling. This tactic is useful to remove oil trapped in vegetation, which can otherwise be difficult to herd toward recovery devices in open water. However, some oil may remain stranded in vegetation and will need to be removed through other means.

Low-Pressure, Ambient-Water Flushing

- Maintain low output pressures (less than 50 psi) to avoid disrupting the substrate and vegetation.
- Effectiveness increases with lighter oils because less residual oil is left in the environment.
- This tactic can be used with flooding to prevent re-deposition of oil.
- Use for spot removal of oil because of the limited area of effectiveness.

In-Situ Burning

- Presence of a water layer on marsh surface can protect roots.
- “Heavy ends” of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- The amount and placement of natural fuel in the surrounding area may present challenges to constraining the fire only to oiled areas.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.
- May be one of the least physically damaging means of moderate and heavy oil removal as it leaves plant roots intact.
- May be difficult to protect riparian vegetation.

Debris/Vegetation Removal

- Most appropriate for oils that form a persistent, thick, sticky coating on the vegetation, such as medium and heavy oils.
- Removal will release trapped oil and speed natural flushing rates.
- Debris may be associated with nests or living areas (e.g., beaver and muskrat lodges), therefore impacts on resident animal habitat need to be considered.
- If oil is trapped in floating vegetation, removal may be the only way to recover the oil in the absence of water currents.
- May be appropriate to prevent secondary oiling of wildlife.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Because perennials are an attractive food and habitat source, leaving oiled plants could harm birds and other wildlife that come to the marsh to feed and nest. If that is not an issue, this tactic has few adverse effects.
- Lesser impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- Damage to vegetation and substrate may be reduced by controlling access routes, using pontoons or mats, or using a helicopter to bring in equipment.
- May be needed where oil has heavily contaminated bottom sediments.

Sediment Removal

- Vacuum/dredge sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment.
- Significant sediment removal may result in a change in the area's hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

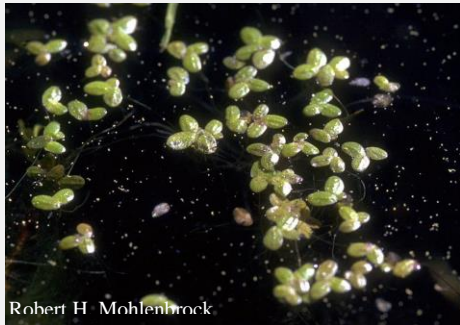
Open Water



Indicator Species

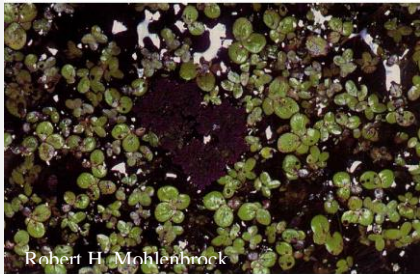


Water Meal
Wolffia spp.



Robert H. Mohlenbrock

Duckweed
Lemna spp.



Robert H. Mohlenbrock

Duckweed
Spirodela spp.

I. Habitat Description

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



Open Water can provide habitat for threatened plants such as these native phragmites in Pool 8 of the Mississippi River. Image: Matt Jacobson



Oil sheens on the Upper Mississippi River. Image: NOAA

II. Sensitivity to Oil Spills

The open waters habitat is highly sensitive to oil spills. Open waters provide critical habitat for many types of plants and animals, including a wide variety of fish, amphibians, reptiles, birds and mammals. Oil may inhibit the ability of vegetation to decompose, adversely affecting organisms within the detritus food web. Oil removal in this habitat is often driven by the threat of migratory waterfowl and/or wetland animals becoming oiled. Light oils with high water-soluble fractions can result in acute mortality of submersed vegetation, fish, and invertebrates. Heavier oils tend to smother aquatic animals and plants, and coat shorelines.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

NatureServe (natureserve.org)

Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Open Water

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Containment Booming

- Use containment boom to keep oil from spreading and to concentrate slicks from recovery.
- Recovery by skimmers or vacuum systems needs to accompany booming.
- Effectiveness is increased by positioning boom at appropriate angles for the current flow, areas where flow decreases and where debris naturally collects.

Sorbents/Sorbent Boom

- Deploy sorbent boom to recover sheens in low-current areas and along the shoreline.
- Overuse results in excess waste generation.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Debris/Vegetation Removal

- Collect oiled free-floating vegetation. Minimize the cutting of rooted vegetation when possible.

Some Adverse Habitat Impact

In-Situ Burning

- Less likely to impact plants in areas of open water.
- "Heavy ends" of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- The amount and placement of natural fuel in the surrounding area may present challenges to constraining the fire only to oiled areas.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.
- May be one of the least physically damaging means of moderate and heavy oil removal as it leaves plant roots intact.
- May be difficult to protect riparian vegetation.

Most Adverse Habitat Impact

Sediment Removal

- May make it difficult to restore the plant community that existed prior to the spill incident.
- Vacuum/dredge sediments and dewater using geotube/settling tank. Treat the water and dispose the sediment.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Rooted-Floating Aquatics



Indicator Species



Source: Roberta Hill, VLMP © 2007

Spatterdock
Nuphar spp.



© William S. Justice

Water Lily
Nymphaea spp.



By W.S. Justice

American Lotus
Nelumbo spp.

I. Habitat Description

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



Non-native water lilies typically have pink, purple, and red flowers.

Image: Dept. of Ecology, State of Washington



2005 © Peter M. Dziuk
Colony of American lotus.

II. Sensitivity to Oil Spills

Due to proximity to shorelines and establishment in shallow water, the rooted floating aquatics habitat is highly sensitive to oil spills. Floating vegetation provides cover for several species of amphibians and fish. It is also important habitat for invertebrates. Many fish, invertebrates, and amphibious species deposit eggs on rooted floating vegetation. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants in these shallow habitats. Heavier oils tend to coat vegetation and animals, though the vegetation may survive because the roots are not affected. It is more difficult for more viscous oils to penetrate dense vegetation beds. However, these oils can smother water lily beds. Above all, oil reduces plant and animal tolerance to other environmental stress factors.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

NatureServe (natureserve.org)

Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Routed-Floating Aquatics



III. Sensitivity to Response Methods

Relevant response tactics are ordered below by least-to-most adverse habitat impact. Bullet points list quick-reference information regarding the tactic; any potential adverse impacts of its use; and suggestions for mitigation of these impacts if available. This is not intended to preclude the use of any particular tactic, but rather to aid responders in choosing the tactic(s) best suited to a specific habitat. For more information on a tactic, click on it or go to the corresponding section in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Containment Booming

- Use containment boom to keep oil from spreading and to concentrate slicks for recovery.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed and where water slows down and debris naturally collects, such as the outside of a meander or below a point bar.
- Recovery by skimmers or vacuum systems needs to accompany booming.

Sorbents/Sorbent Booming

- Deploy sorbent boom to recover sheens in low-current areas and along the shoreline.
- Overuse results in excess waste generation.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Debris/Vegetation Removal

- Collect oiled free-floating vegetation. Minimize the cutting of rooted vegetation when possible.

Natural Attenuation

- Least impact for small spills and lighter oils; avoids damage often associated with cleanup activities.
- Consider impact to aquatic life in the area. Consultation with a Trustee is recommended.

Some Adverse Habitat Impact

In-Situ Burning

- Burn only in calm water with no current where containment and maintenance of minimum slick thickness (1-3 millimeters) is possible.
- “Heavy ends” of petroleum product remain unburned. This residue will begin to sink as it cools and should therefore be recovered as quickly as possible after the burn is complete.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.

Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers

- Should be coupled with recovery.
- Most effective on lighter oils, which allow the product to mix into the oil.
- Care should be taken not to drive oil into the water column or sediment, or damage rooted vegetation.
- Visco-elastic agents improve overall oil recovery from water surfaces, reducing the potential for secondary shoreline oiling.
- Best used in calm water without debris/vegetation.
- Prior approval must be obtained from the RRT before use of these agents and solidifiers.

Most Adverse Habitat Impact

Sediment Removal

- Vacuum/dredge heavily oiled sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment.
- Significant sediment removal may result in a change in the area’s hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits may be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Sedge Meadow



Indicator Species



Dr. John Hilty

Lake Sedge
Carex spp.



New York Flora Association

Hummock Sedge
Carex spp.



© 2010 Kaiti Chynka

Pennsylvania Sedge
Carex spp.

I. Habitat Description

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



Sedge meadow in Navarino Wildlife Area – Wisconsin
Image: WI DNR



Tussock sedge meadow. Image: Steve Eggers, USACE

II. Sensitivity to Oil Spills

The sedge meadows habitat is highly sensitive to oil spills. This biologically diverse habitat provides a home to many types of plants and animals. Restoration of the plant community may require the purchase of plugs, as many of the area's plants have low germination rates. Many animal species such as the sandhill crane and common snipe use the sedge meadows for reproduction and feeding purposes. The abundance of small mammals makes these ideal feeding grounds for raptors, mink, and fox. Significant loss of this habitat would greatly affect the populations of these animals and, consequently, the local ecology. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants in this habitat. Heavier oils tend to coat vegetation and animals, though the vegetation may survive if oil coats only the stems or if the roots are not affected. Viscous oils will not penetrate into dense vegetation.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

MN DNR (<http://www.dnr.state.mn.us/restoreyourshore/pg/meadow.html>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)

Oil Spills in Marshes: Planning and Response Considerations

(http://response.restoration.noaa.gov/sites/default/files/Oil_Spills_in_Marshes.pdf)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Sedge Meadow

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Flooding

- Appropriate for locations with gentle gradient where persistent oil has pooled.
- Should only be used if released oil can be reliably directed towards sorbents or recovery devices and prevented from impacting other areas.
- Effectiveness increases with lighter oils because they are less viscous and less residual oil is left in the environment.
- Some oil may still be left stranded after flooding and will need to be collected through other means.

Collection by Direct Suction

- Adverse impact can be mitigated by limiting vehicles, hoses, and equipment to staging areas with firm substrate and sparse vegetation. If equipment must access other areas, precautions should be taken to avoid driving oil into sediment or softer substrate, and trampling vegetation. For example: limit access routes through the area; walk, drive, and station equipment on mats or boards instead of directly on top of vegetation; use boats in flooded areas; and use a helicopter to bring in equipment to areas that are difficult to access.
- Only useful where oil is thickly pooled (not appropriate for sheens).

Low-Pressure, Ambient-Water Flushing

- Effective for washing oil stranded on banks into the water for recovery.
- Vegetation cover minimizes the potential for sediment erosion from flushing. However, thick vegetation also reduces area of influence of flushing operations.
- Effectiveness increases with lighter oils because they are less viscous and less residual oil is left in the environment.

In-Situ Burning

- May be one of the least physically damaging means of moderate and heavy oil removal.
- Fires are a naturally occurring part of this habitat's plant lifecycle, so vegetation should be able to recover quickly from a burn as long as the roots are not damaged.
- "Heavy ends" of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- Least adverse impact when used in grassy areas versus areas covered with trees and shrubs. Fires are a naturally occurring part of this habitat's plant lifecycle, so vegetation should be able to recover quickly from a burn as long as the roots are not damaged.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Least impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Debris/Vegetation Removal

- Most appropriate for oils that form a thick, sticky coating on the vegetation, such as medium and heavy oils.
- Remove stained or oiled vegetation to protect wildlife users of the habitat. Additionally, grass roots can be damaged by oil and may need to be removed as well.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- May be needed where oil has heavily contaminated bottom sediments.
- Avoid forcing oil into the substrate and trampling vegetation by limiting access routes through the area, traversing the area on boards/mats/pontoons, or using a helicopter to bring in equipment.

Nutrient Enrichment

- Applicable where nutrients are a limiting factor for oil degradation.
- More effective after gross oil removal is completed.
- Should be used in environments where preservation is not a priority.
- When used on bare soil, nutrients need to be mixed with oil and soil.

Sediment Removal

- For watered areas: vacuum/dredge sediments and dewater using geotube/settling tank; or, where feasible, dewater the area and excavate the sediment.
- Significant sediment removal may result in a change in the area's hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

Hand Tool Oil Removal/Cleaning

- Used where persistent oil occurs in heavy amounts and animals using the wetland are likely to be oiled.
- Avoid forcing oil into substrate and trampling vegetation by limiting access routes through the area and walking on boards or mats.

Sorbents

- Overuse generates excess waste.
- Forcing contact between pads and oiled substrate can drive oil into the soil, making it more difficult to recover.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE: Shallow Marsh Annual



Indicator Species



Pinkweed
Polygonum spp.



Nodding-Bur Marigold
Bidens spp.



Barnard Grass (Invasive)
Echinochloa spp.

I. Habitat Description

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



Shallow marsh dominated by barnyard grass. Image: USGS



Invasive cocklebur overtaking stand of Nodding-bur marigold. Image: USGS

II. Sensitivity to Oil Spills

The shallow marsh annuals habitat is highly sensitive to oil spills. This biologically diverse habitat is critical to many plants and animals. Many animal species, especially waterfowl, rely on annual plants as a food source. Significant loss of this habitat would greatly affect the populations of these animals and consequently, the local ecology. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants in these shallow habitats. Heavier oils tend to coat vegetation and animals, though the vegetation may survive if oil coats only the stem. Plant mortality is heightened during the growing season.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems

(<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill

Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)

Oil Spills in Marshes: Planning and Response Considerations

(http://response.restoration.noaa.gov/sites/default/files/Oil_Spills_in_Marshes.pdf)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Shallow Marsh Annual

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Exclusion or Deflection Booming

- Boom can be used to exclude or deflect the spill away from sensitive resources.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed.

Sorbents/Sorbent Boom

- In areas with vegetation at or above water, sorbents are most effective in water surrounding vegetation (as opposed to within/on top of vegetated areas).
- Care is necessary during placement and recovery to minimize disturbance of vegetation. Work in boats to avoid driving oil into the sediment.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Flooding

- This tactic is only applicable in areas where the water level can be controlled, such as near locks and dams or in a small pond/marsh. Contact the U.S. Army Corps of Engineers water control regarding lock and dam operation.
- Can be used selectively to remove localized heavy oiling. This tactic is useful to remove oil trapped in vegetation, which can otherwise be difficult to herd toward recovery devices in open water. However, some oil may remain stranded in vegetation and will need to be removed through other means.

Low-Pressure, Ambient-Water Flushing

- Maintain low output pressures (less than 50 psi) to avoid disrupting the substrate and vegetation.
- Effectiveness increases with lighter oils because less residual oil is left in the environment.
- This tactic can be used with flooding to prevent re-deposition of oil.
- Use for spot removal of oil because of the limited area of effectiveness.

In-Situ Burning

- Presence of a water layer on marsh surface can protect roots.
- "Heavy ends" of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- The amount and placement of natural fuel in the surrounding area may present challenges to constraining the fire only to oiled areas.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.
- May be one of the least physically damaging means of moderate and heavy oil removal as it leaves plant roots intact.
- May be difficult to protect riparian vegetation.

Debris/Vegetation Removal

- Most appropriate for oils that form a persistent, thick, sticky coating on the vegetation, such as medium and heavy oils.
- Removal will release trapped oil and speed natural flushing rates.
- Debris may be associated with nests or living areas (e.g., beaver and muskrat lodges), therefore impacts on resident animal habitat need to be considered.
- If oil is trapped in floating vegetation, removal may be the only way to recover the oil in the absence of water currents.
- May be appropriate to prevent secondary oiling of wildlife.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Because wild rice is an attractive food source, leaving oiled zizania plants could harm birds and other wildlife that come to the marsh to feed. If that is not an issue, this tactic has few adverse effects.
- Lesser impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- Damage to vegetation and substrate may be reduced by controlling access routes, using pontoons or mats, or using a helicopter to bring in equipment.
- May be needed where oil has heavily contaminated bottom sediments.

Sediment Removal

- Vacuum/dredge sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment.
- Significant sediment removal may result in a change in the area's hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE: Shallow Marsh Perennial



Indicator Species



Water Smartweed
Polygonum spp.



River Bulrush
Schoenoplectus spp.



Common Reed
Phragmites spp.

Invasive Species



Purple Loosestrife
Lythrum spp.

I. Habitat Description

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



Invasive common reed.



Stand of invasive purple loosestrife.
Image: Ned Hettinger

II. Sensitivity to Oil Spills

The shallow marsh perennials habitat is high sensitive to oil spills. This habitat is valuable to a variety of birds, amphibian, reptile, and mammal species as well as micro and macro invertebrates, many of which are extremely sensitive to chemical exposure. During normal water levels, oil would be less likely to penetrate water-saturated soils; during floods, oil could be deposited in areas that dry out after the flood, and penetrate the loose, organic-rich surface soils. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants. Heavier oils tend to coat vegetation, which may survive if oil coats only the stems or if the roots are unaffected. It is difficult for more viscous oils to penetrate densely vegetated areas.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)
Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)
NatureServe (natureserve.org)
Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)
The U.S. National Vegetation Classification (<http://usnvc.org/>)
Wetland Plants and Plant Communities of MN & WI, 3rd Edition (http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Shallow Marsh Perennial

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Exclusion or Deflection Booming

- Boom can be used to exclude or deflect the spill away from sensitive resources.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed.

Sorbents/Sorbent Boom

- In areas with vegetation at or above water, sorbents are most effective in water surrounding vegetation (as opposed to within/on top of vegetated areas).
- Care is necessary during placement and recovery to minimize disturbance of vegetation. Work in boats to avoid driving oil into the sediment.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Flooding

- This tactic is only applicable in areas where the water level can be controlled, such as near locks and dams or in a small pond/marsh. Contact the U.S. Army Corps of Engineers water control regarding lock and dam operation.
- Can be used selectively to remove localized heavy oiling. This tactic is useful to remove oil trapped in vegetation, which can otherwise be difficult to herd toward recovery devices in open water. However, some oil may remain stranded in vegetation and will need to be removed through other means.

Low-Pressure, Ambient-Water Flushing

- Maintain low output pressures (less than 50 psi) to avoid disrupting the substrate and vegetation.
- Effectiveness increases with lighter oils because less residual oil is left in the environment.
- This tactic can be used with flooding to prevent re-deposition of oil.
- Use for spot removal of oil because of the limited area of effectiveness.

In-Situ Burning

- Presence of a water layer on marsh surface can protect roots.
- “Heavy ends” of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- The amount and placement of natural fuel in the surrounding area may present challenges to constraining the fire only to oiled areas.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.
- May be one of the least physically damaging means of moderate and heavy oil removal as it leaves plant roots intact.
- May be difficult to protect riparian vegetation.

Debris/Vegetation Removal

- Most appropriate for oils that form a persistent, thick, sticky coating on the vegetation, such as medium and heavy oils.
- Removal will release trapped oil and speed natural flushing rates.
- Debris may be associated with nests or living areas (e.g., beaver and muskrat lodges), therefore impacts on resident animal habitat need to be considered.
- If oil is trapped in floating vegetation, removal may be the only way to recover the oil in the absence of water currents.
- May be appropriate to prevent secondary oiling of wildlife.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Because perennials are an attractive food and nesting source, leaving oiled plants could harm birds and other wildlife that come to the marsh to feed and nest. If that is not an issue, this tactic has few adverse effects.
- Lesser impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- Damage to vegetation and substrate may be reduced by controlling access routes, using pontoons or mats, or using a helicopter to bring in equipment.
- May be needed where oil has heavily contaminated bottom sediments.

Sediment Removal

- Vacuum/dredge sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment.
- Significant sediment removal may result in a change in the area’s hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE: Submersed Aquatic Vegetation



Indicator Species



Maryland DNR

Wild Celery
Vallisneria spp.



Aquatic Plant Management Society

Coontail
Ceratophyllum spp.

Invasive Species



WI DNR

UGA1624031

Eurasian Watermilfoil
Genus: *Myriophyllum*



Christian Fischer

Curly-leaf Pondweed
Genus: *Potamogeton*

I. Habitat Description

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



Water Star Grass (*Heteranthera*) beds.
Image: Kurt Carpenter, USGS

II. Sensitivity to Oil Spills

Due to proximity to shorelines and establishment in shallow water, submersed aquatic vegetation habitat is highly sensitive to oil spills. Submersed vegetation, especially wild celery, are an important food source for waterfowl such as canvasback (*Aythya valisneria*), and provide habitat and food sources for a variety of invertebrates, fish, and other wildlife. Many fish and amphibious species deposit eggs on submerged vegetation. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants in these shallow habitats. Heavier oils tend to coat vegetation and animals, though the vegetation may survive because the roots are not affected. It is more difficult for more viscous oils to penetrate dense vegetation beds. However, these oils can smother submersed grass beds. Above all, oil reduces plant and animal tolerance to other environmental stress factors.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems (<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

NatureServe (natureserve.org)

Natural Wetland Inventory (<http://www.fws.gov/wetlands/>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Submersed Aquatic Vegetation

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Containment Booming

- Use containment boom to keep oil from spreading and to concentrate slicks for recovery.
- Effectiveness is increased by positioning boom at appropriate angles for the current speed and where water slows down and debris naturally collects, such as the outside of a meander or below a point bar.
- Recovery by skimmers or vacuum systems needs to accompany booming.

Sorbents/Sorbent Boom

- Deploy sorbent boom to recover sheens in low-current areas and along the shoreline.
- Overuse results in excess waste generation.
- Pom-pom type sorbents are best for heavy viscous oils that coat the strands; sorbent boom is best for light, low-viscosity oils that can penetrate into the sorbents.
- Absorbent boom must be changed frequently to prevent it from becoming a source of sheen.

Debris/Vegetation Removal

- Collect oiled free-floating vegetation. Minimize the cutting of rooted vegetation when possible.

Natural Attenuation

- Least impact for small spills and lighter oils; avoids damage often associated with cleanup activities.
- Consider impact to aquatic life in the area. Consultation with a Trustee is recommended.

Some Adverse Habitat Impact

In-Situ Burning

- Burn only in calm water with no current where containment and maintenance of minimum slick thickness (1-3 millimeters) is possible.
- "Heavy ends" of petroleum product remain unburned. This residue will begin to sink as it cools and should therefore be recovered as quickly as possible after the burn is complete.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.

Herding Agents/Physical Herding and Visco-Elastic Agents/Solidifiers

- Should be coupled with recovery.
- Most effective on lighter oils, which allow the product to mix into the oil.
- Care should be taken not to drive oil into the water column or sediment, or damage rooted vegetation.
- Visco-elastic agents improve overall oil recovery from water surfaces, reducing the potential for secondary shoreline oiling.
- Best used in calm water without debris/vegetation.
- Prior approval must be obtained from the RRT before use of these agents and solidifiers.

Most Adverse Habitat Impact

Sediment Removal

- Vacuum/dredge sediments and dewater using geotube/settling tank. Or, where feasible, dewater area and excavate the sediment
- Significant sediment removal may result in a change in the area's hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Wet Meadow



Indicator Species



Peter M. Dziuk

Joe-Pye Weed
Eupatoriadelphus spp.



Prairie Moon Nursery

Bluejoint Grass
Calamagrostis spp.



Arthur Haines

Prairie Cordgrass
Spartina spp.

Invasive Species



K. Chayka

Reed Canary Grass
Phalaris spp.

I. Habitat Description

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



Wet meadow dominated by grasses.
Image: USDA NRCS



Goldenrods in a wet meadow.
Image: Bob Arnebeck

II. Sensitivity to Oil Spills

The wet meadows habitat is highly sensitive to oil spills. This transitional habitat is valuable to upland and wetland plants and animals. Many animal species use the wet meadows habitat for reproduction, feeding, and as winter cover. Significant loss of this habitat would greatly affect the populations of these animals and consequently, the local ecology. Light refined oils can spread downslope even through thick vegetation and can penetrate into the organic-rich soils. Light refined oils with high amounts of water-soluble fractions can cause acute mortality to animals and plants in this habitat. Heavier oils get trapped at the edge of thick vegetation and can be more persistent. They also tend to coat vegetation and animals, though the vegetation may survive if oil coats only the stems or if the roots are not affected.

References/Additional Information:

General Classification Handbook for Floodplain Vegetation in Large River Systems

(<http://pubs.usgs.gov/tm/2005/tm2A1/>)

Inland Oil Spills: Options for Minimizing Environmental Impacts for Freshwater Spill Response (http://www.michigan.gov/documents/deq/deq-wb-wws-FreshwaterResponse_NOAA102706_265069_7.pdf)

MN DNR (<http://www.dnr.state.mn.us/restoreyourshore/pg/meadow.html>)

The U.S. National Vegetation Classification (<http://usnvc.org/>)

Wetland Plants and Plant Communities of MN & WI, 3rd Edition

(http://www.bwsr.state.mn.us/wetlands/delineation/WPPC_MN_WI/index.html)

Oil Spills in Marshes: Planning and Response Considerations

(http://response.restoration.noaa.gov/sites/default/files/Oil_Spills_in_Marshes.pdf)



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Wet Meadow

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to this habitat resulting from various oil spill response methods and provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Habitat Impacts

Flooding

- Appropriate for locations with gentle gradient where persistent oil has pooled.
- Should only be used if released oil can be reliably directed towards sorbents or recovery devices and prevented from impacting other areas.
- Effectiveness increases with lighter oils because they are less viscous and less residual oil is left in the environment.
- Some oil may still be left stranded after flooding and will need to be collected through other means.

Collection by Direct Suction

- Adverse impact can be mitigated by limiting vehicles, hoses, and equipment to staging areas with firm substrate and sparse vegetation. If equipment must access other areas, precautions should be taken to avoid driving oil into sediment or softer substrate, and trampling vegetation. For example: limit access routes through the area; walk, drive, and station equipment on mats or boards instead of directly on top of vegetation; use boats in flooded areas; and use a helicopter to bring in equipment to areas that are difficult to access.
- Only useful where oil is thickly pooled (not appropriate for sheens).

Low-Pressure, Ambient-Water Flushing

- Effective for washing oil stranded on banks into the water for recovery.
- Vegetation cover minimizes the potential for sediment erosion from flushing. However, thick vegetation also reduces area of influence of flushing operations.
- Effectiveness increases with lighter oils because they are less viscous and less residual oil is left in the environment.

In-Situ Burning

- May be one of the least physically damaging means of moderate and heavy oil removal.
- “Heavy ends” of petroleum product remain unburned and must be recovered. This residue will sink once it is cool.
- Least adverse impact when used in grassy areas versus areas covered with trees and shrubs. Fires are a naturally occurring part of this habitat’s plant lifecycle, so vegetation should be able to recover quickly from a burn as long as the roots are not damaged.
- Authorization of in-situ burning is subject to RRT approval, consultation and concurrence from the state and the Department of the Interior.

Some Adverse Habitat Impact

Natural Attenuation/Phytoremediation

- Least impact for small to moderate spills and lighter oils; avoids damage often associated with cleanup activities.
- Cleanup should be used in addition to attenuation in areas where using only attenuation would put sizable wildlife populations at risk for becoming oiled or re-oiled.

Debris/Vegetation Removal

- Most appropriate for oils that form a thick, sticky coating on the vegetation, such as medium and heavy oils.
- Remove stained or oiled vegetation to protect wildlife users of the habitat. Additionally, grass roots can be damaged by oil and may need to be removed as well.
- Damage by cleanup crews may be reduced by avoiding excessive cutting/removal.
- Response crews entering the marsh can inadvertently trample vegetation during cleanup/removal. To reduce this impact: control and minimize access routes through the marsh; have personnel stand or kneel on boards while working; and conduct operations from boats when possible.

Most Adverse Habitat Impact

Light Equipment Oil Removal

- May be needed where oil has heavily contaminated bottom sediments.
- Most effective where access is good and substrate can support vehicles.
- Avoid forcing oil into the substrate and trampling vegetation by limiting access routes through the area, traversing the area on boards/mats/pontoons, or using a helicopter to bring in equipment.

Hand Tool Oil Removal/Cleaning

- Used where persistent oil occurs in heavy amounts and animals using the wetland are likely to be oiled.
- Avoid forcing oil into substrate and trampling vegetation by limiting access routes through the area and walking on boards or mats.

Sorbents

- Overuse generates excess waste.
- Forcing contact between pads and oiled substrate can drive oil into the soil, making it more difficult to recover.

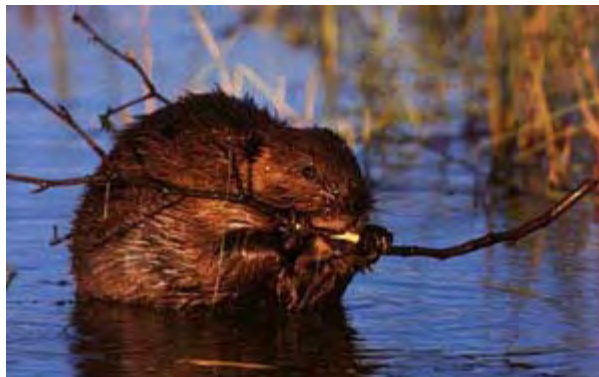
Sediment Removal

- For watered areas: vacuum/dredge sediments and dewater using geotube/settling tank; or, where feasible, dewater the area and excavate the sediment.
- Significant sediment removal may result in a change in the area’s hydrology as well as make it difficult to fully restore the plant community that existed prior to the spill incident.
- Permits will be required for sediment removal and for water discharge.

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: AMERICAN BEAVER (*Castor Canadensis*)

I. Species Description

Beavers are the largest rodents in North America. They are primarily aquatic animals. They average 3 to 4 feet in length and range from 30 to 75 pounds in weight. They have a waterproof, rich, glossy, reddish brown or blackish brown coat. The ears are short, round, and dark brown. The hind legs are longer than the front legs, making the rear end higher than the front end while walking. A beaver's incisors are long, massive and sharp and are used chiefly for gnawing. They have a spilt nail on the second hind toe used for grooming. Beavers are easily identified by their large paddle-shaped tails.



Beavers are found throughout all of North America except for the northern regions of Canada, the deserts of the southern United States, Mexico, and Florida. They live in lodges, of which there are three types: those built on islands, those built on the banks of ponds, and those built on the shores of lakes. The island lodge consists of a central chamber, with its floor slightly above the water level, and with two entrances. One entrance opens up into the center of the hut floor, while the other is a more abrupt descent into the water.



Beavers confine their activities to within one-half mile of their lodge or den. They are most active at night, dusk, and dawn. Daytime activity is rare except during the breeding season, when the ice melts in springtime, and in areas with little human disturbance.

Beavers eat bark and cambium (the softer growing tissue under the bark of trees). Their favorites include willow, maple, poplar, beech, birch, alder, and aspen trees. They store woody vegetation near shore for winter food. They also eat water vegetation, buds, and roots in warm weather.

II. Sensitivity to Oil and Other Spills

Beavers spend large amounts of time in the water and rely on their fur for insulation. If externally oiled, they could suffer eye damage or become hypothermic and die. Beavers groom frequently, placing them at risk of ingesting oil. Consumption of contaminated plants could also result in oil ingestion. Ingestion of oil can result in digestive tract bleeding and in liver and kidney damage. Breathing hydrocarbon vapors can result in nerve damage and behavioral abnormalities to all mammals. Spills may also indirectly affect habitats and food resources.

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: AMERICAN BEAVER (*Castor Canadensis*)

III. Sensitivity to Response Methods

Methods Causing Least Adverse Impacts

Boom Deployment

- Control the movement of floating oil to prevent or reduce contamination of species.

Skimming

- Recover floating oil from surface to prevent or reduce contamination of species.

Physical Herding

- Free oil trapped in vegetation or debris to move away from sensitive areas.

Vacuum

- Minimal effects if foot and vehicular traffic is controlled and minimal substrate is removed.

Manual Cleaning/Removal

- Oiled debris should be removed to prevent scavenging and the ingestion of oil.

Methods Causing Some Adverse Impact

In-Situ Burning

- If used, include either wildlife hazing in burn area or capture of oiled wildlife.

Shoreline Cleaning Agents

- Wildlife may contact cleaning agents and/or bioremediation substances used for shoreline treatment.

Sorbents

- Likely disturbance of habitat during deployment and retrieval. Use should be monitored to prevent overuse and generating large volumes of waste.

Scare Tactics

- Increased stressing of wildlife may lead to shock and fatalities.

Methods Causing Probable Adverse Impact

Natural Recovery

- This method may be inappropriate for areas where high numbers of mobile animals (birds, terrestrial mammals) or endangered species use the body of water or shoreline.

Vegetation Removal

- Will destroy habitat for many animals. Cut areas will have reduced plant growth. Trampled areas will recover much more slowly.

Sources

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<http://www.epa.gov/oilspill/pdfs/chap5.pdf>

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: FROGS (*Order Anura*)

I. Species Description

There is no scientific distinction between "frogs" and "toads," although most of the species are usually referred to as one or the other. They are found throughout most of the world, except in polar regions, some oceanic islands, and extremely dry deserts. They are found from tropical rainforests to dry mountaintops, from deserts to swamps. Adults may be arboreal, terrestrial, or aquatic. The continental United States is home to at least 90 frog species.



Physical features shared by most frogs include powerful hind legs for hopping and leaping, bulging eyes, and squat bodies. However, because of the large number of species, there are many characteristics that are not shared. There is a wide range in size, and many different types of skin textures, colors, and markings.



Being cold blooded, temperature is critical to frogs. In the winter months, frogs in temperate zones cannot remain active and must enter into a state of extremely reduced activity. In summer months, frogs can avoid the extreme heat by remaining underground in daylight, and being active at night.

Frogs are also susceptible to the loss of body water due to extremely hot or dry conditions. Those in temperate climates maintain moist skin to aid in evaporative cooling. Permeable skin allows the frog

the ability to absorb water simply by jumping into a pond or sitting in a puddle. Frogs in arid regions, on the other hand, have different ways of regulating body water. Their skin is often impermeable to water to prevent rapid evaporation and dehydration. Instead, they may cover their bodies with a thick mucus, or burrow to avoid the heat altogether.

Frogs are carnivorous. They mostly feed on insects, other small arthropods, or worms. Some of the larger species eat vertebrates such as other frogs, and small rodents, snakes, and turtles.

II. Sensitivity to Oil and Other Spills

Frogs are in constant danger from toxic spills from egg to adult. As eggs and larval tadpoles they are particularly exposed to contaminants in the water. Most adult frogs have thin, permeable skin which externally absorbs pollution from the air, water, and soil. They are also likely to ingest spilled chemicals via consumption of contaminated food, soil, or sediment in their habitats. Research suggests that toxic spills in aquatic environments are linked to global outbreaks of frog deformities and population declines.

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: FROGS (*Order Anura*)

III. Sensitivity to Response Methods

Methods Causing Least Adverse Impacts

Boom Deployment

- Control the movement of floating oil to prevent or reduce contamination of species.

Skimming

- Recover floating oil from surface to prevent or reduce contamination of species.

Physical Herding

- Free oil trapped in vegetation or debris to move away from sensitive areas.

Vacuum

- Minimal effects to wildlife if foot and vehicular traffic is controlled and minimal substrate is removed.

Manual Cleaning/Removal

- Oiled debris should be removed to minimize the ingestion of oil.

Methods Causing Some Adverse Impact

In-Situ Burning

- If used, include either wildlife hazing in burn area or capture of oiled wildlife.

Shoreline Cleaning Agents

- Wildlife may contact cleaning agents and/or bioremediation substances used for shoreline treatment.

Sorbents

- Likely disturbance of habitat during deployment and retrieval. Use should be monitored to prevent overuse and generating large volumes of waste.

Methods Causing Probable Adverse Impact

Natural Recovery

- This method may be inappropriate for areas where dense species populations or endangered species use the body of water or shoreline.

Vegetation Removal

- Will destroy habitat for many animals. Cut areas will have reduced plant growth. Trampled areas will recover much more slowly.

Sources

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<http://frogweb.nbii.gov/>

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NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: FRESHWATER MUSSELS

I. Species Description

Nearly 300 species of mussels inhabit freshwater rivers, streams, and lakes in North America, it is estimated that 43% of these species are in danger of extinction. Historically, the Midwest boasted the most diverse collection of mussels in the world. But today, the States of Minnesota, Wisconsin, Iowa, Missouri, Illinois, Indiana, and Ohio list more than half of their 78 known mussel species as endangered, threatened, or requiring special concern.



Freshwater mussels belong to a larger group of animals with shells called mollusks. Mollusks are soft-bodied animals enclosed by two hard shells made mostly of calcium and are connected by a ligament or hinge. Because adults are sedentary, long-lived (some live over 100 years), live in sediments, and feed by filtering water, they are excellent indicators of the health of aquatic ecosystems. In addition, mussels are a vital link in the food chain because they are a major food item for wildlife such as raccoon, muskrat, and otter.

Unlike oysters and clams, freshwater mussels need a fish to complete their life cycle. Some mussels require a specific host fish to complete their life cycle; others can use a variety of fish species.



Freshwater mussels are often found in mussel beds, which can be a mile or more long and contain thousands of mussels anchored in mud, sand or gravel. The majority of mussel beds found in large rivers occur in main channel areas, secondary channels, and adjacent backwater habitats.

II. Sensitivity to Oil Spills

Freshwater mussels are highly sensitive to oil spills. Although adult mussels have the ability to "clam up" for a limited time to avoid toxins such as gasoline and oil, young mussels are often killed immediately. Multiple spills or the long-term, chronic leaching of toxins accumulate in the tissues of mussels as they continually filter water for food, and can be passed through the food chain. Eventually the entire mussel population can be killed; directly from a toxin or by killing the fish hosts on which they depend for successful reproduction, ultimately eliminating the mussels.

Freshwater mussels inhabiting navigational river systems have additional sensitivity when responders use the river's lock and dam system to exclude the downstream movement of oil. The resulting changes in water depth, water currents, temperature can negatively affect freshwater mussels. Additionally, closing dams may become barriers to fish and mussel migration, possibly affecting upstream distribution and survival of juvenile mussels in these river systems.

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: FRESHWATER MUSSELS

III. Sensitivity to Response Methods

Methods Causing Least Adverse Impacts

Debris Removal

- Degree of oiling that warrants debris removal and disposal depends on human and sensitive resource use of the site

Sorbents

- Overuse generates excess waste
- Physical removal rates of heavy oils will be slow, so less oil will be mobilized for recovery by sorbents

Methods Causing Some Adverse Impact

Natural Recovery

- Oil can stimulate algal production, which covers mussel beds, inhibits feeding, and reduces the supply of oxygen.
- Sheltered mussels may need cleanup because of slow natural removal rates

Flooding and Low-Pressure, Cold-Water Flushing

- Use on heavy oils is likely to leave large amounts of residual oil in the environment
- Use on gasoline spills may transport the oil to more sensitive habitats

Manual Oil Removal/Cleaning

- Mussels are susceptible to trampling

Vacuum

- Not applicable to gasoline spills because of safety concerns

Shoreline Cleaning Agents

- Individual products vary in their toxicity and recoverability of the treated oil

Low Pressure, Hot Water Flushing

- Mussels would be adversely affected by hot water
- Most effective on heavy crudes where heat would make oil more fluid

Methods Causing Probable Adverse Impact

High-Pressure, Hot-Water Flushing

- Will likely kill mussels; use is appropriate in limited areas

Exclusion

- Changes in water depth, water currents, temperature, and restructured fish and algal communities can negatively affect freshwater mussels by exposure, accumulated sedimentation, and affecting upstream distribution and survival of juvenile mussels.

Sources

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NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: FRESHWATER MUSSELS

<http://www.ext.vt.edu/pubs/fisheries/420-523/420-523.html#L5>

http://www.great-lakes.net/partners/epa/acp-rcp/app_VI.html#3.0

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: NORTHERN RIVER OTTER (*Lontra Canadensis*)

I. Species Description

North American river otters are semi-aquatic mammals, with long, streamlined bodies, thick tapered tails, and short legs. They have wide, rounded heads, small ears, and nostrils that can be closed underwater. The whiskers are long and thick. The fur is dark brown to almost black above and a lighter color on the underside. The throat and cheeks are golden brown. The fur is dense and soft, effectively insulating these animals in water. The feet have claws and are completely webbed. Body length ranges from 35 to 51 inches and tail length from 12 to 20 inches. Weight ranges from 11 to 30 lbs. Males average larger than females in all measurements.



River otters are found in Canada, Alaska, the Pacific Northwest, the Great Lakes states and along the Atlantic coast and Gulf of Mexico. Vegetation adjacent to rivers, streams, lakes, and other wetland areas are key habitats. Adult males live along large stretches of river, often up to 40 to 50 miles. Females are not as mobile. Their home ranges are only 3 to 10 miles depending on habitat quality and the time of year. They travel a lot but spend most of their time at activity centers with abundant food and cover. Examples of these centers include logjams, oxbows, pools below dams or spillways, and springs or riffles that stay free of ice all winter.



River otters eat mainly aquatic organisms such as amphibians, fish, turtles, crayfish, crabs, and other invertebrates. Birds, their eggs, small terrestrial mammals, and sometimes aquatic plants are also eaten on occasion. Prey is eaten immediately after capture, usually in the water, although larger prey is eaten on land.

II. Sensitivity to Oil and Other Spills

River otters spend a great deal of time swimming and diving in for food. Their fur can become oiled while in the water, resulting in a loss of insulation and hypothermia. In addition, river otters groom frequently and can ingest oil as a result.

While they prefer live prey, they are also opportunistic feeders and potentially will eat oiled carrion, especially during the winter and spring. Ingestion of hydrocarbons during the grooming process or through feeding on contaminated prey items may result in digestive-tract irritation, neurological effects and physiological changes, which in turn, may lead to organ injury, dysfunction, and death. Aromatic hydrocarbons are capable of causing inhalation injury and may cause death before either hypothermia or ingestion injuries affect the animals.

NET ENVIRONMENTAL BENEFITS ANALYSIS SPECIES FACT SHEET: NORTHERN RIVER OTTER (*Lontra Canadensis*)

III. Sensitivity to Response Methods

Methods Causing Least Adverse Impacts

Boom Deployment

- Control the movement of floating oil to prevent or reduce contamination of species.

Skimming

- Recover floating oil from surface to prevent or reduce contamination of species.

Physical Herding

- Free oil trapped in vegetation or debris to move away from sensitive areas.

Vacuum

- Minimal effects to wildlife if foot and vehicular traffic is controlled and minimal substrate is removed.

Manual Cleaning/Removal

- Oiled debris should be removed to prevent scavenging and the ingestion of oil.

Methods Causing Some Adverse Impact

In-Situ Burning

- If used, include either wildlife hazing in burn area or capture of oiled wildlife.

Shoreline Cleaning Agents

- Wildlife may contact cleaning agents and/or bioremediation substances used for shoreline treatment.

Sorbents

- Likely disturbance of habitat during deployment and retrieval. Use should be monitored to prevent overuse and generating large volumes of waste.

Scare Tactics

- Increased stressing of wildlife may lead to shock and fatalities.

Methods Causing Probable Adverse Impact

Natural Recovery

- This method may be inappropriate for areas where high numbers of mobile animals (birds, terrestrial mammals) or endangered species use the body of water or shoreline.

Vegetation Removal

- Will destroy habitat for many animals. Cut areas will have reduced plant growth. Trampled areas will recover much more slowly.

Sources

State of Illinois, Illinois Department of Natural Resources, Illinois Furbearer Guide: River Otter, Accessed February 8, 2006 at, http://www.dnr.state.il.us/orc/wildlife/furbearers/river_otter.htm

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http://www.great-lakes.net/partners/epa/acp-rcp/app_VI.html#2.0

INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Toxic Plant Species



Some plant species found in and along inland waterways are toxic to humans. This fact sheet highlights four toxic plants common near inland waterways in the Midwest. Exposure to these plants through direct skin contact can produce a host of unpleasant effects, ranging from minor skin irritation to rash, blistering, and discoloration of the skin. Caution should be exercised while conducting Shoreline Cleanup and Assessment (SCAT) in areas that may contain the plant species listed below. Wear gloves, long sleeve shirts, and long pants to avoid coming into direct contact with these toxic plants. Wash clothing immediately as toxins from plants can persist for long periods of time beyond initial contact.

Poison Ivy	Wild parsnip	Wood Nettle and Stinging Nettle	Giant Hogweed
Spring	Rosette	Leaves	Leaves
			
Summer	Flower	Flower	Flower
			
Fall	Mature plant	Stand	Mature Plant
			



INLAND STRANDED OIL HABITAT FACT SHEET FOR RESPONSE:

Toxic Plant Species

Species Descriptions:

Poison Ivy (*Toxicodendron radicans*)

A poisonous flowering perennial plant distributed widely across the United States known for causing an itching, irritating, and often painful rash on most people who come into direct contact with it. This reaction is caused by urushiol, a compound in the sap that helps the plant retain water. **This compound can persist on clothing, plants, and other surfaces for several years, so it is important to wash anything that comes into contact with poison ivy in order to avoid future exposure. The entire plant, not just the leaves, is poisonous.**

Though highly variable in appearance, poison ivy is commonly identified by three droopy, almond-shaped leaves. Leaf colors vary from light to dark green and turn reddish in the fall. Younger leaves in the spring are typically red before turning green. All plant variations have smooth woody stems, but can grow as a trailing vine 10-25 centimeters tall, a shrub up to 3 feet in height, or as a climbing vine that grows on a tree or some other type of support. Flowering occurs from May through July. The flowers range in color from yellow to white. Small, gray-white and berry-like fruits appear from August through November.

Poison Ivy is typically found in wooded areas with partial sunlight, older suburban developments, and can also grow in exposed rocky areas, and open fields.

Similar species: box-elder, Virginia creeper, tree of heaven seedling, Sassafras seedling, raspberry, jewelweed

Wild Parsnip (*Pastinaca sativa*)

A poisonous perennial herbaceous plant native to Eurasia, wild parsnip is phytophototoxic and **can cause rash, blistering and discolored skin in the presence of sunlight**. Though grown as a root vegetable, it is considered a noxious weed in several states and in some instances, prohibited from transportation.

Wild parsnip is monocarpic and thus spends one or more years in a smaller 6 inch tall rosette stage before entering a 4 foot tall flowering stage. The plant dies after flowering and producing seed. The leaves are alternately arranged and consist of 5-15 egg-shaped leaflets along both sides of a stalk. Leaflets can be sharply-toothed or lobed at the margins. The five-petaled, yellow flowers bloom in June throughout the summer.

Wild parsnip is a widespread colonizer of dry, mesic, and wet disturbed and open areas. It is common along roadsides, railways, and oak openings.

Similar species: Golden Alexander, Cow parsnip, Poison hemlock

Wood Nettle (*Laportea canadensis*) and Stinging Nettle (*Urtica dioica*)

Stinging nettle and wood nettle have several tiny stinging hairs on their leaves and stem. **Direct contact with both types of nettles results in a brief, but intense itching of the skin.** Both are similar in size and appearance, reaching heights of 2-7 feet with slender stems and coarsely serrated leaves. A difference occurs in leaf arrangement as the wood nettle has an alternate arranged leaf pattern whereas the stinging nettles are oppositely arranged.

Though both plants are widespread, their habitats differ with the wood nettle perhaps being of more concern for responders to inland river spills. The wood nettle grows in dense stands in deep-shaded, moist woodlands or underneath trees found along streams or lakes. The stinging nettle is more common on higher ground in full sunlight.

Similar species: Jewelweed, Slender nettle, False nettle, Clearweed, Mint, Raspberry

Giant Hogweed (*Heracleum mantegazzianum*)

A plant of considerable stature, the giant hogweed is difficult to miss. It has a stiff, bright green stem spotted with dark red and hollow red-spotted leaf stalks that produce bristles. The compound leaves are sharply incised and can grow up to 3-5 feet in width. The large white inflorescences typically flower from mid-June to mid-July. Its height ranges from 6-18 feet. Like the wild parsnip, giant hogweed is phytophototoxic. **Direct contact with the sap combined with exposure to sunlight will result in blisters, burns, long-lasting scars, and-if exposed to eyes-blindness. Moreover, skin will continue to burn for up to two years upon repeated exposure to sunlight. These reactions can result from contact with the leaves, roots, stems, flowers, and seeds of the plant.**

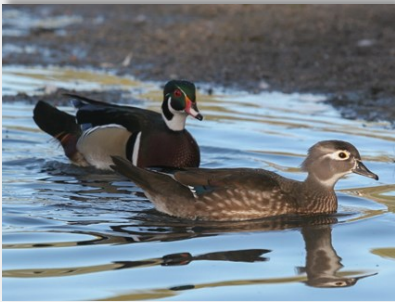
Giant hogweed distribution is limited to the Northeast and Northwest United States, Illinois, Michigan, and Wisconsin. It prefers to grow along riverbanks, making it a concern for responders to inland river spills.

Similar species: Common hogweed, Cow parsnip, Queen Anne's Lace, Elderberry

INLAND STRANDED OIL SPECIES FACT SHEET FOR RESPONSE: Waterfowl



Key Mississippi Flyway Species



Wood Duck
Aix spp.



Canvasback
Aythya spp.



Greater Scaup
Aythya spp.



Ring-necked Duck
Aythya spp.

I. Description

Waterfowl are medium to large birds (1 to 6 ft; 8 oz to 50 lbs.). The birds' necks are relatively long and the heads are small. Wings are short and tails may be short and rounded or longer and narrow. Legs are set far back on the body and the front three toes are webbed. Bills are generally broad. The birds spend much of their time in the water and spend a great deal of time on preening and feather maintenance. They use their bills to condition and waterproof their feathers with oil secreted from a gland in the skin at the base of the tail.

Most waterfowl are omnivorous, but some are primarily herbivorous and others are mostly carnivorous. They eat the seeds, roots, stems, leaves and flowers of aquatic vegetation. Some feed on plankton or algae. Other food items taken include mollusks, aquatic insects, crustaceans and small fish. Some waterfowl feed by diving under water.

Waterfowl tend to form flocks ranging from a few to several hundred thousand individuals. Flocks form for protection from predation, during migration, and while locating abundant food sources.

II. Sensitivity to Oil

Waterfowl are some of the most sensitive and vulnerable species to oil spills. Direct exposure to oil causes feathers to separate, impairs waterproofing, buoyancy, and exposes skin to hyper or hypothermia and lesions. Oil ingested while preening may result in ulcers, pneumonia, and liver damage, among other life-threatening conditions. Oiled waterfowl will focus all attention on preening, and will forgo feeding and predator avoidance. This can lead to other severe conditions such as dehydration, anemia, and extreme weight-loss. **State and Federal wildlife officials must be notified for response to oiled birds. Oiled waterfowl require proper collection, cleaning, and treatment by certified, state-licensed wildlife rehabilitators at an off-site facility, though temporary processing centers may be necessary.**

References/Additional Information:

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National Wildlife Federation. "Oil Spill Impacts on Birds" (On-line). Accessed February 25, 2015 at <https://www.nwf.org/What-We-Do/Protect-Habitat/Gulf-Restoration/Oil-Spill/Effects-on-Wildlife/Birds.aspx>

Wildlife Resources Webinar Training: oil spill response modules. Hosted by: USEPA, USFWS, USDA APHIS. 9/11/2014.



Oiled Canada goose



Mallards take flight



Oiled mallards



Mississippi River Flyway

Thousands of waterfowl congregate in some of the pools on the Upper Mississippi River during the peak migration times, generally occurring around March/April and October/November. Waterfowl typically stage for longer periods during the fall migration period.



INLAND STRANDED OIL SPECIES FACT SHEET FOR RESPONSE:

Waterfowl

III. Sensitivity to Response Methods

The following text describes potential adverse impacts to waterfowl resulting from various oil spill response methods and/or provides recommendations to reduce impact when these methods are implemented. This is not intended to preclude the use of any particular methods, but rather to aid responders in balancing the need to remove oil with the possible adverse effects of removal with respect to waterfowl. More detail about the response methods themselves can be found in the [Inland Response Tactics Manual](#).

Least Adverse Impacts on Waterfowl

Boom Deployment

- Control the movement of floating oil to prevent or reduce contamination of waterfowl.

Skimming

- Recover floating oil from water surface to prevent or reduce the contamination of waterfowl.

Physical Herding

- Free oil trapped in vegetation or debris and away from sensitive waterfowl habitat like feeding, nesting, and staging areas.

Vacuum

- Minimal effects to waterfowl if foot and vehicular traffic is controlled and minimal substrate is removed.

Manual Cleaning/Removal

- Oiled debris should be removed to prevent scavenging and the ingestion of oil.

Some Adverse Habitat Impact

Dispersants

- Dispersant/detergent contact with waterfowl can reduce insulating value of plumage.

Hazing

- Increased stressing of waterfowl may lead to shock and fatalities.
- Can be used to keep waterfowl from *in-situ* burn areas.

Most Adverse Habitat Impact

In-Situ Burning

- Haze waterfowl away from burn areas and/or the capture of oiled birds.
- Will destroy waterfowl habitat.

Natural Attenuation

- This method may not be suitable for waterfowl nesting, foraging, and staging areas.

Vegetation Removal

- Will destroy waterfowl habitat. Clearing of upland areas will reduce waterfowl nesting habitat. Trampled vegetation will recover slowly.

IV. Sensitivity to Hazing and Recovery Methods

The following text describes potential adverse impacts to this habitat resulting from wildlife hazing and recovery methods and provides recommendations to reduce impact when these methods are implemented. Wildlife hazing and recovery must be done under the direction of the wildlife branch director and a hazing plan that includes safety considerations must be in place. This is not intended to preclude the use of any particular methods, but rather to aid responders with determining suitable techniques.

Least Adverse Hazing/Recovery Impacts on Waterfowl

Visual Deterrent(s)- reflective materials, lights/lasers, kites/balloons, scarecrows/effigies

- Mylar tape can be used to startle birds, but will habituate quickly to reflective hazing techniques.
- Brightly colored balloons, kites and effigies designed to imitate predators may startle birds. Need to regularly monitor and maintain to ensure effectiveness.
- Lasers/lights most effective in dim light and areas where pyrotechnics cannot be used.
- Need to ensure effigies/scarecrows do not offend public.

Acoustic Deterrent(s)- natural calls, artificial sounds

- Predators calls/species distress calls may be effective for hazing in areas where pyrotechnics are not appropriate to use.
- Artificial sounds like air horns, whistles, bells are a short-term hazing technique.
- Not effective for hazing diving birds.

Recovery- traps/cages

- Should be placed in areas not susceptible to further oiling and away from spill cleanup zones.

Some Adverse Capture/Hazing Impacts on Waterfowl

Acoustic/Visual Deterrent(s)- pyrotechnics

- Users must be trained to use pyrotechnics, wear proper protective equipment, follow Class C explosive guidelines, and notify responders in vicinity of use.
- Do not use when there is a risk of fire.

Recovery- manual capture/nets

- Trained wildlife handler with proper PPE should capture most heavily oiled individual birds.

Most Adverse Capture/Hazing Impacts on Waterfowl

Acoustic Deterrent(s)- propane cannon

- Upon Incident Command approval, can be set up to fire automatically in areas not susceptible to fire.
- Locations should be mapped and made known to all responders.
- May be vulnerable to sabotage by locals/public.

Recovery- cannon nets

- Technique should only be implemented by a trained wildlife professional.
- Responsible party is not liable for injured/killed wildlife resulting from poorly chosen/implemented recovery techniques.