ESSENTIAL FISH HABITAT BEST MANAGEMENT PRACTICES FOR CERTAIN RESPONSE ACTIVITIES TO ACCIDENTAL DISCHARGES OF OIL AND OTHER HAZARDOUS MATERIALS

National Marine Fisheries Service, Southeast Region, Habitat Conservation Division

PURPOSE

The National Marine Fisheries Service (NMFS), Southeast Region, Habitat Conservation Division has prepared the following best management practices (BMPs) for minimizing impacts to trust resources and serve as EFH conservation recommendations for certain, frequently utilized, emergency response activities approved by U.S. Coast Guard (USCG) and/or Environmental Protection Agency (EPA). **NOTE: At this time, these BMPs are not intended to satisfy any requirements of the Endangered Species Act.**

Why is an EFH Consultation Required?

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) created a requirement for federal agencies to consult with the NMFS when their actions or activities may adversely affect habitat identified by federal regional fishery management councils or NMFS as essential fish habitat (EFH). Through this consultation process, measures are identified to avoid, reduce, or compensate for adverse impacts to EFH.

The EFH regulations (50 C.F.R. Section 600.920(a)(1)) addresses consultation during emergencies:

> Consultation is required for emergency Federal actions that may adversely affect EFH, such as hazardous material clean-up, response to natural disasters, or actions to protect public safety. Federal agencies should contact NMFS early in emergency response planning, but may consult after-the-fact if consultation on an expedited basis is not practicable before taking the action.

At its most basic, an EFH consultation consists of a federal agency providing NMFS with an EFH Assessment, NMFS responding with EFH conservation recommendations followed by the federal agency's response to NMFS recommendations.

Is consultation required for response activities? Response activities generally protect the environment from hazardous material discharges.

It is recognized that oil and other hazardous materials accidentally discharged into the environment can result in significant adverse effects to the marine and estuarine habitats including those identified and described as EFH. It is also recognized response actions undertaken by the USCG and the EPA are intended to limit or prevent adverse effects on the environment. Nonetheless, various response activities have the potential to adversely affect marine and estuarine habitats identified as EFH and therefore trigger the consultation requirement.

To prevent the need to conduct emergency consultation during every oil spill occurring in the NMFS Southeast Region's area of responsibility the Habitat Conservation Division has prepared the following BMPs for minimizing impacts to trust resources and serve as EFH conservation recommendations for certain response activities.

How should these BMPs be used?

NMFS Southeast Regional Habitat Conservation Division personnel are not on-call for immediate consultation or coordination during emergencies, particularly those occurring outside normal weekday business hours. These BMPs are intended as general guidelines when response options are being considered by the USCG and/or EPA. EFH conservation recommendations are advisory and these guidelines can be adapted as warranted to protect human life, prevent significant loss of property, and protection of the environment.

When do these BMPs *not* apply?

Emergency consultation should occur in the following instances:

- Any Spill of National Significance
- Any proposed use of:
    - Barriers, Berms, and Underflow Dams
    - Dispersants not in accordance with a pre-approval plan
    - In-Situ Burning not in accordance with a pre-approval plan
    - Solidifiers not in accordance with a pre-approval plan
    - Nutrient Enrichment
    - Natural Microbe Seeding
- When no BMPs are identified for a response method or BMPs are specifically not recommended for category(ies) of EFH.

If the BMPs do not apply, how should an emergency consultation occur?

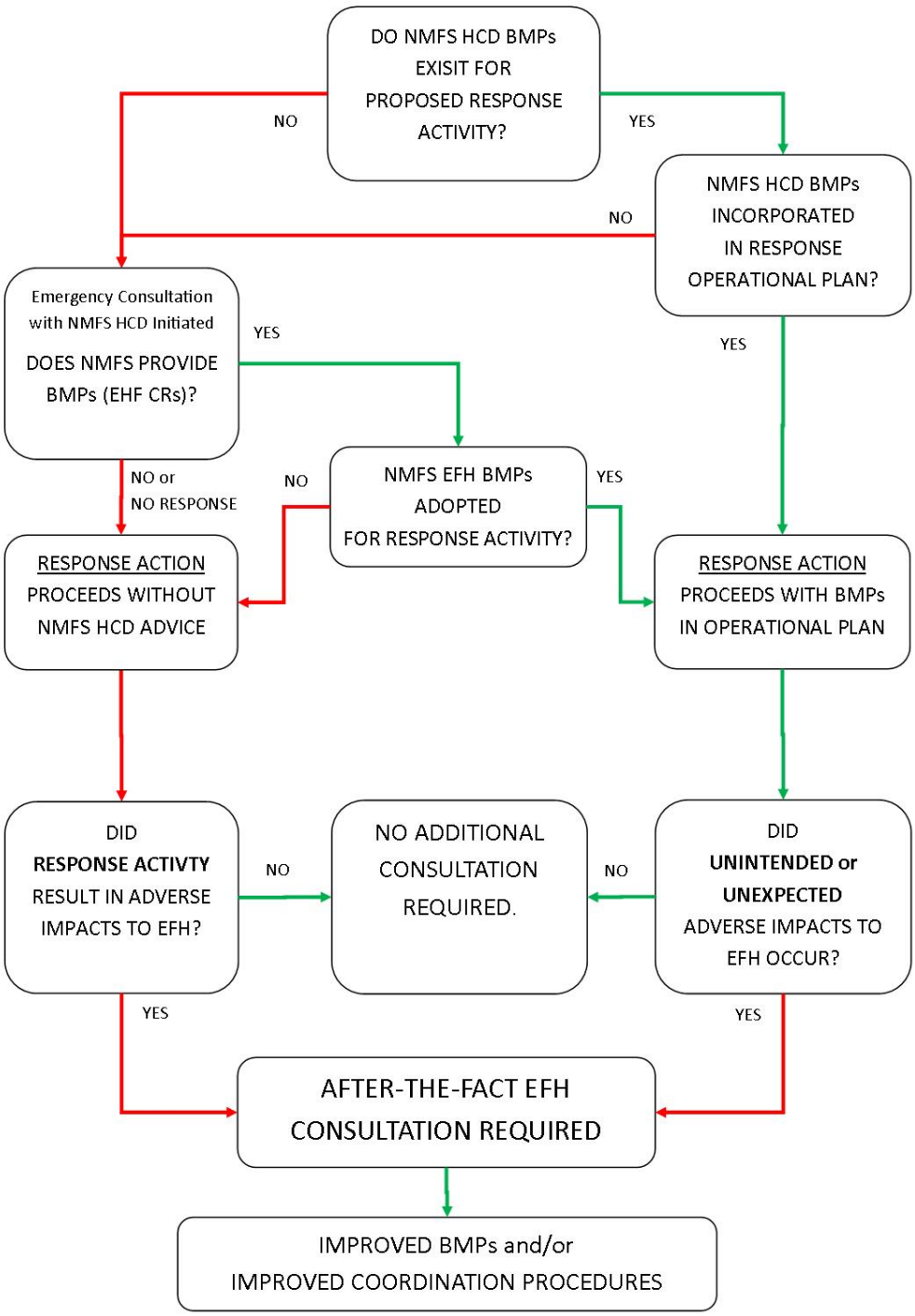
Often the NOAA Scientific Support Coordinator (NOAA SSC) will contact the NMFS Habitat Conservation Division (and Protected Resources Division). To avoid unnecessary delays and duplication, the Southeast Region utilizes the same process for initiating contact for both Essential Fish Habitat and Endangered Species Act Emergency Consultations found here:

http://sero.nmfs.noaa.gov/habitat_conservation/efh/emergency_consultation/index.html

When is After-the-Fact EFH Consultation Required?

The USCG and/or EPA should consult with NMFS Habitat Conservation Division after-the-fact when response activities result in unexpected or unanticipated adverse effects to habitats identified and described as EFH. The primary purpose of an after-the-fact consultation to emergency response activities will be to gather and analyze lessons-learned to inform revisions to these BMPs and future response activities.

GENERAL COORDINATION/CONSULTATION FLOW CHART



POINTS OF CONTACT

NMFS SOUTHEAST REGION
HABITAT CONSERVATION DIVISION (HCD)

PRIMARY CONTACT DURING EMERGENCIES:

nmfs.ser.emergency.consult@noaa.gov

This emergency consultation e-mail address redirects to several NMFS Southeast Region personnel in both the Protected Resources and Habitat Conservation Divisions.

HCD Response BMPs &
HCD EFH Coordinator.....David Dale..... David.Dale@noaa.gov 727-551-5736

HCD LOCAL FIELD PERSONNEL:

The HCD has offices located throughout the southeast United States. If you need local expertise contact information for our field personnel is available here:

http://sero.nmfs.noaa.gov/habitat_conservation/faqs/hcd_contact_us.html

SOUTHEAST REGION HCD LEADERSHIP:

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BEST MANAGEMENT PRACTICES

The following BMPs are intended as general guidelines to be considered along with recommendations from other state and federal agencies when response options are being considered by the USCG and/or EPA. EFH conservation recommendations are advisory and these guidelines can be adapted as warranted to protect human life, prevent significant loss of property, and protection of the environment. When BMPs are not identified for a response method, or specifically not recommended for a category of EFH, emergency consultation should occur.

VEHICLE / VESSEL / PERSONNEL OPERATIONS

Boats and Other Watercraft

Boats and other watercraft (*e.g.*, hovercraft, wave runners) may be used in open water and shoreline responses. The use of these resources varies depending on the specific response. However, they may be used as a component of the response itself (*e.g.*, skimmers, platforms for applying dispersants, deploying or collecting boom), or as a mode of transportation to and from remote locations for response personnel (*e.g.*, manual oil removal). As a result, boats and other watercraft may be used in shallow or deep water, nearshore or offshore, fresh water or marine environments, *etc.*

- In waters with less than 4-feet clearance between the vessel/motor and seafloor, all vessels should operate at "no wake/idle" speed at all times.
- All personnel associated with watercraft use should be reminded daily of the potential presence of seagrasses, corals, and shallow water areas.
- All vessels should follow deep-water routes whenever possible.
- Avoid scouring and prop-scarring submerged aquatic vegetation (e.g., seagrass).
- Watercraft landings should be designated and minimized.
- Avoid crushing vegetation when landing or staging boats.
- Boats should be anchored rather than parked on the marsh.
- If a boat must enter the marsh (e.g., to retrieve boom material) pull the boat and encroach only as far as necessary.

Vehicles / All-Terrain Vehicles (ATVs)

ATVs may be used for a variety of purposes, including the transportation of response personnel and for the collection and disposal of oil, oiled sediments or oiled debris in support of response activities in nearshore open water and on shorelines. The use of ATVs is often dependent upon the accessibility of the site (*e.g.*, proximity of roads) to this type of vehicle and the type of shoreline in which they are to be used. Some shoreline types (*e.g.*, marshes, vegetated low banks) are more sensitive to the use of motorized equipment (as well as human foot traffic) than other shoreline types, both in the presence and absence of oil. For example, it is recognized that the use of ATVs may adversely affect particular unoiled shoreline habitats that are susceptible to erosion. As a result,

care is taken to weigh the tradeoffs of ATV use on a particular shoreline type and ATV use should be limited to those situations in which it is judged that the benefits of using ATVs outweigh any potential adverse effects of their use.

- ATVs should be limited to use on sand beaches, and restricted to transiting outside of oiled areas along the upper part of the beach.
- Marsh buggies and tracked equipment should be prohibited from working in or accessing through vegetated marsh.
- Vehicle traffic should be limited to the hard-packed sand near or below the high tide line. Stay below the high tide line when driving if no oil is present and it is safe to do so.
- Designated access points should be established.

People / Personnel

Vegetation is easily trampled, and substrate erosion can result. Personnel should minimize unnecessary trampling and follow paths at sites visited repeatedly. Use board walkways to protect the marsh surface and root mass.

- Restrict foot traffic over sensitive areas (marsh, tidal flats, SAV, marsh, algal and mud flats) to reduce the potential for damage.
- Do not walk in the marsh; use boards to protect marsh surface and root mass.
- When entering estuarine streams and crossing ditches personnel should select areas of bank that are not too high or too steep.

NATURAL RECOVERY

- Should only be considered when cleanup activity would cause more environmental damage than the released substance.
- Generally acceptable for lighter fuels such as gasoline, diesel, and jet fuels.
- Sorbents should be utilized to recover sheens released during natural recovery and/or removal.

HERDING

Booming

Booms are flexible floating barriers that are placed on the surface of the water to control the spread of spilled oil and to protect ecologically sensitive areas.

- All work should be conducted from boats.
- Booms should be placed so as not to contact the bottom.
- Anchors should not be placed in seagrasses or on coral.
- Walking and boating should not occur in the marsh vegetation unless absolutely necessary to retrieve any dislodged boom.
- Restrict foot traffic over sensitive areas (marsh, tidal flats, SAV, marsh, algal and mud flats) when deploying booms to reduce the potential for damage.
- Use boards to protect marsh surface and root mass.

Barrier-Berm

No BMPs are provided for this response activity.

Trenching/Recovery Wells

The objective of this action is to remove subsurface oil from permeable substrates. Trenches or wells are dug down to the depth of the oil (or water table) to intercept oil migrating through the substrate. The oil collected in the trench or well is then recovered by vacuum pump or skimmer and disposed of offsite. The oil must be liquid enough to flow at ambient temperatures. Water flooding or flushing the substrate can be used to speed up oil migration into the trench or well.

- Trenches and recovery wells should be located in un-vegetated areas.
- Segregate topsoil where practical.
- Collapse or fill in trenches/well when response action is completed; ensure sides and bottom of trenches are clean before collapsing; replace topsoil where practical.
- Trenches which do not reach the water table should be lined with plastic to prevent the collected oil from penetrating deeper into the substrate.
- Restrict trenches from the lower intertidal zone where attached algae and organisms are more likely to be abundant.
- Restrict foot traffic over sensitive areas (marsh, tidal flats, SAV, marsh, algal and mud flats) to reduce the potential for damage. Use boards to protect marsh surface and root mass.

MECHANICAL REMOVAL

Manual Removal/Hand Tools

The objective of this method is to remove oil by using tools such as hands, rakes, shovels, and other manual means. This response variation is most appropriate for light to moderate oiling conditions. Collected oil is placed in bags or containers and removed from the area.

- Manual removal of oil is not recommended for algal flats and exposed submerged aquatic vegetation because of the likelihood of mixing oil deeper into the sediments.
- Cleanup should generally commence after the majority of oil has come ashore unless significant burial or remobilization is expected.
- Conduct cleanup between tidal cycles (between high tides) to minimize burial and/or remobilization of material.
- Minimize the amount of sediment removed with the oil.
- Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt, *etc.*) to reduce the likelihood oil will be worked into the sediment.
- Restrict foot traffic over sensitive areas (tidal flats, SAV, algal mats, *etc.*) to reduce the potential for mechanical damage. Use boards to protect marsh surface and root mass.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

Sorbents

This method of removal of surface oil allows for oil adsorption onto oleophilic material placed in the intertidal zone or along shorelines. Oil adheres to the outside of the material or "sorbs" into the material by capillary action. There are three basic types of sorbent materials: mineral based, natural organic, and synthetic organic. Sorbent material is generally placed on the surface of the shoreline substrate, allowing it to adsorb oil as it is released by tidal or wave action.

- Use of sorbents is not recommended for algal flats and exposed submerged aquatic vegetation because of the likelihood of mixing oil deeper into the sediments.
- Continually monitor and collect passive sorbent material deployed in the intertidal zone to prevent it from entering the environment as nondegradable, oily debris.
- Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt, etc.) to reduce the likelihood oil will be worked into the sediment.
- Restrict foot traffic over sensitive areas (tidal flats, SAV, marsh, algal mats, *etc.*) to reduce the potential for mechanical damage. Use boards to protect marsh surface and root mass.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

Skimming

- Limit collection and skimming operations to water deeper than 10 feet.
- Tend booms regularly so they do not harm shallow reefs.
- Do not damage coral or seagrass when anchoring booms.
- Route boat traffic away from shallow reefs and seagrass beds to avoid propeller damage and increased sedimentation.

Vacuum Removal

This method of the removal of surface oil is to remove free oil that has pooled on the substrate. It involves the use of a vacuum unit with a suction head to recover free oil. Equipment can range in size from small portable units that fill individual drums to large "supersuckers" that are truck-mounted and have the capacity to lift large rocks.

- Vacuum removal of oil is not recommended for tidal flats, SAV, and algal flats.
- In wetlands, vacuum operations should be closely monitored to minimize impact to marsh plant root system which could lead to erosion.
- Restrict foot traffic over sensitive areas (tidal flats, SAV, marsh, algal mats, *etc.*) to reduce the potential for damage. Use boards to protect marsh surface and root mass.
- Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt, etc.) to reduce the likelihood oil will be worked into the sediment.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

Debris Removal

The objective of this response is the removal of oiled debris (organic and man-made) from the shoreline. Debris (*e.g.*, seaweed, trash and logs) may be removed when it becomes heavily contaminated and when it is either a potential source of chronic oil release, an aesthetic problem, or a source of contamination for organisms on the shoreline.

- Restrict removal of oily debris from shorelines with soft mud substrates (mudflats, marshes) to debris stranded at the high tide line where it can be recovered without working oil into the substrate.
- Minimize foot traffic through oiled areas on non-solid substrates (sand, gravel, dirt) to reduce the likelihood oil will be worked into the sediment.
- Restrict foot traffic over sensitive areas (tidal flats, SAV, marsh, algal flats) to reduce the potential for damage. Use boards to protect marsh surface and root mass.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

Removal of Oiled Sediment

This response method removes oiled surface sediments. Oiled sediments are removed by either manual use of hand tools or mechanical use of various kinds of motorized equipment. This method of cleanup is generally most effective when there is a limited amount of oiled sediment that must be removed. In some instances, after removal of the

oiled sediment, new clean sediment of similar composition is brought in for replacement. The oiled sediment may also be cleaned and then replaced on the beach. The sediments are loaded into a container for washing. Cleansing methods include a hot water wash or physical agitation with a cleaning solution. After the cleansing process, the rinsed materials are returned to the original area. Cleaning equipment must be placed close to beaches to reduce transportation problems.

- Oiled sediment removal (without replacement) should be restricted to sand beaches not subject to high rates of erosion.
- Restrict sediment removal to supra and upper intertidal zones to minimize disturbance of biological communities in lower intertidal and subtidal zones.
- Cleanup should commence after the majority of oil has come ashore, unless significant burial or remobilization is expected (e.g., sand beaches); minimize burial and/or remobilization by conducting cleanup between tidal cycles.
- Adjacent or nearby sensitive environments (marsh, SAV, algal and tidal flats) should be protected from the effects of oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, and sorbents.
- Minimize vehicle traffic through oiled areas to reduce the likelihood oil will be worked into the sediment and contamination carried off site by cleanup equipment.
- Restrict foot traffic over sensitive areas (marsh, SAV, algal and tidal flats) to reduce the potential for damage. Use boards to protect marsh surface and root mass.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

Sediment Reworking/Surf Washing

The objective of this response variation is to re-work oiled sediments to break up oil deposits, increase surface area, and mix oxygen into deep subsurface oil layers. This activity exposes the oil to natural removal processes and enhances the rate of oil degradation. Beach sediments may be mechanically mixed (e.g., roto-tilled) with the use of heavy equipment. The oiled sediments in the upper beach area may also be relocated to the mid-tidal portion of the beach. Relocation enhances natural cleanup during reworking by wave activity.

- Sediment reworking should be restricted to sand beaches where high erosion rates or low natural sediment replenishment rates are issues of concern.
- Cleanup should commence after the majority of oil has come ashore, unless significant burial is expected (e.g., sand beaches).
- Restrict rototilling to mid- and upper-intertidal zones to minimize disturbance of biological communities in lower intertidal and subtidal zones.
- Restrict surf washing in vicinity of sensitive environments (SAV, algal flats, live bottom) to prevent adverse effects from oil runoff/sheening or siltation.
- Minimize burial and/or remobilization by conducting cleanup between tidal cycles when possible.

- Take appropriate actions to protect nearby sensitive environments (marshes, SAV, algal flats) from the effects of oil runoff/sheening or siltation by the proper deployment of booms, siltation curtains, and sorbents; monitor for effectiveness of protection measures.
- Minimize the amount of oiled sediment removed by closely monitoring mechanical equipment operations.
- Locate any temporary oiled sediment staging or storage sites on uplands.
- Minimize vehicle traffic through oiled areas to reduce the likelihood oil will be worked into the sediment and contamination carried off site by cleanup equipment.

Cutting Vegetation

This response method removes oiled vegetation to prevent the oiling of wildlife or remobilization of trapped oil. This response method is generally used when large quantities of potentially mobile oil is trapped in the vegetation or when the risk of oiled vegetation contaminating wildlife is greater than the value of the vegetation that is to be cut, and there is no less destructive method to remove the oil. Oiled plant cuttings are raked up and removed for disposal. Any remaining oil pooled around the roots/stems can then be flushed out for recovery.

- Vegetation cutting is not recommended for mangroves and SAV.
- Minimize foot traffic through oiled areas on non-solid substrates (e.g., sand, gravel, and dirt) to reduce the likelihood oil will be worked into the sediment.
- Restrict foot traffic over sensitive areas (marshes, SAV, algal flats) to reduce the potential for damage. Use boards to protect marsh surface and root mass.
- Cleanup should commence after the majority of oil has come ashore.
- Collection sites for oiled waste materials should be established on uplands.
- Collection sites should be designed to prevent secondary contamination from runoff.

FLUSHING/CLEANING

Surface Washing Agents

Surface washing agents are liquid products designed to make it easier to remove oil from surfaces and structures that have been oiled so that they don't become "secondary sources" of pollution. Surface washing agents are also used to clean and decontaminate response equipment and possibly vessels that have been oiled. "Lift and float" products lift oil from the surface so it floats on the water as a slick and can be recovered. "Lift and disperse" products act like detergents to lift oil off surfaces, emulsify it (break it into fine droplets), and disperse it into the water.

- "Lift and float" products should be utilized over "lift and disperse" products.

Flooding/Deluge

This method mobilizes stranded oil from rock crevices and interstices. It is generally used on heavily oiled shorelines when the oil is still fluid and loosely adhering to the substrate

and where oil has penetrated into cobble or boulder areas. Ambient water is pumped through a header pipe at low pressure above and inshore from the fouled area of shoreline. The pipe is meant to create a sheet of water that simulates tidal washing over the affected area. Removing stranded oil may be particularly important when a more sensitive habitat is nearby and in danger of becoming fouled with oil after the intertidal zone is washed over the next tidal cycle, remobilizing oil. The effects of flooding may also be desired when a spring tide has deposited oil above the normal high water mark or when the wave energy of the adjacent water is not great enough to sufficiently wash the affected area over the following tidal cycle. After oil has been loosened from the substrate, it may be collected and removed using a variety of mechanical, manual and passive methods.

- Flooding/deluge is not recommended for sand beaches, emergent wetlands, exposed SAV, algal, and mud flats.
- Intake hoses should be fitted with screens to minimize the extraction of debris, flora and fauna, generally not greater than 0.25 inch in diameter.
- Intake hoses should be propped off the bottom about a minimum of 3 feet to minimize the amount of sediment, debris, and organisms taken into the hose and pump.
- Ambient water flooding (deluge) may be used on all shoreline types with the exception of fine- to coarse-grained sand beaches, which could mobilize contaminated sediment into the environmentally sensitive subtidal zone or cause excessive siltation.
- Cleanup should commence after the majority of oil has come ashore, unless significant burial or remobilization is expected (e.g., sand beaches); minimize burial and/or remobilization by conducting cleanup between tidal cycles.
- Protect nearby sensitive environments (SAV, algal flats, mangroves, marshes) from the effects of runoff by the proper deployment of booms, and sorbents; monitor for effectiveness of protection measures.
- Restrict foot or vehicular traffic over sensitive areas (SAV, algal flats, marshes) to reduce the potential for damage. Use boards to protect marsh surface and root mass.

Ambient Water Flushing - Low-Pressure/High-Pressure

This method mobilizes liquid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation. Low-pressure (<50 psi) and high-pressure (may reach 100+ psi) washing uses ambient seawater sprayed through hoses to flush oil to the water's edge for pickup. Oil may be trapped by booms and picked up with skimmers or sorbents. May also be used in concert with ambient water flooding, which helps move the oil without the potential effects associated with higher water pressures.

- Ambient water flushing is not recommended for sand beaches, exposed SAV, algal flats, and exposed mud flats.
- Prevent pushing or mixing oil deeper into the sediment by not directing the stream of water directly into the oil; direct hoses to place stream of water above or behind the

surface oil to create a sheet of water to re-mobilize and carry oil to a containment area for recovery.

- Intake hoses should be fitted with screens to minimize the extraction of debris, flora and fauna, generally not greater than 0.25 inch in diameter.
- Intake hoses should be propped off the bottom about a minimum of 3 feet to minimize the amount of sediment, debris, and organisms taken into the hose and pump.
- Restrict flushing in marshes from boats or on shore above the high tide line during high tide to minimize mixing oil into the sediments or damaging the marsh plants.
- Protect nearby sensitive environments (SAV, algal flats, live bottom) from the effects of increased oil runoff by the proper deployment of booms, and sorbents; monitor for effectiveness of protection measures.
- Cleanup should commence after the majority of oil has come ashore, unless significant burial or remobilization is expected (e.g., sand beaches); minimize burial and/or remobilization by conducting cleanup between high tide cycles.
- Restrict foot traffic over sensitive areas (SAV, algal flats, marshes) to reduce the potential for damage. Use boards to protect marsh surface and root mass.

Warm Water Washing - Low-Pressure/High-Pressure

This response method is used to mobilize thick and weathered oil that has adhered to rock surfaces, prior to flushing it to the water's edge for collection. Seawater is heated (typically between the ambient temperature and 90F) and applied at moderate pressure to mobilize weathered oil that has adhered to rocks. If the warm water is not sufficient to flush the oil down, flooding or additional low- or high-pressure washing may be used to float the oil to the water's edge for pickup. Oil is then trapped by booms and may be picked up with skimmers or sorbents.

- Warm-water washing is generally recommended only for seawalls, bulkheads, docks, riprap, and rock surfaces.
- Warm-water washing is not recommended for estuarine wetlands, mangroves, sandy beaches, SAV, and algal flats.
- Intake hoses should be fitted with screens to minimize the extraction of debris, flora and fauna, generally not greater than 0.25 inch in diameter.
- Intake hoses should be propped off the bottom about a minimum of 3 feet to minimize the amount of sediment, debris, and organisms taken into the hose and pump.
- Restrict use to certain tidal elevations so that the oil/water effluent does not drain across sensitive low-tide habitats (damage can result from exposure to oil, oiled sediments, and hot water).
- Protect nearby sensitive environments (SAV, algal flats, mangroves, marsh) from the effects of oil runoff by the proper deployment of booms, and sorbents; monitor for effectiveness of protection measures.

High-Pressure Hot Water Washing

This response method dislodges and mobilizes trapped and weathered oil from inaccessible locations and surfaces not amenable to mechanical removal, prior to flushing oil to water's edge for collection. Water heaters are mounted offshore on barges or small land-based units. The water is heated to temperatures from 90F to 170F, which is usually sprayed in small volumes by hand using moderate-pressure wands. Used without water flooding, this procedure requires immediate use of vacuums (vacuum trucks or super suckers) to remove the oil/water runoff. With a deluge system, the oil is flushed to the water's surface for collection with skimmers or sorbents. This response is generally used when the oil has weathered to the point that even warm water at high pressure is ineffective for the removal of adhered oil, which must be removed due to the threat of continued release of oil or for aesthetic reasons.

- Hot water moderate pressure flushing should only be used on heavily oiled hard, manmade structures such as seawalls, bulkheads, docks and riprap, primarily for aesthetic purposes.
- Restrict use when the oil/water effluent would drain across sensitive habitats (SAV, algal flats, mangroves, marsh).
- Restrict foot traffic over sensitive areas to reduce the potential for physical damage. Use boards to protect marsh surface and root mass.

REFERENCES:

The following are available or linked from: sero.nmfs.noaa.gov/habitat_conservation

Caribbean Fishery Management Council. 2004. Final Environmental Impact Statement for the Generic Essential Fish Habitat Amendment to the Fishery Management Plans of the U.S. Caribbean. Caribbean Fishery Management Council. San Juan, Puerto Rico.

Caribbean Fishery Management Council. 2005. Amendment to the Fishery Management Plans (FMPs) of the U.S. Caribbean to Address Required Provisions of the Magnuson-Stevens Fishery Conservation and Management Act: Amendment 2 to the FMP for the Spiny Lobster Fishery of Puerto Rico and the U.S. Virgin Islands; Amendment 1 to FMP for the Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands; Amendment 3 to the FMP for the Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands; Amendment 2 to the FMP for the Corals and Reef Associated Invertebrates of Puerto Rico and the U.S. Virgin Islands; Including Supplemental Environmental Impact Statement, Regulatory Impact Review, and Regulatory Flexibility Act Analysis. San Juan, Puerto Rico.

Gulf of Mexico Fishery Management Council. 2004. Final environmental impact statement for the generic amendment to the following fishery management plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States Waters; Red Drum Fishery of the Gulf of Mexico; Reef Fish Fishery of the Gulf of Mexico; Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic; Stone Crab Fishery of the Gulf of Mexico; Spiny Lobster in the Gulf of Mexico and South Atlantic; Coral and Coral Reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council. Tampa, FL.

Gulf of Mexico Fishery Management Council. 2005. Final generic amendment number 3 for addressing Essential Fish Habitat requirements, Habitat Areas of Particular Concern, and adverse effects of fishing in the following fishery management plans of the Gulf of Mexico: Shrimp Fishery of the Gulf of Mexico, United States Waters; Red Drum Fishery of the Gulf of Mexico; Reef Fish Fishery of the Gulf of Mexico; Coastal Migratory Pelagic Resources (Mackerels) in the Gulf of Mexico and South Atlantic; Stone Crab Fishery of the Gulf of Mexico; Spiny Lobster in the Gulf of Mexico and South Atlantic; Coral and Coral Reefs of the Gulf of Mexico. Gulf of Mexico Fishery Management Council. Tampa, FL.

NMFS. 1999. Amendment 1 to the Atlantic billfish fishery management plan amendment. National Marine Fisheries Service. Silver Spring, MD.

NMFS. 1999. Fishery management plan for Atlantic tunas, swordfish, and sharks. National Marine Fisheries Service. Silver Spring, MD. 2 vols.

South Atlantic Fishery Management Council. 1998. Final habitat plan for the South Atlantic region: Essential Fish Habitat requirements for Fishery Management Plans of the South Atlantic fishery Management Council: The Shrimp Fishery Management Plan, The Red Drum Fishery Management Plan, The Snapper Grouper Fishery Management Plan, The Coastal Migratory Pelagics Fishery Management Plan, The Golden Crab Fishery Management Plan, The Spiny Lobster Fishery Management Plan, The Coral, Coral Reefs, and Live/Hard Bottom Habitat Fishery Management Plan, and The Calico Scallop Fishery Management Plan. South Atlantic Fishery Management Council. Charleston, SC.

South Atlantic Fishery Management Council. 2003. Fishery management plan for the dolphin and wahoo fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC.

South Atlantic Fishery Management Council. 2003. Fishery management plan for the pelagic Sargassum habitat of the south Atlantic region. South Atlantic Fishery Management Council. Charleston, SC.

The following are available or linked from: response.restoration.noaa.gov/publications

NOAA. 1992. Shoreline Countermeasures Manual, Tropical Coastal Environments. Hazardous Materials Response and Assessment Division, NOAA. 108 pp.

NOAA. 1992. Shoreline Countermeasures Manual, Temperate Coastal Environments. Hazardous Materials Response and Assessment Division, NOAA. 95pp.

Hoff, R.Z. 1995. Responding to oil spills in coastal marshes: the fine line between help and hindrance. HAZMAT Report 96-2. Seattle: Hazardous Materials Response and Assessment Division, NOAA. 16 pp.

NOAA. 2010. Oil Spills in Coral Reefs Planning & Response Considerations. Hazardous Materials Response and Assessment Division, NOAA. 84 pp.

NOAA. 2010. Characteristic Coastal Habitats: Choosing Spill Response Alternatives. Hazardous Materials Response and Assessment Division, NOAA. 86 pp.

NOAA. 2013. Oil Spills in Marshes Planning & Response Considerations. Office of Response and Restoration. NOAA. 126 pp.