

## Introduction

Oil on coastal waters, shorelines, or subtidal habitats can harm the environment, intrude on recreational activities, cause economic hardship, disrupt commercial activities, and be expensive to clean up. Decisions about if, where, when, and how to remove oil from coastal habitats affect each of these potential spill consequences.

Sound cleanup decisions depend on accurate information about the types of habitats that the oil affects, the degree of oiling, and the location of oiling. *Characteristic Coastal Habitats* illustrates typical physical and biological attributes of North American coastal habitats at risk from oil spills. The text describes each habitat and discusses both how oil is likely to behave there and considerations for treating oil.

The *Characteristic Coastal Habitats* collection was originally designed as a companion to *Environmental Considerations for Marine Oil Spill Response*, published in 2001 by the American Petroleum Institute, the National Oceanic and Atmospheric Administration, the U.S. Coast Guard, and the U.S. Environmental Protection Agency (although this document is not readily available as of 2009). The Response Method table for each habitat is based on information contained in the *NOAA Shoreline Assessment Manual* and the job aid entitled *Characteristics of Response Strategies – A Guide for Spill Response Planning in Marine Environments*. Refer to these publications for complete information on proper use and caveats regarding the guidelines presented in the Response Method tables.

In April 2010, NOAA revised this version of the *Characteristic Coastal Habitats* to reflect the current knowledge on oil spill behavior and impacts of response options.

The *Characteristic Coastal Habitats* collection is a useful job aid for training people who will be participating in cleanup assessment as part of an Environmental Unit within the Incident Command System. It also complements NOAA's *Shoreline Assessment Manual* and *Shoreline Assessment Job Aid*. Visit the Office of Response and Restoration's home page at <http://response.restoration.noaa.gov> for copies of the manual and job aid. *Characteristic Coastal Habitats* is available in a digital version at this website.

## How to use this document

This document summarizes the technical rationale for selecting response methods for four categories of oil in specific habitats. As a companion to *Environmental Considerations for Marine Oil Spill Response, Characteristic Coastal Habitats* can help you select appropriate response options to minimize the adverse environmental impacts of a marine oil spill. The guide discusses intertidal, subtidal, ice, and on-water habitats. Specific response options include natural recovery; mechanical, chemical, and biological treatment; and in-situ burning.

When choosing effective response options, including natural recovery, you must consider trade-offs affecting the option's potential environmental impact, its appropriateness for the habitat, and timing of its application. *Environmental Considerations for Marine Oil Spill Response* discusses these considerations in detail; you may wish to consult it and other documents such as the *NOAA Shoreline Assessment Manual* (2009), *Oil Spills in Coral Reefs* (2003), and *Oil Spills in Mangroves* (2007), before using this guideline. Remember that the benefits and impacts of response options depend upon incident-specific conditions and affect the suitability of the option for use in a habitat during any spill. For example, dove-tailing multiple methods simultaneously throughout an incident might produce a more effective response and fewer adverse environmental impacts.

Each section of this guide includes information about methods currently in use during oil spill responses in marine environments. The two tables following this section present information on the relative environmental impact of methods in the absence of oil for each habitat. These tables will help you understand the impact of a response option independent of oil effects. Following this section is the Habitat section with descriptions of intertidal, shallow subtidal, ice, and on-water habitats. For each of the four habitat categories there is a picture, a description of the habitat type, and a table describing the relative impact of the different response methods to the environment for different oil types. These tables will help you understand the impact of the response option and oil together for each habitat.

# ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: Shoreline Intertidal and Ice Environments

The following categories are used to compare the relative environmental impact of each response method in a specific environment and habitat. The codes in each table mean:

- A = The least adverse habitat impact.
- B = Some adverse habitat impact.
- C = Significant adverse habitat impact.
- D = The most adverse habitat impact.
- I = Insufficient information - impact or effectiveness of the method could not be evaluated.
- = Not applicable.

Response Method	Exposed Rocky Shores	Exposed Solid Man-made Structures	Exposed Wave-cut Platforms	Sand Beaches	Tundra Cliffs	Mixed Sand and Gravel Beaches	Gravel Beaches	Riprap	Exposed Tidal Flats
Natural Recovery	A	A	A	A	A	A	A	A	A
Booming	-	-	-	-	-	-	-	-	-
Skimming	-	-	-	-	-	-	-	-	-
Barriers/Berms	-	-	-	B*	D	B*	C	-	C
Physical Herding	-	-	-	-	-	-	-	-	B
Manual Oil Removal/Cleaning	B	B	B	B	D	B	B	A	C
Mechanical Oil Removal	-	-	-	C*	D	C*	C	C	C
Sorbents	B	B	B	B	C	B	B	A	B
Vacuum	B	-	B	B	D	B	B	A	B
Debris Removal	B	-	B	B	A	B	B	A	B
Sediment Reworking/Tilling	-	-	-	C*	D	C*	C	-	C
Vegetation Cutting/Removal	-	-	-	C*	D	C*	-	-	D
Flooding (deluge)	-	-	B	B	C	B	B	B	B

This table provides information on the relative environmental impacts of response methods in the absence of oil in shoreline intertidal and ice environments.

\* - Special biological need consideration - if birds and turtles are nesting, the ranking would be "D."

Note: Table continues on pages 7-9

## ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: Shoreline Intertidal and Ice Environments

<b>Response Method</b>	<b>Sheltered Rocky Shores &amp; Scarps</b>	<b>Sheltered Solid Man-made Structures</b>	<b>Peat Shores</b>	<b>Sheltered Tidal Flats</b>	<b>Marshes</b>	<b>Mangroves</b>	<b>Inundated Lowland Tundra</b>	<b>Accessible Ice</b>	<b>Inaccessible Ice</b>
Natural Recovery	A	A	A	A	A	A	A	A	A
Booming	-	-	-	-	-	-	-	B	-
Skimming	-	-	-	-	-	-	-	B	-
Barriers/Berms	-	-	-	C	C	C	-	B	-
Physical Herding	-	-	-	-	-	-	-	B	-
Manual Oil Removal/Cleaning	B	B	B	C	C	C	D	B	-
Mechanical Oil Removal	-	-	D	-	D	-	D	B	-
Sorbents	B	A	B	B	C	C	C	B	-
Vacuum	B	-	B	B	C	C	D	B	-
Debris Removal	B	A	B	C	C	C	D	B	-
Sediment Reworking/Tilling	-	-	B	-	D	-	-	-	-
Vegetation Cutting/Removal	D	-	C	D	D	-	D	-	-
Flooding (deluge)	B	-	B	B	B	B	C	-	-

# ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: Shoreline Intertidal and Ice Environments

The following categories are used to compare the relative environmental impact of each response method in the specific environment and habitat.

The codes in each table mean:

- A = The least adverse habitat impact.
- B = Some adverse habitat impact.
- C = Significant adverse habitat impact.
- D = The most adverse habitat impact.
- I = Insufficient information - impact or effectiveness of the method could not be evaluated.
- = Not applicable.

Response Method (cont.)	Exposed Rocky Shores	Exposed Solid Man-made Structures	Exposed Wave-cut Platforms	Sand Beaches	Tundra Cliffs	Mixed Sand and Gravel Beaches	Gravel Beaches	Riprap	Exposed Tidal Flats
Low-pressure, Ambient Water Flushing	B	B	B	B*	D	B*	B	B	C
High-pressure, Ambient Water Flushing	C	C	C	-	-	C*	C	C	-
Low-pressure, Hot Water Flushing	D	D	D	D	-	D	D	D	-
High-pressure, Hot Water Flushing	D	D	D	-	-	D	D	D	-
Steam Cleaning	D	D	D	-	-	D	D	D	-
Sand Blasting	D	D	D	-	-	-	-	D	-
Dispersants	-	-	-	-	-	-	-	-	-
Emulsion-treating Agents	-	-	-	-	-	-	-	-	-
Elasticity Modifiers	-	-	-	-	-	-	-	-	-
Herding Agents	-	-	-	-	-	-	-	-	-
Solidifiers	-	-	B	B	C	B	B	B	B
Shoreline Cleaning Agents	B	B	B	-	-	C*	B	B	-
Nutrient Enrichment	-	-	-	B	C	B	B	B	C
Natural Microbe Seeding	-	-	-	I	I	I	I	I	I
In-situ Burning	-	-	D	C	-	C	C	D	-

This table provides information on the relative environmental impacts of response methods in the absence of oil in shoreline intertidal and ice environments.

\* - Special biological need consideration - if birds and turtles are nesting, the ranking would be "D."

## ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: Shoreline Intertidal and Ice Environments

Response Method	Sheltered Rocky Shores & Scarps	Sheltered Solid Man-made Structures	Peat Shores	Sheltered Tidal Flats	Marshes	Mangroves	Inundated Lowland Tundra	Accessible Ice	Inaccessible Ice
Low-pressure, Ambient Water Flushing	B	B	B	C	B	B	D	B	-
High-pressure, Ambient Water Flushing	C	C	-	-	-	-	-	-	-
Low-pressure, Hot Water Flushing	D	D	-	-	-	-	-	B	-
High-pressure, Hot Water Flushing	D	D	-	-	-	-	-	-	-
Steam Cleaning	D	D	-	-	-	-	-	B	-
Sand Blasting	D	D	-	-	-	-	-	-	-
Dispersants	-	-	-	-	-	-	-	B	-
Emulsion-treating Agents	-	-	-	-	-	-	-	B	-
Elasticity Modifiers	-	-	-	-	-	-	-	B	-
Herding Agents	-	-	-	-	-	-	-	B	-
Solidifiers	B	-	-	C	C	C	C	B	-
Shoreline Cleaning Agents	B	B	-	-	B	I	-	-	-
Nutrient Enrichment	B	-	B	I	B	I	I	I	I
Natural Microbe Seeding	I	-	I	I	I	I	I	I	I
In-situ Burning	D	-	-	-	C	-	D	B	-

# ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: On-water and Shallow Subtidal Environments

The following categories are used to compare the relative environmental impact of each response method in the specific environment and habitat.

The codes in this table mean:

- A = The least adverse habitat impact.
- B = Some adverse habitat impact.
- C = Significant adverse habitat impact.
- D = The most adverse habitat impact.
- I = Insufficient information - impact or effectiveness of the method could not be evaluated.
- = Not applicable.

Response Method	Offshore	Bays and Estuaries	Coral Reefs	Seagrasses	Kelp	Soft Bottom	Mixed and Hard Bottom
Natural Recovery	A	A	A	A	A	A	A
Booming	A	B	C	B	B	A	A
Skimming	A	B	B	B	B	A	A
Barriers/Berms	-	-	-	-	-	-	-
Physical Herding	B	B	B	B	B	B	B
Manual Oil Removal/Cleaning	-	B	D	C	B	B	C
Mechanical Oil Removal	-	-	D	D	D	C	-
Sorbents	A	B	C	B	B	B	C
Vacuum	-	-	C	C	B	B	C
Debris Removal	B	B	B	B	B	B	B
Sediment Reworking/Tilling	-	-	-	-	-	-	-
Vegetation Cutting/Removal	-	-	-	C	C	-	-
Flooding (deluge)	-	-	-	-	-	-	-

This table provides information on the relative environmental impacts of response methods in the absence of oil in on-water and shallow subtidal environments.

# ENVIRONMENTAL IMPACTS IN THE ABSENCE OF OIL: On-water and Shallow Subtidal Environments

<b>Response Method (cont.)</b>	<b>Offshore</b>	<b>Bays and Estuaries</b>	<b>Coral Reefs</b>	<b>Seagrasses</b>	<b>Kelp</b>	<b>Soft Bottom</b>	<b>Mixed and Hard Bottom</b>
Low-pressure, Ambient Water Flushing	-	-	B	-	-	-	-
High-pressure, Ambient Water Flushing	-	-	-	-	-	-	-
Low-pressure, Hot Water Flushing	-	-	-	-	-	-	-
High-pressure, Hot Water Flushing	-	-	-	-	-	-	-
Steam Cleaning	-	-	-	-	-	-	-
Sand Blasting	-	-	-	-	-	-	-
Dispersants	B	B	D	D	D	C	C
Emulsion-treating Agents	B	B	I	I	I	I	I
Elasticity Modifiers	B	B	C	C	I	I	I
Herdng Agents	B	B	C	C	I	I	I
Solidifiers	B	B	C	C	I	I	I
Shoreline Cleaning Agents	-	-	-	-	-	-	-
Nutrient Enrichment	-	-	-	-	-	-	-
Natural Microbe Seeding	-	-	-	-	-	-	-
In-situ Burning	B	B	B	B	C	B	B