

RESPONSE CONSIDERATIONS FOR FRESHWATER ENVIRONMENTS AND SHORELINE HABITATS

Oil discharges have varied impacts on different types of environments, depending on the location and other site-specific conditions at the scene of a release. Factors that influence sensitivity to oiling in freshwater environments and shoreline habitats include exposure to waves, biology, substrate type, shoreline slope, and ease of cleanup and restoration.

Freshwater environments can be divided into three broad categories: standing water, such as lakes and ponds; flowing water, which includes streams and rivers; and wetlands. These three categories are discussed in further detail in the following subsections. The environments and habitats listed below are the primary freshwater environments and habitats identified by the National Oceanic and Atmospheric Administration (NOAA).

WATER ENVIRONMENTS

Open Water
Large Rivers
Small Lakes and Ponds
Small Rivers and Streams

SHORELINE HABITATS

Bedrock
Man-made Structures
Sand
Sand and Gravel
Vegetated Shores
Mud
Wetlands

Source: NOAA/American Petroleum Institute (API) 1994

Lakes and Ponds

The near-shore areas of standing freshwater environments usually support large numbers of various animals and plants. Populations residing in lakes and ponds are at greater risk from adverse effects than are populations in streams and rivers. Because of relative stillness in lakes and ponds, spilled oil tends to collect, undispersed by waves or currents.

Streams and Rivers

Oil entering a stream or river is typically carried downstream by the current. Oil entering slower flowing streams tends to remain on the surface, while oil discharged to a high-velocity, turbulent stream disperses throughout the entire water column of the stream. As a result of the turbulent agitation, oil may become trapped in sediment along the stream bed, resulting in fatalities of benthic organisms.

Stream reaches can be subdivided into three categories: low gradient, moderate gradient, and high gradient.

- **Low gradient** portions of a stream are characterized by meandering channels, moderate currents, wide zones of associated riparian vegetation, sand bars, intermediate oil residence time, numerous collection sites, and restricted mixing into the water column.
- **Moderate gradient** portions of a stream are characterized by intermittent rapids, moderately wide channels, associated riparian vegetation, brisk currents, sand and gravel bars, short oil residence time, few collection sites, and significant mixing into the water column.
- **High gradient** portions of a stream are characterized by numerous rapids, narrow associated riparian vegetation, strong currents, coarse gravel sediments, short oil residence time, no collection sites, and intense mixing into the water column.

Wetlands

Wetlands are extremely sensitive to oil spills. Wetlands such as freshwater swamps, marshes, and prairie potholes act as natural hatcheries, nesting areas, food sources, and watering areas for terrestrial and aquatic wildlife. Therefore, they are crucial areas for wildlife support.

NOAA's habitat-shoreline ranking scheme has been an effective planning and response tool for more than 10 years and helps to provide consistent habitat designations throughout the planning process and response operations. The NOAA Environmental Sensitivity Index (ESI) identifies habitats and assigns priority classifications to them. The ESI ranking is based on biological productivity and ability to recover after exposure to oil, degree of exposure to natural removal processes, human use of the habitat, and ease of oil removal. Table 1 lists the ESI rankings for lacustrine and riverine shoreline habitats. The highest-priority habitats include vegetated wetlands (ESI = 10). The lowest priority habitats include high-energy shorelines of exposed rocky cliffs and banks (ESI = 1A).

A location's ranking may change seasonally, reflecting changes in distribution of natural resources or its sensitivity. The Region's seasonality is a major consideration in preparing and planning for a response. Ice and snow during the winter, fluctuations of river and stream flow rates and water levels, and migratory patterns of wildlife all must be considered on a location-by-location basis.

TABLE 1

TYPICAL NOAA ESI RANKINGS FOR INLAND HABITATS IN EPA REGION 8

ESI No.	Lacustrine	Riverine (Large Rivers)
1A	Exposed rocky cliffs	Exposed rocky banks
1B	Exposed, hard, man-made structures	Vertical, solid revetments
2	Shelving bedrock shores	Rocky shoals, bedrock ledges
3	Eroding scarps in unconsolidated sediments	Exposed, eroding banks in unconsolidated sediments
4	Sand beaches	Sandy bars and gently sloping banks
5	Mixed sand and gravel beaches	Mixed sand and gravel bars and gently sloping banks
6A	Gravel beaches	Gravel bars and gently sloping banks
6B	Riprap structures	Riprap structures
7	Exposed tidal flats	Not present
8A	Sheltered scarps in bedrock	Vegetated, steeply sloping bluffs
9A	Sheltered vegetated low banks	Vegetated, low banks
9B	Sheltered sand/mud flats	Muddy substrates (non-vegetated)
10A	Not Applicable to Fresh Water Environments	
10B	Not Applicable to Fresh Water Environments	
10C	Freshwater marshes	Freshwater marshes
10D	Freshwater swamps	Freshwater swamps