



# Deepwater Horizon Natural Resource Damage Assessment

## Damage Assessment

On April 20, 2010, the *Deepwater Horizon* oil spill set into motion the largest Natural Resource Damage Assessment (NRDA) in history. A NRDA is the process used by natural resource trustees to develop the public's claim for natural resource damages against the party or parties responsible for the spill and to seek compensation for the harm done to natural resources and services. It also provides for the development of a restoration plan or series of plans to restore or replace those resources.

### Technical Working Groups

Fundamental to the NRDA process is a comprehensive assessment of a diverse range of resources. From the early days of the spill, NRDA teams have been collecting data related to a wide range of natural resources and the services they provide. Scores of field teams are conducting research around the Gulf Coast, and more than 100 research cruises have been launched to assess the spill's offshore impacts. Work of this type continues today and likely will continue for several years. **Technical Working Groups** (TWGs) are comprised of subject matter experts and scientists from state and federal resource agencies, universities and other institutions. They have developed workplans to guide the damage assessment process and direct data collection efforts. Once samples are collected, they are sent to specific labs approved by the trustees and BP for analysis. For additional information on workplans and data, please visit [www.gulfspillrestoration.noaa.gov/gulf-spill-data](http://www.gulfspillrestoration.noaa.gov/gulf-spill-data). The diagram below illustrates the various types of resources being evaluated as part of the *Deepwater Horizon* oil spill NRDA. It provides a sense of the three-dimensional scope of investigations under way to evaluate the impacts of oil, dispersants and other response actions on the resources.

## NRDA TECHNICAL WORKING GROUPS

### SUBMERGED AQUATIC VEGETATION

Rooted vascular plants such as seagrasses and freshwater/brackish species grow in the intertidal and subtidal zones. They provide food and habitat for birds, fish, shellfish and invertebrates.

### OYSTERS

American or eastern oysters found in the Gulf are the building blocks of oyster reefs. Oysters are a valuable ecological and economic resource for the Gulf.

### SHORELINES

Salt- and brackish marsh, tidal mudflats, mangroves and sandy beaches provide biological nurseries, storm surge protection, recreation and nutrient control.

### TERRESTRIAL SPECIES

Species that use the habitats above the mean high-tide line include birds, crabs, turtles, alligators and small mammals.

### BIRDS

Many types of shorebirds, colonial seabirds, openwater (pelagic) seabirds and marsh (secretive) birds rely heavily on the Gulf Coast.

### HUMAN USE

People rely on the bounty of the Gulf for fishing, sunbathing, bird watching and myriad other recreational activities. Tourism and recreation are major drivers of the Gulf Coast economy.

### WATER COLUMN AND INVERTEBRATES

Water serves as important habitat for many species. Plankton, neuston and micronekton move through the water column, fueling the food chain and future generations.

### NEARSHORE SEDIMENT AND ASSOCIATED RESOURCES

Soil near the shore and the fish, shrimp, crabs and invertebrates that live in the waters from the low-tide line to the edge of the continental shelf at a depth of 656 feet are of particular concern.

### MARINE FISH

The Gulf's diverse species include red snapper, red and black drum, anchovy, grouper, cobia, bass, menhaden, mullet, mackerel, jacks, killifish, Gulf sturgeon, whale shark, sharks, Atlantic bluefin tuna and groundfish.

### MARINE MAMMALS

Marine mammals in the Gulf include 28 species of whales and dolphins, and the Florida manatee.

### SEA TURTLES

There are five sea turtle species occurring in the Gulf listed as threatened or endangered under the Endangered Species Act: Kemp's ridley, green, leatherback, loggerhead and hawksbill.

### DEEPWATER COMMUNITIES

Hard- and soft-bottomed communities at depths of more than 200 feet include resources such as corals, tube worms and sponges.

### SHALLOW CORALS

Healthy coral reefs provide a source of food for plants and animals. They protect coastlines from storms and erosion and provide habitat, spawning and nursery grounds for fish.



The state and federal trustees are working to assess injury to the Gulf of Mexico ecosystem and the lost human use of those resources caused by the *Deepwater Horizon* oil spill and associated response actions. The spill presents a vast and complex three-dimensional threat to organisms, habitats and ecosystems of the northern Gulf of Mexico. Each resource listed is evaluated by a Technical Working Group (TWG). For the majority of the TWGs it is too early to draw conclusions on most studies. **We will share those results when it is scientifically responsible to do so.**

Resource/ Technical Working Group	Assessment Activities
<i>Toxicity</i>	The trustees are evaluating the toxicological responses of representative Gulf of Mexico aquatic animals to discharged oil and dispersants. The trustees have developed an extensive toxicity testing protocol to determine the effects of oil and dispersants on a variety of important species potentially exposed to the spill.
<i>Deepwater Benthic Communities</i>	This group is mapping the spatial distribution of oil/dispersant and drilling mud, and mapping the soft- and hard-bottom habitats along the continental shelf and sea floor. It has collected and continues to collect sediment and tissue samples to characterize exposure and to document adverse effects that may have been caused by the spill. Researchers complete this work using remotely operated vehicles (ROVs), autonomous underwater vehicles (AUVs) and other ship-based research tools.
<i>Water Column and Invertebrates</i>	This group has collected sufficient chemical, physical and biological field-based evidence to demonstrate pathways. It is using three-dimensional hydrodynamic modeling to evaluate the transport of oil and dissolved constituents.
<i>Marine Fish</i>	The marine fish TWG is studying the abundances and distribution of fish populations, including eggs and larvae, in potentially affected areas. This work occurs in both coastal zones (estuarine and nearshore) and in deep water. The invertebrate prey of fish is being tested for contamination from polycyclic aromatic hydrocarbons.
<i>Marine Mammals</i>	Using boat and aerial surveys, the marine mammal group is assessing distribution, exposure, population demographics, habitat and presence of deep oceanic prey. Dolphin health assessments on live animals also are being conducted in a contaminated area (Barataria Bay, LA) and an area not exposed to the oil (Sarasota Bay, FL).
<i>Sea Turtles</i>	The sea turtle TWG is assessing exposure to all sea turtles, but specifically those observed to be the most affected: loggerhead and Kemp's ridley sea turtles. It is conducting a series of studies designed to better understand and quantify the presence and distribution of these sea turtles and the level of contaminant exposure they may have experienced. The group uses aerial surveys and satellite telemetry and is studying <i>Sargassum</i> , which is highly productive marine seaweed that provides the framework for a large, floating oceanic ecosystem.
<i>Nearshore Sediment and Associated Resources</i>	Working within 1 kilometer of the shoreline, this group's studies include those towing weighted snares made of material that adheres to oil and placing other snares at stationary sentinel stations. Almost 2,900 snares have been tested for the presence of oil. When oil is detected, sediment samples are collected and analyzed. This group works closely with the marine fish and water column and invertebrates TWGs.
<i>Oysters</i>	This TWG is looking at oysters at more than 150 sites from Louisiana to Florida. About half of these sites have data that pre-dates the spill. It has collected about 9,500 oysters for contaminant, disease and gonad analysis. The group collects water samples to count larvae and collects information on live and dead oyster density and biomass. More than 2,500 samples have been collected for sediment analysis.
<i>Submerged Aquatic Vegetation</i>	This group is using a phased approach that includes analysis of photographs, samples, observations and maps to assess submerged aquatic vegetation injury. Oil trajectories identified 19 sites potentially threatened by oil. Using shoreline cleanup data and aerial overflights, the TWG confirmed 14 of those sites were potentially exposed to oil. Nine sites were chosen as priority, and the group collected and analyzed sediment, plant and invertebrate tissue samples. Five of the nine priority sites had been oiled.
<i>Shallow Water Coral Reefs</i>	This TWG continuously monitored previously surveyed shallow water coral reef sites using photos, video, deployment of semi-permeable membrane devices to monitor water quality, and sediment and tissue collection. Hundreds of samples have been collected in and around shallow water coral reef habitat. Studies of shallow water coral reefs have documented no evidence of exposure to oil, dispersants or disruptive response activities.
<i>Shorelines</i>	This TWG divides shoreline habitats into components of herbaceous marshes, mangroves, beaches and mudflats. The group is using aerial and ground surveys to evaluate the severity, special extent and duration of oiling. More than 4,000 miles of shoreline have been surveyed, and oiling was observed along about 1,100 miles. They are reporting about 220 miles were heavily oiled and about 130 miles were moderately oiled. The remaining miles of shoreline received some degree of oiling. Combined with observations regarding how far onto the shoreline the oil penetrated, the trustees will determine the acreage of total shoreline oiled by degree of oiling for each shoreline type.
<i>Birds</i>	The bird TWG uses a combination of surveys to document the densities and abundance of different types of birds in their habitats. The group used beached bird surveys to estimate the rate of spill-related carcasses deposited on sand beaches and marshes and is studying how polycyclic aromatic hydrocarbons found in crude oil can compromise birds' vital functions such as the ability to fly, swim, forage, migrate and reproduce. A total of 8,567 birds were collected in the northern Gulf of Mexico as part of wildlife response and NRDA operations. Of these, 1,423 birds were rehabilitated. These birds represent more than 100 species collected in all five Gulf Coast states.
<i>Terrestrial Species</i>	The terrestrial species group is contemplating impacts to beach mice, otter, mink, terrapin, alligator and coastal dunes. Since the spill began, the group has been documenting observations of oiled habitats and oiled terrestrial wildlife. It also has been examining other specific impacts for listed species, including beach mice and terrapins.
<i>Human Use</i>	This TWG is employing a variety of efforts for estimating the diminished use and lost value from the spill, including surveys of recreational activities and values, investigations of possible approaches for estimating lost total value and initiation of those approaches, and background studies on economic activity related to marine recreation and total value. For direct/recreational use losses, the focus will be on three sectors: boating and boat-based fishing, shoreline fishing, and general shoreline use. The impacts of the spill on consumer prices for seafood also will be evaluated. The total impact due to direct oiling, threat of oiling and response activities will be taken into account.