



NATURAL RESOURCE DAMAGE ASSESSMENT OF THE GULF OF MEXICO DEEPWATER HORIZON INCIDENT



Year One Report

Gulf Coast Restoration Organization



Natural Resource Damage Assessment Of The Gulf Of Mexico Message From BP's Gulf Coast Restoration Organization

The Gulf of Mexico is more than a place. It is a source of life, of culture and commerce, and a home for those who are fortunate to live there year-round. It also has special meaning for many Americans. Families look forward to visiting its white sand beaches. Big city restaurants fly in its crab and shrimp in season. College students from all directions point their cars to its shores for spring break.

At BP we know that the Gulf and its residents and visitors were tested last year by the Deepwater Horizon spill.

This report explains what is being done and what is planned to restore the Gulf to a “baseline” condition. This important work related to the Deepwater Horizon incident is being conducted under the Natural Resource Damage (NRD) process to understand the impact of the spill on the Gulf and then restore injured resources and lost recreational opportunities. The Natural Resource Damage Assessment (NRDA) is part of this process. This book is intended to be the first in a series of reports on NRDA work and progress. As we learn more about the Gulf’s condition and restoration plans for impacted areas, we will share news and information with the public through follow up reports, on our website and other media.

An effective approach built on cooperation with government agencies and local communities has made it possible to achieve progress in the first year. While this will be an ongoing effort, we are all dedicated to achieving lasting results as quickly as possible.

[More information, along with details on work plans, can be found by visiting bp.com/nrda.](http://bp.com/nrda)

INTRODUCTION

After the spill

Since the Deepwater Horizon spill began in the Gulf of Mexico on April 20, 2010, BP and federal and state agencies have undertaken cleanup activities on an unprecedented scale. BP's response efforts grew from a few thousand people during the first weeks following the incident to more than 45,000 at its peak in July 2010.

Response efforts

Response activities, undertaken by BP and directed by the U.S. Coast Guard, addressed the spill on all fronts—capping and plugging the Macondo well, cleaning the beaches and removing all recoverable oil. Oil was skimmed from the water's surface, controlled burns were conducted, dispersants were applied to break up the oil, and approximately 4.2 million feet of containment boom and approximately 9.1 million feet of sorbent boom were deployed to contain the oil and control its spread.

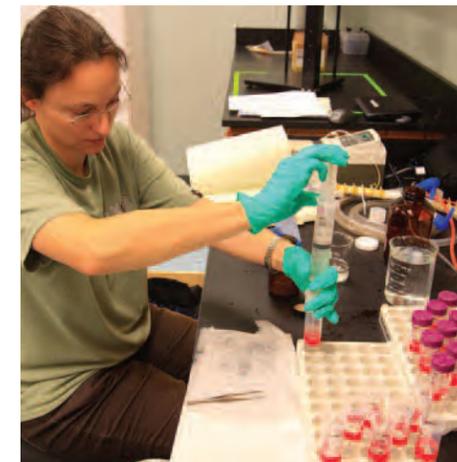
On the shore, Shoreline Cleanup Assessment Technique (SCAT) teams patrolled beaches and marshlands daily and identified areas of recoverable oil, which helped operations teams direct their cleanup efforts. At the same time, efforts were made to locate birds, sea turtles and other wildlife potentially impacted by the spill and to take the necessary steps to rescue and rehabilitate them.

Cleanup operations are approaching substantial completion. A team of scientists from several federal agencies determined there is no recoverable oil remaining in the deepwater area of the Gulf. The team also found that some residual oil remains in localized areas of the shoreline and in limited areas of water close to shore. Work is underway to remove that oil or take other action to address and monitor those conditions. The team's conclusions were documented in two reports: "Summary Report for Sub-Sea and Sub-Surface Oil and Dispersant Detection: Sampling and Monitoring" released in December 2010, and "Summary Report for Rate and Effects of Remnant Oil in the Beach Environment" released in February 2011, both produced by the Operational Scientific Advisory Team (OSAT).

For additional information on the response activities, please visit the [Gulf of Mexico Response page at bp.com](#).

Natural Resource Damage Assessment (NRDA)

BP seeks to restore natural resources in the Gulf of Mexico to their baseline condition. The first step is to identify the type and extent of injury to natural resources, using the Natural Resource Damage Assessment (NRDA) process established under the Oil Pollution Act of 1990 (OPA 90). Since shortly after the spill began, BP has been working with federal and state agencies to collect the data needed to assess damages to natural resources.



PART ONE EXPLANATION OF NRDA

NRDA is governed by provisions of OPA 90 authorizing federal and state Trustees to assess natural resource injuries resulting from a discharge of oil and develop and implement a plan for the restoration of the injured resources.

The U.S. government, acting on behalf of the public as Trustee over natural resources in the Gulf of Mexico, is working with agencies in the five Gulf states: Alabama, Florida, Louisiana, Mississippi and Texas.

or absence of oil across the impacted area; and determine how natural resources, from deepwater to shoreline, may have been impacted over a period of time and space. Pre-assessment sampling activities are now complete.

Injury Assessment. Scientific and economic studies are the basis of the ongoing process to assess the impact of the spill on natural resources. Experts are studying a wide range of natural resources and

The Trustees are jointly conducting the studies necessary to identify the extent of resource injuries, methods for restoring those resources, and the type and amount of restoration required.

BP has been a cooperative participant from the beginning, and reimburses the federal and state Trustees for all of the cooperative assessment costs.

The NRDA process

The cooperative NRDA process was initiated within days of the oil spill. It has three overlapping and active phases:

Pre-assessment. Information was collected to help determine the condition of resources but for the spill (the baseline conditions); confirm the presence

habitats in the Gulf of Mexico to understand how populations and locations may have been affected by the spill. In addition, economists are evaluating how the Gulf spill may have affected recreational uses, so that these collective losses can be addressed through implementation of restoration projects.

Restoration. The Trustees are working to identify restoration projects that will restore or rehabilitate injured resources. In many cases, these will include direct restoration or rehabilitation of areas damaged by oil. In other cases, alternate projects will be undertaken, such as the creation of new wetlands or restoration of nearby resources.

PART TWO

ASSESSMENT AND RESTORATION WORK

Who are the Trustees?

The Trustees are in charge of the NRDA cooperative process and BP is a participant. To facilitate cooperation and coordination among the participating state and federal agencies, the Trustees formed a Trustee Council.

The Trustees for the Deepwater Horizon oil spill are: the U.S. Department of Commerce, through the National Oceanic and Atmospheric Administration (NOAA); the U.S. Department of the Interior through the U.S. Fish and Wildlife Service (USFWS), Bureau of Indian Affairs (BIA), National Park Service (NPS), and Bureau of Land Management (BLM); the U.S. Department of Defense; and the states of Alabama, Florida, Louisiana, Mississippi and Texas.

State Trustees, as designated by the governor of each state, are:

Alabama –

Department of Conservation and Natural Resources
Geological Survey of Alabama

Florida –

Department of Environmental Protection
Florida Fish and Wildlife Conservation Commission

Louisiana –

Coastal Protection and Restoration Authority
Oil Spill Coordinator's Office
Department of Environmental Quality
Department of Wildlife and Fisheries
Department of Natural Resources

Mississippi –

Department of Environmental Quality

Texas –

Parks and Wildlife Department
General Land Office
Commission on Environmental Quality

Roles of the five affected states

Together with the federal agencies, each of the five states on the Gulf of Mexico has devoted significant attention to addressing recovery efforts and participating in NRDA activities.

The Trustees keep the public informed and invite their input. A series of public meetings will be held in 2011 to invite ideas and public participation. State Trustees also assigned representatives to the Technical Working Groups (TWGs; discussed below) to ensure that the states' points of view are considered in the assessment and planning process.

Other examples of state efforts include:

- Providing the public with detailed information on water quality, including status of beaches, fishing areas and other recreational information.
- Conducting baseline water sampling to determine the presence/absence of oil in an area before any oil reached the shoreline and sensitive habitats.
- Working with federal Trustees to identify restoration needs in their respective states.

These efforts will continue and expand as assessment progresses and restoration projects are identified in the Gulf.

As discussed, the Trustees, working with BP, will use the extensive data collected through the pre-assessment and injury assessment phases to develop potential restoration projects.



Pre-assessment phase

The pre-assessment process began within a few days of the spill. The federal and state Trustees, with NOAA and USFWS acting as lead federal agencies, began to assess the potential impact of the oil spill through a cooperative assessment process. Federal and BP scientists, working within the Incident Command Center, developed a detailed set of studies directed at a wide range of natural resources, from deepwater to shoreline to wildlife. Because of the size, scope and distance of the spill from the shore, the pre-assessment phase was longer and more ambitious than any previous NRDA investigation. According to NOAA, oil did not reach the first shoreline until approximately 16 days after the April 20, 2010 incident. Other areas were not impacted until later, providing scientists more time and geographic area to assess pre-spill conditions. The substantial amount of baseline data collected, while required for NRDA, will also be helpful for other scientific and ecological projects in the Gulf for years to come.

Technical Working Groups (TWGs) were established to focus on specific areas of expertise and natural resources. They are led by Trustee representatives who review data and guide new studies, which are reflected in workplans.

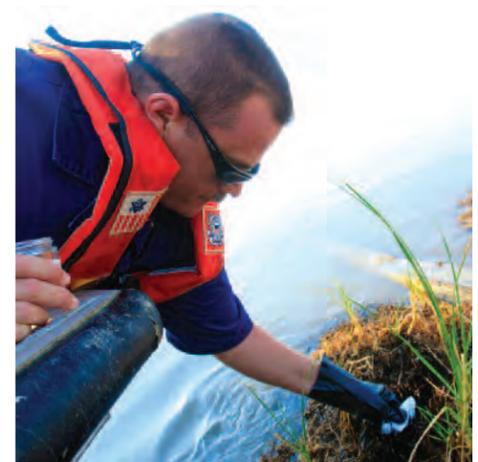
Pre-assessment and injury assessment workplans for studies have dealt with a wide range of natural resources across the five affected states and the waters of the Gulf of Mexico.

The pre-assessment and injury assessment phases sometimes proceeded in parallel. The examples described in the following list include some of the data from both phases.

Birds – Surveys were conducted for a broad range of birds, from those that nest in large colonies to ocean-going birds that spend most of their time offshore. Trained experts examined impacted beaches and other shoreline areas. They used bird calls to locate secretive marsh birds, conducted helicopter surveys for birds that nest in large colonies, and searched for pelagic birds by boat. In addition, birds from different species were captured, tagged and released so their movements could be tracked.

Fish and Invertebrates – Data were collected to determine baseline conditions, from shallow water corals to some deepwater communities. Monitoring work included:

- Fisheries (areas of the ocean that are home to specific species of fish) - to assess overall conditions and trends
- Oysters and shrimp – looking at populations and abundance
- Threatened or endangered species - Gulf sturgeon and whale shark
- Offshore habitat - sargassum mats, reefs and hard bottom communities





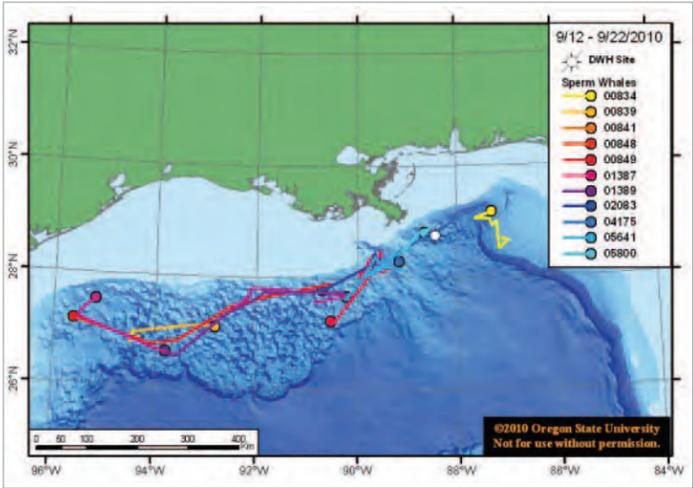
Marine Mammals and Sea Turtles – Dolphins, whales, manatees and sea turtles were surveyed and tracked across the northern Gulf of Mexico. In deep waters, several species of animals were captured and tagged with devices to track their movements while acoustic tools counted the numbers of marine mammals.

Shoreline Sampling – Baseline sampling was conducted in coastal areas from Florida’s east coast to Texas. Crews surveyed the shoreline from land, water and in the air, examining all aspects of the coastal area, from marshes to beaches to creeks.

Water Quality – Research vessels brought scientists to the deep ocean to observe the oil and understand how and where it may travel. At the same time, they studied Gulf of Mexico conditions:

- Water, sediment, plankton and sea bottom samples were taken and oil droplets were measured.
- Video images were recorded at varying depths and distances from the well and over time.
- Additional samples are being taken near shore and in deep waters to understand local variations.

Workplans – Under NRDA, before experts go out into the field to study conditions in the Gulf, workplans are prepared and approved by the Trustees and BP. Cooperative studies under some workplans are already underway; others are being developed. Information learned or questions raised by the cleanup and response pointed to the need to develop new workplans. As the documents make clear, many different experts are examining diverse resources, but the workplans are all science-based, and are produced and implemented in both the pre-assessment and injury assessment phases.



Satellite telemetry tracks from sperm whales in September 2010. Source Bruce Mate, Oregon State University

Work plans for pre-assessment and injury assessment studies may be found at restorethegulf.gov and bp.com/nrda. The work plans that have been approved as of March 2011 are listed in the back of this document.

Injury assessment phase

The publication of a “Notice of Intent to Conduct Restoration Planning” in the “Federal Register” on October 1, 2010 marked the formal transition from the pre-assessment to the injury assessment and restoration phases.

The injury assessment phase looks at the post-oil spill conditions in the Gulf and assesses possible injuries to the region’s natural resources. The Trustees and BP are working cooperatively to gather the data needed to assess injury. All parties retain the right to undertake independent investigations and to prepare their own independent analyses and interpretations of the data.

Before the Trustees prepare a final injury assessment, the public will have ample opportunity to provide comment and ask questions through a series of public meetings and a public comment period. The scientific community will be scrutinizing the injury analysis through a peer-review process.

Establishing baseline conditions

The measure used to define restoration goals in the Gulf of Mexico is referred to as “baseline conditions.” BP is working with governments and communities toward the goal of restoring the Gulf to its baseline condition: what it would be like if the spill had not occurred. Restoration is achieved through repair, rehabilitation, or restoration of injured resources or acquisition of the equivalent. A rigorous assessment is needed to determine baseline conditions. In the Gulf of Mexico, this has included significant scientific studies, tens of thousands of samples, extensive observation of conditions in the Gulf, and careful analysis of the data by experts.

Studies of baseline conditions include the mapping and further analysis of natural seeps and associated life forms found in the Gulf. For many years oceanographers and oil and gas explorers have known about natural oil seeps and the communities associated with the seeps that are found deep within the sea. These naturally occurring seeps, which are prevalent in the Gulf of Mexico, can teach us about the possible movement and environmental effect of oil and gas releases. Some seeps are close to the Deepwater Horizon well. It is expected that this new data will increase understanding of the ties between seeps and the forms of life that are associated with them – the microbes that naturally adapt to consume the oil, and other deep sea creatures that live alongside them in symbiotic (mutually compatible) ecosystems.

Assessing baseline conditions is a challenge further complicated by the expanse of the Gulf, as well as hurricanes, tornadoes, floods, urban and industrial development, and other human activities that have some impact on natural resources in the Gulf.

Initiating restoration

The publication of a “Notice of Intent to Begin Restoration Scoping and Prepare a Programmatic Environmental Impact Statement (PEIS)” in the *Federal Register* on February 17, 2011 marked the formal initiation of the restoration phase. Following the gathering of pre-assessment data and determination of injury, the primary means of returning the Gulf of Mexico to its baseline condition is restora-

Although NRDA is structured so that the injury assessment phase is typically completed before restoration commences, the parties may take emergency restoration action before the assessment is complete, when this is needed to avoid an irreversible loss of natural resources, or to prevent or reduce a continuing danger to natural resources. BP has committed to fund cooperative emergency



tion—to repair, rehabilitate or restore injured resources or acquire the equivalent. In cases where it is not possible to repair those resources, efforts will be undertaken to create new functioning resources to replace or compensate for those that were lost.

The Trustees are responsible for managing the selection of restoration projects. State and federal Trustees have set guidelines for restoration projects and will hold a series of public meetings to invite public input. As part of the PEIS process, the first set of meetings to obtain public input on restoration projects took place in all five states in March 2011 and in Washington, DC in April.

restoration. BP scientists and the Trustees are currently working to identify and approve emergency restoration projects that can be implemented quickly and efficiently to halt or reduce ongoing threats to natural resources.

The first emergency restoration project began in February 2011 in Issaquena County, Mississippi, to enhance inland wetlands habitat for migratory birds (see description in Part 3) and the Trustees are looking at other emergency restoration projects in all five states, while the assessment phase is still active. Longer-term restoration efforts will require continued cooperative planning by BP and the Trustees.



NRDA data collection: a rigorous process

A tremendous amount of information is being collected through the assessment work, from samples of water and sediments to observations of wildlife. Mechanisms are in place to make sure this information is collected properly and ensure the entire process has complete integrity.

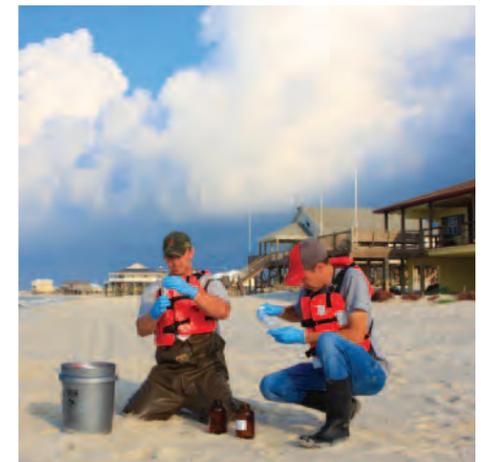
For the cooperative programs, each research team includes representatives of both the Trustee agencies and BP. Together, they agree on a data collection program. For instance, during some research cruises, both a NOAA scientist and a BP scientist jointly verify the collection point and methodology. In another scenario– a bird survey– a USFWS observer and a BP observer jointly confirm their bird observations.

At the outset, participants agree that the purpose of the study is to obtain data for the NRDA process, and that each reserves its right to produce its own independent interpretation and analysis of any data collected.

Following data collection, Trustees and BP scientists may analyze the data independently. Lab analyses are subject to a rigorous Quality Assurance/Quality Control process. To ensure the integrity of the analysis, researchers may, as specified, take split or double samples.

Scientists use standard operating procedures (SOPs) that govern sampling methodology to assure accurate and consistent results. Before going into the field, scientists and samplers are provided with SOPs specific to their sampling efforts.

Samples are subject to a secure government chain of custody from the point of collection to analysis at the lab. The sample is sealed into a cooler or carrier and is not allowed out of the sampler's sight until it is transferred to a driver or field assistant who will sign for custody and then personally accompany it to a lab or to a shipping point. Once delivered to the lab, the sample is signed for, acknowledging a complete chain of custody.



PART THREE

EARLY PROGRESS AND RESULTS

From the onset of the spill, BP has worked cooperatively with the Trustees to collect pre-assessment and injury assessment data. BP has supported the development, review, and approval of these study plans that look at the many aspects of the Gulf, from deepwater columns to coastal marshlands. Scientists and technical experts are collecting and sharing data, which will also be made available to the public.

Throughout the response, assessment and restoration phases, BP is committed to working with the Trustees and the public to:

- Complete the response.
- Restore natural resources to their baseline condition.



- Ensure an accurate assessment of injuries resulting from the spill, using extensive field sampling and observations to determine actual conditions in the Gulf.
- Implement appropriate natural resource restoration plans quickly and effectively.
- Monitor restoration work to make sure it meets its stated goals.

The NRDA program for the Gulf will continue until the Trustees have sufficient information to complete a final restoration plan.

Birds, sediments, deep water and shorelines

Following are examples of some of the work that has been completed or is currently underway:

- OSAT report on oil and dispersant sampling in the water, sediments and shoreline
- Bird, mammal and sea turtle rescue and recovery efforts
- Emergency habitat restoration in the Mississippi Delta

OSAT reports

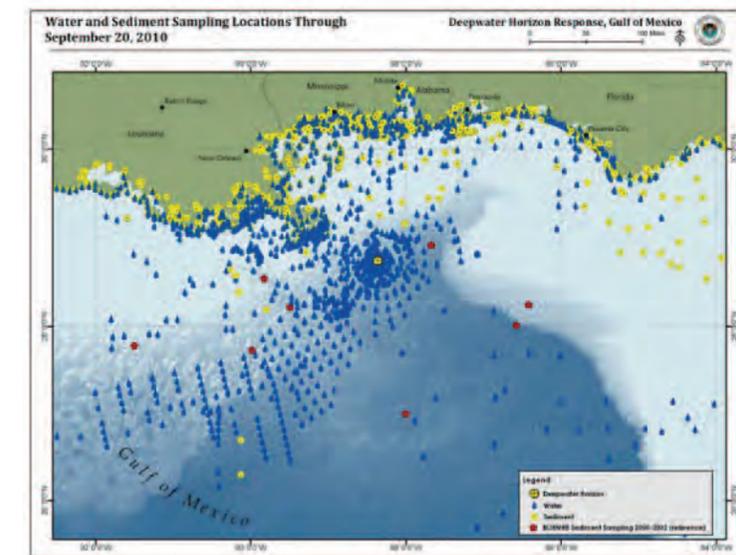
Information gathered during the response phase, such as the reports described below, provides valuable information that helped to launch the NRDA process.

Summary Report on Oil and Dispersant Sampling:

OSAT was formed to provide situational data and analysis for use in directing ongoing response efforts. OSAT comprises scientific expertise from the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), U.S. Environmental Protection Agency (EPA), NOAA, U.S. Coast Guard, U.S. Geological Survey, U.S. Fish and Wildlife Service and BP. Appointed by Coast Guard Admiral P.F. Zukunft, the team was charged with examining more than 17,000 water and sediment samples taken by 25 research ships on more than 125 cruises, from May 5 to October 23, 2010. The resulting report, "Summary Report for Sub-Sea and Sub-Surface Oil and Dispersant Detection: Sampling and Monitoring," was issued on December 17, 2010. The report's key findings are:

1. *No deposits of liquid phase MC-252 oil were identified in sediments beyond the shoreline.*
2. *No exceedances of EPA's Human Health benchmark were observed.*
3. *No exceedances of EPA's dispersant benchmarks were observed.*
4. *Since August 3, 2010 less than 1% of water samples and approximately 1% of sediment samples exceeded EPA's Aquatic Life benchmarks for polycyclic aromatic hydrocarbons (PAHs). Analysis of individual samples indicated that none of the water sample exceedances were consistent with MC-252. Of the sediment exceedances, only those within 3 km of the wellhead were consistent with MC-252.*

5. *Published research indicates that MC-252 oil is weathering and biodegrading under natural conditions. Estimates of weathering and degradation rates vary, precluding the use of simple empirical models to assess the persistence of residual MC 252 oil.*
6. *Of the previously closed fisheries, 87,481 square miles (state and federal) have been reopened; 1041 square miles around the wellhead remain closed (≈ 0.4% of Gulf of Mexico federal waters), and an adjacent 4,213 square miles were closed to royal red shrimping and then reopened (≈ 1.4% of waters; currently reopened).*



Source OSAT

The full report can be viewed at:
www.restorethegulf.gov/release/2010/12/16/data-analysis-and-findings



OSAT 2: Follow-Up Report on Oil and Dispersant Sampling:

Most of the oil that reached the shorelines has been removed. However, a report released in February 2011, “Summary Report for Fate and Effects of Remnant Oil in the Beach Environment,” examined the oil that remains in and near protected habitat beaches. The report found the “calculated human health effects from short and long-term exposures from remnant oil are below established EPA benchmarks for concern.”

A press release issued to announce the report also stated that “cleanup operations beyond established standards may disturb sensitive habitats and wildlife – posing a greater environmental risk than leaving the residue in place. In these instances, further cleaning will likely do more harm than good to the ecosystem.”

Based on this guidance, in areas where residual oil remains, the response team is conducting studies to determine the net environmental benefits of additional mechanical or manual recovery of oil, compared to the risk of leaving a small amount of remaining oil in place to degrade naturally. Along recreational beaches, BP will test delineation and recovery technologies to address remaining weathered oil mats. In the meantime, BP also continues to respond to any reports of oil tar balls or tar mats on shore.

Bird Rescue and Recovery Efforts

The U.S. Gulf coast is an important area for birds, particularly beach-nesting birds such as sandwich terns and snowy plovers, colonial nesting birds like brown pelicans, and wintering birds such as northern gannets.

Beginning in late April 2010, teams of bird rescue specialists worked along the Gulf of Mexico to locate oiled birds and initiate rescue and recovery efforts. Assessing the size and extent of impact to birds was one of the first pre-assessment projects approved by the NRDA Trustees and BP.

The USFWS tracked the number of birds collected in oiled areas, estimated the extent of their oiling, and identified them by species and geographical location. The data will help guide the Trustees’ efforts to determine injury and initiate restoration efforts.

As of January 25, 2011, a total of 6,124 dead birds (2,263 with visible oil) and 2,085 live birds (2,079 with visible oil) had been collected in areas potentially affected by the Deepwater Horizon spill. Most of the birds were found in Louisiana. The most-collected bird species were:

- laughing gulls (42 percent)
- brown pelicans (12 percent)
- northern gannets (8 percent)
- royal terns (4 percent)
- other species (38 percent)



PART FOUR BP'S COMMITMENT

Of the live collected birds, as of January 25, 2011, approximately 1,252 were cleaned, rehabilitated and released to the wild. Of the remaining birds, any carcasses will be examined by the government to identify the likely cause of death. This data will be used to assess injury and will help guide ongoing NRDA studies on the spill's potential impact on bird populations and habitat.

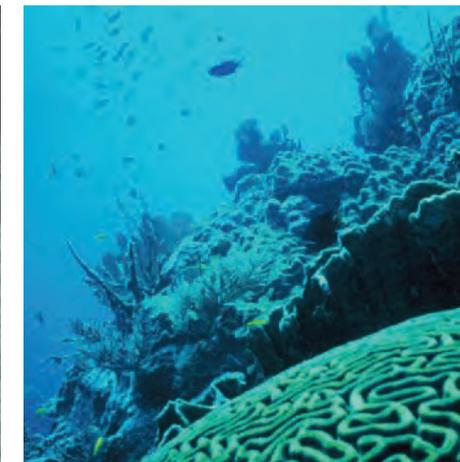
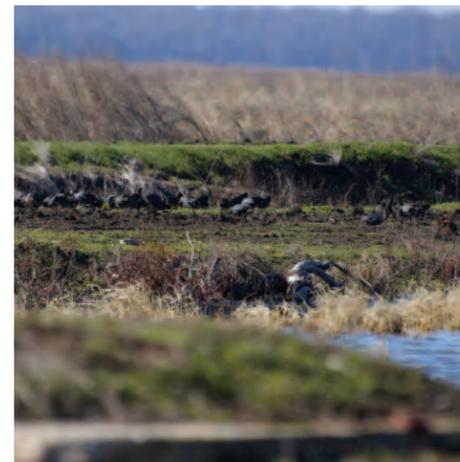
Emergency habitat restoration project benefits migratory birds

Inaugurating the restoration phase of NRDA, BP provided funding to enhance two wetlands areas in Mississippi, under the direction of the Trustees. The projects enhance approximately 2,400 acres of mudflats and shallow water habitats for shorebirds, wading birds, and waterfowl on the Howard Miller Wildlife Management Area north of Vicksburg, Mississippi. In addition, 58 acres of wetlands will be restored on the Malmaison Wildlife Management Area, north of Greenwood, Mississippi. The project is managed by the Mississippi Department of Wildlife, Fisheries, and Parks under the direction of the Mississippi Department of Environmental Quality.

These projects had already been recognized as high priorities for the Lower Mississippi Alluvial Valley as part of the North American Wetland Conservation program. The Trustees saw an opportunity to improve habitat for some of the bird species that utilize coastal areas and to lure migratory birds away from potentially oiled habitats this past winter season.

The restoration efforts help to maintain or even increase the region's overall wintering capacity for migratory birds. Reports on those collections can be found at www.fws.gov/home/dhoilspill/collection-reports.html#wildlifetable

The Mississippi wetlands projects provide a good illustration of the cooperative approach taken by the Trustees and BP, demonstrating how NRDA will respond when opportunities are found to make a difference quickly.



The injury assessment process is comprehensive. There are large amounts of data to be analyzed. In the coming months, as data become available, it will be presented by a diverse group of scientists to audiences throughout the country for review and comment. It is expected that consensus will emerge in some areas while in other areas, scientific debate may continue until additional data is obtained.

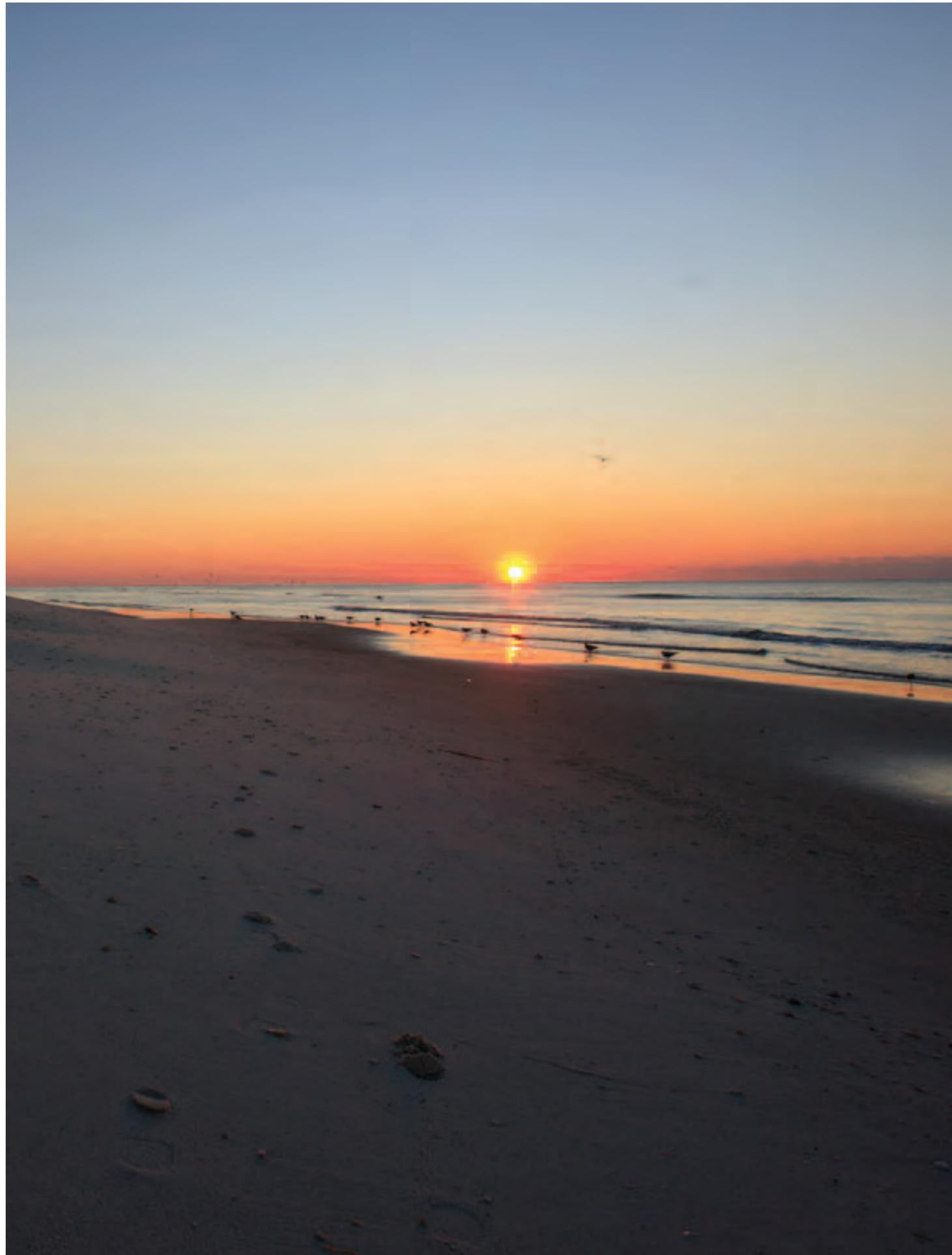
system will help us better understand how to enjoy it while protecting its resources.

Already scientists have learned more about all aspects of the Gulf, from deepwater to shoreline habitats and resources. We know more about the functions of coral and plankton in deep water and about the resilience of sea grass and marsh grass. We have more detailed mapping of the many

In the coming months, more information will be gathered and assessed, and more restoration projects will be designed, approved and launched. The public will have an active role in this important work through public scoping meetings led by the Trustees. Under this process, everyone will gain a greater understanding of the Gulf environment. New knowledge about the Gulf of Mexico's eco-

naturally-occurring seeps, which are an indicator of the vast reserves of oil and gas in offshore areas.

As Gulf ecosystems are restored, scientists will continue to expand their understanding of how these systems are related, their value and their limitations.



CONCLUSION

The past year put everyone to the test, especially Gulf coast residents and businesses. We are working closely with men and women, many from the Gulf area, who are not only experts in their technical or scientific fields, but are deeply committed to restoring the Gulf.

There are many points of view about the impact of the spill and what it will take for the Gulf coast and its people and businesses to recover. There may be debates ahead as study results are collected, analyzed and restoration plans are put into action.

Importantly, there is common ground: the shared dedication to a successful recovery and restoration of the natural resources that were injured as a result of the spill.

BP has great respect for the many people who have worked long hours over the past year during the response and the launching of the assessment and restoration phases of NRDA. We thank you for your commitment and contributions, and value your patience and cooperation.

We have every intention of making sure that the efforts of so many will result in a restored Gulf of Mexico.



NRDA-RELATED APPROVED WORK PLANS, AS OF MARCH 5, 2011



Marine Mammals/ Sea Turtles	<p>Assess Injury to Florida Manatees in Florida</p> <p>Assess Injury to Florida Manatees outside of Florida</p> <p>Assess Injury to Louisiana and Mississippi Estuarine Dolphin Stocks</p> <p>Determine Impacts on Endangered and Protected Marine Mammals in northern Gulf of Mexico</p> <p>Post-Release Tracking of Injured, Stranded or Entrapped, and Released Cetaceans</p> <p>Aerial Surveys for Assessing Marine Mammals and Sea Turtles</p> <p>Loggerhead Turtle Nesting and Hatchling Pre-Assessment</p> <p>Kemp's Ridley Turtle Nesting and Hatchling Pre-assessment</p> <p>Potential Exposure and Injury of Sea Turtles West of Mississippi Delta</p>
Birds	<p>Estimating Mortality of Birds Using Beached Bird Surveys in Louisiana</p> <p>Estimating Secretive Marsh Bird Mortality</p> <p>Aerial Surveys and Photographic Census for Water Birds and Seabirds in Vicinity of Oil Spill</p> <p>Estimating Oiling Rates Among Pelagic Birds Using Ship Based Surveys</p> <p>Estimating Oiling and Mortality of Breeding Colonial Waterbirds</p> <p>Piping Plover Assessment for Determining Injury</p>
Fish/Invertebrates	<p>Assess Potential Impacts to Whale Sharks in Northern Gulf of Mexico</p> <p>Pre-assessment to Determine Potential Injury to Gulf Sturgeon</p> <p>Establish Baseline for Fish and Invertebrate Kills in northern Gulf of Mexico</p> <p>Louisiana Fisheries Monitoring Program *</p> <p>Deepwater Coral Plan for Detection of Hydrocarbons in Water Column</p> <p>Deepwater Communities Assessment (Tier 1)</p> <p>Adaptive Water Column Plankton Sampling Cruise (American Diver 2)</p> <p>Survey of Hard-Ground Megafauna Communities in Vicinity of Spill Site</p> <p>Shallow Water Corals Baseline Assessment (Tier 1)</p>
Plants/Aquatic Vegetation	<p>Aerial Image Acquisition and Processing in Support of SAV and Shoreline Assessment</p> <p>Pre-assessment Baseline for Submerged Aquatic Vegetation in Northern Gulf of Mexico</p>

Water Quality/Biotic Condition	<p>Water Column Profiling to Measure Dissolved-Phase Aromatic Hydrocarbons and Free Oil Droplets (M/V Jack Fitz)</p> <p>Water Column Injury Assessment-R/V Brooks McCall Sampling</p> <p>Water Column Injury Assessment-Surface Water Sampling (Cruise 2, M/V Jack Fitz)</p> <p>Water Column Injury Assessment-Surface Water Sampling for Dispersant Treated Oil (Cruise 3, M/V Bunny Bordelon)</p> <p>Water Column Injury- M/V Jack Fitz Water Sampling Cruise 4</p> <p>Florida Keys Sediment and Water Sampling Baseline</p> <p>Louisiana Sediment and Water Collection Baseline Analysis</p> <p>Southeast Florida Water and Sediment Baseline Sampling</p> <p>Cooperative Research Cruise to Document Biotic Effects (R/V Weatherbird II)</p> <p>Water Column Injury-American Diver 1 and Ocean Veritas 9 Cruises</p> <p>Nearshore Spatial Extent of Oil</p> <p>Procedure for Obtaining Oil Samples from Drillship</p> <p>Procedure for Obtaining Submerged Oil Samples from Nearshore Environment</p> <p>Adaptive Water Column Sampling Cruise (HOS Davis 1)</p> <p>Adaptive Water Column Sampling Cruise (HOS Davis 2)</p> <p>Adaptive Water Column Sampling Cruise (HOS Davis 3)</p> <p>Louisiana Pre-assessment Water Sampling</p> <p>Samples of Opportunity in Support of Florida Keys/Florida Bay Water Column Baseline</p> <p>Water Column Injury Assessment-NOAA Vessel Gordon Gunter Data Collection Cruise</p> <p>Florida West Coast Pre-Impact Sampling</p> <p>Texas Baseline Survey and Sampling</p> <p>Water Column Injury-Submerged Oil Reconnaissance</p> <p>Intertidal Shoreline/Vegetation Pre-Assessment</p> <p>Water Column Injury Assessment-Measured Currents Monitoring (M/V Bunny Bordelon)</p>
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* Work plan approved and received, but not posted to NOAA website.

REFERENCES

Acronyms/Abbreviations

BOEMRE	Bureau of Ocean Energy Management, Regulation and Enforcement, U.S. Department of the Interior (formerly Minerals Management Service)
DARRP	Damage Assessment, Remediation and Restoration Program, NOAA
DOA	U.S. Department of Agriculture
DOD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DOJ	U.S. Department of Justice
EPA	U.S. Environmental Protection Agency
GCRO	Gulf Coast Restoration Organization, BP
GC IMT	Gulf Coast Incident Management Team
GOM	Gulf of Mexico
MC-252	Mississippi Canyon 252, site of the Deepwater Horizon drilling rig and the Macondo well
MMS	Minerals Management Service, Department of the Interior (re-organized into BOEMRE in 2010)
NOAA	National Oceanic and Atmospheric Administration, Department of Commerce
NOS	National Ocean Service, NOAA
NMFS	National Marine Fisheries Service, NOAA
Nmile (nm)	Nautical Mile (1.15078 statute miles, 1.852 kilometers)
NRDA	Natural Resource Damage Assessment.
OAR	Office of Oceanic and Atmospheric Research, NOAA
OCS	Outer Continental Shelf
OPA	Oil Pollution Act of 1990.
OSAT	Operational Scientific Advisory Team
PSD	Passive sampling device
QA/QC	Quality Assessment/Quality Control
SAV	Submerged aquatic vegetation
SCATS	Shoreline Cleanup Assessment Teams
SPMD	Semi-permeable membrane device
SOPs	Standard operating procedures
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard, Department of Homeland Security
USFWS	U.S. Fish and Wildlife Service, Department of the Interior
USGS	U.S. Geological Survey, Department of the Interior

Terms Related to NRDA

Acute. Having a sudden onset, lasting a short time. Can be used to define either the exposure or the response to an exposure (effect).

Aquatic. Habitats and ecosystems that exist in bodies of water; refers to both marine and freshwater environments.

Aromatics. Hydrocarbons characterized by unsaturated ring structures of carbon atoms. Examples of petroleum aromatics are benzene, toluene, and xylene.

Barrel (bbl). A unit of volume equal to 42 U.S. gallons or 159 liters at 60 degrees F.

Baseline. Condition of the natural resources and services that would have existed had the spill not occurred. Baseline data may include historical, reference, control and observational data on incremental changes.

Berm. Wall or barrier of sand used to protect against flooding in coastal regions.

Bioassay. A test used to evaluate the effects of chemicals or other substances on a living organism.

Biodegradation. Breakdown of organic compounds by microorganisms.

Biological community. All of the living things in a given environment.

Cetaceans. A group of related marine mammal species that includes whales, dolphins, and porpoises.

Chain of custody. Systematic documentation of all evidence, physical or electronic, from its acquisition to its custody, control, transfer, analysis, and delivery of the results to the Trustees.

Chronic. Involving a stimulus that is lingering or continues for a long time; often signifies periods from several weeks to years, depending on the reproductive life cycle of the aquatic species affected.

Continental shelf. Zone of the sea floor around a continent that extends from the shoreline and where the water depth is much shallower (100-800 meters) than the open sea (2,000+ meters).

Cooperative assessments. Assessments conducted cooperatively after an oil spill by Trustees and the party (parties) responsible for the incident.

Deepwater Horizon. Semisubmersible rig owned by Transocean used to drill the Macondo well.

Dispersants. Chemicals that are used to break down spilled oil into small droplets (see also surfactant).

Estuary. A partly enclosed coastal body of water with downstream connection to the ocean and upstream connection to freshwater, with both fresh and salt water.

Exposure. Direct or indirect contact with the discharged oil.

Fingerprinting. Method by which oil can be determined to have originated from a particular source. Also referred to as hydrocarbon profiling.

Hydrocarbons. A large class of organic compounds containing only carbon and hydrogen; common in petroleum products and other oils.

Hypoxia. Phenomenon in northern Gulf of Mexico and elsewhere where the concentration of dissolved oxygen in the water column decreases to a level that can no longer support living aquatic organisms.

In-situ. Literally “in-place,” to examine the phenomenon exactly in place where it occurs (i.e. without moving it to a laboratory).

Injury. An observable or measurable adverse change in a natural resource or impairment of a natural resource service

Injury assessment and restoration planning. Second phase of a natural resource damage assessment (NRDA) where Trustees identify the injuries to natural resources and determine appropriate restoration.

Invertebrates. Animals lacking backbones such as corals, crabs, shrimp and worms.

Marsh. An emergent wetland seasonally flooded or usually wet and often dominated by one or a few plant species. Marshes can be either freshwater or saltwater.

Macondo well. A well developed in Mississippi Canyon Block 252 (MC-252). The well is owned by BP and its corporate partners, Anadarko Petroleum and MOEX USA. It was drilled using the Deepwater Horizon drilling rig.

Marine mammals. Diverse groups of ocean-dwelling mammals including whales, seals and manatees.

Mississippi Canyon 252 (MC-252). Location of Macondo well and area leased by BP and partners.

Natural resources. Land, fish, wildlife, biota, air, water, ground water, drinking water supplies, and other such resources belonging to, managed by, or held in trust by the United States, a state, an Indian Tribe, or the government of a foreign country. Natural resources are held in trust for the benefit of the public. They do not include privately owned resources or property.

Natural Resource Damage Assessment (NRDA). Investigation performed by Trustees to identify and plan the restoration of natural resources injured by the release of oil or hazardous substances.

Natural resource services. Functions performed by a natural resource for the benefit of another natural resource and/or the public. They include ecological services (the physical, chemical, or biological functions that one natural resource provides for another) and human services (human uses of natural resources or functions of natural resources that provide value to the public, such as fishing and hunting).

Necropsy. An autopsy, particularly one performed on a dead animal to determine the probable cause of death.

Polyaromatic hydrocarbons (PAHs). Atmospheric pollutants produced as byproducts of fuel burning (whether fossil fuels or biomass).

Pelagic. Relating to, or living in open oceans or seas rather than waters adjacent to land or inland waters.

Pre-assessment phase. Activities performed under NRDA to determine whether to pursue restoration under OPA.

Quality assurance (QA). The systematic monitoring and evaluation of the various aspects of the sampling project to ensure that standards of quality are being met.

Quality control (QC). Periodic checks to verify that data are generated, collected, handled, analyzed, and reported according to protocol.

Rapid assessment program (RAP). System to collect perishable data and readily available information.

Responsible parties. The parties (e.g., individuals, companies, or government agencies) responsible for an oil spill or hazardous substance release.

Restoration. The goal of a natural resource damage assessment (NRDA), which involves rehabilitating, replacing, or acquiring the equivalent of injured natural resources and the services they provided. Restoration includes both primary and compensatory restoration projects.

Sediment. Loose particles of sand, clay, silt, and other substances that settle at the bottom of a water body that originate from eroding soil and from decomposing plants and animals.

Seeps (oil seeps). Crude oil and natural gas are released naturally, or “seep,” out of fissures in the ocean seabed and eroding sedimentary rock.

State jurisdiction of marine waters. In general, a state’s jurisdiction over marine waters extends seaward three nautical miles (≈3.3 statute miles). For Texas and the Gulf coast of Florida, jurisdiction extends seaward three marine leagues (nine nautical miles). For Louisiana, jurisdiction extends three imperial nautical miles (imperial nautical mile = 6080.2 feet) seaward of the baseline from which the breadth of the territorial sea is measured.

Submerged aquatic vegetation (SAV). Vegetation at or below the water surface of estuarine and nearshore waters found with one or more species of submerged vegetation such as eelgrass (*Zostera marina*); SAV is important habitat for young fish and other aquatic organisms.

Surfactant. An ingredient in dispersants that helps break oil into small droplets that disperse and ultimately degrade in the environment.

Tar balls. Small, dark-colored pieces of weathered oil.

Technical Working Groups (TWGs). Interdisciplinary teams of state and federal agencies representatives, along with other experts, charged with examining specific aspects of NRDA, such as birds.

Tier1. Studies undertaken as part of NRDA pre-assessment phase.

Toxicity. The potential or capacity of a material to cause adverse effects in a living organism.

Trustees (Natural Resource Trustees). U.S. Government, as Trustee for Gulf of Mexico natural resources, and agencies in five affected states (Alabama, Florida, Louisiana, Mississippi and Texas).

Water column. Figurative cylinder of water from the surface to the bottom of a water body; water conditions, temperature, and density vary throughout the water column.

Weathering. The physical and chemical process that changes the nature of oil, for example from a slick to tar balls.

Well head. Top of a well bore on which the apparatus for extracting the oil is attached.

Wetlands. Transitional areas between uplands and water that are subject to periodic flooding or prolonged saturation and contain specific plant communities and soil types. Wetlands can be classified as either tidal (within the reach of the tides) or non-tidal. Both serve important ecological functions.

NRDA-Related Websites

Work plans and study data, along with other information and details, can be found on several websites:

BP Natural Resource Damage Assessment: bp.com/nrda

Restore the Gulf (official federal portal): www.restorethegulf.gov

NOAA Gulf Coast Restoration: www.gulfspillrestoration.noaa.gov

NOAA Deepwater Horizon Archive: www.noaa.gov/deepwaterhorizon/index.html

U.S. Fish and Wildlife Service (consolidated wildlife reports):
www.fws.gov/home/dhoilspill/collectionreports.html#wildlifetable

Geoplatform-Gulf Response (interactive mapping): www.geoplatform.gov/gulfresponse

