



WATER MARKS

Louisiana Coastal Wetlands Planning, Protection and Restoration News

December 2011 **Number 44**

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Oil in the Wetlands

Habitat Restoration Fundamental to Gulf Coast Recovery

More than a year after the Deepwater Horizon oil spill, numerous questions remain over its ecological consequences in coastal Louisiana and the northern Gulf region. Coastal scientists and resource managers discuss the challenges that disasters pose to ecosystem recovery and the potential role of CWPPRA in the restoration of the Gulf coast.

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WaterMarks is published two times a year by the Louisiana Coastal Wetlands Conservation and Restoration Task Force to communicate news and issues of interest related to the Coastal Wetlands Planning, Protection and Restoration Act of 1990.

This legislation funds wetlands restoration and enhancement projects nationwide, designating nearly \$80 million annually for work in Louisiana. The state contributes 15 percent of total project costs.

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ABOUT THIS ISSUE'S COVER . . .

Seen from NASA's TerraSatellites May 24, 2010, sunlight illuminates a slick off the Mississippi Delta caused by oil from the Deepwater Horizon spill. Oil appears bright white or dark, depending on how sunlight is reflecting off its surface.

Credit: NASA



Eric Vance, EPA

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Eric Vailce/EPA

EXTENT OF INJURY WILL TAKE YEARS TO ASSESS

Oil Spill Delivers New Threats to Louisiana's Wetlands

In April 2010, the Deepwater Horizon oil-drilling rig exploded about 50 miles southeast of the Mississippi River delta. The disaster killed 11 workers, injured scores more and unleashed the largest marine oil spill in history. For 86 days the leaking well spewed millions of gallons of oil into the deep waters of the Gulf of Mexico.¹ Despite efforts to prevent the oil from making landfall along the ecologically rich and productive Gulf coast, more than 1,000 miles of shoreline were contaminated, with oil, ranging from heavy oil to tar balls, persisting on half of them more than 12 months later.²

In Louisiana, response data indicate that oil washed up on 658.8 miles of shoreline, with more than 269 miles suffering heavy to moderate oiling.³ Over a year afterward, the catastrophe continues to affect the Gulf coast ecosystem, economy and society.

Oil's alien presence in the wetlands

Scientists say it will take years to determine the full extent of environmental damage from the Deepwater Horizon oil spill. Posing chemical as well as physical threats, oil causes both immediate and long-term consequences in the coastal ecosystem.⁴ Organisms

ingesting, inhaling, absorbing or filtering oil may or may not suffer direct mortality; effects such as inhibited growth and depressed breeding activity might persist in a wildlife population for more than a decade.⁵

“Different kinds of oil cause different degrees of damage to wildlife,” says Mike Carlloss, a wildlife biologist with the Louisiana Department of Wildlife and Fish. “A bird’s response depended greatly on how much oil it was exposed to and at what point it was in its life cycle. Dispersants used to break up the oil from the Deepwater Horizon spill be-



A Shoreline Clean-up Assessment Technique team member from the University of New Orleans checks marsh vegetation for signs of damage from the Deepwater Horizon oil spill.

fore it reached land may have also been injurious to fish and wildlife, although their environmental effects are not yet fully understood. However, the threat that the dispersants pose must be weighed against the benefit of keeping oil from infiltrating critical wetland habitat.”⁶

The conundrum of whether or not to use dispersants parallels the dilemma of deciding whether or not to clean oil out of wetlands: Buried in a marsh and hidden from the degrading elements of sun and wind, oil can

- disrupt biological and chemical processes

- depress marsh productivity⁷
- reduce the population of organisms forming the base of the food chain⁸
- increase a marsh’s susceptibility to collapse⁹

But greater harm might be caused by clean-up operations that compress and disturb the fragile marsh soils,¹⁰ break apart vegetation and speed erosion.

Habitat restoration the proposed basis for coastal recovery

In the report¹¹ he presented to President Obama on restoring the Gulf following the oil spill, Secretary of the Navy Ray Mabus acknowledges

the fundamental value of Louisiana’s wetlands. Beyond their importance to the region’s economy and culture, wetlands are vital to the nation because of the essential ecosystem services that they supply: provision of food and fiber, purification of air and water, protection from storms, sequestration of carbon, opportunities for recreation and aesthetic values.

As well as securing these ecosystem services, Mabus contends, restoring the coastal environment “will support economic vitality and employment; enhance human health and safety; protect infrastructure and communities ... facilitate commerce and trade ... and contribute to the overall resilience of coastal communities and the nation.” He notes that the tragedy of the oil spill offers the opportunity to “address the root causes of Gulf degradation and to come up with creative solutions to address problems.”

Mabus recommends that Congress dedicate funds from civil penalties levied against the spill perpetrators to coastal restoration in the five states (Alabama, Florida, Louisiana, Mississippi and Texas) that suffered direct damage. To prioritize, coordinate and implement coast-wide restoration, Mabus proposes creating a recovery council. As a bridge to the council, the President established the Gulf Coast Ecosystem Restoration

Task Force and charged it with developing a restoration strategy that

- defines ecosystem restoration goals
- describes milestones towards reaching those goals
- identifies major policy areas where coordinated actions among government agencies are needed
- considers existing research and ecosystem restoration planning efforts
- evaluates existing research and monitoring programs and gaps in data collection¹²

Restoration should be science-based, says Mabus, and use natural ecological processes to rebuild and maintain a healthy, resilient Gulf region. Having built 102 projects over the past 21 years,¹³ CWPPRA has both scientific understanding of coastal ecosystems and engineering expertise to contribute to a regional recovery strategy.

“In addition, CWPPRA’s ability to solicit ideas from the

public, incorporate stakeholder involvement and cultivate interagency cooperation will prove valuable,” says Mark Ford, an ecologist working as a staff member with the Gulf Coast Ecosystem Restoration Task Force. “Our greatest challenge will be getting numerous agencies, stakeholders and citizens together on the same page. All concerned parties need a place at the table.”¹⁴ WM

The entire nation benefits from the range and richness of the Gulf Coast’s natural resources. From the big business of oil extraction and distribution to the private pleasure of throwing a hook into the water, Louisiana’s economy and culture rely on a healthy ecosystem.



¹ National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling*, Report to the President, January 2011. <http://www.oilspillcommission.gov/final-report>

² NOAA, *Road to Restoration*, <http://www.gulfspillrestoration.noaa.gov/2011/05/road-to-restoration-assessing-the-damage-to-shorelines/>

³ State of Louisiana, October, 2011

⁴ USGS, *Shoreline Surveys of Oil-Impacted Marsh in Southern Louisiana*, July to August 2010. <http://pubs.usgs.gov/of/2011/1022/>

⁵ Congressional Research Service, *The Deepwater Horizon Oil Spill: Coastal Wetland and Wildlife Impacts and Response*. <http://www.fas.org/sgp/crs/misc/R41311.pdf>

⁶ WaterMarks interview with Mike Carloss, May, 2011

⁷ Ibid

⁸ Lin and Mendelsohn, 1996; Pezeshki and others, 2000, *Shoreline Surveys of Oil-Impacted Marsh in Southern Louisiana*, July to August 2010, USGS

⁹ Ko and Day, 2004, *Shoreline Surveys of Oil-Impacted Marsh in Southern Louisiana*, July to August 2010, USGS

¹⁰ Congressional Research Service, *The Deepwater Horizon Oil Spill: Coastal Wetland and Wildlife Impacts and Response*. <http://www.fas.org/sgp/crs/misc/R41311.pdf>

¹¹ Mabus, Ray, *America’s Gulf Coast: A Long Term Recovery Plan after the Deepwater Horizon Oil Spill*, September, 2010. <http://www.restorethegulf.gov/release/2010/09/28/america%E2%80%99s-gulf-coast-long-term-recovery-plan-after-deepwater-horizon-oil-spill>

¹² EPA web site: <http://epa.gov/gulfcoasttaskforce/basicinformation.html>

¹³ Browning, Gay, USACE. June, 2011

¹⁴ WaterMarks interview with Mark Ford, July, 2011

CWPPRA Projects

CWPPRA freshwater or sediment diversions and outfall management projects from Mississippi River

CWPPRA hydrologic restoration projects

Forested wetland

CWPPRA shoreline protection or stabilization projects

CWPPRA marsh creation and marsh nourishment projects

CWPPRA vegetative planting projects

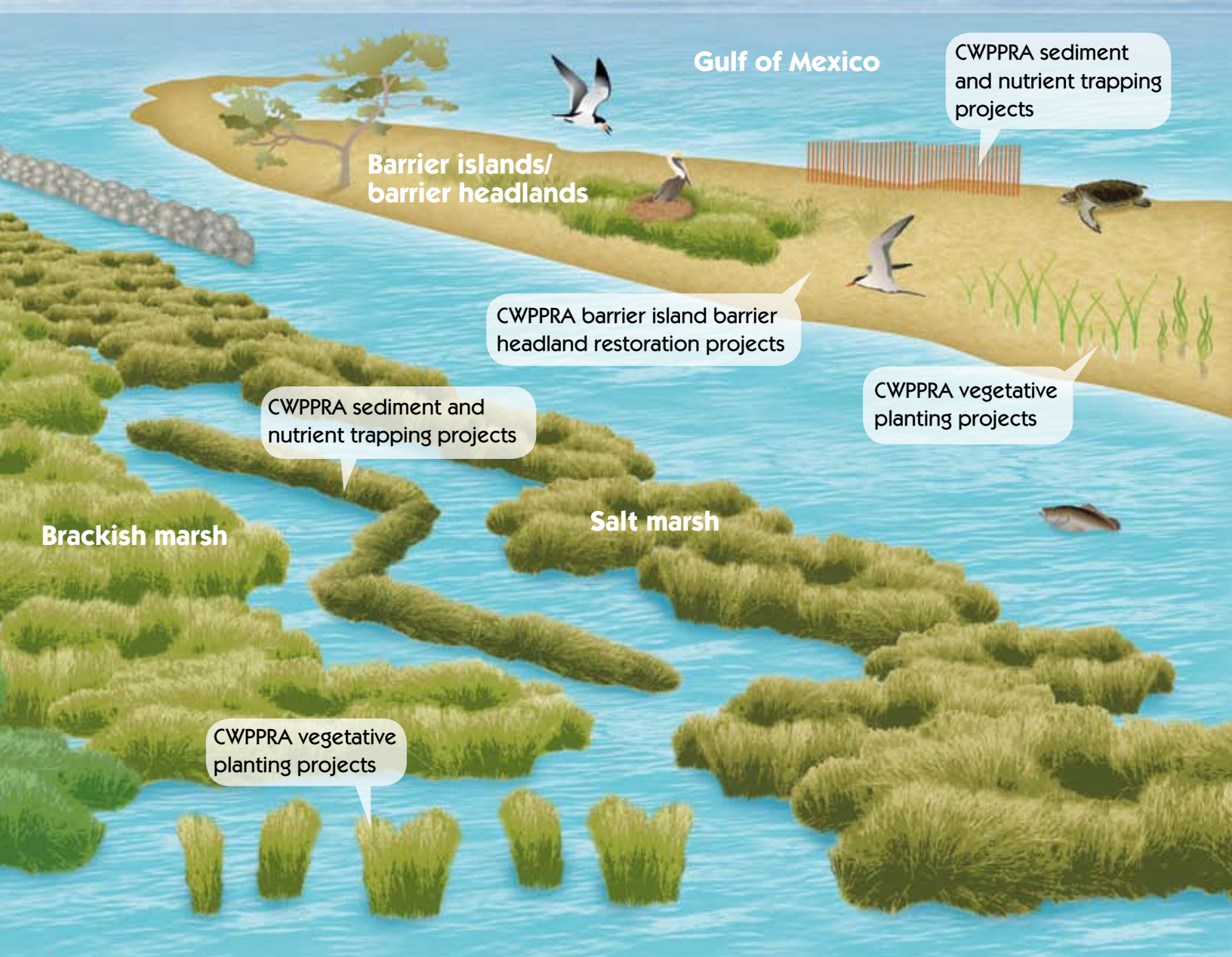
Freshwater marsh

Intermediate marsh

CWPPRA demonstration projects

Legend for CWPPRA project types, techniques and locations on page 8

Build Resilient Wetlands

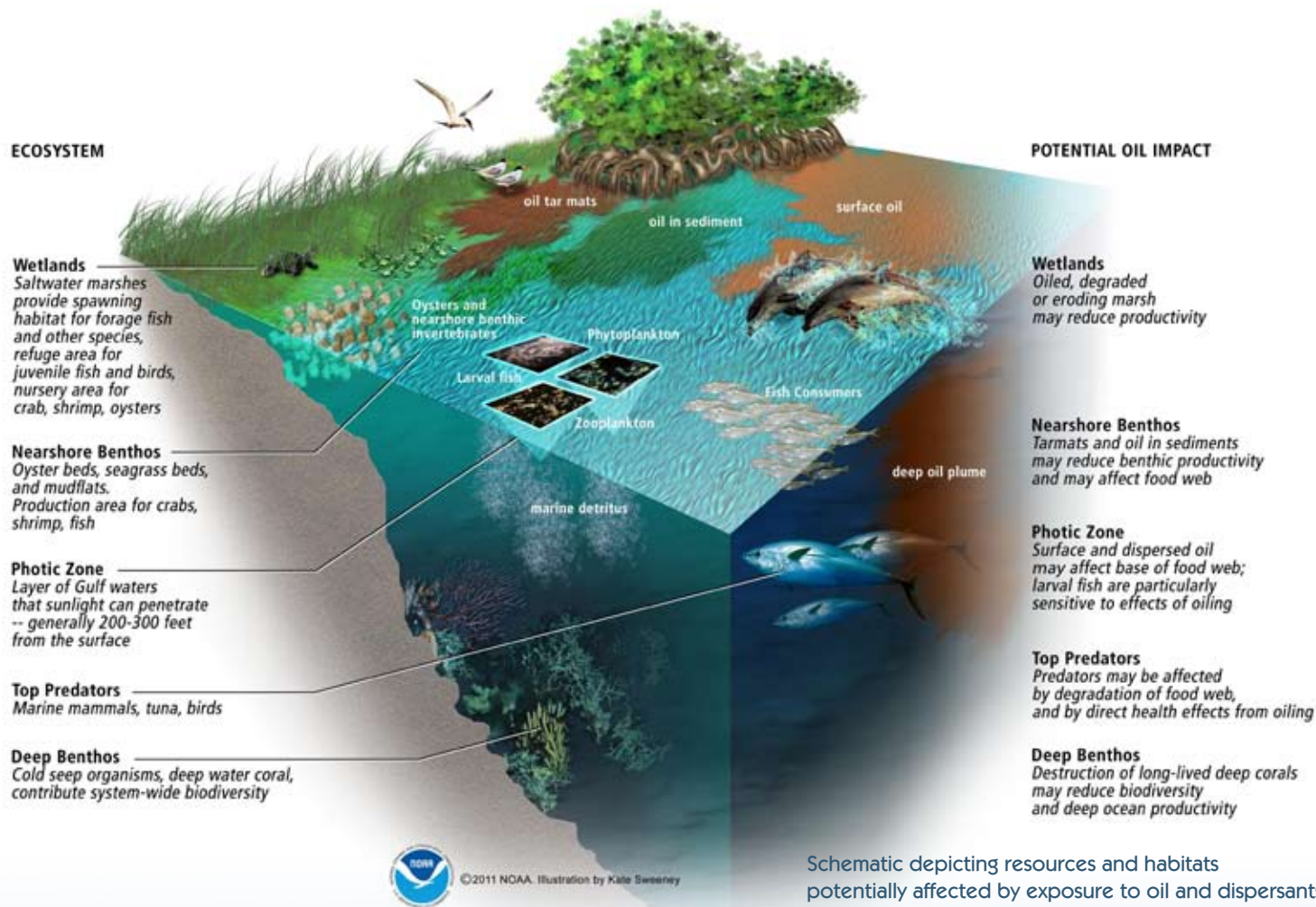


CWPPRA PROJECTS BUILD RESILIENT WETLANDS

COASTAL ZONES	REPRESENTATIVE SPECIES
Gulf of Mexico	Outside CWPPRA project zone
Barrier islands/barrier headlands	Plovers, terns, black skimmers, brown pelicans, sea turtles, sea oats, bitter panicum, beach morning glory, black mangroves, widgeon grass, shoal grass, turtle grass, fish (i.e., mangrove snapper, speckled trout, redfish), bay anchovies
Salt marsh	Smooth cordgrass, black needlerush, grasses, spotted sea trout, menhaden, shrimp (larvae carried on currents from ocean into estuaries), crab
Brackish marsh	Saltmeadow cordgrass, oysters, redfish (red drum), smaller nursery fish in breeding ground, shrimp
Intermediate marsh	Mix of herbaceous species – pink marshmallows, bull tongue, spider lilies, swamp lilies, irises; herons, egrets, ibis, roseate spoonbills, redwing blackbirds, osprey, alligators
Freshwater marsh	Submerged aquatic vegetation, lily pads, flowering plants on banks: pickerel weed, irises, swamp lilies, spider lilies, arrowhead; ducks, bass, crappie, bluegill, catfish
Forested wetlands	Bald cypress, spider lilies, arrowhead, swamp lilies, pickerel weed, irises, ducks, bass, crappie, bluegill, catfish, alligators

CWPPRA PROTECTION AND RESTORATION PROJECT TYPES	PROJECT TECHNIQUES	LOCATION
Barrier island/barrier headland restoration	Sediment dredging and deposition, shoreline protection, plantings, back bay restoration	Barrier islands and barrier headlands adjacent to Gulf of Mexico
Marsh creation and marsh nourishment	Sediment dredging and deposition, spraying sediment onto degraded wetlands, plantings	All project zones
Freshwater or sediment diversions and outfall management	Levee gaps or siphons; gates and other management structures to maximize benefits of water flowing through wetlands	Brackish, salt and freshwater marshes; fresh water and sediment trickle down coastal gradient from projects in upper basins
Shoreline protection or stabilization	Hardscaping – rocks, cement walls along shoreline. Sometimes used with plantings behind the rocks.	All project zones
Sediment and nutrient trapping	Terraces built in open water and planted with marsh grass, sand fences on beaches	All project zones
Vegetative planting	Planting by hand or aerial seeding to shore up eroding banks, jumpstart plant colonization following marsh creation, stabilize soil. In some areas, planting behind shoreline protection builds land rapidly	All project zones
Hydrologic restoration	Weirs and flap-gated culverts allowing water to flow both in and out while limiting saltwater intrusion into upper brackish, intermediate and fresh marshes	All project zones
Demonstration projects	Variety of techniques for each project type	All project zones

Potential oil exposure to resources following the Deepwater Horizon spill



Schematic depicting resources and habitats potentially affected by exposure to oil and dispersants

Eric Vance, EPA

WETLANDS PUMMELED BY NATURE, IMPERILED BY MAN

Disasters Test Resiliency of Coastal Habitats

In the midst of marsh grasses whispering in the breeze and slow-moving water gurgling in tidal creeks, Mylar ribbons flutter and flash in the sun. Without prelude, a propane canon discharges, sending a boom out toward the flat horizon. Startled, a few wading birds flap up and glide away from Bay Jimmy in Louisiana's Plaquemines parish.

"We're trying to keep birds out of areas where oil from the Deepwater Horizon spill continues to pose risks," says Mike Carloss, a wildlife biologist with the Louisiana Department of Wildlife and Fish. "The loud noise and the glittering streamers keep birds away from potential harm, whether from oil newly exposed by wind and waves or from foods tainted with

oil."¹ Although the source of the Deepwater Horizon spill has long since been capped, the disaster continues to menace Louisiana's marshes.

Agents of catastrophe in the coastal environment

Disaster is no stranger to the Gulf Coast. The complex interface of land and sea endures periodic battering

Biologists from the Louisiana Department of Wildlife and Fisheries and the U.S. Fish and Wildlife Service conduct a ground reconnaissance to search for oiled or dead shorebirds in a rookery colony in Barataria Bay after oil from the Deepwater Horizon spill infiltrated the area.



by wind and storms that wash away barrier islands and rip apart vegetated wetlands. Yet the coastal ecology has evolved with natural mechanisms for survival: sands aggregate to form new islands, pieces of broken vegetation root and grow into new plants that tightly knit the marsh soil together.

Whereas a hurricane blows through in a matter of hours, an oil spill disaster may unfold over months. Storms cause sudden physical devastation. Oil can infiltrate a marsh slowly, gradually seeping down into the bottom sediments and causing chemical as well as physical damage. Injury may be quickly apparent – stalks of marsh grass heavily coated with oil may be doomed to suffocate and die, creatures coated with oil may lose the insulating capacity of feathers or fur, and animals that ingest oil either by cleaning themselves or by eating contaminated foods could be fatally poisoned. Other injuries may take years to show up, as the oil works its way into the root systems of marsh vegetation and into the flesh and organs of aquatic and wetland creatures.²

“Once oil is sequestered in the marsh and protected from weathering, it becomes a persistent problem,” says Professor Brian LeBlanc, a water quality specialist with the Louisiana State University Agricultural Center and Louisiana Sea Grant. “Oil that’s on or near the marsh surface will degrade, but if it’s covered with sediment and other materials, its decomposition slows markedly. Buried oil is not consumed by oil-eating microbes, which can’t survive in mud without oxygen. Should waves or storms uncover the oil, it poses the same threats that it did when it was freshly buried. Such oil can contaminate an area for years.”

Yet cleaning oil out of a marsh risks creating worse problems. Footsteps and equipment can push oil deep into the fragile soil. Cleaning operations can destroy roots and rhizomes that are viable even while appearing lifeless. “If the toxic, oiled sediment is below the root system of the marsh grass, a marsh may be able to recover,” says LeBlanc. “But oil can slow vegetative growth to the extent that the entire marsh



A brown pelican coated with oil stands among other brown pelicans on Queen Bess Island off Grand Isle, La.

Tom MacKenzie U.S. Fish and Wildlife Service



Bird rehabilitation specialists clean oil from a juvenile brown pelican.

Tom MacKenzie U.S. Fish and Wildlife Service



Assisted by wildlife managers, a veterinarian with the U.S. Fish and Wildlife Service releases a cleaned pelican back into the wild.

Robert Brazzell, U.S. Coast Guard



NOAA

Louisiana's wetlands are the nursery for numerous Gulf fisheries, including species critical to the nation's seafood industry. During the Deepwater Horizon oil spill, fish and invertebrates were collected and tested regularly for evidence of contamination.

washes away while we wait for natural processes to take place. There's no clear answer to how to treat marshes contaminated with oil. That's why there was so much effort to keep oil from the Deepwater Horizon spill out of the wetlands in the first place."³

Though not impenetrable, booms provide a physical barrier to reduce the amount of oil making landfall, while dispersants use chemical means to break waterborne oil into tiny droplets. "Dispersants

played a role in keeping much of the Deepwater Horizon oil from reaching shore," says Frank Rohwer, a professor at the School of Renewable Natural Resources, Louisiana State University. "But dispersants are a mixed bag for wildlife. Some lab studies indicate they are more injurious than the oil itself, causing direct mortality among fish and microorganisms."⁴

Scientists will attempt to determine the spill's damage to marine life by comparing

populations year to year. "But in the vastness of the ocean we'll never be able to count all the fatalities, the reproductive disorders and the slowed growth rates that the spill caused," says LeBlanc. "If we lose a class of juveniles, it would likely show up among short-lived invertebrates such as shrimp and crabs within the year. However, in the case of some fish, it could take up to four years before the effect is noticeable – and then it could linger for a decade or more."⁵

Nation bears the consequences of catastrophe in the Gulf

The condition of Louisiana's coast is not merely of local concern. Should the wetlands continue to deteriorate and vanish, consequences would include

- disappearance of coastal estuarine habitats that provide nurseries for most Gulf of Mexico fisheries
- decline of a nationally significant seafood industry
- a weakened natural storm buffer system and heightened vulnerability of inland communities to hurricanes and floods
- increased exposure of infrastructure supporting oil and gas production and national energy distribution
- disruption of national maritime commerce
- disintegration of a distinctive, historical coastal culture⁶

Assessing damage and implementing recovery⁷

Natural Resource Damage Assessment (NRDA) is a legal process under the Oil Pollution Act of 1990 (OPA) and the Louisiana Oil Spill Prevention and Response Act of 1991 (LOSPRA), whereby designated trustees represent the public to ensure that natural resources injured in an oil spill are restored.

The Oil Pollution Act authorizes certain federal agencies, states and Indian tribes, collectively known as the Natural Resource Trustees (Trustees), to evaluate the impacts of an oil spill on

natural resources. Trustees are charged with making the environment and the public whole for injuries to natural resources and services resulting from an incident involving a discharge of oil or substantial threat of a discharge of oil. Making the environment whole includes both restoring injured resources to the condition they would have been in but for the discharge as well as compensating for the temporal loss of natural resources, and the ecosystem services they provide, from the time of injury until the time they are fully restored.

The Natural Resource Trustees for the Deepwater Horizon Oil Spill include U.S. Department of Commerce, represented by the National Oceanic and Atmospheric Administration; U.S. Department of the Interior; and the five affected Gulf states: Alabama, Florida, Louisiana, Mississippi and Texas.

The Trustees are currently in the injury assessment and restoration planning stage of the Deepwater Horizon NRDA process. In this stage, teams of scientists develop and implement wide-ranging studies to determine the amount of injury sustained as a result of the spill. Once the injuries are assessed and the scope and scale are determined, the Trustees will develop a restoration plan or series of plans to compensate the public for those injuries. BP and the other responsible parties can either execute this plan or provide the Trustees with funding to implement the plan. Plans for emergency and early restoration projects may be developed and implemented prior to the completion of the assessment. **WM**

Contractors use mops improvised out of bamboo poles and absorbent pads to clean oil from marsh grass in Terrebonne Bay, Louisiana. Walking in the marsh could exacerbate damage by pushing the oil deeper into the fragile soil.



Derek W. Richburg, U.S. Coast Guard

- 1 Carloss, op. cit.
- 2 WaterMarks interview with Troy Baker, NOAA, April 2011; <http://www.gulfspillrestoration.noaa.gov/2011/05/road-to-restoration-assessing-the-damage-to-shorelines/>; <http://www.evostc.state.ak.us/facts/qanda.cfm>; Mabus, op. cit.
- 3 WaterMarks interview with Brian LeBlanc, June 2011
- 4 WaterMarks interview with Frank Rohwer, May 2011
- 5 LeBlanc, op. cit.
- 6 Adapted from Mabus, op. cit.
- 7 State of Louisiana



WATERMARKS INTERVIEW WITH JOHN HANKINSON

Following the Deepwater Horizon disaster in 2010, President Obama asked Navy Secretary Ray Mabus to develop a long-term plan to restore the Gulf of Mexico. In his report, Secretary Mabus suggested creating the Gulf Coast Ecosystem Restoration Task Force to advise federal agencies and ensure restoration efforts are coordinated, collaborative and effective. An Executive Order from President Obama created the Task Force, which is composed of 11 Federal agencies, including four White House offices, and all five Gulf Coast States. Environmental Protection Agency Administrator Lisa Jackson was selected by President Obama to chair the Task Force. John Hankinson, a Florida native who has worked on environmental issues in the private, public and non-profit sectors, serves as the executive director.

WATERMARKS: For decades, numerous agencies have proposed various plans for restoring Louisiana's coast. What distinguishes the work of the Gulf Coast Ecosystem Restoration Task Force from these other efforts?

HANKINSON: The role of the Task Force is to create a strategy to speed the implementation of existing plans and serve as a bridge to the coast-wide restoration council that Secretary Mabus proposes.

Because the Task Force is looking at the Gulf Coast as a whole, we're not constrained by state, county or parish boundaries. We can look at the big picture, determine region-wide priorities, pin-point areas of greatest need, and coordinate efforts among the restoration programs already active throughout the Gulf Coast. Our job is to help implement exist-

ing plans by removing obstacles, where possible.

A good example of how the Task Force is addressing an existing problem in the Gulf is with sediments. Sediment dredged to keep shipping channels navigable is valuable for rebuilding marshes. But because the Corps of Engineers is mandated to dispose of the material they dredge using the lowest cost method, only a fraction of it is used for restoration. The Task Force is working toward a resolution to this problem by more closely aligning resources from multiple sources to help finance transporting more of this valuable sediment into the wetlands. Additionally, we will advocate redefining "beneficial use" to achieve both cost-effective disposal and environmental benefit through effective sediment relocation.

The strength of the Task Force is coordinating federal and state agencies, reaching out to the public and implementing recovery programs. Getting folks together, creating momentum for coastal recovery and keeping a budgetary focus on the Gulf are essential parts of our job.

WATERMARKS: There's a lot of concern that the wetlands will suffer irrevocable damage because of lengthy delays in the oil spill settlement process. Can you allay those fears?

HANKINSON: The scale and pace of ongoing wetland loss, which we have witnessed for decades, is a serious concern. Under the Oil Pollution Act, remediation of damage from BP's Deepwater Horizon spill is being undertaken by the Natural Resources Damage Assessment

(NRDA) program. BP's allocation of early remediation funds is certainly a positive move in the direction of initial restoration. The Gulf Coast Ecosystem Restoration Task Force is looking beyond this at the bigger picture, to the region's ecological conditions overall. Its goal is a long-term, coordinated, coast-wide recovery.

WATERMARKS: Why should Louisiana be interested in working with other states on a regional plan for coastal restoration?

HANKINSON: The deterioration of the Gulf Coast doesn't observe any state boundary. It's a regional problem, so the solution must be regional as well.

Although we describe coastal environmental conditions as a regional problem, it's truly a national concern. There's a growing understanding of the coast's importance to the entire nation's commerce, seafood supply, oil production and energy distribution. I believe the nation is ready to approach the Gulf Coast as a unified ecosystem and address the issues from watershed to blue water, as the saying goes, though the magnitude of the problem is daunting.

Naturally each state has a high interest in projects that have a direct local impact, but states are also seeing that you don't have to choose between projects with local support and a comprehensive, regional plan. The best strategy is a marriage of the two approaches, fitting local interests into a larger picture.

CWPPRA is a good model for making this integration happen. The program's outstanding

strength is its ability to get the numerous parties concerned about coastal restoration to work together. The Task Force wants to build on CWPPRA's example.

WATERMARKS: How would you determine if future restoration is successful?

HANKINSON: If we can find ways to support restoration projects or encourage certain policy changes, we should see measurable results – for example, a reduction in the rate of wetland loss, or a decrease in the excessive amount of nitrogen and phosphorus from fertilizers in the water that cause the Gulf's hypoxic zone. Growing populations of key species and expanding areas of habitat would also be indicators of success. From a process perspective, an increase in the beneficial use of dredged material would show an improved cooperation among agencies.

Other goals, such as involving people in restoration activities and building national awareness, are equally essential to

restoration success but less easily measured.

WATERMARKS: How will CWPPRA fit into the future of regional environmental restoration?

HANKINSON: CWPPRA has done well with the resources it's had. Based on that success, I'd like to see CWPPRA expand its capacity and be prepared in the future to apply itself on a much larger scale. One way CWPPRA might go about doing this is to expand existing successes, such as the Bayou Dupont Sediment Delivery System project (BA-39), across a much wider landscape. This type of expansion will benefit from the development of a comprehensive planning framework to help identify projects.

But I think CWPPRA's most valuable contribution to any restoration effort will be its ability to engage the grass roots, bring agencies to the table and develop relationships. Ultimately the success of coastal restoration lies with the people – and in the Gulf region that is an invaluable resource.



Members of the Gulf Coast Restoration Task Force drive past oil-absorbent pom poms on a survey of coastal beaches.

Eric Vance, EPA

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Brown pelicans congregate on an oil containment boom surrounding Queen Bess Island, Louisiana.

Cory J. Mendenhall, U.S. Coast Guard