



Making the Most of Restoration

Priorities for a Recovering Gulf

A Letter from Our Director

The National Wildlife Federation has worked for nearly two decades to improve the health and productivity of the Gulf of Mexico and its coastal areas for both people and wildlife. In 2000 we mobilized our members and supporters to help secure Congressional support for the Comprehensive Everglades Restoration Plan; we have worked since 2001 to ensure that Texas bays have the fresh water they need to support healthy fish and wildlife populations; and for more than a decade we have championed the restoration of Louisiana's disappearing coastal wetlands.

In the wake of the 2010 Deepwater Horizon oil spill, the National Wildlife Federation worked with our state affiliates and many other partners to secure passage of the RESTORE Act, which dedicates 80 percent of civil penalties from the spill back to the Gulf states for restoration and recovery. Since 2012, we have had staff on the ground in the five states, working with interested stakeholders to help guide the spending of billions in oil spill fines and penalties towards scientifically sound, effective ecosystem restoration projects.

This report is an update to our 2014 priority projects report, *Restoring the Gulf of Mexico for People and Wildlife: Recommended Projects and Priorities*, which highlighted the importance of healthy estuaries to the long-term vitality of the Gulf. We have developed these new recommendations with that same estuary focus in mind. In this report we have also identified several bays and estuaries that, with some significant near-term funding from oil-spill fines, will be better able to sustain the wetlands, barrier islands, nearshore waters, and other natural resources that wildlife, local communities, and coastal businesses all rely on.

The Deepwater Horizon oil spill was the worst environmental disaster in our nation's history. In addition to causing the tragic deaths of 11 men, this unprecedented event killed and injured marine mammals, shorebirds, sea turtles, and other wildlife, and damaged the Gulf's delicate web of life in ways that are still unfolding.

Equally precedent-setting is the opportunity for restoration that is now before us. With more than \$16 billion dollars available to repair and restore the Gulf's natural resources, this is the largest environmental restoration effort our country has ever undertaken. But the need for restoration is also great. The Gulf ecosystem supports much of the Gulf economy, and its long-term health has sometimes been sacrificed for the sake of that economy. We have a chance now to repair both recent and longer-term injuries, and every dollar counts.

We hope this report inspires Gulf communities and other stakeholders to engage in the unfolding restoration processes, and that it suggests to decision-makers a path to restoring and protecting a healthy Gulf. The National Wildlife Federation is committed to Gulf restoration and we hope all Americans will join us in supporting projects that will lead us to a healthy and vibrant Gulf of Mexico for future generations.



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How Deepwater Horizon Settlement Funds Can Help Restore the Gulf of Mexico

More than \$16 billion is available for ecological restoration in the Gulf

On April 4, 2016, the Department of Justice and the five Gulf states finalized a global settlement with BP for \$20.8 billion dollars, to be paid out over the next 15 years.

Of this sum, \$4.4 billion will flow back to the Gulf region via the RESTORE Act to be used for ecosystem and economic restoration and recovery efforts. Another \$8.8 billion is available under the Oil Pollution Act's Natural Resource Damage Assessment process to restore the places and wildlife damaged by the spill and the lost recreational use during the spill. Additionally, in 2013, the Justice Department structured its criminal settlements with BP and Transocean so that \$2.54 billion of these penalties would be administered by the National Fish and Wildlife Foundation to fund projects that benefit the Gulf Coast natural resources impacted by the spill.

With the smaller civil settlements from Transocean and Anadarko, more than **\$16 billion is available that *could* be used for ecological restoration in the Gulf**. With this money, the nation is going beyond just compensating a region for environmental harm done; we are embarking on the largest restoration effort in U.S. history.

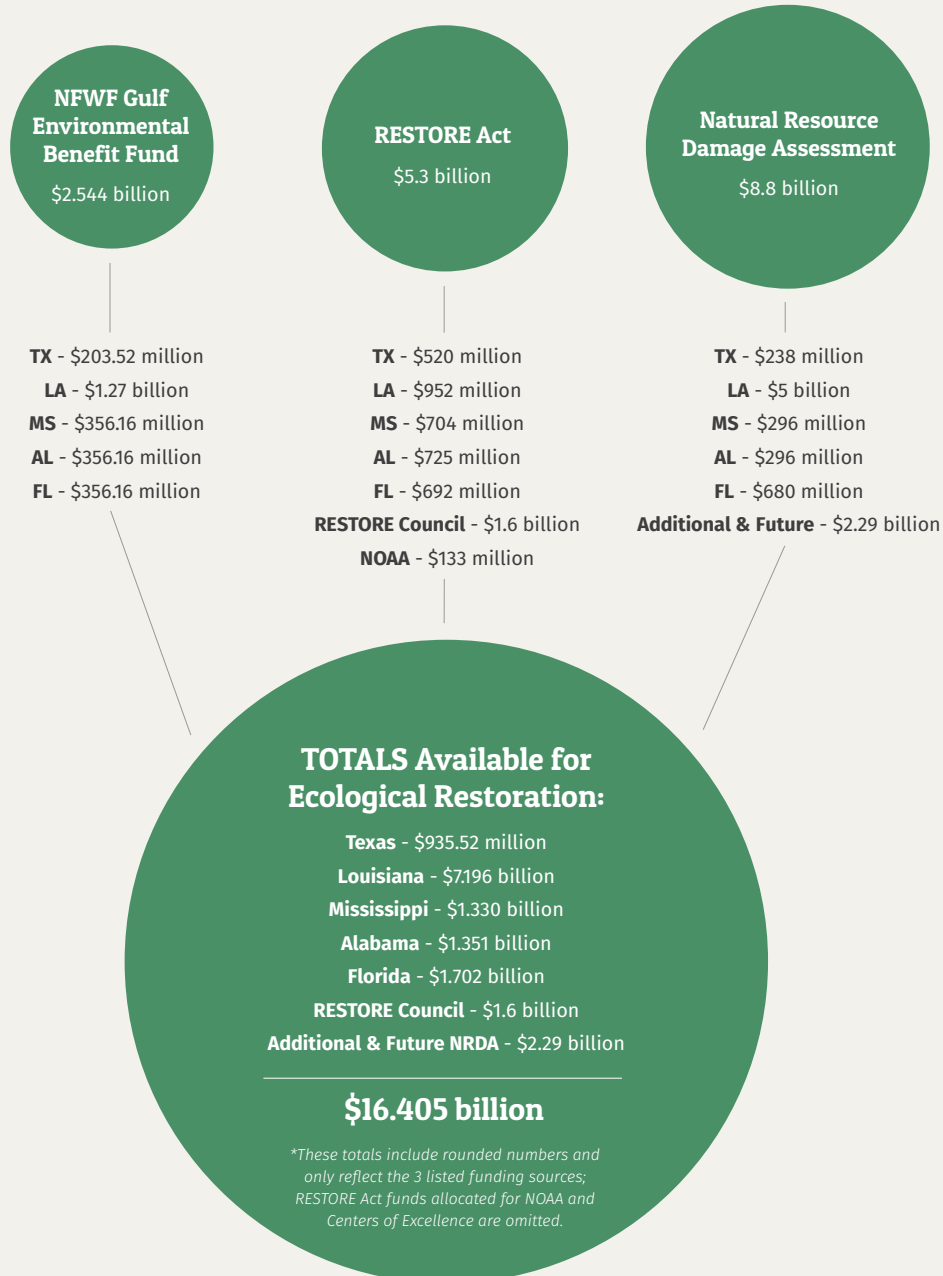
Seven years after the Deepwater Horizon rig exploded, this restoration process is really just getting started. The largest dollar amounts—those from the 2016 global settlement with BP—begin to pay out in 2017.

At the end of 2016, a federal-state council created by the RESTORE Act approved an important update to its statutorily mandated Comprehensive Plan for Gulf-wide restoration. This plan will guide how more than \$3 billion of these restoration dollars are invested. The months to come are also a critical time for the Oil Pollution Act's Natural Resource Damage Assessment process, as initial plans are published for various restoration areas—including one for each state and one for marine resources in the open ocean.

Maximizing this unprecedented opportunity will require vision, coordination, and a commitment to science. It will require decision-makers to think big and act boldly. And it will require active engagement by the people who live, work, or play on the Gulf Coast.

This document lays out the restoration projects the National Wildlife Federation believes will best

Deepwater Horizon Oil Spill Criminal and Civil Fines and Penalties



advance a comprehensive Gulf-wide restoration agenda. Our long history working in the Gulf has given us a first-hand, up-close view of the important role estuaries play in supporting fish and wildlife. Thus we are focused on projects we think will improve the health of Gulf estuaries,

directly or indirectly. We believe supporting estuaries—the nurseries for marine life and the foundation of coastal ecosystems—will give us the greatest return on this historic investment in ecological restoration.

Our Approach to Gulf Restoration



The National Wildlife Federation believes that a significant portion of the Deepwater Horizon restoration dollars should focus on efforts to improve the Gulf of Mexico's estuaries. These coastal systems—where fresh water from rivers mixes with the saltier waters of the Gulf—are among the most productive natural places in the world. Estuaries serve as spawning, nursery, and feeding grounds for nearly all of the Gulf's commercial and recreational fish species and provide essential habitat for hundreds of species of birds, waterfowl, and other wildlife.

As the Gulf region recovers from the largest oil spill in U.S. history, state and federal leaders have an opportunity to invest wisely in the long-term health and resiliency of its coastal lands and waters. Most of the Gulf's estuaries have been harmed by decades of human alterations. Oyster reefs have been over-harvested. Wetlands across the Gulf—particularly in the Mississippi River Delta—have been lost to subsidence and erosion. Most of the rivers that flow to the coast have been leveed, dammed, deepened or straightened, their seasonal cycles of flow altered, and their water diverted for cities, agriculture or navigation. Sea level rise and extreme storm events threaten the coast and its residents.

The Deepwater Horizon penalties will make as much as \$16 billion available for habitat restoration. However, even this vast sum will not be enough address the myriad problems facing the Gulf. Focusing these funds on improving the health of key estuaries vital for wildlife will benefit the health of the Gulf as a whole over the long term.

To identify the suites of projects that have the greatest collective impact on priority estuaries, we reviewed federal, state and local planning and assessment reports, and documented the existing stressors for each system. Next, we identified and evaluated potential restoration needs required



to tackle each underlying stressor. This process allowed us to prioritize projects for a given estuary based on the greatest restoration needs.

One consistent theme occurs across the Gulf Coast: In estuaries from Florida's Apalachicola Bay to Texas' San Antonio Bay, human use of water and alterations in flow are depriving Gulf estuaries of the fresh water they need to maintain their functions for wildlife. In other places—most notably the Mississippi River Delta—the issue is not just a lack of fresh water, but also physical alterations to the system that have deprived the coast of the sediment needed to sustain coastal wetlands.

The need to restore more natural ecological processes, from freshwater flow to sediment delivery, is perhaps the most achievable step we can take to make a substantive, lasting improvement to the health of the Gulf and enhance the resiliency of coastal communities. With a more natural pattern of water and sediment delivery, an estuary will provide a stronger, more sustainable platform for subsequent restoration projects, such as marsh or oyster reef restoration efforts.

Addressing the damage that occurred in the open ocean environment is also fundamental to ensuring that Gulf wildlife and fisheries thrive. Scientists' understanding of the Gulf of Mexico is currently limited by a lack of research on the habitats and marine wildlife that live beyond the shore. This lack of scientific understanding is a major hurdle to recovery. Although not a focus of this report, the National Wildlife Federation supports efforts advanced by partner organizations and agencies to better understand

the offshore environment, including open ocean and deep benthic communities. Examples of these efforts include: documenting travel patterns for migratory fish species; mapping the distribution of deep sea benthic and coral communities; and understanding and addressing stressors in the open ocean environment. Until we have a better understanding of population dynamics, species distributions, and community interactions, we will be unable to fully address the needs of this ecosystem.

We encourage decision-makers to invest in the health and productivity of the Gulf by prioritizing investments, including those described here, that meaningfully address the restoration needs of each estuary and the Gulf as a whole. The Gulf's estuaries are the lifeblood of communities and businesses, and their protection and restoration are key to both the near-term recovery and the long-term resiliency of the national treasure that is the Gulf of Mexico.

Project Types



BARRIER ISLANDS



COASTAL WETLANDS



HABITAT PROTECTION



HYDROLOGIC RESTORATION



OYSTER REEFS & SHORELINES



SEDIMENT DIVERSIONS



Texas

With 367 miles of shoreline, the Texas coast serves as an economic powerhouse for the state. Coastal tourism supports more than 143,000 jobs and draws in nearly \$18 billion in annual spending—more than a quarter of all travel dollars spent in Texas each year. Commercial fishing generates roughly 22,000 jobs and more than \$1.3 billion in sales.

The Texas coast is also home to key wildlife species. The last wild flock of the endangered whooping crane winters in and around San Antonio Bay. Padre Island is the only place in the United States where the Kemp's ridley sea turtle regularly nests. The Texas coast is also home to hundreds of species of birds, particularly during spring migration. However, the health of the Texas coast has declined over the past decades of industrialization. Facing increasingly difficult-to-predict periods of drought and flooding, the ever-present threat of devastating hurricanes, and a rising population with increased water demands, Texas urgently needs to make critical investments to restore, protect, and enhance the health of its Gulf coastal estuaries and communities.



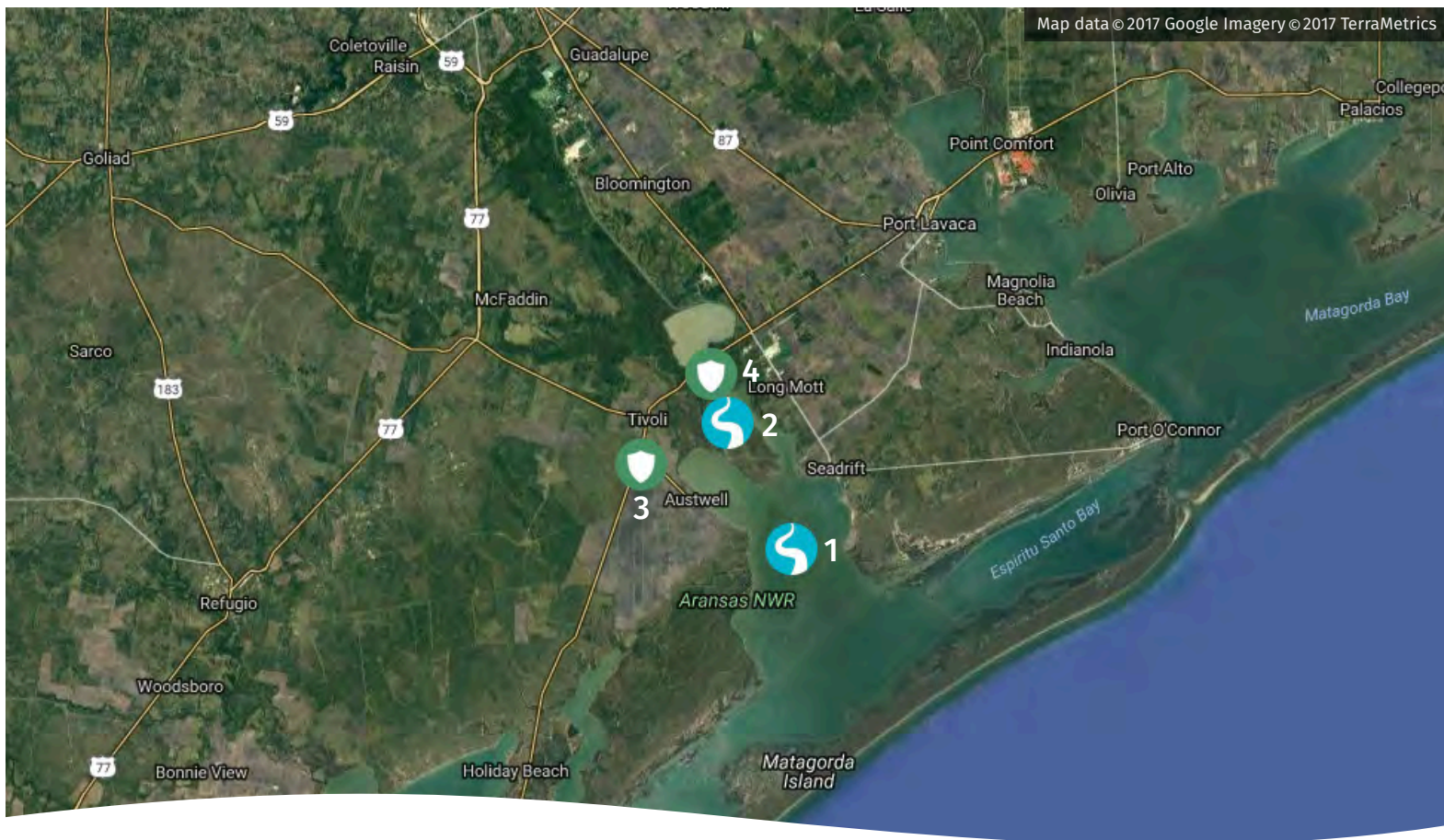
PHOTO: EARL NOTTINGHAM, © TEXAS PARKS AND WILDLIFE DEPARTMENT

The long-term health and productivity of the state's coastal estuaries depend on the continued flow of fresh water to the bays from the rivers that feed them. Healthy marsh vegetation and oyster reefs provide habitat for many species and storm protection for coastal communities, but these systems require adequate freshwater inflows to survive, particularly during times of drought.

Strategic efforts to protect freshwater inflows and to restore habitats in Galveston, Matagorda and San Antonio Bays, outlined in this report, will create synergistic benefits for wildlife and communities. The National Wildlife Federation also supports the completion of two projects outside of these three watersheds that have

already received some oil-spill funding: the restoration of the Salt Bayou watershed in the Chenier Plain and the efforts to restore the Bahia Grande section of the Laguna Atascosa National Wildlife Refuge.

In total, Texas is certain to receive more than \$900,000 dollars that can be used for restoration as a result of the Deepwater Horizon disaster. With a competitive grants process in place, about a quarter of these funds have already been awarded or are in the process of being committed to projects that include purchasing key parcels of land, restoring nesting habitats for birds, monitoring sea turtle populations and rebuilding oyster reefs. The remaining money will become available over the next decade and a half.



San Antonio Bay

THE SAN ANTONIO BAY ESTUARY SYSTEM is located on the mid-Texas coast and depends on freshwater inflows from the Guadalupe and San Antonio rivers. The rivers converge and enter the estuary through a single channel at the head of the Guadalupe Delta.

Bordered in part by the Aransas National Wildlife Refuge, the winter home for the last wild flock of the endangered whooping crane, San Antonio Bay provides an abundance of important habitat for fish and wildlife. The whooping crane's recovery from the brink of extinction is one of the nation's best-known conservation success stories. But the future of the whooping crane remains uncertain and depends in large part on the future health of the bay. The whoopers' winter diet is made up largely of blue crabs. In years when freshwater inflows are low, the availability of blue crabs

decreases, causing stress and increased risk of mortality for the cranes.

Additionally, oysters, shrimp, striped mullet and menhaden are among the species whose populations would decline without adequate freshwater inflows. Indirectly, birds and other wildlife that feed on these species could also be affected. Unfortunately, Guadalupe River flows are seriously threatened by population growth and increasing water use upstream.

The land near the bay consists largely of grassy prairies and is mostly used for agriculture. In addition to reduced freshwater inflow, San Antonio Bay has experienced habitat loss and fragmentation. Investments in strategic habitat conservation will complement other restoration efforts.

Priority Projects

● 1

San Antonio Bay Freshwater Inflow Protection

San Antonio Bay, like most Texas bays, faces serious risk from declining inflows of fresh water from contributing streams and rivers. One key factor contributing to that decline is the increasing levels of water withdrawals upstream of the coast. This project involves voluntary transactions to acquire up to 25,000 acre-feet per year of water that is authorized for withdrawal and use under existing water rights in order to prevent its withdrawal upstream. This project will protect inflows to San Antonio Bay and adjacent marshes, particularly during drought periods, benefitting overall bay health.

● 2

Guadalupe Delta Estuary Restoration

In the 1930s, the man-made diversion of fresh water at Traylor's Cut in the Guadalupe River altered the natural flow of the river and greatly reduced the supply of sediment reaching the Guadalupe Estuary Delta, which once had abundant cypress trees is now open water. This project involves the restoration of river flows to the terminal end of the delta and the creation of a living shoreline to guard against wind and wave erosion, which together will help maintain the functionality of the estuary.

● 3

Conservation Easement Acquisition in the San Antonio Bay Area

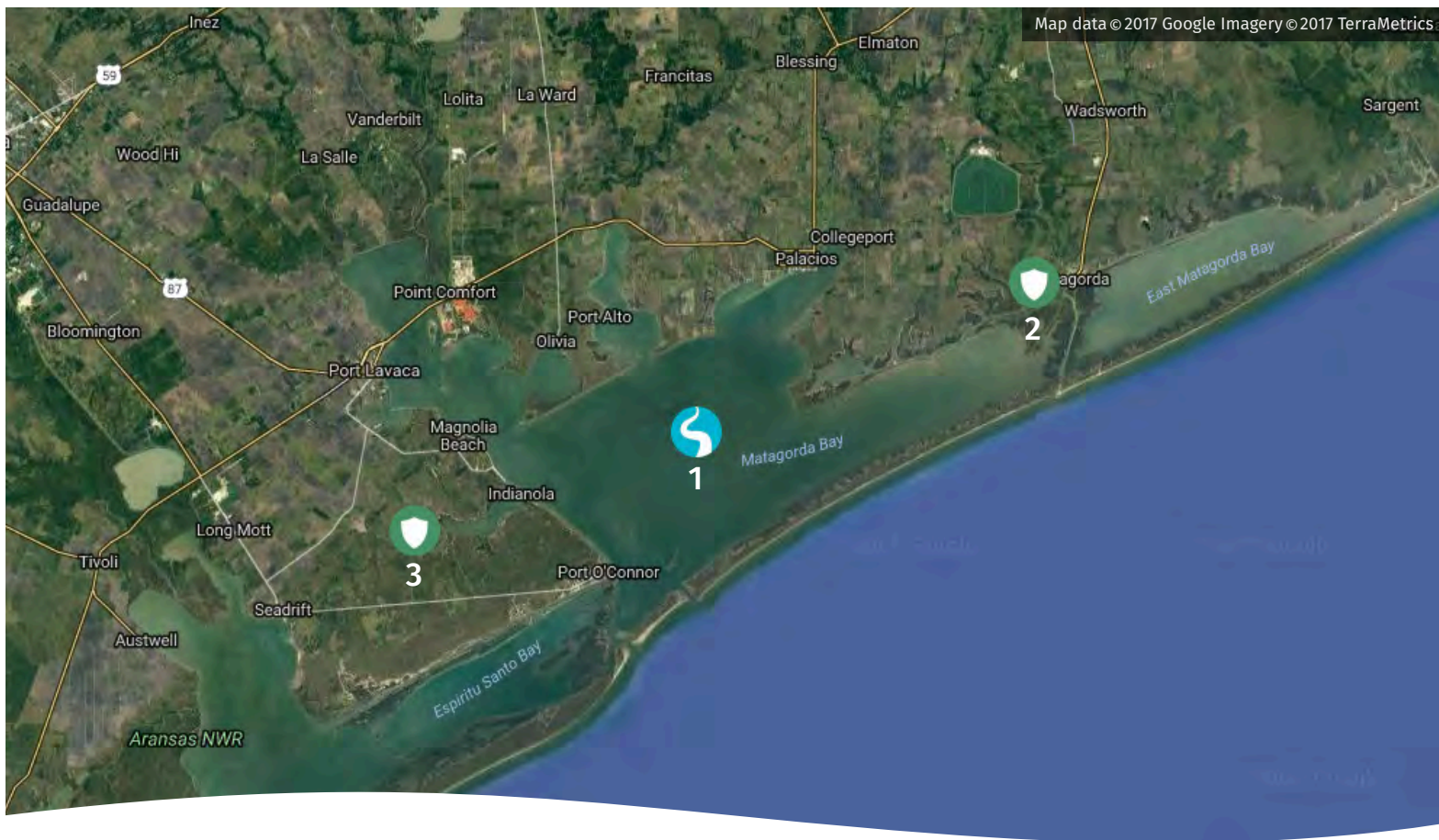
Private landowners hold and manage key tracts in and around the Guadalupe Delta and San Antonio Bay. Several have already donated

conservation easements to the Guadalupe-Blanco River Trust. Though many of the lands are not currently available for fee simple purchase, a number of landowners have expressed interest in sale of conservation easements. Permanently protecting lands in this area would directly benefit waterfowl, wetland-dependent birds, and endangered species as well as protect water quality. Purchase of conservation easements accomplishes many of the same goals as fee simple acquisition without the ongoing operational and maintenance expenses associated with owning the land outright. Engaging local landowners through a conservation easement purchase program in this critical ecological area would also provide additional opportunities for enrolling these same landowners in a number of private lands habitat restoration and enhancement programs established by other private and public funders.

● 4

Guadalupe River and the Guadalupe Delta Wildlife Management Area Corridor Acquisition

This project would acquire 1,000 acres of tidal marsh adjoining the upper reaches of Hynes Bay and the Guadalupe River and the Guadalupe Delta Wildlife Management Area in Refugio County, Texas. This site is valuable to wintering and breeding marsh birds and is currently used as a foraging area for whooping cranes. The property would be an addition to the Guadalupe Delta Wildlife Management Area and would provide significant habitat for wildlife as well as increased opportunities for public use.



Matagorda Bay

THE NAME MATAGORDA, which loosely translates to “dense cane,” reflects the abundant saltwater grasses that lined the bay’s shores when Spanish explorers came. Today, wetlands are still Matagorda Bay’s dominant feature and are a critical source of food and habitat for shrimp, blue crab and many species of fish.

The Colorado, Navidad, and Lavaca rivers provide most of the freshwater inflows to the Matagorda system, but multiple large dams on the Colorado River upstream of Austin, along with other dams and extended periods of drought, have significantly altered flows to the bay, impacting its overall health.

One strategy for protecting inflows to the bay involves purchasing water rights from willing sellers on streams that flow directly into the estuary. Another key tactic will be protecting and restoring strategic tracts of land. The land near Matagorda Bay is fertile, and the bay is largely surrounded by rice fields, ranches and small communities. Deepwater Horizon funds have already been used to purchase Powderhorn Ranch—the largest land acquisition in state history—protecting more than 17,000 acres of marshes, grasslands, and woodlands. Additional investments in the Matagorda Bay area should focus on protecting freshwater inflows, improving the health of the bay and restoring critical nesting and nursery habits.

Priority Projects

● 1

Matagorda Bay Tributary Inflow Protection

Freshwater inflows to the Matagorda Bay system are continuing to decline dramatically from historical levels as more and more water is impounded and withdrawn for use upstream of the coast. Although options for restoring flows from the Colorado River, which is the largest inflow source, are limited, at least in the near-term, restoration of inflows from smaller tributaries offers more immediate potential. This project involves purchasing existing water rights on tributary streams — water that would otherwise be withdrawn in order to prevent the loss of that freshwater inflow. By protecting tributary inflows, especially during drought periods, this project will improve conditions, including salinity levels, and help protect oyster reefs and other key habitats and species in one or more smaller bays that contribute to the resiliency of the larger Matagorda Bay system.

● 2

Colorado River Delta—Matagorda Bay (Acquisition)

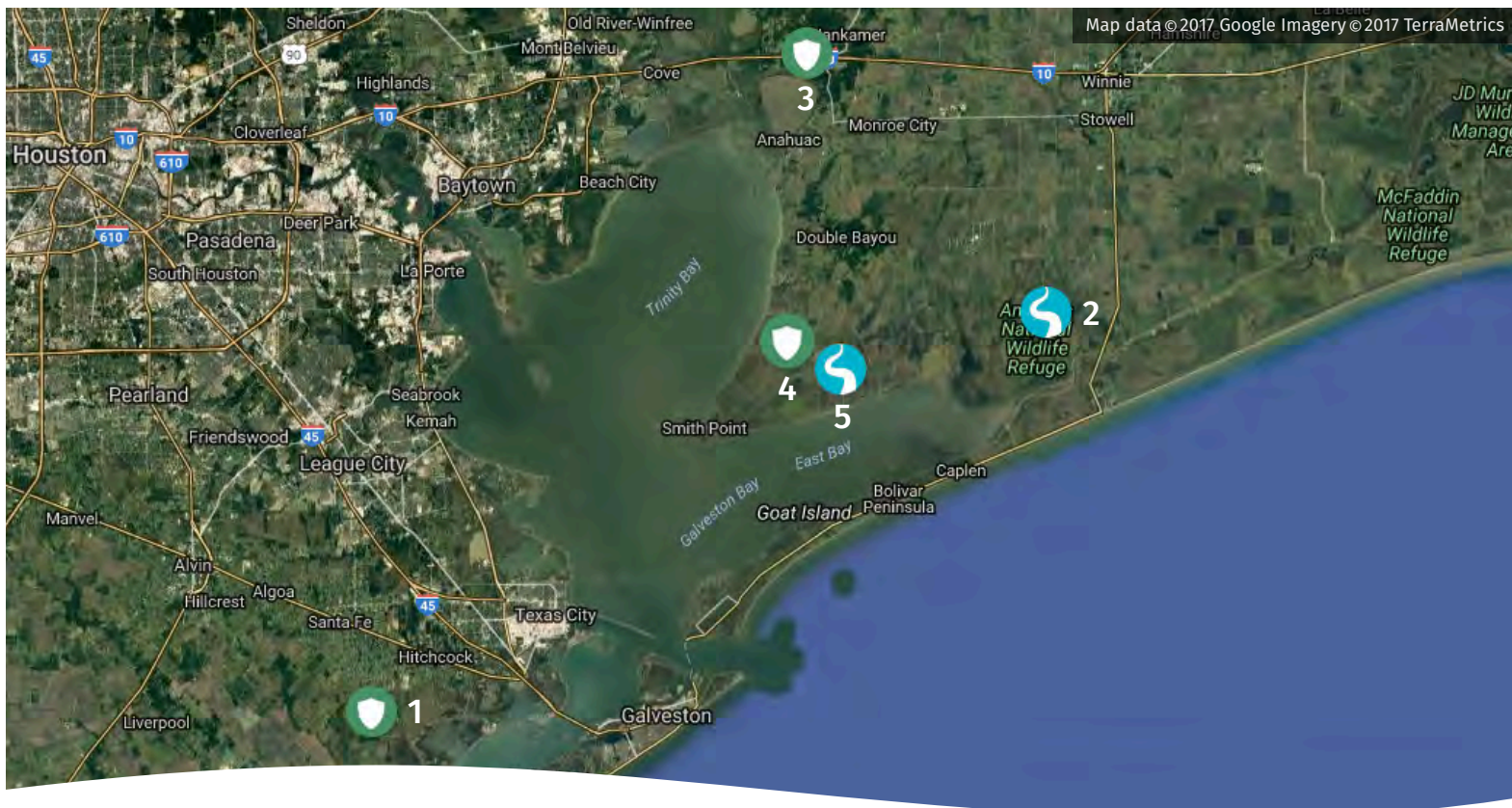
The project is to acquire and protect 2,000 acres of highly productive fresh- and saltwater marsh near the mouth of the Colorado River in West Matagorda Bay. This estuary provides habitat for a vast number of shorebirds, wading birds, waterfowl and Neotropical migrants. As the whooping crane population expands beyond Aransas National Wildlife Refuge, large marsh areas like this will be extremely important to provide the blue crabs and other food sources this critically endangered species requires during the winter months. This is a vibrant marsh area that has grown due to the nutrient-rich

and sediment-rich fresh water overflow of the Colorado River. This portion of West Matagorda Bay was enhanced with the diversion of the river back to the bay, accomplished in 1992. That diversion project was a joint effort of the Corp of Engineers and the state resource agencies.

● 3

West Powderhorn Ranch (Powderhorn II)

On the west side of Powderhorn Ranch, is the 10,000-acre West Powderhorn ranch, with more than four miles of frontage on the tidally influenced Powderhorn Lake, and healthy native prairie, live oak forest, tidal marsh, tidal flat and palustrine freshwater wetlands. Acquisition of the West Powderhorn site would expand the Powderhorn Ranch Wildlife Management Area and State Park to well over 27,000 acres, assuring management for landscape-scale ecosystem functions and sufficient habitat for whooping cranes, as well as a myriad of resident and migratory coastal species such as shore and wading birds and waterfowl, many of which are already identified by the state as species of greatest conservation need.



Galveston Bay

THE GALVESTON BAY SYSTEM is the largest and most economically productive estuary in the state and has been named “an estuary of national significance” by Congress. The bay is vast and varied, ranging from brackish bayous to tidal marshes, from oyster beds to mud flats. These diverse waters are also home to Atlantic croaker, flounder, spotted seatrout, and many other species of finfish. Nearly three hundred different kinds of birds have been seen in the area around Galveston Bay.

The bay is surrounded by one of the largest urban areas in the nation—the Houston-Galveston area—and is home to much of the country’s chemical production and refinery capacity. Water quality has improved since the passage of the Clean Water Act in 1972 but remains a concern, largely due to urban runoff and industrial discharges and spills.

Galveston Bay has long been home to one of the nation’s largest oyster fisheries—but half of the

bay’s oyster reefs were covered in sediment as a result of Hurricane Ike in 2008. The bay is also estimated to have lost approximately 35,000 acres of wetlands between 1953 and 1989.

The shallow waters covering the bay’s 600 square miles are fed largely by the Trinity and San Jacinto rivers. The Trinity River alone contributes approximately half of the freshwater inflow to the bay, but this river is also one of the primary sources of water for the rapidly growing Dallas, Fort Worth, and Houston metropolitan areas.

Making sure that enough fresh water continues to make its way into Galveston Bay, even during droughts, has long been a priority for the National Wildlife Federation. The success of many of the other proposed restoration projects, such as marsh restoration and the rebuilding of oyster reefs, also depends on an appropriate balance of fresh and saltwater.

Priority Projects

● 1

East & West Galveston Bay Watershed Wetland & Habitat Conservation

The Galveston Bay Estuary Program (GBEP) and its partners will protect approximately 5,000 acres of coastal wetlands and natural areas critical to water quality and habitat protection via conservation easements, purchase of development rights or fee title. The project would be implemented through the GBEP's existing Conservation Assistance Program over a 5-7 year time frame at a cost of approximately \$3 million per year. This proposed project would facilitate the preservation of coastal wetlands and natural areas with an objective to link coastal habitats, provide public access, reduce nonpoint source pollution, establish project connectivity and enhance resiliency within the East and West Galveston Bay watersheds. The project is scalable in terms of time and funding. Through this program GBEP and its conservation partners have protected 4,988 acres of wetlands and natural areas over the past five years.

● 2

Anahuac National Wildlife Refuge Environmental Flow Restoration

This project would restore freshwater flows across two large tracts, totaling about 6,500 acres, at the Anahuac National Wildlife Refuge. Land-use changes, such as construction of roads and ditches, have reduced overland flow of fresh water to this area of the refuge. Combined with the channelization of adjacent bayous that connect to East Galveston Bay, the reduced flow has increased salinity levels in marsh habitats, resulting in ongoing marsh degradation including the conversion of some areas to open-water

saline ponds. Water would be purchased and delivered to the tracts. The water deliveries will restore more natural salinity gradients and inundation patterns across the tracts, improving and protecting marsh habitat for wading birds and waterfowl. The water deliveries also will reduce salinity levels in bayous draining the tracts, especially during drought periods, benefiting young fish, shrimp, crabs and other organisms that move between the tracts and nearby East Galveston Bay.

● 3

Texas Chenier Plain Refuge Complex Expansion & Protection

In May 2008, the U.S. Fish and Wildlife Service completed its final recommendation to expand the boundary of the Texas Chenier Plain Refuge Complex by 64,260 acres, bringing the total allowed acreage within the Refuge Complex to 169,928 acres. The Refuge Complex consists of four National Wildlife Refuges—Anahuac, McFaddin, Texas Point and Moody—located along Texas' Upper Gulf Coast within the East Galveston Bay and Sabine Lake watersheds. The Texas Chenier Plain Refuge Complex was established to conserve, enhance and restore the Texas Chenier Plain region's coastal wetlands to provide wintering, migration and nesting habitat for waterfowl, shorebirds, marsh and wading birds, other wetland-dependent migratory birds and habitat for other native fish and wildlife. The Conservation Fund will work with the U.S. Fish and Wildlife Service to identify and acquire properties that are the Service's highest priorities, based on the lands identified in the Final Environmental Impact Statement for Refuge expansion. Upon acquisition, the properties would be conveyed to the U.S. Fish and Wildlife Service to become part of the Refuge Complex.

● 4

Gordy Marsh Land Acquisition Project—Phase II

The Gordy Marsh Land Acquisition Project will permanently protect over 3,500 acres of coastal estuarine wetlands and submerged habitats along with associated coastal prairies and freshwater wetlands. This property is adjacent to Lone Oak Bayou and Gordy Marsh within the Galveston Bay system. Under this proposal, grant funds will be used by Galveston Bay Foundation to implement the project by acquiring fee simple title to the property, restricting land uses with a conservation easement, or a combination of these two methods. Conservation strategy will be determined by landowner negotiations and funding availability. The first phase of the Gordy Marsh Land Acquisition Project successfully protected 1,740 acres of high quality coastal marsh and adjacent native prairie uplands.

● 5

Hydrologic Restoration of Coastal Marsh (Robinson Bayou to Smith Point)

This project will model and then install a hydrologic restoration project that would restore natural salinities across the damaged landscape within the Moody National Wildlife Refuge. Inflows, tidal prisms and drainage will be used to develop a long-term restoration plan for restoring natural salinity patterns in these marshes. Once completed, the project will allow vegetative communities to recover naturally, increase the long-term productivity of fisheries species and provide habitat for waterfowl, wading birds and shorebirds.





Louisiana

Louisiana's estuaries, barrier islands, and vast coastal wetlands are critical to the ecological and economic productivity of the northern Gulf of Mexico. Over the last 7,000 years, the nation's largest river—the Mississippi—built 6.2 million acres of swamps, barrier islands, and marshes: the Mississippi River Delta and the Chenier Plain to the west. Unfortunately, short-sighted management of the river for navigation and flood control, combined with decades of marsh-destroying oil and gas development, have resulted in the loss of 1.2 million acres of coastal land since the 1930s.

And the devastation continues: On average, Louisiana loses an area of land the size of a football field every hour.

Even in its current diminished state, the Mississippi River Delta remains one of America's great landscapes. An estimated 100 million birds can be found in the state annually, many of them migrating through en route to wintering grounds in Central or South America. Louisiana's vast coastal area generates more than \$2 billion annually in revenues from hunting, recreational fishing and wildlife watching. The state's commercial fisheries—valued at nearly \$3 billion per year—provide seafood for markets across the U.S. The entire nation is enriched by the Mississippi River Delta's bounty and will benefit from its revitalization.

Grouped within four estuarine basins in the Mississippi River delta, the projects selected here were identified as both urgent and eligible



for available funding streams. It's important that federal and state agencies work together to implement these projects quickly, given the urgency of the land loss crisis in coastal Louisiana.

Coastal Master Plan

The 13 projects included here are major components of Louisiana's Coastal Master Plan, the state's official blueprint for coastal restoration and storm risk reduction. The state is in the process of a mandated five-year update of this plan. Once finalized, the updated plan is likely to move some major river-diversion sites farther upstream in the Barataria and Pontchartrain basins, based upon climate-change-driven sea-level rise projections. The National Wildlife Federation will consider any needed changes to these priorities once the 2017 Coastal Master Plan is completed.

The National Wildlife Federation is also supportive of Coastal Master Plan projects that

are already prioritized for funding—the barrier island and headland restoration efforts in the Barataria basin and the hydrologic restoration projects in the Houma Navigation Canal and Calcasieu Ship Channel. These efforts remain priorities for the National Wildlife Federation but are not highlighted in this document.

In total, Louisiana is certain to receive more than \$7 billion dollars that can be used for restoration as a result of the Deepwater Horizon disaster. Half of these funds have already been awarded or committed to Louisiana's Coastal Master Plan projects, including nourishing uninhabited barrier headlands and islands with sand, marsh restoration, hydrologic restoration to rebalance a healthy mix of fresh and saltwater, and, most importantly, sediment diversions through river levees to build new delta wetlands and sustain existing marshes. The remaining money will become available over the next decade and a half.



Terrebonne-Atchafalaya Basin

THE TERREBONNE AND ATCHAFALAYA BASINS

occupy the central coast of Louisiana. The area is bordered to the east by Bayou Lafourche, a former outlet of the Mississippi River, and to the west by the Chenier Plain. It includes the growing deltas of the Atchafalaya River—the largest remaining natural distributary of the Mississippi River. Habitats include bottomland hardwood forests; bald cypress swamps; barrier islands; and freshwater, brackish and saltwater marsh. In Atchafalaya Bay, on the western side of the basin, the Atchafalaya River and its Wax Lake Outlet are building new land. However, in Terrebonne Bay, on the eastern side of the basin, wetlands are collapsing and becoming open water as the sediment-starved land sinks and salt water intrudes into freshwater wetlands.

The projects selected for this basin focus on stabilizing the barrier island system (Isles Dernieres Barrier Island and Timbalier Islands Barrier Island Restoration) and re-establishing a balance of fresh and salt water as well as sediment and nutrient distribution. One project (Increase Atchafalaya River Flow into Terrebonne Marshes) will take advantage of the Atchafalaya River to the west and the existence of the Intracoastal Waterway to move fresh water and sediment eastward. In the future, oyster reef restoration will play an important role in protecting remaining and newly created marshes and providing key habitat.

Priority Projects

● 1

Increase Atchafalaya Flow into Terrebonne Marshes

This hydrologic diversion project stretches from the Atchafalaya River to the Houma Navigation Canal, which is part of the Gulf Intracoastal Waterway system. The marshes in the influence area lie nearly equidistant from the Mississippi and Atchafalaya Rivers and are blocked from significant amounts of river water and sediment. As a result of saltwater intrusion and sediment starvation, these marshes have been rapidly converted to open water. This project would dredge and deepen the Gulf Intracoastal Waterway to increase the flow of fresh water from the Atchafalaya River, to help sustain Terrebonne Marsh.

● 2

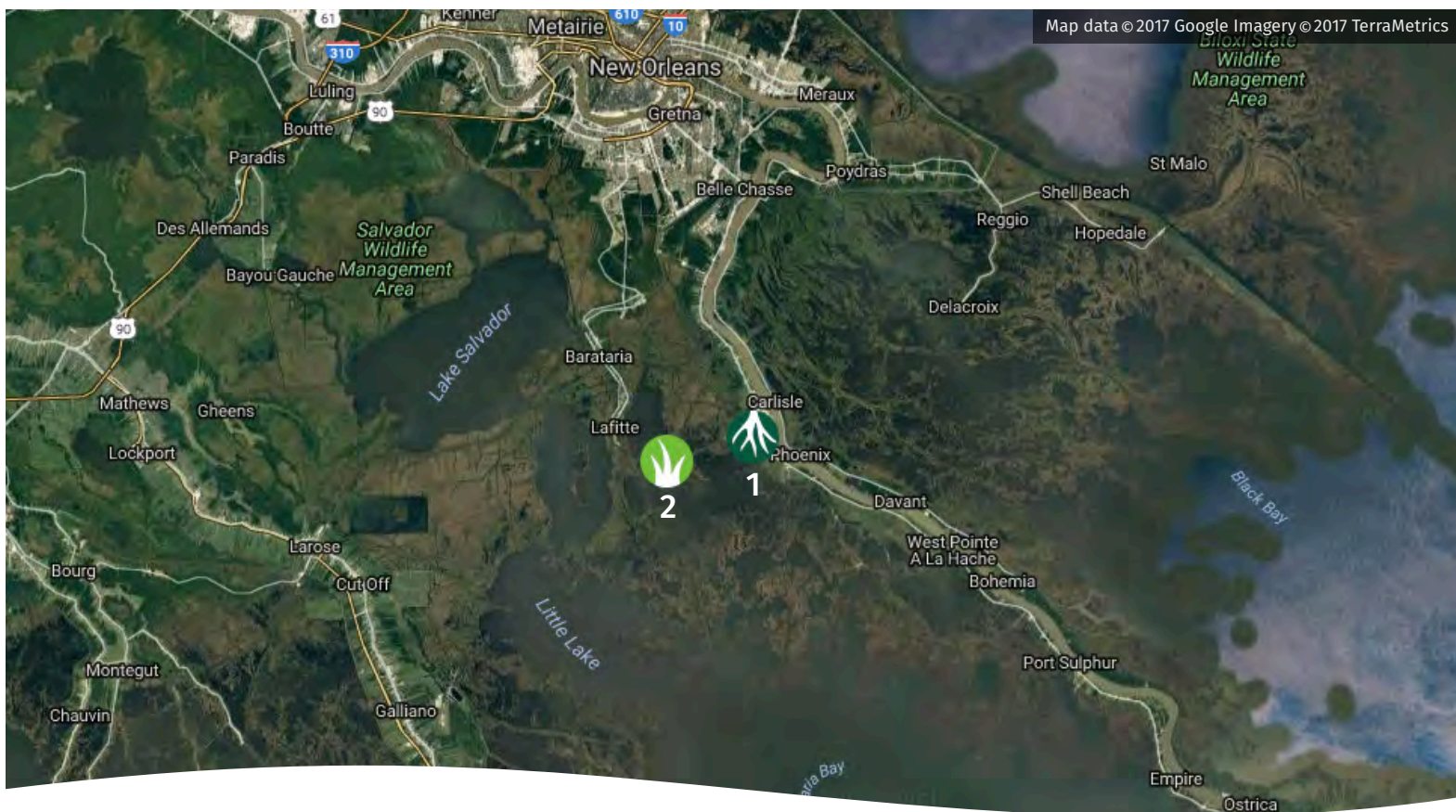
Isles Dernieres Barrier Island Restoration

This project will restore the Isles Dernieres barrier islands located on the western end of the Terrebonne Basin barrier shoreline. Storm-induced breaching and erosion, sediment starvation, sea level rise, tidal increases caused by interior land loss, subsidence, and canal-induced hydrological changes have reduced the size of these islands. This loss directly impacts the fish and wildlife of the region and leaves the marshes and infrastructure in the interior of Terrebonne Bay vulnerable to saltwater intrusion, higher wave energies and storm surge. This project will restore the Isles Dernieres barrier islands, providing dune, beach and back barrier marsh habitat, which will help reduce the impact of storm surge and waves in the Terrebonne Basin.

● 3

Timbalier Islands Barrier Island Restoration

This project will restore the Timbalier Islands located on the eastern end of the Terrebonne Basin barrier shoreline. Sediment starvation, sea level rise, tidal increases and storm events have driven migration of the islands to the northwest and severely reduced their length and width. This has diminished important barrier island habitat in the area and increased the vulnerability of interior Terrebonne Bay marshes to high-energy waves and storm surge. This project will restore dune and beach habitat as well as reduce the impact of storm surge and waves in the Terrebonne Basin and lower Lafourche Parish.



Barataria Basin

THE BARATARIA BASIN is one of the nation's most productive estuaries. The basin is bounded on the north and east side by the man-made Mississippi River levees, to the west by Bayou Lafourche and to the south by a barrier island chain. The Barataria Basin is a vital buffer to storm surge for communities on the West Bank of the river in eight parishes. The basin hosts a variety of coastal habitats, including bottomland hardwood forests, baldcypress swamps, marshes ranging from fresh to saltwater, bays and barrier islands. The basin also contains the Barataria Preserve, which is the only natural area on the Louisiana coast that is part of the National Park System. Starved of sediment, habitats throughout the estuary system are collapsing. In the upper basin, bald cypress trees stand in stagnant waters, too deep for new trees to sprout, while freshwater marshes are converting to floating peat in the absence of a sediment source. The sediment-

starved brackish marshes in the mid-basin have all but disintegrated. Barrier islands, with no supply of and from the river, are rapidly eroding, offering little protection from salty Gulf waters that will eat away what remains of the upper estuary habitats.

The priority projects chosen for this basin include a sediment diversion (Mid-Barataria) and the rebuilding of a key marsh land-bridge (Barataria Marsh Restoration). In this basin, two large-scale barrier island restoration projects (Barataria Pass to Sandy Point and Belle Pass to Caminada Pass) have largely been completed. These projects can work in concert to protect the upper basin freshwater wetlands, re-establish a barrier to Gulf intrusion, enhance storm surge protection and reintroduce annual infusions of fresh water, sediment and nutrients to build land and sustain existing wetlands.

Priority Projects

● 1

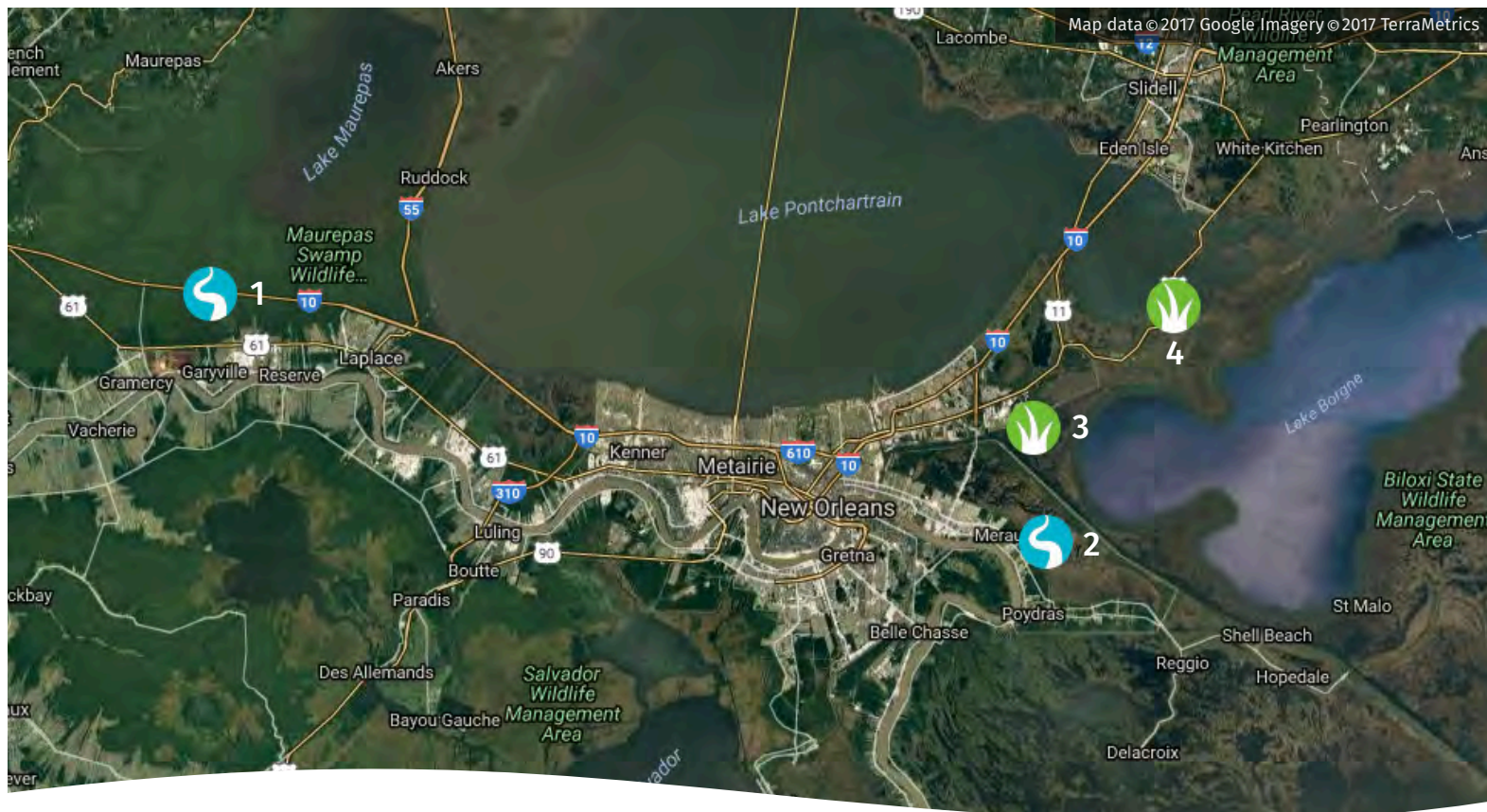
Mid-Barataria Diversion

This sediment diversion project into the mid-Barataria Basin is located along the west bank of the Mississippi River, near Myrtle Grove. The brackish and freshwater wetlands in the influence area are highly degraded due to a combination of saltwater intrusion, decreased fresh water supply, alterations to the natural hydrology of the area and a lack of sediment input. This project will reconnect the river to the influence area and divert sediment and fresh water to build new land, maintain existing marshes and increase habitat resiliency to sea level rise and storm events.

● 2

Barataria Land-Bridge, Large-Scale Barataria Marsh Creation

This marsh creation project is in mid-Barataria Bay in the vicinity of Lafitte. Historically, there was a limited hydrological connection between the fresher upper basin and the saltier lower basin. Canal networks, erosion and subsidence have eaten holes through natural barriers, exposing wetlands in the upper basin to saltwater intrusion and increased wave energy. Long identified as a critical landscape feature, this project will continue to build increments of the Barataria Marsh Land-Bridge, already under construction. Sediment conveyed from the river through a pipeline is being used to build new marsh, nourish existing marsh in the area, help restore historic salinities in the upper basin and help protect the nearby community of Lafitte from storm surge and tidal flooding.



Pontchartrain-Maurepas Basin

THE PONTCHARTRAIN-MAUREPAS BASIN is dominated by three large estuarine lakes that are connected by tidal passes, with a gradient that runs from fresh to salt, running roughly west to east. Coastal habitats in the basin include bottomland hardwood forest, freshwater swamps and marshes and brackish and saltwater marshes. In the upper basin, the swamps are cut off from the nourishing fresh water, nutrients and sediment of Mississippi River by levees installed for flood protection and navigation. As a result, these swamps are sinking and converting to marsh and open water. Marshes in the lower part of the basin are suffering from similar problems, exacerbated by the construction of the Mississippi River Gulf Outlet shipping channel, levees and other navigation canals. These marshes are rapidly becoming open water. The freshwater swamps once found in the lower basin have almost completely disappeared.

The priority projects chosen for this basin are critical to restoring the heavily degraded Mississippi River Gulf Outlet ecosystem area. The projects restore freshwater flows into the upper basin swamps (West Maurepas) and lower basin marshes (Central Wetlands Diversion), coupled with marsh and swamp restoration. They also restore or sustain two marsh or swamp land-bridges: one between lakes Maurepas and Pontchartrain, and one between Pontchartrain and Borgne. These projects help to prevent these three lakes from becoming a single arm of the Gulf. The built or sustained marshes will not only provide important habitats to birds, fish and wildlife—they will also help buffer the new surge barrier on the east side of Lake Borgne (Golden Triangle). The West Maurepas and Central Wetlands diversions are necessary for the long-term success of the Golden Triangle marsh creation project and the New Orleans East land-bridge restoration project.

Priority Projects

● 1

West Maurepas Freshwater Diversions

This diversion project encompasses as many as three individual freshwater conduits from the Mississippi River in the vicinity of Hope Canal, Convent/Blind River and the Bonnet Carré Spillway. It would benefit the western Maurepas swamps, the land-bridge between Lakes Maurepas and Pontchartrain and the LaBranche wetlands. Dominated by bald cypress and water tupelo trees, this swamp complex is one of the largest forested wetlands in the nation. However, levees constructed along the river and the closure of Bayou Manchac have isolated the area from spring floods and the vital freshwater, nutrients and sediments they bring. This isolation coupled with rising salinities throughout the Pontchartrain Basin has left the swamp in a state of rapid decline—trees are dying, and young trees are not growing to replace them. The West Maurepas Freshwater Diversions will benefit the swamp by reconnecting it with the river, preventing further loss and the conversion to open water, as well as helping to temper rising salinities throughout the entire Pontchartrain Basin.

● 2

Central Wetlands Diversion and Wetland Restoration

This diversion and restoration project will benefit the Central Wetlands Unit in eastern Orleans and St. Bernard parishes, including the Bayou Bienvenue Triangle. The area was once primarily a freshwater system, dominated by bald cypress swamp and freshwater marsh, but today deteriorating brackish marsh is the predominant habitat type, and much of what was swamp is now open water. The destruction of the swamp

habitat was caused by saltwater intrusion into this system through the Mississippi River Gulf Outlet navigation channel. This project will help sustain remaining marsh and swamp in the Central Wetlands and will facilitate restoration of marsh and swamp in areas that are now open water by utilizing strategically placed dredged sediment. Additionally, fresh water from this project could help maintain optimum salinities for oysters and other estuarine organisms in the nearby Lake Borgne and Biloxi marshes.

● 3

Golden Triangle

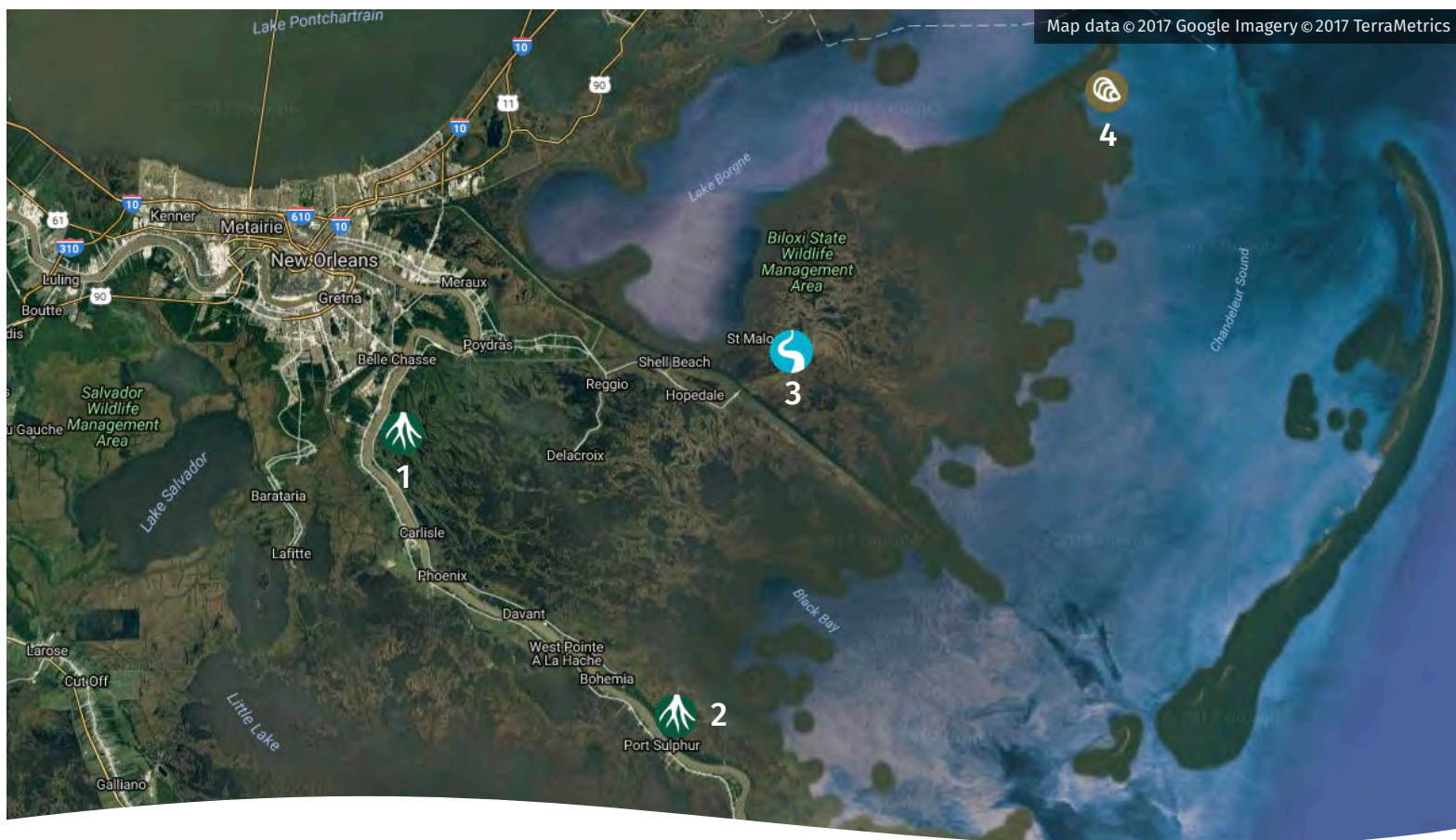
This marsh creation project is located near the confluence of the Mississippi River Gulf Outlet shipping channel and the Gulf Intracoastal Waterway. Dominated by brackish marsh, this area was badly damaged by saltwater intrusion and erosion following the dredging of the Mississippi River Gulf Outlet. This project will use a sediment conveyance pipeline to create and restore marsh. The restored marsh will help buffer the newly constructed surge barrier and eventually provide important estuarine habitat for Lake Borgne.

● 4

New Orleans East Land-Bridge Restoration

This project consists of marsh creation located in eastern New Orleans on a narrow land-bridge separating Lake Pontchartrain from Lake Borgne, where local subsidence and canals have raised salinities. This, combined with the exposure to high wave energy, has resulted in rapid retreat of the shoreline and the expansion of ponds and lakes within the marsh. This project will create and restore marsh via a sediment conveyance

pipeline. The project area is a critical landscape feature that includes the Bayou Sauvage National Wildlife Refuge, the largest urban refuge in the nation. It separates Lake Pontchartrain from the Gulf, providing estuarine habitat. It is also a crucial line of defense from storm surge for more than 1.5 million people in eight parishes, including the cities of New Orleans, Laplace, Madisonville, Mandeville and Slidell.



Breton-Chandeleur Basin

THE BRETON-CHANDELEUR BASIN is a large, open sound bordered on the east by remnants of a barrier island chain and on the west by the Mississippi River flood-protection levee system. Habitats in the basin range from freshwater to saltwater marshes. To the north is the Biloxi Marsh, which is among the most stable marsh platforms remaining in coastal Louisiana. However, wave induced erosion along the marsh edge has contributed to significant land loss. Marshes in the mid-part of the basin have been starved of sediment for almost a century and have some of the highest recent marsh loss rates along the coast. In contrast, marshes in the lower basin periodically receive fresh water and sediment from the river during high flows and have much lower rates of loss.

The priority projects selected for this basin reintroduce sediment and freshwater flows from the river to slow the rate of land loss, strengthen soils and build new land in the mid-basin (Mid-Breton Sediment Diversion) and in the lower basin (Lower Breton Sediment Diversion). Two projects—the Bayou la Loutre Ridge Restoration and the Biloxi Marsh Oyster Reef—will provide natural structural protection by reducing wave and tidal energy, thus prolonging the life of the marshes while providing habitats for neotropical migratory birds on the ridge and fish on the reef.

Priority Projects

● 1

Mid-Breton Sediment Diversion

To be located along the east bank of the Mississippi River, in the vicinity of White's Ditch, this sediment diversion will convey fresh water and sediments into deteriorating marshes that drain into Breton Sound. The brackish marshes in the influence area have disappeared due to a combination of changes in the supply and distribution of fresh water, rapid subsidence, saltwater intrusion, sediment starvation and storm events. This project will reconnect the influence area with the river and divert sediment and fresh water during flood pulses, building new land and sustaining existing marsh.

● 2

Lower Breton Diversion

This sediment diversion project is planned for lower Breton Sound along the east bank of the Mississippi River, in a location to be determined. The brackish and salt marshes in the influence area have low rates of loss relative to many other parts of the coast, which may be attributed to the sediment and fresh water it periodically receives when the river overtops the natural levee during high flows. This project will divert sediment and fresh water into the basin to build new land, maintain existing marshes and increase the resiliency of the influence area to sea level rise and storm events.

● 3

Bayou la Loutre Ridge Restoration

This project will restore the Bayou la Loutre Ridge, which stretches from the southwestern side of the Mississippi River Gulf Outlet to the Biloxi Marsh. The Bayou la Loutre Ridge is actually two parallel natural levees flanking old Bayou la Loutre (Otter Bayou), which is part of the structural underpinning of the Biloxi marshes. Construction of the Mississippi River Gulf Outlet breached the ridges, dramatically altering the hydrology of the area and leading to saltwater intrusion and extensive wetland loss. The ridge has suffered from subsidence, saltwater intrusion and canal breaches. The purpose of this project is to re-establish the ridge by adding soil and elevation, improve hydrology, provide storm surge protection, decrease saltwater intrusion and provide important resting habitat for migratory birds.

● 4

Biloxi Marsh Oyster Reef

This project will continue the construction of oyster barrier reef along the eastern shore of the Biloxi Marsh. The Biloxi Marsh platform is relatively stable geologically as it has a fairly low rate of subsidence. However, erosion on the marsh edge by wave action has resulted in significant loss of this productive habitat. Reestablishment of vertical oyster reefs in conjunction with the reintroduction of small amounts river water via West Maurepas and Central Wetlands diversions will help slow marsh deterioration. In addition to providing protection against waves and storm surge, oyster reefs also provide a broad range of other ecosystem and economic benefits. Once established, these reefs are naturally self-maintaining.





Mississippi

With an ecosystem that encompasses barrier islands, seagrass beds, meandering waterways, and maritime forests, the Mississippi Coast celebrates a cultural heritage tied to its diverse lands and waters. Mississippi Sound is the centerpiece of the state's 86-mile-long coast.

Key to maintaining the intricate ecological balance of the Sound are the coast's barrier islands, which also help defend local communities against storms and hurricanes. Four of these islands and a portion of a fifth island are protected under the Gulf Islands National Seashore, while two are federally designated wilderness areas.

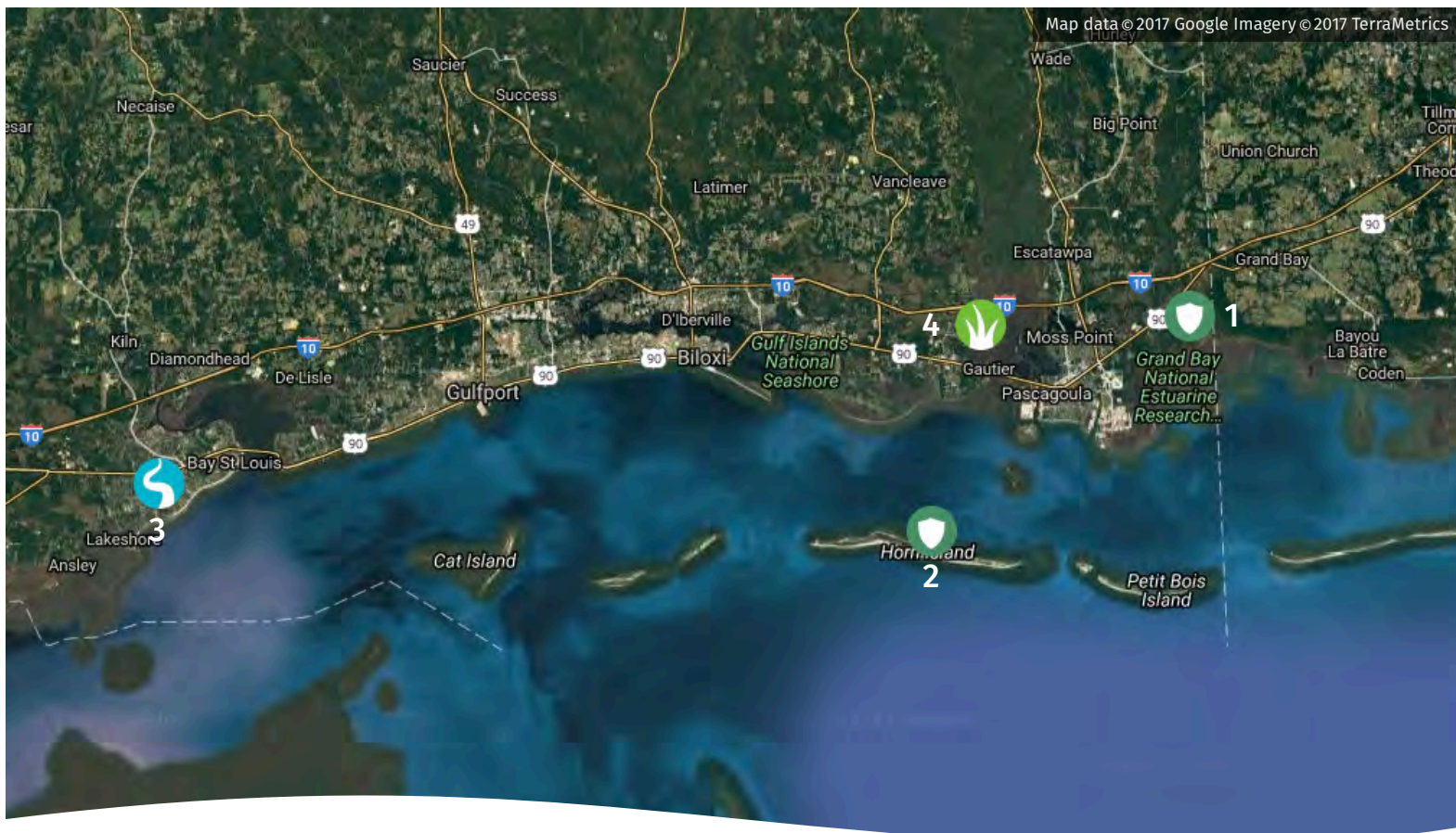
This complex system supports main sectors of the state's economy, particularly the tourism, shipping, and seafood industries. Commercial and recreational fishing generate more than \$700 million in sales annually and



support more than 5,000 jobs. Nearly one in five jobs on the coast is tourism-related. Each year the Mississippi sites of the Gulf Islands National Seashore draw nearly 900,000 visitors, generating \$32 million for the local economy and supporting more than 540 local jobs.

In total, Mississippi is certain to receive more than \$1.3 billion dollars that can be used for restoration as a result of the Deepwater Horizon disaster. More than a quarter of these funds have already been awarded or are in the process of being committed to projects that include improving water quality, restoring and protecting critical

habitats, and benefiting birds, oysters, fish, and sea turtles. The remaining money will become available over the next decade and a half.



Mississippi Sound

MISSISSIPPI SOUND is fed by several rivers including the Pascagoula, the largest undammed river in the lower 48 states. The coast loses 200 acres of wetlands every year to erosion—with some parts of Mississippi Sound creeping inland as much as 30 feet a year. Mississippi’s barrier islands are experiencing a particularly accelerated rate of land loss; for example, Ship Island has lost nearly two thirds of its area since the mid-1800s. The loss of these protective barrier islands and wetlands jeopardize the intricate balance of salt and fresh water within the estuary and make communities more vulnerable to coastal flooding and sea level rise.

Poor water quality is also an issue. Urbanization, nutrient pollution from agriculture, failing septic and sewer systems, altered waterways, and stormwater runoff have degraded water quality over the last 20 years. Seventeen streams that

feed the estuary are listed as “impaired” under the Clean Water Act. As a result, the Mississippi Beach Monitoring Task Force issues advisories or closures due to high bacterial counts an average of 28 days a year.

Key habitats that support the coast’s diverse wildlife and marine life have also suffered. Oyster reefs have declined by approximately 90 percent while seagrass beds have declined by 80 percent.

As a major ecological linchpin to many other coastal waters—Mobile Bay in Alabama, Lakes Pontchartrain and Borgne and the Chandeleur Sound in Louisiana, and Mississippi’s Bay St. Louis and Back Bay of Biloxi—restoring the health of Mississippi Sound will bring tremendous benefits to the Gulf region.

Priority Projects

● 1

Grand Bay National Wildlife Refuge Acquisition

The Grand Bay National Wildlife Refuge, in Mississippi and Alabama, protects one of the largest expanses of undisturbed pine savannah habitat in the Gulf Coast. Grand Bay is home to several federally threatened and endangered species and supports many aquatic, migratory and Neotropical species. This project seeks to permanently protect more than 1,650 acres identified by the U.S. Fish and Wildlife Service and the State of Mississippi as critical for acquisition and long-term management by the Grand Bay National Wildlife Refuge (NWR) and Grand Bay National Estuarine Research Reserve (NERR). This will be added to the nearly 18,000 acres currently owned by the U.S. Fish and Wildlife Service and the State of Mississippi. This project will add critical coastal lands to the Grand Bay NWR/NERR for permanent protection and will allow for improved management of coastal wetlands and adjacent upland areas. The targeted lands consist of wet pine savanna, maritime forest, tidal and non-tidal wetlands, salt marshes, salt pannes, bays and bayous.

● 2

Gulf Islands National Seashore Land Acquisition

Gulf Islands National Seashore spans two barrier island chains off the Mississippi Coast and Florida Panhandle. This project will permanently protect roughly 250 acres on Horn Island through the acquisition of an outstanding 50 percent interest held in private ownership. These inholdings within the Gulf Islands National Seashore are among the highest acquisition priorities for the National Park Service. The

permanent protection of this tract would support a variety of wildlife species, increase storm-surge protection and facilitate public use of the property. Horn Island is one of the few nationally designated barrier island wilderness areas in the national park system. In particular, the lands to be acquired provide nesting habitat for sea turtles and grazing seagrass beds for migrating manatees, and will protect important barrier island maritime forests and freshwater wetland areas. The Conservation Fund is in discussions with the landowner's representative regarding acquisition of these tracts and anticipates that the project could be completed immediately, pending availability of funds.

● 3

Grand Bayou Ecological Restoration

This project includes three interdependent estuarine ecosystems: Grand Bayou, Mud Bayou and Jackson Marsh. Grand and Mud Bayous are open estuarine marshes supporting subtidal and intertidal communities. The state manages 565 acres of Grand Bayou as a Gulf Ecological Management Site for its special ecological significance and unique habitats. Jackson Marsh abuts Grand Bayou upstream, but a low head dam built in the 1960s severely disrupted tidal influence in the marsh and freshwater flows into the bayou, which has resulted in a serious infestation of invasive aquatic species in riparian areas. Trash and debris have further reduced flows and trapped sediment. The project will reestablish linkages between these ecosystems by restoring the natural hydrology of 20,518 linear feet of streams and bayous and 662 acres of adjacent wetlands and coastal marshes. This will have significant and measurable benefits to highly altered coastal streams and habitats by providing integrated, aquatic green corridors in urban/suburban landscapes. Further, the

project addresses stormwater management and will be designed and constructed to use natural hydrology to minimize erosion and sedimentation throughout the ecosystems. Finally, the project will add 2.2 miles of nature/education trails and up to four interpretive pavilions to Buccaneer State Park's trail system to enhance public access.

● 4

Dantzler Restoration

The Dantzler Coastal Preserve is part of the state's larger Pascagoula River Marsh Preserve and is a Gulf Ecological Management Site. This project will restore a total of 900 acres; 500 acres of estuarine marsh and 400 acres of longleaf pine savannah. The Dantzler property suffered less direct wind and tidal surge damage than many of the other Coastal Preserves during Hurricane Katrina. However, serious long-term consequences are anticipated due to the distribution of Chinese tallow tree propagules across the site. The effort to regain control of Chinese tallow throughout the site and cleanup residual storm debris would be greatly aided by first conducting comprehensive prescribed burns. Restoring access that was lost due to storm downfall can be accomplished as part of the preparation for prescribed burning. There would be prescribed fires, 400 acres of invasive species control via spraying and cutting, 75 acres of reforestation and monitoring.





Alabama

Coastal Alabama is known for its white-sand beaches and seafood industry. It boasts a dynamic system of dunes, marshes, beaches, bays, rivers, oyster reefs and barrier islands, with the Mobile Bay watershed at its heart. Coastal Alabama is home to a stunning array of wildlife and marine life, including more than 350 species of birds and more than 335 species of freshwater and saltwater fish.

Mobile Bay provides critical nursery grounds for a multitude of commercially and recreationally important fish and shellfish species. The state's thriving seafood industry supports more than 17,000 jobs, and recreational and commercial fishing combined generate \$1 billion annually in the state.

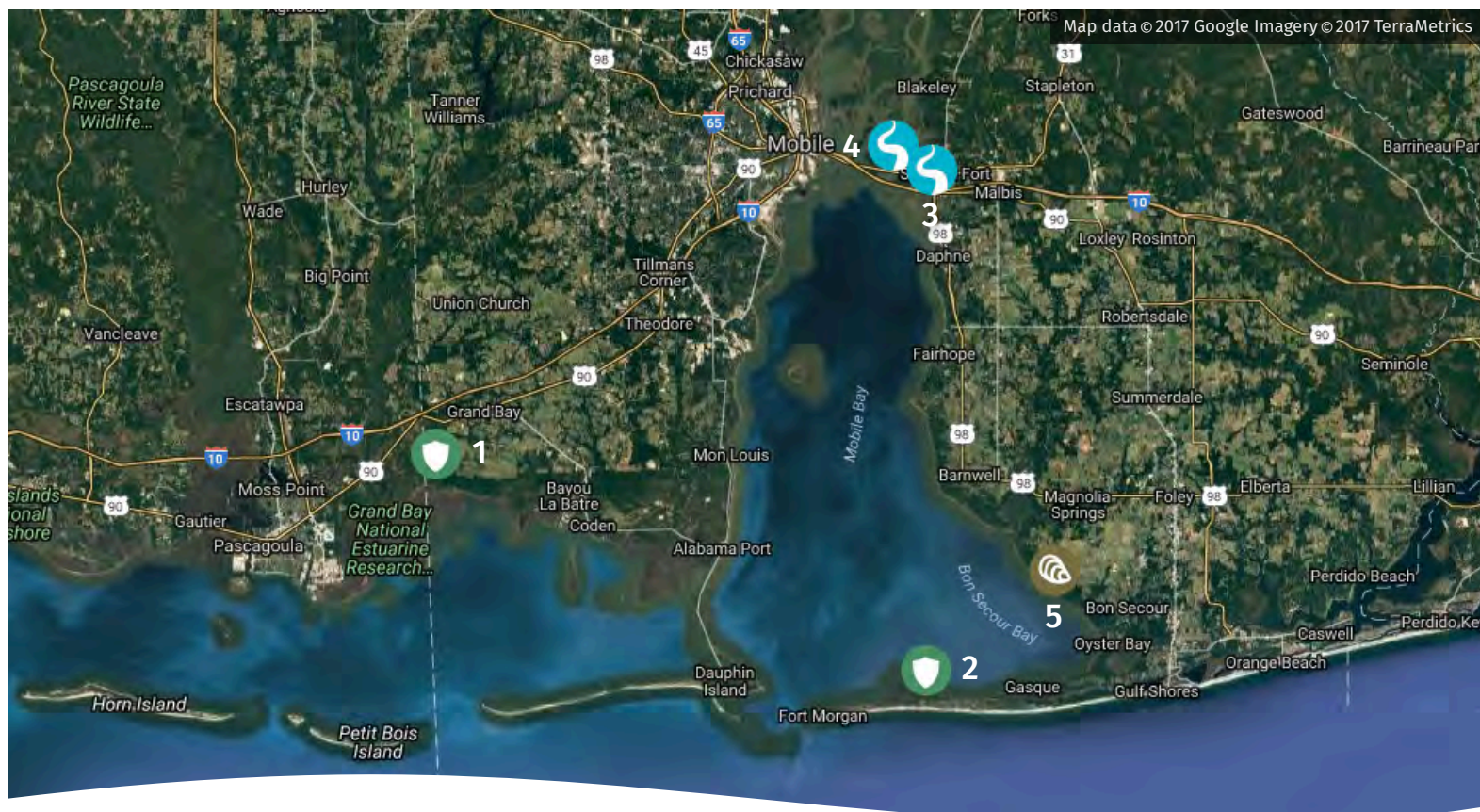
In addition to its seafood industry, coastal Alabama's varied lands and waters support a prosperous tourism sector. Coastal tourism generates an estimated \$4.6 billion annually, which accounts for more than a third of all travel dollars spent in the state. Nearly 1,400 wildlife tourism-related businesses reside in



PHOTO: MATTHEW FAUVER

Alabama's two coastal counties with more than 2.3 million wildlife tourists visiting the state each year.

In total, Alabama is certain to receive more than \$1.3 billion dollars that can be used for restoration as a result of the Deepwater Horizon disaster. Roughly a fifth of these funds have already been awarded or are in the process of being committed to projects that include building living shorelines, expanding the Grand Bay National Wildlife Refuge and completing a full suite of 31 watershed plans for Mobile Bay. The remaining money will become available over the next decade and a half.



Mobile Bay

MOBILE BAY is fed by six different rivers—most importantly the Mobile and the Tensaw—making it the fourth largest estuary in the United States. During wet months, the influence of freshwater flowing out of the estuary can be measured as far as 50 miles out into the Gulf. During drier times, salt water from the Gulf can reach 80 miles upstream, bringing saltwater species with it.

The Mobile-Tensaw Delta is at the northern crown of the estuary, and benefits from hundreds of thousands of acres of bottomland forests in its watershed that are flooded for months at a time. As a result, the delta and the bay are recognized nationally for their biodiversity.

Mobile Bay is the only place in the world known to have a “jubilee”—a rare combination of temperatures, tides and winds resulting in a low-oxygen event that forces fish and crustaceans to the surface of the water near the shoreline.

Jubilees are natural occurrences but human changes to the coast may have increased the frequency of low-dissolved-oxygen events. However, for the early residents of Alabama, having fish and shellfish so accessible and easy to catch was a cause for celebration, hence the name “jubilee.”

Mobile Bay faces many serious environmental challenges. More than half of Alabama’s coastal wetlands were lost by 1980. Storms, saltwater intrusion, sea level rise and continued human activities mean that the bay is still losing wetlands at a rapid rate. The bay now has less than a third of the seagrass beds it did in 1940. Oyster reefs have declined significantly as well, but a lack of baseline data makes it difficult to understand exactly how much. Urbanization, altered hydrology and invasive species have harmed water quality, altered salinities, increased sediment loads and reduced biodiversity.

Priority Projects

● 1

Grand Bay National Wildlife Refuge Land Acquisition

The Grand Bay National Wildlife Refuge, in Alabama and Mississippi, protects one of the largest expanses of undisturbed pine savannah habitat along the Gulf Coast. Grand Bay is home to several federally threatened and endangered species and supports many aquatic, migratory and Neotropical species. The goals of the refuge include conserving valuable riverine habitat, protecting threatened and endangered species, restoring and protecting key coastal habitats and managing populations of migratory birds and other trust species. This project would add approximately 2,250 acres to the nearly 18,000 acres currently owned by the U.S. Fish and Wildlife Service and the Grand Bay National Estuarine Research Reserve, which is jointly managed by Alabama and Mississippi. It will add critical coastal frontage to the refuge for permanent protection and improved management of coastal wetlands and adjacent upland areas.

● 2

Bon Secour National Wildlife Refuge Land Acquisition

Bon Secour National Wildlife Refuge is renowned for its ecological and biological services, which include supporting diverse wildlife and marine habitats, providing a home to several threatened and endangered species and serving as a key migratory stopover for more than 370 species of birds. This project will permanently protect 488 acres of sensitive lands identified by the U.S. Fish and Wildlife Service, which include significant frontage along Saint Andrews Bay and Bon Secour Bay and more than 200 acres of salt- and

freshwater wetlands, as well as numerous tidal sloughs and adjacent upland areas. Two tracts are currently under agreement for purchase by The Conservation Fund and they will be added to the Refuge's Little Point Clear Unit, expanding its size by twenty-five percent.

● 3

D'Olive Creek Watershed Restoration

The D'Olive Creek Watershed drains more than 7,700 acres on the eastern shore of Mobile Bay and provides critical nursery habitat for fish and wildlife. Restoration of watershed hydrology through improved stormwater management measures would reduce the abnormally high sediment loads making their way into this productive ecosystem. This project involves stabilizing 20,000 linear feet of priority stream reaches to minimize further head-cutting, channel-incision and bank-erosion processes. Restoration techniques, including grade control, bank protection and flow deflection and concentration, will reduce sediment loads and restore aquatic habitats. Additional restoration activities include mechanical sediment removal, invasive species control, excavation to restore width to riparian areas, and planting of native vegetation. The project will address components of the D'Olive Watershed Management Plan and the Mobile Bay National Estuary Program's Comprehensive Conservation Management Plan.

● 4

Mobile Causeway Hydrologic Restoration

This project proposes to restore the hydrologic connectivity between the Mobile/Tensaw Delta and Mobile Bay that was lost as a result of the construction of the Mobile Bay Causeway. Reconnecting the tidal exchange will have significant ecological benefits on the water, flora and fauna of this significant estuary. While this project resolves an historic problem, addressing upstream and downstream modifications that have altered ecological productivity can create habitat for brown pelicans and other wildlife impacted by the Deepwater Horizon oil spill. This project also is expected to create technical and construction jobs along and support habitat vital to the region's thriving seafood industry.

● 5

100-1000: Restore Coastal Alabama

This project is a partnership between federal and state agencies, academia, municipalities, non-profits, businesses and citizens. It involves building 100 miles of intertidal oyster reefs across the coast, which will in turn protect and promote the growth of more than 1,000 acres of coastal marsh and seagrass. The project will improve water quality and create new habitat for many species of fish and wildlife. These living shoreline projects will provide substrate for oyster larvae to settle and colonize and in the process create nursery and foraging habitat for commercially and recreationally important fish and shellfish. Because oysters filter water, the new reefs will increase light penetration for seagrasses. By absorbing wave energy, the reefs also will reduce shoreline erosion and support adjacent marsh habitat.





Florida

The Florida Gulf Coast's 770 miles of coast, 5,000 miles of tidal shoreline, and 7 million acres of tidally submerged lands stretch from temperate Pensacola to tropical Key West. The state's barrier islands, estuaries, beaches, seagrass meadows, wetlands and mangrove forests are world-renowned. The Florida coast also incorporates many rare habitats—lakes within coastal dunes, the Everglades' River of Grass and the coral reefs of the Florida Keys.

With its length and diversity, the Florida coast is a major ecological driver for the Gulf of Mexico as a whole. The state's many coastal estuaries provide food, shelter, and important nurseries for a wide range of fish, birds and other marine life. Similarly, much of the coast, including the Florida Keys, provides important habitat for endangered shore birds, beach mice, manatees and sea turtles.

Florida's long coastline also fuels the state's economic engine. Its white sandy beaches are consistently ranked among the best in the nation, and millions of people come to Florida each year to fish, dive, swim, and view wildlife. Florida has more world-record fish catches than anywhere else in the world and it leads all states in economic return for its marine recreational fisheries. Similarly, its commercial



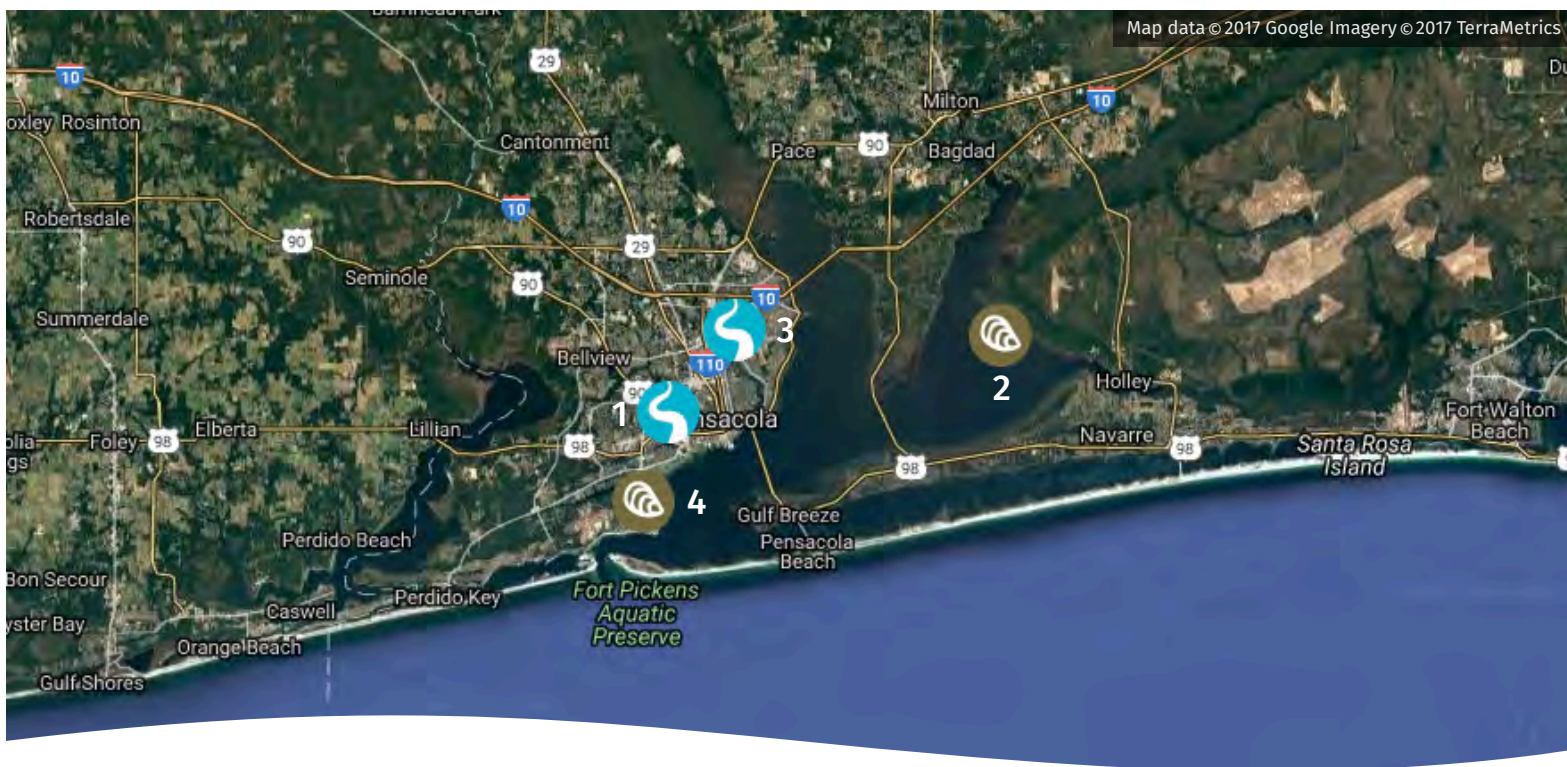
PHOTO: NICOLE RANKIN, USFWS

fishery is the second-largest in the nation. Nearly 300,000 people work in the tourism industry on Florida's Gulf Coast alone.

Although the state's coastline is diverse and extensive, there are common problems across the coast, particularly the need to improve water quality, rebuild wetlands and oyster reefs and restore more natural timing and patterns of river flows to estuaries. Watersheds across the state also need to address nutrient pollution, stormwater, and sedimentation, which harm water quality and clarity.

In total, Florida is certain to receive approximately \$1.7 billion dollars that can be used for restoration as a result of the

Deepwater Horizon disaster. More than a sixth of these funds have already been awarded to projects aimed at improving water quality, restoring oyster reefs and benefiting birds and sea turtle populations, with additional expenditure plans currently underway to dedicate more of the funds. The remaining money will become available over the next decade and a half.



Pensacola Bay

THE PENSACOLA BAY WATERSHED covers approximately 4.5 million acres and extends from southern Alabama through Florida’s central Panhandle. The watershed includes three major rivers—the Escambia, the Blackwater and the Yellow—as well as smaller tributaries. The northern portion of the watershed is largely agricultural lands or timber forests, while the coastal portion of the watershed contains urban and industrial areas.

The Pensacola Bay system is affected by numerous historic and current environmental stressors. In the 1960s and 70s, the bay received large industrial discharges of toxins and pollutants and some of these pollutants remain in the system today. In addition, roughly 20 percent of the segments in the Florida portion of the Pensacola Bay watershed are considered “impaired” under the Clean Water Act—largely a result of urban stormwater, agricultural fertilizer runoff and sewage and septic tank overflows.

Bayou Chico, which discharges directly into Pensacola Bay and the Gulf of Mexico, is the only waterbody in the Pensacola Bay system that has a Basin Management Action Plan established, which identifies steps to reduce pollution. Given its influence on the health of the larger system, Bayou Chico and its tributaries are a high priority for restoration.

Although Pensacola Bay once had a viable commercial oyster fishery, today oyster reefs in the bay have declined by 72 percent and are largely closed to harvest. Restoring oyster reefs will provide habitat, stabilize shorelines and improve water quality and clarity in the Pensacola Bay system.

Marshes, wetlands and seagrass beds stabilize coastlines, trap and filter pollutants and provide habitat for fish and wildlife. However, all these habitats are in decline in Pensacola Bay. Since the 1960s, seagrass coverage has declined by nearly half while wetlands have declined by nearly three-quarters in some areas.

Priority Projects

● 1

Bayou Chico Restoration

Bayou Chico is listed as an impaired water body under section 303 (d) of the Clean Water Act. It suffers from legacy pollutants, including PCBs, dioxins and metals. The overall goal of this project is to improve habitat and water quality in both the bayou proper as well as its tributaries (Jones Creek, Jackson Creek and Maggie's Ditch) by reducing the sediment and nutrient loads entering the system as well as removing these legacy pollutants. Additional long term goals of the project include improved benthic habitat, improved circulation, a decrease in turbidity, and improved conditions for the establishment of submerged aquatic vegetation.

● 2

Pensacola East Bay Living Shorelines & Oyster Reef Restoration

This project will create up to 6.5 miles of living shorelines in the East Bay area of Pensacola Bay. The project will include installation of materials to provide structure suitable for development of oyster reef habitat and will serve as a natural approach to controlling shoreline erosion. The project will apply the most appropriate substrate for oyster larvae to settle and colonize, ultimately providing nursery habitat for commercially and recreationally important finfish and shellfish and forage and nesting areas for birds. The deployment of oyster habitat (which serves as a breakwater) and the planting of salt marsh vegetation will protect the shoreline by dampening wave energy (which erodes the shoreline) and stabilizing sediments (which cause turbidity). These improvements will promote the growth of seagrass and increase colonization by oysters.

● 3

Pensacola Bay Watershed Restoration: Carpenter Creek and Bayou Texar

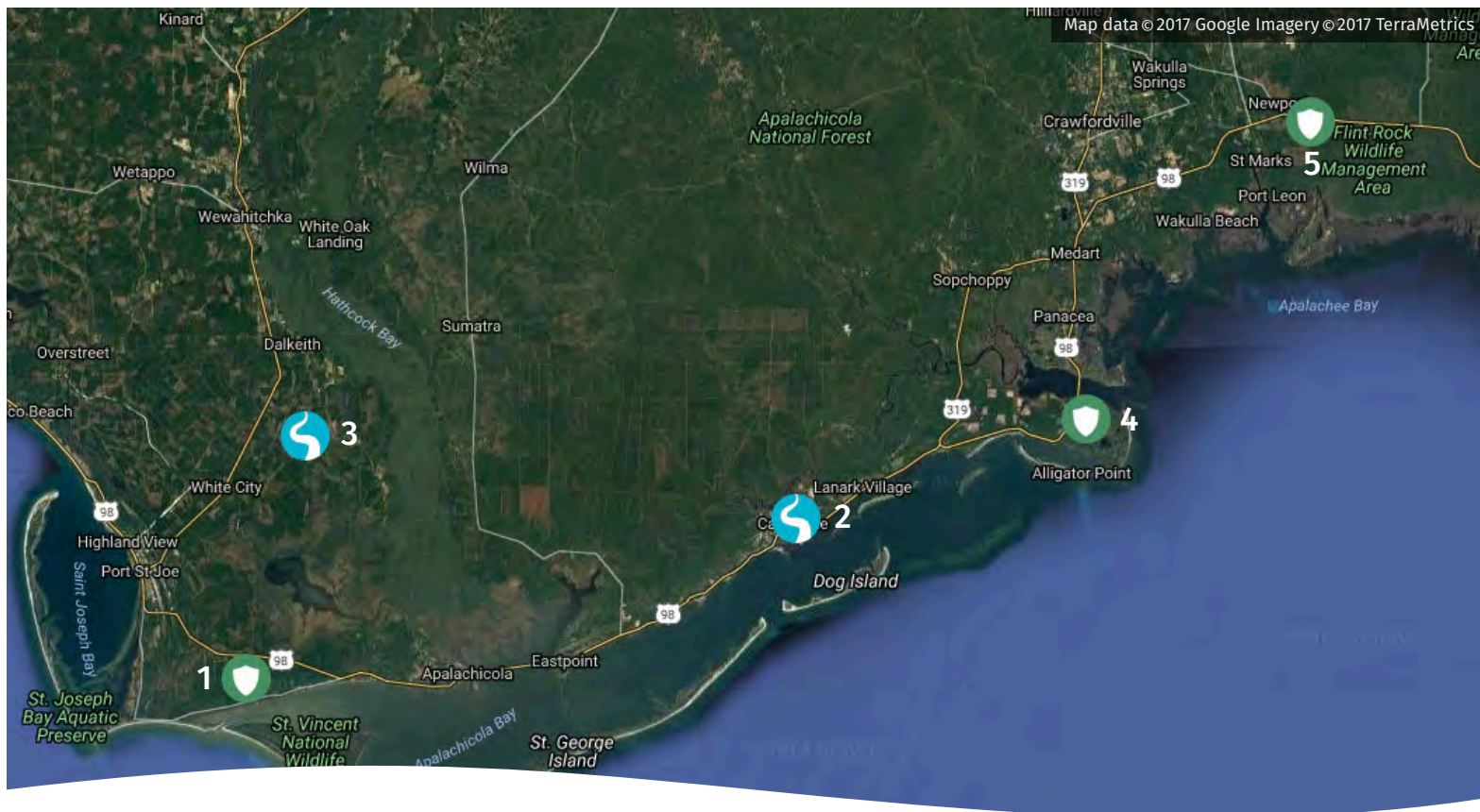
The Pensacola Bay Watershed Restoration Project consists of up to 115 multifaceted priority watershed restoration elements that include estuarine habitat living shoreline restoration, sewage infrastructure, land management and water quality and stormwater improvement projects. Two key elements include Carpenter Creek/Bayou Texar and Jones Swamp Wetland Preservation. An initial effort entails developing a Master Plan for Carpenter Creek and Bayou Texar. Urban encroachment around Carpenter Creek has reduced riparian buffers leading to increased erosion rates and flooding, increased stormwater runoff and reduced water quality and clarity. Projects identified in the master plan will be implemented to undertake stream restoration, restore and enhance the floodplain, stabilize creek banks, improve water flow and quality and establish a greenway with trails. Another important initial element is the development and implementation of a Jones Swamp Wetland Preserve comprehensive management plan, which would include acquisition of key parcels wetland restoration, riparian buffer expansion, and wildlife habitat improvements.

● 4

NAS Pensacola and Escambia County Living Shorelines

This living shoreline project will install 24,800 linear feet of rock and oyster reef breakwater and create 205 acres of emergent marsh and submerged aquatic vegetation habitat. This project will benefit water quality, further enhancing coastal marshes and seagrass beds

in Pensacola Bay. This living shoreline project will apply the expertise and lessons learned by Florida Department of Environmental Protection and Escambia County scientists, who designed and constructed the successful Project Greenshores living shoreline project establishing a necklace of living shorelines around downtown Pensacola.



Apalachicola Bay

THE APALACHICOLA RIVER AND BAY SYSTEM in the Florida Panhandle is an area of exceptional ecological importance. It constitutes one of the least polluted, least developed, resource-rich systems left in the United States. Designated as an International Biosphere Reserve, a National Estuarine Research Reserve and an Outstanding Florida Water, the river supports the most diverse assemblage of freshwater fish in Florida and the largest number of endemic species in western Florida. Apalachicola River and Bay are inextricably linked—the river and its floodplain are the biological factory that fuels the estuary’s productivity.

Despite its enormous ecological value, the Apalachicola ecosystem has been severely degraded over the decades, due to the impoundment of water by upstream reservoirs, consumptive use of water by farms and cities, and decades of navigational dredging and

channel alterations. The combined effect of these activities has been to alter the river’s flow regime, reduce the river’s habitat diversity, and smother and displace habitat in the river’s rich sloughs and floodplains. More than four million trees have died in the river’s floodplain due to lack of overbank flows over the past four decades, a decline approximately 40 percent.

This mismanagement of the river, combined with a prolonged drought in 2011 and 2012, has caused significant damage in the river and bay system. Lack of river flows led to the collapse of the bay’s oyster populations and triggered a federal declaration of a commercial fishery failure for the bay’s oyster fishery, which had previously produced as much as 10 percent of the nation’s oysters annually. Today, the bay’s oyster harvests are still far below normal. Restoring river flows is essential to the recovery of the Apalachicola’s famed oysters.

The Florida Fish and Wildlife Conservation Commission is currently funding a scientific assessment of the geomorphology, hydrology, and ecological processes in a portion of the river in order to develop projects to restore endangered

mussel habitat. The National Wildlife Federation is participating in these efforts and urges the state to expand this work into a comprehensive hydro-geomorphic study of the river and to carry out restoration projects identified by the process.

Priority Projects

● 1

St. Vincent to Lake Wimico Land Acquisition

The St. Vincent to Lake Wimico Watershed Project is comprised of approximately 40,000 acres near the City of Apalachicola. It runs from St. Vincent Sound northeast to the greater Lake Wimico area and is almost entirely owned by one landowner, with a few key inholdings held by other landowners. It is adjacent to significant public lands and waters and has been a longtime conservation priority of state, federal, and non-profit organizations. A unique and important public neighbor is the Apalachicola National Estuarine Research Reserve—one of America's first protected National Estuarine Sanctuaries—a designation which recognizes only exemplary estuarine areas for protection, research, and management with local community involvement. This project will protect water quality and freshwater flows into the Apalachicola River and Bay and will benefit a host of listed species, including Gulf sturgeon, Gopher tortoise, Florida black bear, Swallow-tailed kite and others.

● 2

Central Tate's Hell Hydrologic Restoration and Estuarine Monitoring

Encompassing more than 110,000 acres, the New River basin is the largest watershed in the Tate's Hell State Forest; and it drains into the Apalachicola Bay. Roads and ditches from past forestry activities in the watershed have severed historical drainage pathways and disrupted the natural flow of freshwater to the bay, impacting the salinity regime in adjacent estuarine habitats. The Northwest Florida Water Management District, in cooperation with the Florida Division of Forestry, have planned a project to reconnect and restore the natural hydrology and wetland functions in the watershed and re-establish a more natural salinity regime. The watershed contains areas of former cypress sloughs, wet savannas, forest wetlands and mesic flatwoods that will be restored along with redirecting surface water to its previous flow patterns. Hydrologic improvements will include 60 low water crossings, 29 flashboard risers, 55 new or replacement culverts, 13 culvert removals, 189 ditch blocks, one bridge and approximately 7 miles of road removals.

● 3

MK Ranch Hydrologic Restoration

MK Ranch is roughly 6,000 acres of a historic tidal marsh in the lower Apalachicola River basin. The property acts as a filter and storage area for water flowing from upland sites to creeks and rivers, and eventually into Apalachicola Bay and Lake Wimico. Historic construction of roads, ditches, dikes and berms have altered land use and water flow patterns in the area. This project will restore historic wetland structure and function by reconnecting the floodplain to natural drainage pathways within the watershed, restoring the historic flow regime to the estuary and improving habitat conditions and water quality. The hydrologic restoration of this large expanse of tidal marsh will provide the appropriate delivery and storage of surface water from the Ingram Creek and Saul Creek watersheds that ultimately feed Apalachicola Bay and its economically important fishery.

● 4

Bluffs of St. Teresa

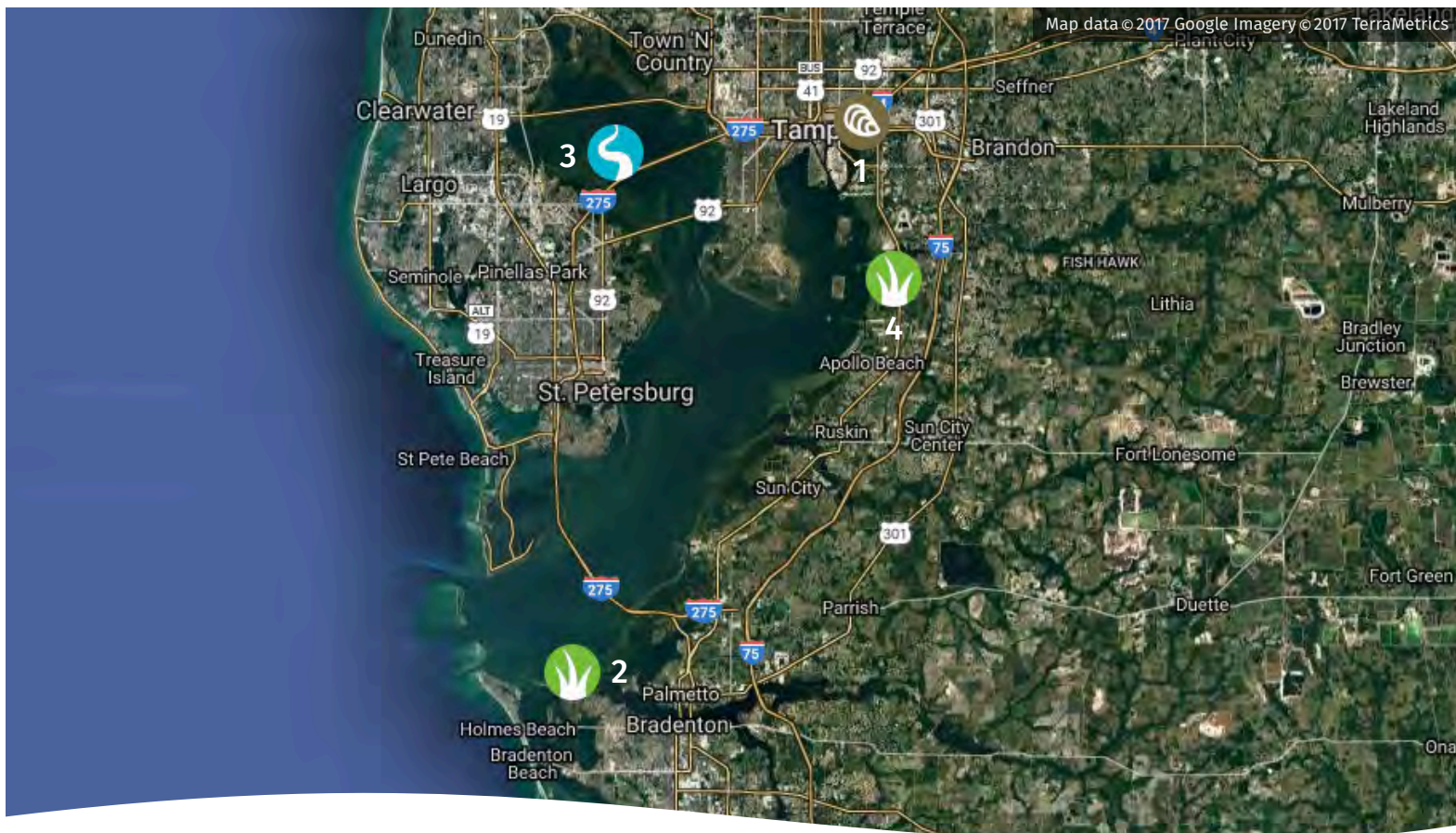
The phased Bluffs of St. Teresa Project will preserve 17,080 acres adjacent to Bald Point State Park. The Nature Conservancy ranks the area from Apalachee Bay to Apalachicola Bay as the third-highest biodiversity spot in the entire nation, and this project sits on the junction of those two bays. The property has two miles of Gulf of Mexico frontage, 6.2 miles along Ochlocknee Bay and 8.5 miles along the Ochlocknee River. Natural communities include beach dune, estuarine coastal salt marsh, salt flats, tidal creeks, lakes, depression marshes and flatwoods with crucial ecological value. The bays and salt marsh communities provide foraging habitat for endangered species, including sea turtles. The project area contains habitat and nesting areas for listed species, such as Gulf sturgeon and Kemp's ridley, green and loggerhead sea turtles.

The area also provides habitat for swallow-tailed kite, Cuban snowy plover, black-crowned night heron and numerous species of shore birds. This project provides significant water quality and fish and wildlife benefits to the surrounding bays and rivers.

● 5

St. Marks National Wildlife Refuge Acquisition

This project—located in Wakulla, Jefferson, Taylor and Franklin Counties —provides habitat conservation through land acquisition and permanent conservation easements via expansion of the St. Marks National Wildlife Refuge. This project will enhance water quality, improve community resilience, protect coastal marine resources and provide tremendous benefit to migratory bird species. The targeted tracts include wetland habitats that provide direct benefits to Apalachee Bay, St. Marks River, and the Gulf of Mexico. Two tracts, the Sam Shine tract (8,117 acres) and The Nature Conservancy Tract (7,699 acres) comprise the vast majority of this project. In addition, the 2,228-acre Lower Ochlocknee River Tract would provide protection to the local estuary, and two other easement parcels (JLT and Five Smooth Stones, totaling approximately 2,100 acres), would greatly aid the St. Marks River. This project will buffer Apalachee Bay, a high salinity, seagrass rich aquatic area which is an important corridor to the low salinity, phytoplankton rich area of nearby Apalachicola Bay. Apalachee Bay is also renowned as one of the cleanest and most ecologically abundant bays left in Florida. Thus, the unique combination of both bays are critical to maintaining species diversity.



Tampa Bay

TAMPA BAY is Florida's largest estuary, covering close to 400 square miles. The bay is fed by numerous waters including Hillsborough River, Palm River, Manatee River, Alafia River, Little Manatee River and Lake Tarpon. Tampa Bay hosts a diverse array of habitats, from oyster beds, seagrass meadows, mangroves and coastal hardwood hammocks. These habitats support a robust tourism industry as well as abundant populations of fish, birds and other wildlife, including numerous threatened and endangered species.

The surrounding area is home to about four million residents, putting stress on the bay's ecosystem. In 1990, Tampa Bay was designated an "estuary of national significance" by Congress,

creating an avenue for restoration. Significant efforts over the past decades have improved water quality by reducing the nutrients and other pollution entering the bay. Seagrass beds and other bay habitats have recovered as a result. In 2016, the bay had more overall seagrass coverage than it is thought to have had in 1950.

However, a few areas of Tampa Bay have been more challenging to recover. Runoff from urban, residential and agricultural lands remains the largest source of nitrogen—the primary pollutant in the bay. The National Wildlife Federation supports projects to improve Tampa Bay's habitats and water quality, especially in those areas that have been slow to fully recover.

Priority Projects

● 1

McKay Bay Oyster Reef Creation

McKay Bay is one of the few remaining areas of Tampa Bay that is routinely found to have poor water quality. Fortunately, several projects are currently being implemented that will improve water quality, such as an effort to address stormwater in the lower Palm River and Upper McKay Bay and septic-to-sewer conversions along the Palm River. The McKay Bay Oyster Project is a state, private and nonprofit partnership that will create 16 acres of new oyster reef habitat along the eastern shoreline of McKay Bay. The project will construct a series of subtidal and intertidal oyster reefs similar in nature to existing natural oyster reef communities that will contribute to the health and the restoration of the Bay. This project was identified as a high priority in 2016 by the National Estuary Program. In conjunction with other restoration projects targeting water quality, this project should provide cumulative benefits for the health of the bay.

● 2

Robinson Preserve Restoration, Phase II

Robinson Preserve is a 637-acre conservation area positioned at the junction of two estuaries of national significance: Tampa Bay and Sarasota Bay. The recommended Phase II project would add 150 acres of land to the preserve, restore that land to a more natural state and open it to the public for passive recreation and education. The 150 acres of primarily upland habitat will provide an ecological connection to existing features of the preserve. By re-contouring the land, planting native vegetation and conducting intensive maintenance the project will enhance 61 acres of pine flatwoods, 35 acres of coastal

hammock, 34 acres of open water, 11 acres of freshwater emergent marsh and 13 acres of intertidal habitats. These habitats will benefit water quality, biological diversity and fisheries. This project is also part of the National Estuary Program's Southwest Florida Regional Restoration Plan and has received partial funding in the RESTORE Council's Initial Funded Priority List.

● 3

Howard Frankland Causeway Circulation Enhancement

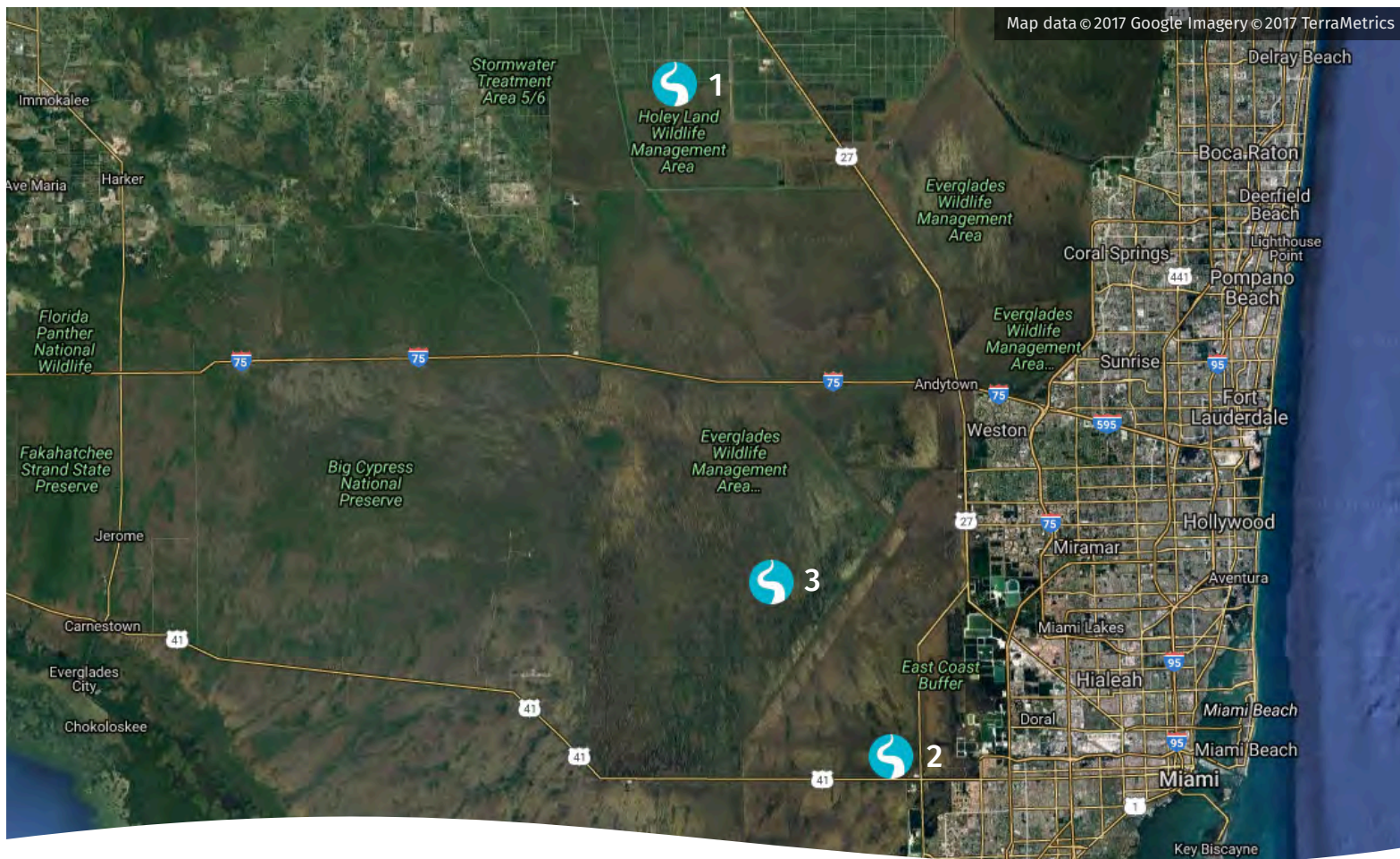
This project would be conducted in conjunction with an expansion of the Howard Frankland Bridge that cuts across Tampa Bay. The project would construct an opening in the existing western causeway, currently restricting bridge circulation, in order to enhance flushing, improve water quality and reduce the occurrence and duration of harmful algal blooms. This is a rare opportunity to possibly make a significant difference in an area of Tampa Bay that has been slow to recover. The proposed causeway opening will enhance circulation in Old Tampa Bay, resulting in improved water quality. Tampa Bay Estuary Program has identified this project as one of its High Priority Projects for the Tampa Bay Region.

● 4

Kracker Avenue Fish Farm Hydrological Restoration Project, Phase II

Kracker Avenue Fish Farm was once comprised of over 300 man-made fish ponds but was abandoned and is now overrun with invasive exotic vegetation. Its restoration will include the creation of native estuarine, freshwater and coastal upland habitats. Other hydrologic

improvements will provide for low-salinity fish nursery habitats. Phase II will focus on enhancing connections to the adjacent Shultz Preserve as well as diversifying Phase I Habitat Restoration. Phase II will acquire the remaining land parcels and ponds—prioritizing the land to the west which includes a freshwater lake as well as multiple connections and flow enhancement alternatives. Similar to the initial phase, Phase II will increase the amount of estuarine habitat, including wetlands with mangrove, salt marsh and saltern habitat, associated coastal uplands, a freshwater lake and low-salinity tidal channels. In addition, the restoration project will be studied to better understand the appropriate conditions for favorable fishery production. The Tampa Bay Estuary Program has identified this project as one of its High Priority Projects for the Tampa Bay Region.



Everglades

THERE IS NO PLACE IN THE WORLD QUITE LIKE THE EVERGLADES. These diverse but connected waters and wetlands stretch over two million acres from Orlando south to Florida Bay. The Everglades is internationally known for its wildlife, for crocodiles, manatees, the Florida panther and huge host of birds such as roseate spoonbills, egrets and wood storks.

Originally, the greater Everglades ecosystem had a diversity of habitats connected by these wetlands and water bodies. Since the 1800s, human actions have reduced the size of the Everglades by half. Water diversions and flood-control projects severed many of the water flows that connected different parts of the Everglades, while large areas of its land were changed to agricultural or residential areas.

The re-plumbing of the Everglades has resulted in a system where the health of critical coastal estuaries—including the Caloosahatchee River Estuary and Florida Bay—is at risk. These estuaries' future hinges on the restoration of more natural water flows through the system. When Lake Okeechobee gets too full, the fertilizer-laden water is pumped through the Caloosahatchee and St. Lucie rivers to lower lake levels. In many years, the polluted water fuels outbreaks of toxic algae once the water reaches the coast. The thick green algae can reach as far as Pine Island Sound, home to the J.N. "Ding" Darling National Wildlife Refuge.

Meanwhile, Florida Bay—an iconic fishing paradise at the tip of the state—receives too little fresh water, which causes salinity to spike and kill off

vital seagrass beds, the habitat that shelters and feeds the bay's abundant fish and shellfish and helps keep its waters clear.

There is one solution to all these different problems: send fresh water south. The National Wildlife Federation supports projects that will allow Lake Okeechobee water to be cleaned

and released to the coast in a way that mimics natural flow patterns. These projects are part of the Comprehensive Everglades Restoration Plan, which was passed by Congress in 2000. Urgent implementation of these projects is fundamental to restoring the Everglades, Florida Bay and the Caloosahatchee River Estuary, and will benefit the health of the Gulf of Mexico.

Priority Projects

● 1

Everglades Agricultural Area Water Storage Reservoir

A key component to restoring the Caloosahatchee and St. Lucie estuaries and Florida Bay is to increase water storage capacity in the Everglades Agricultural Area. Contained in the the Comprehensive Everglades Restoration Plan, this project involves construction of a 60,000 acre reservoir to store and treat water in the EAA. Creation of this reservoir will provide an outlet for water currently being diverted to Florida's east and west coasts, causing algal blooms and wreaking havoc on the estuarine environment and the coastal economies. The reservoir will also hold water that can be sent south to the heart of the Everglades, providing a desperately needed source of additional freshwater for Florida Bay. A study by the Everglades Foundation found that the EAA reservoir reduced the volume of discharges from Lake Okeechobee to the estuaries by nearly 50 percent and increased flows to the Everglades by 26 percent.

● 2

Tamiami Trail Bridging

In order to restore the Everglades, it is essential to remove key barriers to the natural flow of water in the ecosystem. Tamiami Trail, or US-41, is a two-lane road that cuts across the Everglades connecting Naples to Miami. Because of this barrier, Everglades National Park to the south only receives a portion of its historic annual flow, diminishing fish and wildlife habitat in the Glades and raising salinity levels in Florida Bay. The solution is to elevate a total of 6.5 miles of Tamiami Trail to send more water through to Florida Bay, a project that will be completed in four sections. The first mile of the bridge was completed in 2013, and construction on the second section, a 2.6 mile bridge, was initiated in 2016. Funding must still be identified for the remaining portions of the bridging. When completed, the project will allow water levels along the trail to be raised by one foot, which is estimated to increase peak flows to the park and Florida Bay by 47 percent over current conditions.

● 3

Central Everglades Project

The Central Everglades Project, authorized by Congress in 2016, is a bundle of high-impact project components that will improve the delivery of water to the central Everglades ecosystem. It includes elements to store, treat and convey water south of Lake Okeechobee, and to remove barriers to the sheetflow of water between the Water Conservation Areas and Everglades National Park. CEP will work synergistically with the EAA Reservoir and the Tamiami Trail Bridging to reconnect different areas of the Everglades and send water south, where it is needed. When completed, CEP will restore the natural sheetflow to 10,000 acres of degraded Everglades wetlands and improve the health of Florida Bay.



PHOTO: CHRIS KUHLMAN / RESTORE AMERICA'S ESTUARIES

Make a Difference for the Gulf

1

Call your senators and representatives and ask them to support Gulf restoration based upon sound science.

2

If you live in one of the Gulf states, contact your local NWF policy specialist for ways you can weigh in with state and local decision-makers. There are several opportunities for public input each year.

3

Be mindful of your local waterway. Roughly 60 percent of the continental United States ultimately drains to the Gulf of Mexico. Preventing pollution begins at home—simple steps like picking up pet waste and using low impact yard care practices can make a big difference if we all work together.

Contact the National Wildlife Federation's Gulf of Mexico Restoration Experts

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