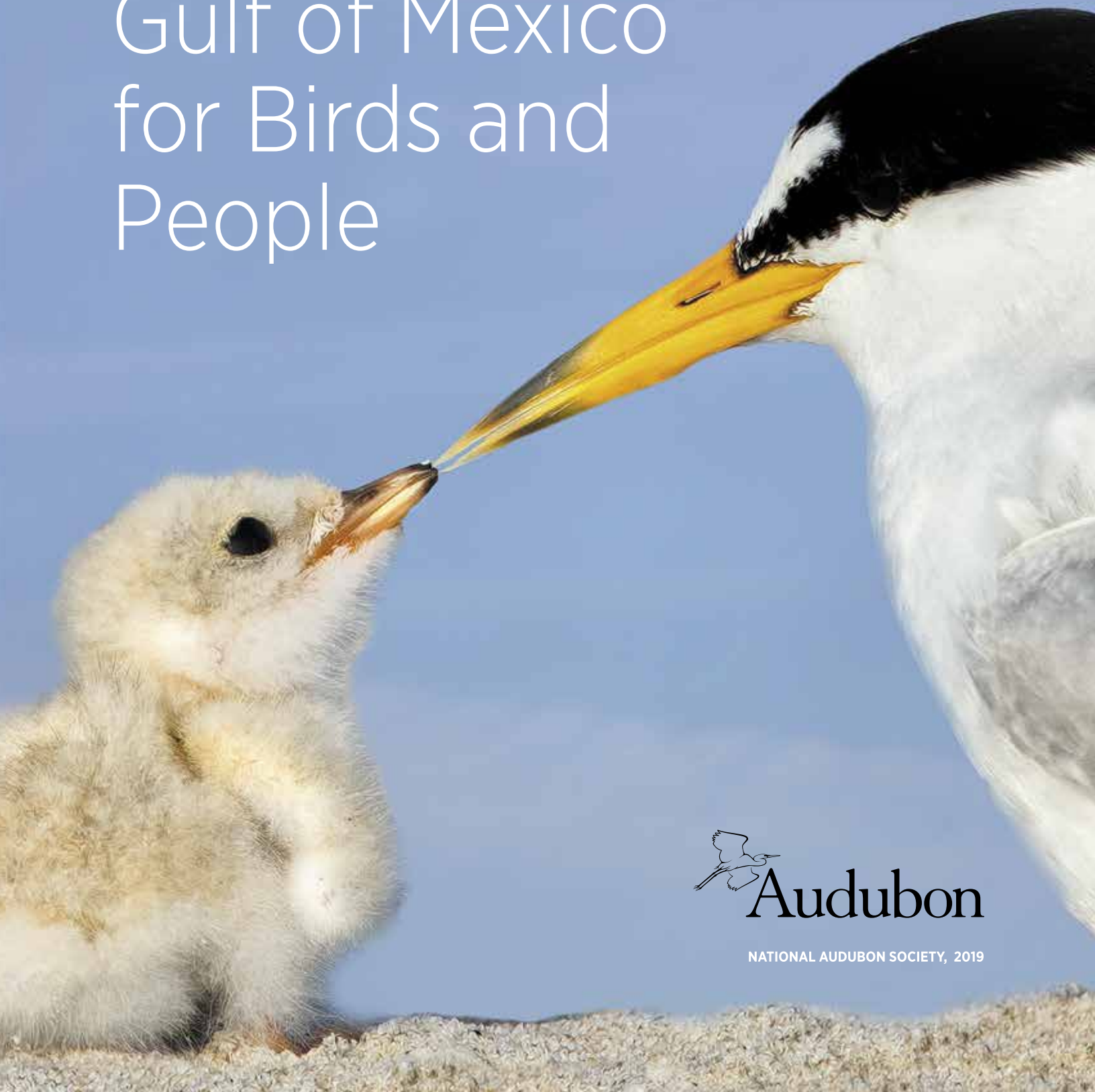
AUDUBON'S VISION:

Restoring the Gulf of Mexico for Birds and People



Audubon

NATIONAL AUDUBON SOCIETY, 2019

Audubon

The National Audubon Society protects birds and the places they need, today and tomorrow, throughout the Americas using science, advocacy, education, and on-the-ground conservation. Audubon's state programs, nature centers, chapters, and partners have an unparalleled wingspan that reaches millions of people each year to inform, inspire, and unite diverse communities in conservation action. Since 1905, Audubon's vision has been a world in which people and wildlife thrive.

Audubon is a nonprofit conservation organization. Learn more at *www.Audubon.org* and follow us on Twitter and Instagram at *@audubonsociety.*

Reddish Egret

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THE GULF OF MEXICO FOR BIRDS

Ecological Significance of the Gulf

Stretching from the Florida Keys to the Yucatan Peninsula, the Gulf of Mexico is an ecological treasure. For millions of birds, it is the last resting stop before a nonstop journey across or around the Gulf to the Caribbean and Central and South America during fall migration. It also provides the first bit of land many of these birds return to after a grueling spring trip north flying thousands of miles. From the offshore waters of the open ocean to barrier and bay islands to coastal marshes, abundant estuaries, and inland swamps, the region supports an incredible diversity of habitats that many species, including species of conservation concern, need to survive and thrive. Stretching across the Atlantic, Mississippi, and Central flyways, the U.S. Gulf Coast supports nearly half of North America's migrating birds, including the threatened Piping Plover and Red Knot, as well as resident iconic species of concern like the Black Skimmer, Brown Pelican, and Clapper Rail.

For people, the Gulf is a place to live, work, and play. Tens of millions of people call the region home. Its beaches and waterways provide abundant opportunities for recreation for both locals and visitors. Whether through shipping, tourism, or fishing, the Gulf is home to a wealth of industries that benefit the entire nation. Just as birds need healthy, abundant coastlines, marshes, and swamps to nest, rest, and forage, a diverse set of people and their communities benefit from these natural systems as well. Healthy barrier islands, marshes, and estuaries provide natural infrastructure that can reduce damage from hurricane storm surge, improve water quality, and protect the natural resources on which we depend.

The National Audubon Society recognizes the value of the Gulf to birds, fish and other wildlife, and people. For these reasons, we are pursuing a multifaceted strategy to restore habitat and to monitor and protect bird populations from Florida to Texas. These efforts will help in the region's continued recovery following disasters like oil spills and hurricanes, while also mitigating future threats caused by sea level rise, development, and human disturbance. Although Audubon's work centers around birds, it is important to note that our projects and priorities have ancillary benefits to multiple species, habitats, and communities in a changing climate. For example, restoring a barrier island for shorebird nesting habitat will support a wide variety of wildlife, including fish, sea turtles, oysters, crabs, and many other species. Barrier islands also serve as an important first line of defense during hurricanes by protecting coastal communities from storm surge. Natural systems like marshes, seagrasses, and mangroves serve as carbon sinks by uptaking carbon dioxide from the atmosphere. Therefore protecting and restoring these systems is a good way to reduce climate change.[1]

Piping Plover

Red Knot

Brown Pelican

Further, birds can serve as indicator species for overall ecosystem health.[2] Just as birds—canaries—were literally used to indicate air quality in coal mines, today birds can tell us about the environments they inhabit. They can be indicators of deteriorating habitat quality and environmental pollution, as well as barometers to determine the success of restoration and conservation efforts.[3] This report outlines our priorities for achieving a healthy, restored Gulf of Mexico at the local, state, and regional levels for the entire life cycle of birds and the habitats they need. This, in turn, will benefit the people who live in or depend on this region.

Willet and Western Sandpipers

> "If you take care of the birds, you take care of most of the big problems in the world."
>
> **DR. THOMAS LOVEJOY**
> Professor of Environmental Science and Policy
> George Mason University

HABITAT NEEDS OF A LEAST TERN

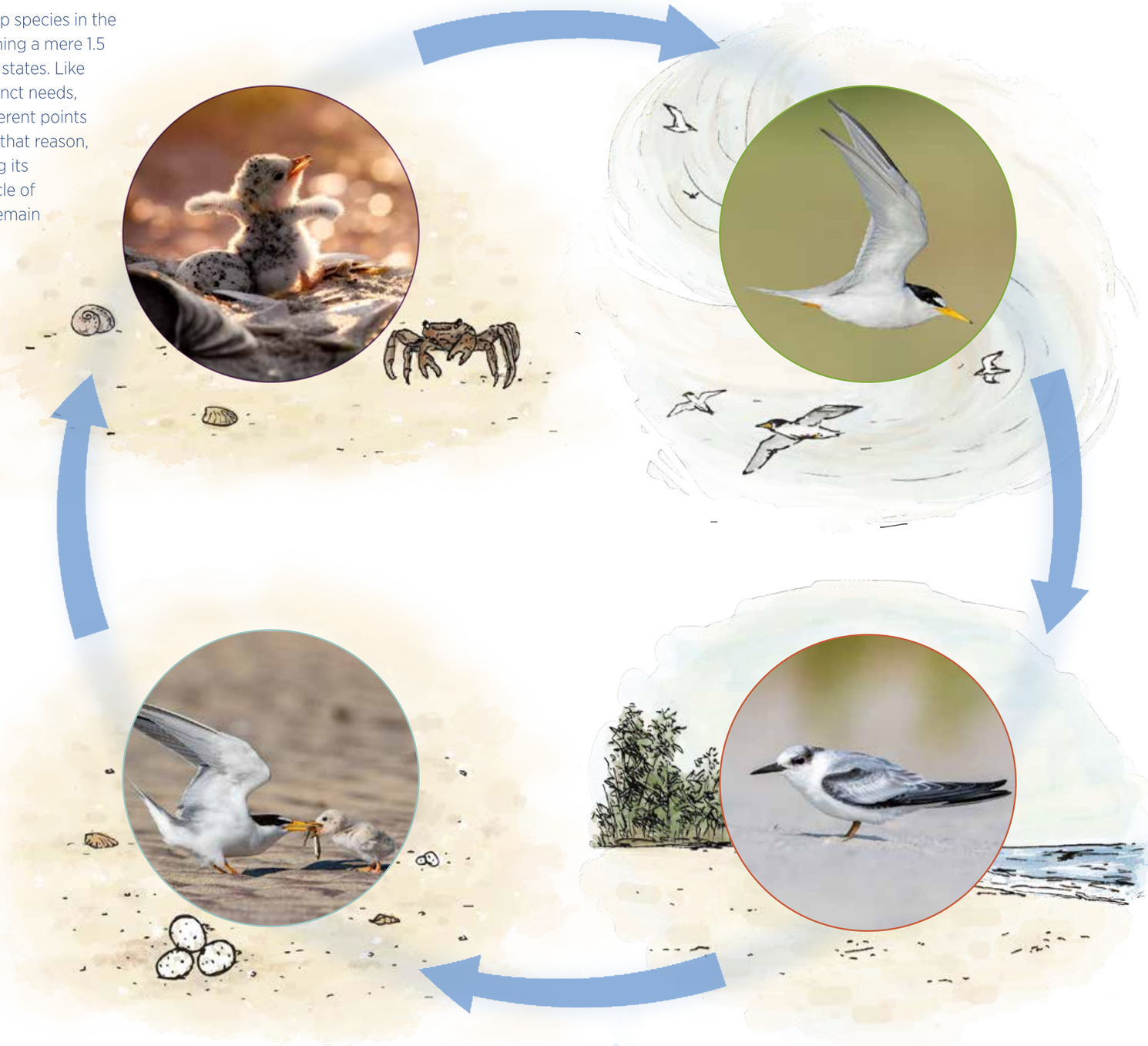
Least Terns are one of Audubon's flagship species in the Gulf. They are a migratory species, weighing a mere 1.5 ounces and occurring across all five Gulf states. Like many bird species, Least Terns have distinct needs, from habitat to food sources, during different points in their lives in order to stay healthy. For that reason, the National Audubon Society is focusing its conservation efforts on the entire life cycle of bird species to ensure populations can remain healthy and thrive along the Gulf Coast.

NESTING

In the spring and summer, Least Terns nest on sandy or gravelly beaches, digging a shallow scrape, sometimes lining it with pebbles, grass, or other debris.

FORAGING

These birds eat small fish and the occasional invertebrate, such as small crustaceans and insects. Least Terns forage along the coast, in areas where the beach meets shallow water. Further inland, they can be found feeding along sandbars near rivers or salt flats by lakes.



MIGRATION

In the fall, Least Terns migrate south, departing North America and northern Mexico for warmer weather.

WINTERING HABITAT

Least Terns seek the warm waters of the tropics, migrating as far south as Brazil. They inhabit coastal areas, estuaries, bays, lagoons, lakes, and rivers.

Environmental Challenges

Over the past decade, the Gulf of Mexico has experienced a number of significant environmental stressors that continue to affect the long-term ecological health of the region. Both natural and man-made, these disasters have had severe and negative impacts on people, birds, and other wildlife that are still present today and will continue for some time. In the aftermath of these disasters, the National Audubon Society, our staff, partners, and thousands of volunteers have been on the ground working to respond to the damage, assess needs, and advocate for measures that will help the ecosystem recover.

BP DEEPWATER HORIZON OIL SPILL

On April 20, 2010, the *Deepwater Horizon (DWH)* rig exploded, killing 11 people and unleashing one of the worst environmental disasters in U.S. history. The well gushed oil for 87 days, damaging marine and coastal habitats and wildlife. In the *Final Programmatic Damage Assessment and Restoration Plan (PDARP)* and the *Final Programmatic Environmental Impact Statement (PEIS),* the Natural Resource Damage Assessment (NRDA) Trustees indicated the oil spill had caused an "ecosystem-level injury" to the Gulf of Mexico. Endangered species already struggling with dwindling populations, such as Kemp's ridley sea turtles and Atlantic bluefin tuna, were heavily affected by the spill. For birds, particularly breeding waterbirds, the spill was devastating, as it occurred during the height of the nesting season, and it will take years to fully recover from the loss of an entire generation of birds.

The NRDA Trustees state, "The magnitude of the injury and the number of species affected makes the *DWH* spill an unprecedented human-caused injury to birds of the region."[4] The Trustees indicate that "at least 93 species of birds, including both resident and migratory species and across all five Gulf Coast states, were exposed to *DWH* oil in multiple northern Gulf habitats, including open water, islands, beaches, bays, and marshes."[5]

In the *PDARP*, the Trustees estimated "that mortality ranged from 51,600 to 84,500 individual birds." The Trustees also estimated a loss of "from 4,600 to 17,900 fledglings that would have been produced in the absence of premature deaths of adult birds as a result of the *DWH* oil spill"[6]. Most important, however, the Trustees acknowledge that "the quantified injury described above captured only a portion of the overall injury to birds," meaning that while additional injuries were likely incurred, they could not be measured using the available data.

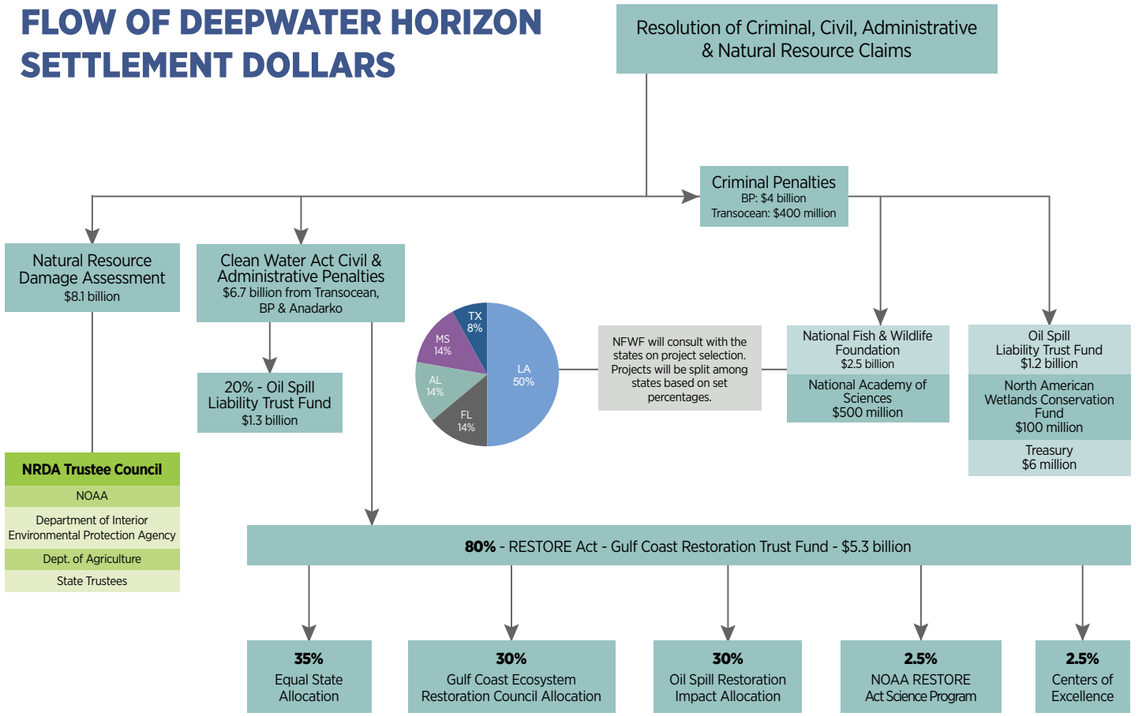
Other estimates put bird mortality from the spill at a number exceeding 1 million birds[7,8]. Given the size, scale, severity, and potential long-term impacts of the oil spill, quantifying a precise bird mortality number has proven impossible. However, there is no question that the impacts of the spill on birds and their habitats will continue to be felt for decades and will require ongoing monitoring and conservation efforts to ensure the recovery and health of those species affected.

In the direct aftermath of the spill, many vulnerable species, including Piping Plovers, Least Terns, Wilson's Plovers, Black Terns, and Audubon's Shearwaters, were heavily oiled and badly injured. Of all the birds affected, perhaps the most widely recognizable was the iconic Brown Pelican. This species had severely declined in the eastern United States as a result of the chemical insecticide DDT, until efforts to ban the chemical and reintroduce the birds helped the population rebound in the 1970s and 1980s. But while the return of the Brown Pelican is a conservation success story, the oil spill devastated this species just a few months after it had finally been removed from the endangered species list. Studies indicate that an estimated 12 percent of the Gulf's Brown Pelican population was eliminated by the oil spill.[9]

Despite the challenges faced by Brown Pelicans and other Gulf birds, an unprecedented opportunity exists to help the ecosystem and its species recover. With thoughtful research, restoration, and conservation investments, there is hope of restoring a wide range of coastal habitats for the benefit of the entire Gulf ecosystem, its communities, and all species that depend on it.

In 2015, BP and the U.S. Department of Justice reached a global settlement amounting to $20.8 billion, the largest environmental settlement in U.S. history, to be paid out over 15 years. Never before has this amount of funding been dedicated to ecosystem restoration. The magnitude of injury spanning a large marine and coastal ecosystem makes recovery a daunting task that will take generations to accomplish. Successful restoration depends on an ecosystem-wide strategy that allows for monitoring, adaptive management, and flexibility. The overall success of Gulf restoration will depend on the combined effectiveness of individual projects targeting particular injured species and habitats across the Gulf. With science guiding the process, Audubon is invested in a successful outcome.

FLOW OF DEEPWATER HORIZON SETTLEMENT DOLLARS



HURRICANES

Hurricanes are not a new occurrence for the Gulf Coast. However, recent studies have suggested that climate change is increasing the size, strength, and duration of these storms.[10,11] Extensive development in coastal areas and the loss of coastal islands, marshes, and forests have resulted in increased damages to more people and communities on a more frequent basis. In 2005, Hurricanes Katrina and Rita devastated much of coastal Louisiana and areas from Alabama to Texas, including New Orleans. More recently, the 2017 Atlantic hurricane season was one of the most devastating on record. The damage from Hurricanes Harvey, Irma, and Maria alone are responsible for approximately $265 billion of the $306.2 billion cumulative U.S. weather and climate disaster cost of 2017 (NOAA 2017).[12] Each of these destructive hurricanes now joins Katrina and Sandy in the new top 5 costliest U.S. hurricanes on record.[13] Millions of people from Puerto Rico to Florida to Texas felt the effects of these mega-storms, while birds and their habitats were damaged and disrupted across the Gulf.

In the aftermath of the 2017 season, Audubon staff completed an assessment of damage to coastal areas from Hurricane Harvey in Texas and Hurricane Irma in Florida. The report found that the storms had badly eroded critical barrier island habitat, such as on Chester's Island and the Galveston rookery islands in Texas and the Alafia Bank Sanctuary in Florida.[14] Additionally, winds and waves affected wetland nesting sites surrounding Matagorda Bay in Texas, habitat for birds including Whooping Cranes, Reddish Egrets, and Roseate Spoonbills. Wind and wave activity also reduced elevation and vegetation on barrier islands, impacting beach-nesting birds, such as Black Skimmers. The storms brought massive amounts of rainfall, inundating Florida and Texas with freshwater that affected the health of vital estuarine systems and also flooded nests, in some cases causing hatching failures.

Although not as severe, Tropical Storm Cindy made landfall in Louisiana and Mississippi in June 2017 at the height of nesting season. Across the coast, Least Tern nesting sites were severely damaged, with nearly complete nest loss, except in two areas. On Elmer's Island—part of the Caminada Headland Beach and Dune Restoration, a project funded by the National Fish and Wildlife Foundation (NFWF) and completed by the state's Coastal Protection and Restoration Authority as the largest coastal restoration project in the state's history—33 percent of nests survived as a result of the increased elevation.[15] This success story showcases the importance and value of restoration, not just to birds but also to people as the Caminada Headland helps reduce storm surge to nearby communities and nationally significant infrastructure. In Mississippi, New Round Island, a recently created beneficial use area also funded by the NFWF and completed by the Mississippi Department of Environmental Quality, not only sustained minimal damage from the storm but proved to be a safe haven for nesting seabirds, hosting mixed colonies of Caspian Terns, Royal Terns, and Sandwich Terns, as well as separate colonies of Gull-billed Terns, Black Skimmers, and Least Terns.

The 2017 Atlantic hurricane season was a powerful reminder of the need to advance large-scale coastal restoration and rebuild our natural infrastructure to reduce risks to people and businesses, while protecting and strengthening habitat for birds. Audubon remains committed to working across the Gulf to advocate for investments in these critical projects.

OTHER ENVIRONMENTAL STRESSORS

Hurricanes and oil spills are not the only challenges impacting birds in the Gulf, but these disasters further compound existing environmental stressors that affect the health of many populations. Coastal land loss from sea level rise, erosion, subsidence, and coastal development make suitable nesting and foraging grounds difficult to find for many bird species. Coastal ecosystems are losing up to 7 percent of habitat annually: Mangroves lose 0.7 to 3 percent of their area each year; seagrasses lose 7 percent annually; and salt marshes lose 1-2 percent every year.[16] Over the last 80 years, more than 1,800 square miles of coastal forests, marshes, beaches, and barrier islands have turned into open water in Louisiana alone, putting more than 2 million people at risk from flooding and threatening vital habitat on which birds and other species depend. Furthermore, the impact of habitat degradation on shorebirds is exacerbated by increased human recreational use (e.g., off-leash dog walking, off-road vehicle use) that both reduces the amount of functional coastal habitat available for shorebirds and has physical effects on the birds, such as reduction in body condition, winter survival rates, and reproductive success.[17, 18] In some areas, beach-nesting birds compete with humans for that perfect strip of white sandy beach. Fragile eggs that blend in perfectly with the sand are easily trampled by unsuspecting beachgoers. Predators like coyotes and ghost crabs can wipe out entire nesting colonies. Finally, migratory and overwintering habitats continue to be lost or degraded through shoreline modifications and, more recently, by climate change and sea level rise.[19] For these reasons, Audubon's work to monitor and protect these birds and their habitats is vitally important to maintaining healthy bird populations and healthy ecosystems across the Gulf.

Audubon Across the Gulf

Through chapters, state offices, and sanctuaries, the National Audubon Society has had a presence on the Gulf Coast for nearly a century. The organization currently maintains a state headquarters, coastal office, or chapter network in each of the five Gulf Coast states, as well as a Gulf-wide coastal stewardship program that stretches from the Florida Everglades to South Texas.

Audubon's approach to Gulf recovery involves advancing restoration, conservation, and stewardship of Audubon's flagship species within each of the five states along the Gulf of Mexico, while also coordinating across the entire Audubon network to leverage resources, partnerships, and expertise from outside of the Gulf region to benefit those priority birds that use the Gulf ecosystem for a portion of their life cycle.

See Audubon Coastal Bird Stewardship project details on page 56.

AUDUBON BY THE NUMBERS

4 State or Coastal Offices	**71** Chapters	**118K** Members	**94** Staff
19 Centers and Sanctuaries	**5** States Participating in Coastal Stewardship Programs	**641** Coastal Stewardship and Audubon Coastal Bird Survey Sites	


Roseate Spoonbill

TEXAS

The first Audubon chapter in Texas was established in 1899 in Galveston, and by 1923, the National Audubon Society had received the first long-term lease from the Texas General Land Office for the preservation of 3,871 acres of coastal habitat. That lease included the Vingt-et-un island chain near Smith Point in the mouth of Galveston Bay; Green Island in the southernmost Laguna Madre and just east of Brownsville; the Second Chain of Islands in San Antonio Bay; and North Bird and South Bird Islands near Corpus Christi. This act launched one of the first coastal management programs in the United States, and is now known as the Audubon Texas Coastal Conservation Program.

The program oversees 178 islands, along 70 percent of the Texas Coast (more than 367 miles of coastline), that are home to the world's largest Reddish Egret and Roseate Spoonbill colonies. With support from state, federal, local, and nonprofit partners, more than 1,600 volunteers have contributed approximately 3,400 hours, monitoring species and habitat along the coast through the Texas Estuarine Resource Network (TERN). Through TERN, Audubon's staff enlists the help of our community members, chapters, and partner organizations to protect colonial waterbird populations in every major bay and estuary system of the Texas Coast.

LOUISIANA

In Louisiana, the 26,000-acre Paul J. Rainey Wildlife Sanctuary is Audubon's oldest and largest sanctuary. Audubon acquired the sanctuary in 1924, and today operates the property as a living laboratory for coastal restoration and land management to inform other coastal landowners through the Rainey Conservation Alliance. As part of the Restore the Mississippi River Delta coalition, Audubon Louisiana staff are working to advance Louisiana's science-based Coastal Master Plan by advocating for large-scale coastal restoration projects that address Louisiana's coastal land-loss crisis to benefit the nation's largest populations of Brown Pelicans, Clapper Rails, Sandwich Terns, and Seaside Sparrows, among other coastal species. Meanwhile, Audubon Louisiana also stewards and monitors important nesting sites for Least Terns, Wilson's Plovers, and Common Nighthawks on recently completed shoreline restoration projects, as well as other sites with human disturbance pressures.

MISSISSIPPI

Audubon Mississippi supports and manages two premier nature centers and a coastal bird stewardship office. Created in June 2014, the Audubon Mississippi Coastal Bird Stewardship Program's (AMCBSP) roots are both organic and responsive. Building on the foundation laid by the Pascagoula River Audubon Center, the Baton Rouge Audubon Society, and the Mississippi Coast Audubon Chapter for coastal bird conservation, the AMCBSP stewards flagship species such as Least Terns, Black Skimmers, Piping Plovers, and American Oystercatchers, and their associated habitats, which were grievously harmed by the BP *Deepwater Horizon* oil spill. The program takes a multidisciplinary approach to conserving birds, including research and monitoring, stewardship, civic engagement, and capacity building of land managers, industry, and policy makers.

ALABAMA

Implemented by the Birmingham Audubon Society, the Alabama Coastal Bird Stewardship Program (ALCBSP) provides critical protection and monitoring of Alabama's sensitive beach-nesting birds, and provides scientists with valuable data for addressing future management decisions and conservation needs of coastal waterbirds. Birmingham Audubon staff and volunteers collect Audubon Coastal Bird Survey (ACBS) data using standardized protocols at 13 study sites across Mobile and Baldwin counties during designated survey pulses in the fall, winter, and spring. The stewardship portion of the program involves the monitoring and protection of important nesting sites for flagship species such as Least Terns, Snowy Plovers, and Black Skimmers. Additionally, the program works to collect valuable migratory and wintering data on flagship species such as Semipalmated Sandpipers, Piping Plovers, Western Sandpipers, Red Knots, and others.

FLORIDA

Audubon began managing and protecting waterbird rookeries in the Florida Gulf Coast's Charlotte Harbor region in 1901. Since the 1930s, Audubon has fielded biologists and wardens to protect coastal nesting waterbirds from a sanctuary base in the Greater Tampa Bay area. To expand Audubon's reach, volunteers and partnership-based beach-nesting bird stewardship programs were organized along Florida's west-central Gulf Coast in the late 1990s. By 2009, additional partnerships had been formed on the remainder of the Gulf Coast. Audubon manages coastal island sanctuaries covering thousands of acres and conducts extensive work to protect the Everglades and Florida Bay. Audubon Florida's year-round coastal bird surveys, conducted in partnership with the Florida Fish and Wildlife Conservation Commission (FWC), provide population and spatial data that are used to inform restoration and conservation actions for species including Snowy Plovers, Least Terns, Black Skimmers, Piping Plovers, Red Knots, Reddish Egrets, Roseate Spoonbills, and Brown Pelicans. Disturbance abatement and stewardship programs for beach-nesting birds provide vital protection to nests and flightless chicks, and educate beach visitors about the ecology and conservation of coastal waterbirds. As key founding partners of the Florida Shorebird Alliance, Audubon and the FWC work together with a multitude of agency, local government, and NGO partners to advance coastal bird conservation all along the state's Gulf Coast.


Black Skimmer

REGION-WIDE

Birds know no geographical boundaries, and many species travel across various Gulf Coast habitats throughout their life cycles. Audubon is leveraging its national, regional, and in-state staff and volunteers to advance conservation policies and priority projects across the entire Gulf for the benefit of these species.

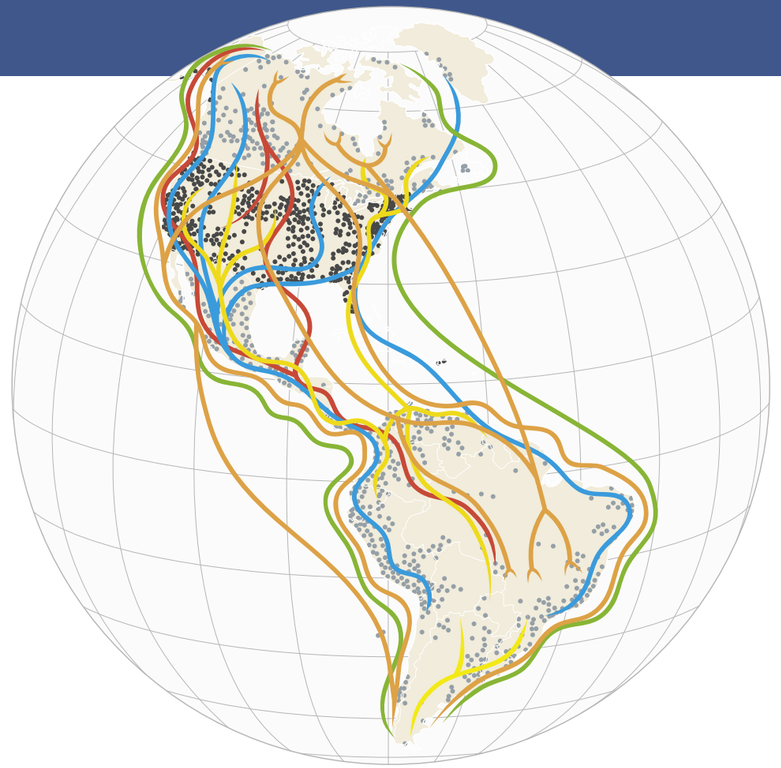

Black Tern

OPEN OCEAN

The BP *Deepwater Horizon* oil spill affected many bird species that migrate through the Gulf but do not spend significant time there. The NRDA Trustees address the injury to these birds under the Open Ocean Trustee Implementation Group. Audubon has identified six open ocean priority bird species that use the Gulf of Mexico and its habitats mostly during non-breeding stages of their life cycles. Audubon is committed to full life-cycle conservation of these species while they are in the Gulf and along their flyways.

NATIONAL AUDUBON SOCIETY

Audubon's work across the Gulf demonstrates our commitment to advancing conservation strategies that meet the full life-cycle needs of birds, including the 11 flagship species of focus in this report. This work is made possible by our vast network of assets and partners across the Western Hemisphere.



- U.S. Important Bird Areas
- International IBAs

Important Bird Areas are locations that have been identified as critical areas for sustaining birdlife. There are more than 2,800 IBAs in the United States, and a further 2,100 in the rest of the Americas.

Hemispheric Reach

Each spring and fall, billions of migratory birds follow the flyways of the Americas from wintering to breeding grounds and back again. By protecting the web of life that represents the Americas' richest veins of biodiversity, Audubon is safeguarding our great natural heritage for future generations, preserving our shared quality of life, and fostering a healthier environment.

Shorebirds Land Birds Seabirds Raptors Waterfowl

Audubon's Gulf Vision

Tricolored Heron


Least Tern

OUR VISION

Healthy, resilient coastal and marine ecosystems that support viable populations of birds and people from south Texas to the Florida Keys.

THEORY OF VICTORY

Audubon will develop comprehensive partnerships and programs to actively monitor, manage, and recover key colonies and nesting sites for beach, coastal marsh, estuary, and other coastal and marine habitat-dependent Gulf birds.

Audubon is dedicated to seeing the Gulf of Mexico ecosystem made whole and resilient in the wake of past disasters and future obstacles. We have made a long-term commitment to this invaluable ecosystem and have dedicated significant resources and staff to the recovery of the Gulf for people and birds. Through sound science, policy leadership, and habitat conservation and restoration, Audubon and our partners are protecting and revitalizing ecosystems battered by man-made and natural disasters and advancing measures to protect birds in the face of overdevelopment, pollution, extreme weather events, sea level rise, and other climate change impacts. Now, with unprecedented funding available for Gulf restoration and a greater need for effective conservation, we're implementing four strategies to protect, enhance, and rebuild habitat:

1. Monitoring of flagship and priority bird species
2. Strategic conservation planning and advocacy
3. Coastal conservation and restoration through collaborative partnerships and programs
4. Long-term stewardship


Audubon coastal scientists examine and band Least Terns as part of a research effort to inform conservation.

1. MONITORING: USING SCIENCE TO GUIDE OUR WORK

A core component of making sound, science-based conservation decisions is Audubon's legacy of bird monitoring. Audubon staff and volunteers across the Gulf track population size and productivity of priority breeding species, using standardized data-collection methods, to demonstrate stewardship success or indicate new stressors to the populations. For example, Audubon monitors Least Tern breeding colonies in all five Gulf states, collecting data on colony size and number of chicks fledged. This data set can be used year after year to track population trends and the birds' responses to threats and restoration activities. In conjunction with our valued partners, our scientists are building a credible, long-term inventory of information on coastal waterbirds to help keep these birds' populations resilient in the face of sea level rise, extreme weather events, and human development. We use the findings to assess threats to birds, identify species in the greatest need of help, and determine the most effective conservation actions. Audubon will augment these monitoring and research efforts by continuing standardized surveys of birds and their habitats during breeding, migration, and wintering periods. We will work with partner organizations (e.g., the Gulf of Mexico Avian Monitoring Network) to further develop compatible monitoring protocols and data-sharing technologies so that we can combine our efforts to gain a broader understanding of bird populations.

2. STRATEGIC CONSERVATION PLANNING AND ADVOCACY: ADVANCING POLICIES THAT SUPPORT HIGH-IMPACT CONSERVATION PROJECTS

Audubon played a lead role in developing, supporting, and passing legislation ensuring that billions of dollars of BP penalty fines are used for habitat restoration. Now we're working directly with the Gulf Coast Ecosystem Restoration Council (RESTORE Council), the NFWF, and the Natural Resource Damage Assessment (NRDA) Trustees—the governing bodies in control of most recovery dollars—along with federal, state, and local decision-makers to:

- Ensure transparency and public participation in the processes that guide Gulf conservation and restoration funding
- Advocate to ensure recovery dollars are dedicated to science-based projects that will improve habitat along the coasts and within watersheds affecting the Gulf Coast
- Secure funding and permitting for sediment-diversion projects to restore the Mississippi River Delta wetlands starved by levees and upstream damming of the river

3. COASTAL CONSERVATION AND RESTORATION: CREATING NATURAL INFRASTRUCTURE TO PROTECT BIRDS AND COMMUNITIES

We work with partners to create islands, shorelines, and marshes to help birds and communities adapt to a changing climate. Not only are barrier islands, coastal bays, shorelines, and coastal marshes essential habitats for wildlife, they also buffer communities from storm surge and sea level rise. For example, as a result of the recently completed Caminada Headland Barrier Island and Beach restoration project in Louisiana, 30 percent of Least Tern nests on the restored island survived storm surge from Tropical Storm Cindy, compared to a complete loss of nests at sites that hadn't been restored. In addition to benefiting birds, this barrier island protects vital infrastructure and communities. In Texas's Matagorda Bay, we're advising and assessing the construction of bay islands, which will support colonies of Brown Pelicans, American Oystercatchers, Royal Terns, and other birds. In Florida, we plan to construct breakwater arrays along the shore of Tampa Bay's Alafia Banks to decrease erosion and support what is one of the state's largest coastal waterbird rookeries. With benefits to multiple species and human communities, these projects set the stage for us to expand on-the-ground restoration efforts throughout the Gulf.

30% of Least Tern nests

on the restored beach survived storm surge from Tropical Storm Cindy, compared to a complete loss of nests at sites that hadn't been restored.

4. LONG-TERM STEWARDSHIP: PROTECTING AND ENHANCING BIRD HABITAT THROUGH HANDS-ON STEWARDSHIP

Each year, thousands of Audubon staff and volunteers steward beaches, bays, and barrier islands across all five Gulf states to protect bird nesting habitat and to help people better coexist with birds in these areas. Our activities benefit birds including Wilson's and Snowy Plovers, Black Skimmers, Least Terns, and Reddish Egrets. Audubon's volunteers and stewards fence off nesting sites, post warning signs near vulnerable areas, plant native dune grass to enhance habitat for nesting birds, and teach beachgoers about the need to protect coastal habitat for birds. At other sites, professional stewards protect the critical island breeding habitat of colonial waterbirds.

Community Engagement: Audubon's Equity, Diversity, and Inclusion (EDI) Initiative

Audubon's EDI initiative demands that our collective work be respectful and sensitive to the needs of all people in the many varied communities that our organization serves. Recognition of the inequities in our society associated with poverty, inadequate housing, lack of employment opportunities, and racism has led and should lead to a renewed acknowledgement that individuals are embedded within social, political, and economic systems that shape behaviors and access to resources necessary to maintain a healthy quality of life. As it relates to this conservation plan, it is our intent that the implementation of this plan will follow the absolute spirit and intent of Audubon's EDI initiative.

The following is taken from Audubon's statement regarding the importance of our EDI initiative:

Just as biodiversity strengthens natural systems, the diversity of human experience strengthens our conservation efforts for the benefit of nature and all human beings. Audubon must represent and reflect that human diversity, embracing it in all the communities where we work, in order to achieve our conservation goals. To that end, we are committed to increasing the diversity of our staff, board, volunteers, members, and supporters, and to fostering an inclusive network of Audubon Centers and Chapters in all kinds of communities, from rural to urban.

Coastal Stewardship: A Vital Investment in Long-Term Bird Health

It is hard to imagine the Gulf of Mexico without Reddish Egrets, Least Terns, Black Skimmers, and Roseate Spoonbills, but without consistent, long-term management, this unthinkable scenario could become a reality. These iconic Gulf birds nest in coastal habitats that are feeling the crush of development and sea level rise, and even nesting sites in parks and preserves are at risk. Whether, like Reddish Egrets, they nest in mangroves overhanging the water, or, like Least Terns, they use meager scrapes on the beach, the maternity wards of these declining species are also the playgrounds of humans. Boaters and beachgoers, unaware that birds are nesting at these sites, get too close, flushing parents from their eggs and chicks. Without the protection of their parents, chicks can fall from the mangroves and drown in the water below, be crushed underfoot, cook in the sun without shade from their parents, or succumb to opportunistic predators like crows and gulls. Many of these species were already listed as threatened by federal or state wildlife agencies prior to the BP *Deepwater Horizon* oil spill. The impacts of the spill and the spill response drove these birds even closer to the brink.

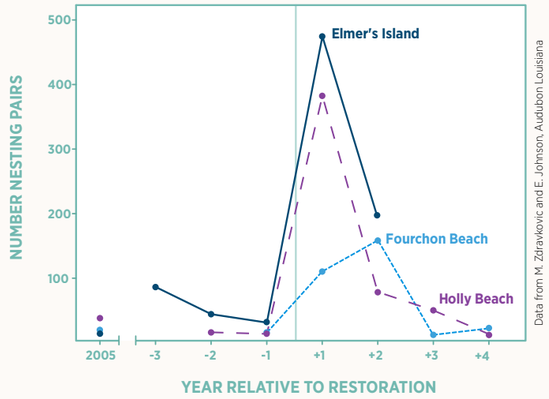
If these "conservation-dependent species" are to persist alongside humans on our coasts, resource managers acknowledge, they must be consistently managed. This long-term stewardship, however, can create the conditions these species need not just to survive but to recover and thrive. Audubon has pioneered the practice of posting, monitoring, and protecting beach and island nesting sites, demonstrating that where resources are dedicated to the stewardship of these birds, nesting can succeed.

The Gulf without its birds would no longer be the Gulf. And as a result, Gulf restoration cannot be considered a success without a secure future for these iconic and vulnerable species. One of the most important investments we can make in their future is a commitment to long-term stewardship funding. The birds are committed to the Gulf for the long haul, and our commitment to them must be as enduring.

Learn more and get involved in coastal stewardship efforts in your community by visiting *audubon.org/conservation/coastal-bird-stewardship.*

RESTORATION + CONSERVATION = HEALTHY BEACH-NESTING BIRD SITES

1 **Restoration of storm-altered beaches** can **increase hatching rates for birds** because nests on higher-elevation beaches are washed out less often.



2 Three restoration projects on Louisiana's coast attracted an **increased number of Least Terns** in the two years after completion.

3 However, beach **restoration projects can support predators**, such as coyotes and ghost crabs. So colonies on restored beaches tend to have higher rates of nest depredation.

4 Conservation actions such as **predator fencing can double hatching success**, maximizing the value of restoration for beach-nesting birds.

Gulf Flagship Species

Audubon's coastal restoration and conservation priorities in the Gulf of Mexico center around 11 flagship species. These are species of conservation concern that benefit most from our conservation work. They are permanent residents, winter residents, or migratory visitors, and they call us to action, representing the broader ecosystems of which they are a part and serving as barometers of environmental health.

BLACK SKIMMER

Primary Habitat: **Barrier Islands**
Secondary Habitat: **Beaches**

SNOWY PLOVER

Primary Habitat: **Beaches**
Secondary Habitat: **Barrier Islands**

CLAPPER RAIL

Primary Habitat: **Estuarine Marsh**
Secondary Habitat: **Mangrove Swamp**

RED KNOT

Primary Habitat: **Intertidal Bars and Flats**
Secondary Habitat: **Barrier Islands**

LEAST TERN

Primary Habitat: **Barrier Islands**
Secondary Habitat: **Beaches**

PIPING PLOVER

Primary Habitat: **Beaches**
Secondary Habitat: **Barrier Islands**

BROWN PELICAN

Primary Habitat: **Bay Islands**
Secondary Habitat: **Barrier Islands**

WESTERN SANDPIPER

Primary Habitat: **Intertidal Bars and Flats**
Secondary Habitat: **Beaches**

AMERICAN OYSTERCATCHER

Primary Habitat: **Intertidal Bars and Flats**
Secondary Habitat: **Barrier Islands**

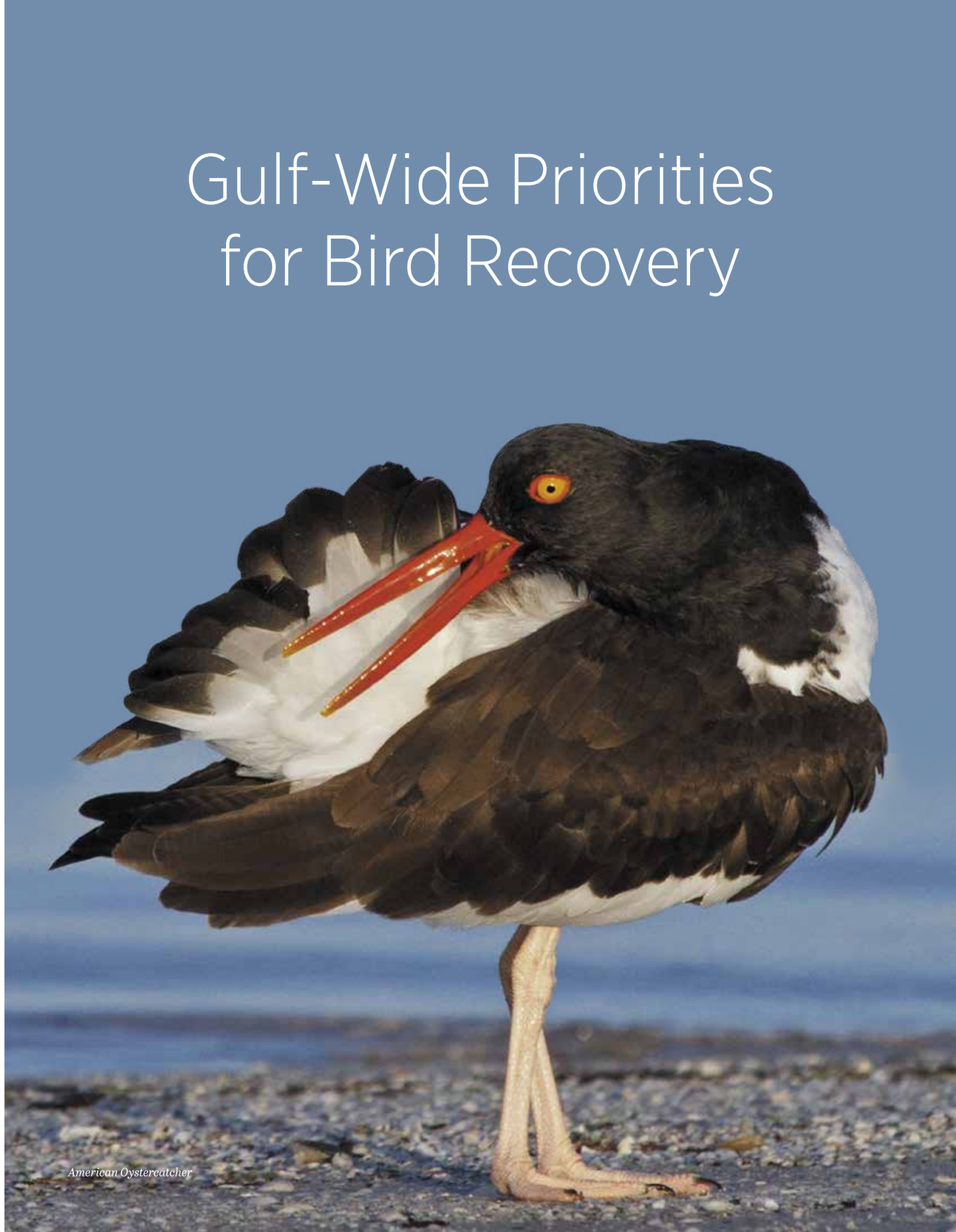
SEMIPALMATED SANDPIPER

Primary Habitat: **Intertidal Bars and Flats**
Secondary Habitat: **Beaches**

REDDISH EGRET

Primary Habitat: **Bay Islands**
Secondary Habitat: **Intertidal Bars and Flats**

Gulf-Wide Priorities for Bird Recovery

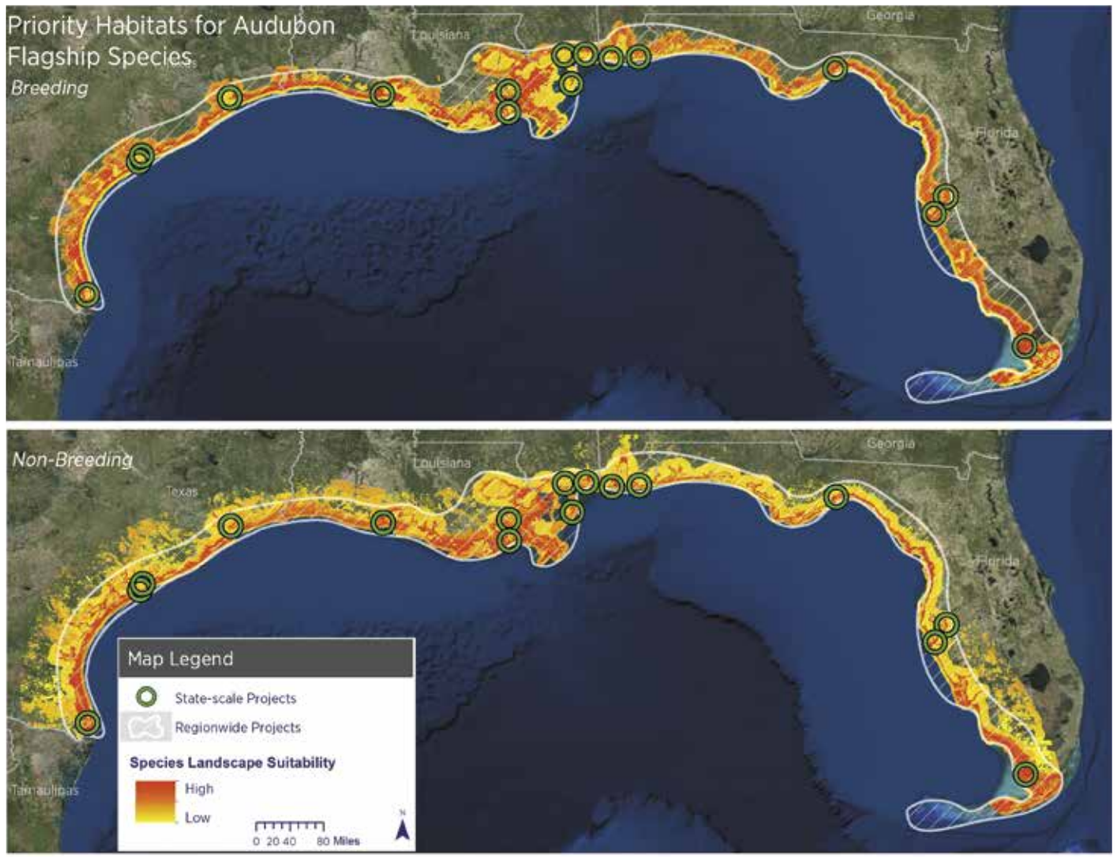


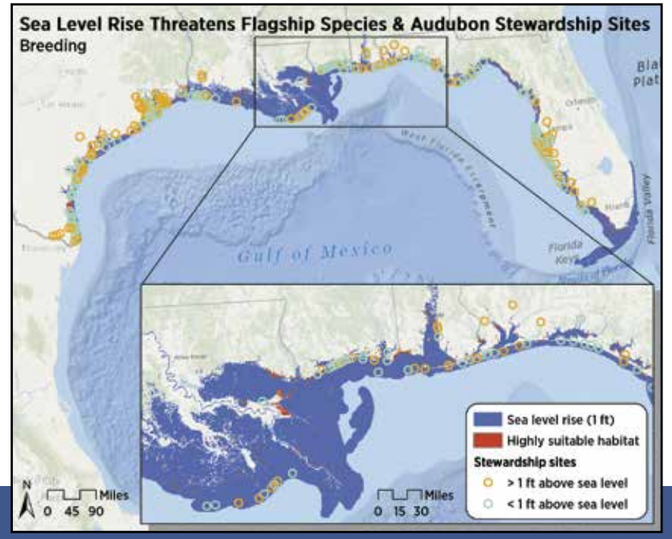
American Oystercatcher

Restoring bird species that were devastated by the BP *Deepwater Horizon* oil spill requires understanding where to focus resources to have the greatest impact on priority populations. Audubon's science team conducted habitat suitability modeling to determine priority areas for restoration and conservation (see Methodology for Habitat Suitability Modeling, page 86).[20]

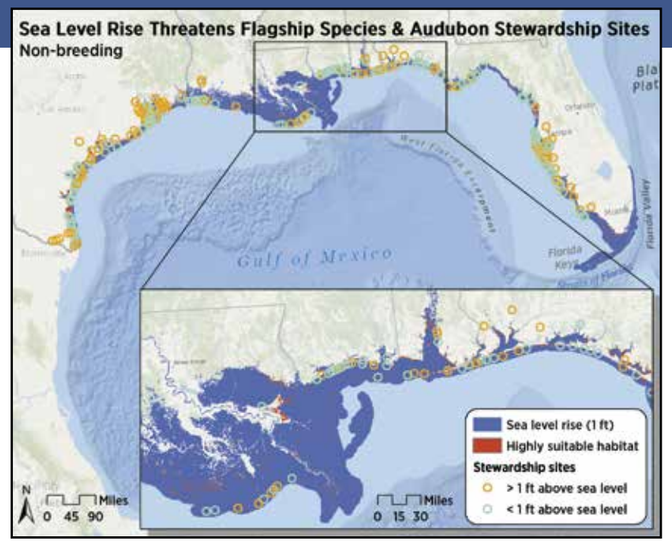
Our modeling found: Highly suitable breeding and non-breeding habitats for all 11 flagship species range from south Texas to the south Florida coastlines. These habitats include barrier and bay islands, headland beaches, intertidal bars and flats, and saltwater marshes. These areas were found in south Texas; the Galveston Bay area; southeastern Louisiana; barrier islands off the Mississippi, Alabama, and Florida Panhandle coasts; and south Florida.

There are
8,176,210 acres
of highly suitable habitat across the Gulf for Audubon's flagship species during the breeding and non-breeding seasons combined.





Our modeling helps identify priority restoration and conservation areas that will create a more resilient coastline as we continue to determine how sea level rise will affect the Gulf and identify ways to better support these species as their habitats migrate inland with sea level rise. In fact, under a very conservative scenario of 1 foot of sea level rise,[21] more than 6 million acres (77 percent) of highly suitable habitat and more than half the sites where we already work will be inundated. This includes 3.8 million acres (75 percent) of highly suitable breeding habitat and 5.9 million acres (80 percent) of highly suitable non-breeding habitat. Moreover, this sea level rise will threaten 56 percent of sites where we protect breeding birds, and 55 percent of sites where we protect non-breeding habitat across the Gulf. Shoring up habitats for birds in the wake of sea level rise is critically important as we work to set aside habitat migration corridors as seas continue to push inland.



Priority Projects and Programs

Using the information from the habitat suitability models, coupled with the scientific and local knowledge of Audubon scientists in the Gulf region, we have developed a suite of restoration, conservation, research, and stewardship projects across the Gulf of Mexico that will collectively address the recovery and population health of Audubon's 11 Gulf flagship species.

These projects are sound investments that together total over 136,000 acres of habitat restored or protected for birds and human communities.

Brown Pelican

Texas

Audubon has been managing rookery islands along the Texas coast since 1923, when it established the first bird sanctuary, Green Island, in the state. Audubon leases and manages many of these islands, overseen by coastal wardens, for the protection of nesting birds. From Sabine Lake to the Laguna Madre, coastal islands support globally important bird populations, including 80 percent of the Reddish Egrets in the U.S. Despite great efforts to protect these birds, many islands are deteriorating in the face of increasing human encroachment, and adjacent foraging habitat is suffering from degraded water quality. RESTORE and NRDA dollars could help many of these islands, which serve as important refugia away from the immediate effects of the BP *Deepwater Horizon* oil spill, and could serve as a source population for regions to the east that may have been heavily affected by oil.

Reddish Egret

1 OPTIMIZING BENEFICIAL USE MATERIAL FOR COLONIAL WATERBIRD CONSERVATION ON CHESTER ISLAND

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Matagorda Bay, Texas	$820,000	2 years

Flagship Species	Likely Implementing Agency or Partnership
Brown Pelican, Reddish Egret, Least Tern	Audubon Texas, U.S. Army Corps of Engineers

Project Overview

Chester Island (previously Sundown Island) was constructed in 1963 with sediment dredged from the Matagorda Ship Channel. The island is a U.S. Army Corps of Engineers (USACE)-designated placement area for sediment dredged from the MSC and Gulf Intracoastal Waterway navigation channels. Audubon leases Chester Island from the Texas General Land Office and has managed it as a bird sanctuary since 1973. Audubon adaptively manages sediment placement on the island in a manner consistent with newly created design templates, thus minimizing the loss of new material to ongoing erosional forces and improving benefits to nesting birds. New material will be available from upcoming USACE projects and will be applied according to the design templates and the USACE's dredge schedule. Monitoring for post-placement sediment loss and bird nesting use will be conducted using high-resolution photography captured with drones and GIS spatial analysis of the photographs.

Link to Injury

Chester Island is the largest and most productive colonial waterbird nesting site in Matagorda and San Antonio bays. There are very few nesting islands available in the upper and middle coasts; therefore, restoration of this site is important to both sustain and recover populations of Reddish Egrets, Black Skimmers, Least Terns, and Brown Pelicans, all of which were affected by the BP *Deepwater Horizon* oil spill.

Benefits and Rationale

Chester Island is one of only three islands consistently supporting more than 10,000 breeding pairs of colonial waterbirds in Texas. In 2017, Chester Island had 18,204 breeding pairs of birds, including Black Skimmers and Reddish Egrets. Repeated placement of dredged sediments has, in the past, buffered the island from erosion, and boosted both the diversity of colonial waterbird nesting habitat and the number of nesting pairs by as much as 25 percent in the year following sediment placement.

Chester Island is one of only three islands consistently supporting more than 10,000 breeding pairs of colonial waterbirds in Texas.

2 GALVESTON BAY BIRD NESTING ISLANDS RESTORATION

Restoration Approach
Restore and conserve bird nesting and foraging habitat

Project Location
Galveston Bay, Texas

Cost Estimate
$5–15 million

Time Frame
Island restoration design and construction would take 1.5 to 2 years

Flagship Species
American Oystercatcher, Black Skimmer, Brown Pelican, Least Tern

Likely Implementing Agency or Partnership
Audubon Texas, Houston Audubon Society, U.S. Army Corps of Engineers, Texas General Land Office, Texas Parks and Wildlife Department

Project Overview
The Vingt-et-un chain of islands and Struve Lucy Island have lost significant acreage because of erosion and subsidence. Dredge spoil material will be strategically added to the Vingt-et-un and Struve Lucy islands to increase elevation and prevent overwash of ground-nesting birds. Shrubs and other vegetative plantings will be added to the Vingt-et-un Islands to stabilize sediment and provide nesting sites for shrub-nesting colonial waterbirds.

Link to Injury
Restoration would support critical nesting sites for ground nesters like skimmers, terns, and oystercatchers, as well as shrub nesters like spoonbills and pelicans. These birds could serve as source populations for species that were directly injured by the BP *Deepwater Horizon* oil spill.


Mixed species flock

Benefits and Rationale
Despite being bordered by one of the largest metropolitan areas in the country, Galveston Bay remains an important location for colonially nesting waterbirds and seabirds. Nesting rookeries in Sabine Lake to the east are quickly disappearing, and East Matagorda Bay to the southwest has little nesting habitat, making large, productive rookery islands in Galveston Bay a source population for recolonizing other sites to the north and south. Heavy ship and barge traffic creates wakes that continually erode shorelines, but the abundance of channels ensures a steady supply of dredge material for restoration work.

3 MATAGORDA BAY NEW ISLAND CREATION

Restoration Approach
Create, restore, and enhance coastal islands

Project Location
Matagorda Bay, Texas

Cost Estimate
$10–40 million, one to four islands

Time Frame
2–3 years to secure permits and construct islands

Flagship Species
American Oystercatcher, Black Skimmer, Brown Pelican, Least Tern, Reddish Egret

Likely Implementing Agency or Partnership
Audubon Texas, U.S. Fish and Wildlife Service, Texas Parks and Wildlife Department, U.S. Army Corps of Engineers, Calhoun Port Authority

Project Overview
Matagorda Bay and neighboring San Antonio Bay have lost many of their island rookery sites to erosion. Ample foraging habitat is available, but there are simply few islands with nesting habitat for either ground or shrub nesters. Islands that do remain are low in elevation and prone to washouts during storms or high-tide events. Possible sites to build new islands exist where the remains of old rookeries still provide higher elevations on the bay floor. A feasibility study and alternatives analysis conducted by Audubon is near completion, and will provide designs for up to four islands. This project would comprise permitting and island construction of one to four islands.

Link to Injury
Constructed islands will support nesting waterbirds harmed by the BP *Deepwater Horizon* oil spill, like Royal Terns, Brown Pelicans, and Reddish Egrets.


American Oystercatcher

Benefits and Rationale
The limited number of intact and undisturbed nesting sites in Texas limits population growth, especially along the central coast. Yet these islands support some of the most important nesting grounds in the Gulf for species like Reddish Egrets. Overcrowding on existing islands is apparent, causing reduced nesting success for less dominant species. Providing new nesting islands would reduce issues associated with overcrowding and provide opportunities for increases in coastal waterbird populations.

4 LOWER LAGUNA MADRE ROOKERY ISLAND RESTORATION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Lower Laguna Madre, Texas	$5–7 million	2-3 years for alternatives analysis and restoration of one island

Flagship Species	Likely Implementing Agency or Partnership
Black Skimmer, Reddish Egret, Least Tern	Audubon Texas, U.S. Fish and Wildlife Service, Coastal Bend Bays and Estuaries Program

Project Overview

The Laguna Madre is one of only five hypersaline estuaries in the world. From shorebirds to waterfowl, a rich diversity of birds depends on the laguna for survival. Bird species that use the Laguna Madre include Reddish Egrets, Black Skimmers, Gull-billed Terns, and Piping Plovers. The entire coastal region of southern Texas and northeastern Mexico, and its wetlands, marshes, bays, lagoons, and barrier islands, is coming under increasing pressure and fragmentation from resort development, sewage and agricultural runoff, increasing commercial industry, boat traffic, and dredging. Several important rookery islands in the Laguna Madre are at high risk of erosion, including East Flats Spoils, Green Island Spoils, Arroyo Colorado Spoils, and Laguna Vista Spoils. An alternatives analysis will be conducted by a subcontractor to assess the best designs for island restoration.

Link to Injury

Rookery island restoration will provide ample nesting habitat for colonial waterbirds directly impacted by the BP *Deepwater Horizon* oil spill.

Reddish Egret

Benefits and Rationale

Green Island is a critical bird rookery in the Lower Laguna Madre that hosts an average of 2,934 breeding pairs of colonial waterbirds a year. A globally recognized Important Bird Area (IBA), the island is the most important Reddish Egret colony along the entire Gulf Coast and one of only 15 nesting colonies for the species throughout its range. Protection of Green Island, combined with the restoration of East Flat Spoils, Green Island Spoils, Arroyo Colorado Spoils, and Laguna Vista Spoils, will support a diverse assemblage of colonial waterbirds and other bird species.

Louisiana

Coastal Louisiana is critical for supporting a large variety of coastal waterbirds, shorebirds, and marshbirds. A recent analysis by Remsen et al. suggests that when it comes to Atlantic and Gulf U.S. bird populations, Louisiana's coastal zone supports approximately 73 percent of Sandwich Terns, 55 percent of Seaside Sparrows, 38 percent of Clapper Rails, 33 percent of Brown Pelicans, and 30 percent of Royal Terns, among other examples.[22] The rich estuaries of the Mississippi River Delta, combined with a diversity of mainland and offshore nesting habitats, are under tremendous threat. More than 1,900 square miles of coastal habitats have been lost to open water since the 1930s, the result of a series of natural events and human modifications to the landscape. The changes wrought by the heightening of levees along the Mississippi River after the 1927 flood, along with the channels cut for oil and gas activities, have been exacerbated by sea level rise, subsidence, the BP *Deepwater Horizon* oil spill, and increasingly severe weather events. Through advocacy and policy action, Audubon is working to enact the most effective approaches to restore ecosystems and stabilize land loss rates. These actions will have positive ripple effects for coastal bird populations across the Gulf. At the same time, Audubon is on the ground stewarding important nesting and foraging grounds and monitoring restoration outcomes.

Brown Pelican

1 MID-BARATARIA SEDIMENT DIVERSION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Create, restore, and enhance coastal wetlands	Myrtle Grove area in Plaquemines Parish, along the west bank of the Mississippi River	$1.3 billion	Permitting is underway, with construction set to begin in 2020

Flagship Species

Brown Pelican, Reddish Egret, Western Sandpiper, Semipalmated Sandpiper

Likely Implementing Agency or Partnership

State of Louisiana and federal permitting agencies

Project Overview

Barataria Basin wetland loss averaged 3,050 acres per year between 1985 and 2010. While at least part of these losses were due to natural erosional processes, they were exacerbated by human activities and sea level rise. These activities included channelization of the Mississippi River and the construction of levees that have starved the Mississippi River Delta of the nutrients, sediment, and freshwater needed to sustain it over time. In addition, oil and gas canals have been dug through wetlands, resulting in saltwater intrusion that has altered the hydrology and severely damaged the ecosystem. The Mid-Barataria Sediment Diversion is needed to reverse past and mitigate future land loss by replicating the processes that direct sediment, freshwater, and nutrients from the Mississippi River into adjacent degrading wetlands. The Mid-Barataria Sediment Diversion has been studied by state and federal agencies since 1984, a process that culminated in 2004 with a programmatic-level main report and an Environmental Impact Statement (EIS). The project has since been included in the State of Louisiana Coastal Master Plans in both 2012 and 2017 as one of its highest-priority projects for rebuilding Louisiana's wetlands. In January 2017, the Mid-Barataria Sediment Diversion was added to the roster of projects that fall under the Fast-41 Federal Permitting Dashboard, a public platform that tracks agency reviews and permitting for projects of national significance.

Link to Injury

Barataria Bay was among the most heavily and consistently oiled areas during the BP *Deepwater Horizon* oil spill, damaging marshes and wildlife.

Semipalmated Sandpiper

Benefits and Rationale

Because diversions reestablish natural deltaic processes and continuously build land over time, they provide long-term benefits that constructed marsh creation projects alone do not. The 2017 Louisiana Coastal Master Plan projects that land area built or maintained by the diversion, based on Delft-3D modeling analysis, will be approximately 8,000 acres at year 20 and nearly 30,000 acres at year 50. Enhancing wetlands throughout the Barataria Basin would safeguard critical habitat for important birds and other wildlife, resulting in higher biodiversity and productivity. Additionally, these new and sustained wetlands would provide a buffer from storm surge for communities and industry.

2 CHANDELEUR ISLAND RESTORATION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Create, restore, and enhance coastal wetlands	Chandeleur Islands, St. Bernard Parish, Louisiana	$32 million	Undefined

Flagship Species

Brown Pelican, Reddish Egret, Snowy Plover, Piping Plover

Likely Implementing Agency or Partnership

U.S. Fish and Wildlife Service

Project Overview

The Chandeleur Islands are a barrier island complex extending 80 kilometers along the eastern edge of southern Louisiana's coastal zone in the north-central Gulf of Mexico. The barrier complex consists of a system of small to larger (~10-kilometer length) islands that historically have been divided into the northern islands (semi-continuous barrier arc), the southern islands (Curlew, Grand Gosier, and Breton islands), and the western islands (North Harbor and Freemason islands). This project will nourish and restore 140 acres of barrier island habitat in various locations across the island chain.

Link to Injury

The Chandeleur Islands, including its beach- and mangrove-nesting and foraging areas, as well as seagrass beds, were damaged by oiling during the BP *Deepwater Horizon* oil spill.

Snowy Plover

Benefits and Rationale

This restoration project will nourish and stabilize beach-nesting areas, back barrier-island marsh and mangrove habitat, and the largest submerged aquatic vegetation beds found in the north-central Gulf of Mexico. The Chandeleur Islands are renowned for their pristine nesting habitat for a rich diversity and abundance of conservation-priority seabirds and waterbirds, and as important wintering and foraging habitat for endangered species including Piping Plovers and Red Knots. A variety of other shorebirds, waterfowl (particularly one of the largest Redhead populations in the Gulf of Mexico outside of the Laguna Madre), and waterbirds also use this area.

3 QUEEN BESS ISLAND RESTORATION

Restoration Approach

Restore and conserve bird nesting and foraging habitat

Project Location

Queen Bess Island, 3 miles north of the eastern tip of Grand Isle, Louisiana's only inhabited barrier island, Jefferson Parish

Cost Estimate

Engineering and Design: $2.5 million
Total project cost: $17.5 million

Time Frame

Currently in engineering and design, with construction expected to begin in fall 2019

Flagship Species

Brown Pelican, Reddish Egret, American Oystercatcher, Black Skimmer

Likely Implementing Agency or Partnership

Louisiana Department of Wildlife and Fisheries

Project Overview

In the the 1960s and '70s, after the pesticide DDT decimated the population of Brown Pelicans (Louisiana's state bird), breeding pairs of pelicans were brought from the Tampa area to a series of rookery sites along the Louisiana coast to reestablish nesting populations. One of these sites was Queen Bess Island, a small island in Barataria Bay northeast of Grand Isle. Today thousands of pelicans, egrets, herons, terns, gulls, Roseate Spoonbills, ibises, and other birds come to Queen Bess Island each spring to mate and raise their young. Brown Pelicans in particular are extremely site-faithful and return to the same isolated islands, like Queen Bess, each year to breed. Although Brown Pelican populations in Louisiana have more or less recovered to pre-DDT-era numbers, today they nest on only a select few islands, putting them at great risk to hurricanes and oil spills. Queen Bess Island restoration includes 9.2 acres suitable for nesting terns and skimmers and 26.8 acres for colonial nesting waterbirds.

Link to Injury

Located in Barataria Bay, Queen Bess Island was among the areas hardest hit by the BP *Deepwater Horizon* oil spill. Not only were thousands of adult nesting birds oiled during the spill, but most of the young on the island were as well.

Benefits and Rationale

The Queen Bess Island restoration project was recommended for engineering and design dollars from BP in the state's first Natural Resource Damages restoration plan. The island needs increased elevation to create additional nesting areas for terns, skimmers, and colonial nesting waterbirds, including Brown Pelicans; currently only five of the island's 36 acres are suitable for nesting. It is very important that this island and others like it are reinforced, to protect them from eroding into the Gulf of Mexico.

Although Brown Pelican populations in Louisiana have more or less recovered to pre-DDT-era numbers, today they nest on only a select few islands, putting them at great risk to hurricanes and oil spills.

4 FRESHWATER BAYOU NORTH MARSH CREATION

Restoration Approach

Create, restore, and enhance coastal wetlands

Project Location

Freshwater Bayou, Vermilion Parish

Cost Estimate

Engineering and Design: $2.42 million
Construction: $25.5 million

Time Frame

Engineering and design is scheduled to be complete in 2019, with construction beginning as soon as funding is secured. Construction would ideally begin in 2020 and take 1-2 years to complete.

Flagship Species

Clapper Rail, Western Sandpiper, Semipalmated Sandpiper, Least Tern

Likely Implementing Agency or Partnership

Natural Resources Conservation Service, with support from the Coastal Protection and Restoration Authority and Rainey Conservation Alliance landowners, including Audubon Louisiana

Project Overview

The Paul J. Rainey Wildlife Sanctuary is Audubon's oldest and largest sanctuary, and its extensive wetlands and ridges provide refuge to more than 200 species of resident and migratory birds. Hurricanes Rita (2005) and Ike (2008) converted large areas of degraded marsh to open water. In response, through the Rainey Conservation Alliance (RCA) with neighboring landowners who collectively manage 185,000 acres of coastal wetlands, Audubon has helped guide $82 million in restoration funding to benefit the region. Restoring freshwater hydrology is critical for strengthening these marshes, which, when healthy, can maintain elevation through sediment capture and root growth in the face of sea level rise. But converting large areas of damaged marsh and open water into a sustainable marsh platform requires additional decisive action and further funding. This marsh restoration project would rebuild 401 acres closest to Freshwater Bayou, thereby reducing saltwater intrusion and protecting interior wetlands in an area identified as a priority by the 2017 Louisiana Coastal Master Plan.

Link to Injury

Rainey's shoreline and wetlands received oil from the BP *Deepwater Horizon* oil spill, the origin of which was about 200 miles away. Many of the emergent wetland and shoreline species that RCA lands support were affected through direct (oiling) or indirect (habitat loss/degradation) impacts. These wetlands are important nurseries for fisheries that support a variety of waterbirds, and during low water periods exposed mudflats provide rich foraging grounds for migratory shorebirds.

Benefits and Rationale

This project will create 401 acres of new wetland habitat and restore degraded marsh. The marshes around Freshwater Bayou are critical for protecting the interior marshes from saltwater intrusion and future erosion, and provide nesting and foraging habitat for a variety of coastal waterbirds.

Mississippi

The Mississippi Coast is home to a diverse ecosystem of barrier islands, wetlands, coastal forests, and an array of rivers and streams that support the estuarine health of Mississippi Sound. The BP *Deepwater Horizon* oil spill, which choked marshes, oiled beaches, and polluted foraging waters, highlighted the vulnerability of this biologically rich and productive ecosystem. For the state's coastal birds, the consequences of the oil spill were compounded by the extant pressures these species already face: a dearth of data on current populations and composition; loss of habitat and poor water quality due to increased coastal development; coastal erosion; competition for space; human-induced disturbances; predation; and the reduction of prey species. Audubon supports the State of Mississippi's restoration efforts, including acquisition of key habitats, habitat protection, water-quality improvements, and watershed protection. Audubon proposes projects that will leverage Mississippi's restoration efforts through expanded research, restoration planning, improved beach management, and enhancing stewardship programs.

Sandwich Terns

1 ASSESSMENT AND DEVELOPMENT OF BLACK SKIMMER RESTORATION PLAN FOR COASTAL MISSISSIPPI

Restoration Approach	Project Location	Cost Estimate	Time Frame
Identify key sites, monitor, and restore and conserve Black Skimmer nesting and foraging habitat	Coastal Mississippi (mainland shoreline, nearshore and barrier islands)	$1.8 million (Phase One)	3 years (Phase One)

Flagship Species	Likely Implementing Agency or Partnership
Black Skimmer	Audubon Mississippi, Mississippi Department of Marine Resources, National Park Service, Jackson County, Harrison County, Hancock County

Project Overview

Coastal Mississippi supports Black Skimmers throughout the year, with increased numbers in migration and winter. However, little is known about population dynamics and demographics, and the lack of a formal assessment has hindered the creation of a restoration plan for this species. In Phase One of this project, monitoring and banding of Black Skimmers will provide a baseline assessment of local population demographics and will identify important breeding, stopover, and wintering sites for this species. A formal plan covering habitat and species restoration will be developed. At the same time, stewardship actions for any breeding colonies will be undertaken. In Phase Two, we will implement the habitat and species restoration plan created under Phase One.

Link to Injury

Thousands of Black Skimmers were injured during the BP *Deepwater Horizon* oil spill, and more than 1,000 miles of this species' sandy beach habitat across the Gulf was affected by direct oiling or cleanup activities.

Benefits and Rationale

A comprehensive assessment of Black Skimmer population demographics will provide the necessary information for prioritizing sites for restoration, and baseline data from which to measure restoration success. The creation and protection of nesting and foraging habitat will increase productivity of this species.

Black Skimmer

2 MANAGEMENT AND STEWARDSHIP OF FORAGING HABITAT FOR MIGRANT AND WINTERING SHOREBIRDS ON THE MISSISSIPPI COAST

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird foraging and loafing habitat	Mississippi Coast and nearshore islands	$750,000	2 years

Flagship Species

Piping Plover,
Black Skimmer

Likely Implementing Agency or Partnership

Audubon Mississippi, Jackson County Board of Supervisors, Jackson County Sheriff's Department, Harrison County Board of Supervisors, Harrison County Sand Beach Authority, Harrison County Sheriff's Department, Mississippi Department of Marine Resources

Project Overview

This project will increase institutional capacity within county governments and law enforcement agencies to protect critical wildlife habitat by establishing protected wildlife areas along certain regions of coast, and by introducing county ordinances that support these protected areas. Protected wildlife areas will have a reduced raking schedule on beaches in order to limit disturbance and increase food-rich wrack buildup, dune plantings to reduce beach erosion, and placement of signage to increase public awareness and reduce the presence of dogs in sensitive areas. Outreach and stewardship at protected wildlife areas will ensure minimal disturbance to migrant and wintering shorebirds.

Link to Injury

The protection and stewardship of key winter foraging and roosting areas will help increase annual survival rates of priority injured bird species such as Piping Plovers and Black Skimmers.

Piping Plover

Benefits and Rationale

Existing conservation efforts offer limited protections for birds' stopover and wintering grounds, which are critical stages in their annual life cycles that affect population growth. Eliminating seasonal beach raking at sites used by wintering Piping Plovers will improve habitat by increasing the invertebrate prey base and reducing disturbance.

Alabama

Alabama provides critical nesting, stopover, and overwintering habitat to coastal bird species of conservation concern. Previously distributed restoration funds have thus far established the Alabama Coastal Bird Stewardship Program (ALCBSP), acquired lands that were deemed important habitat, and worked to restore other areas, including beaches, dunes, and wetland habitats vital to coastal bird conservation. Audubon will focus on sustaining and expanding the stewardship and monitoring program, led by partner Birmingham Audubon, and will additionally advocate for continued habitat acquisition and restoration.

American Oystercatcher

1 DAUPHIN ISLAND BEACH RESTORATION AND PROTECTION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Dauphin Island, Mobile County, Alabama	$5–10 million	Undefined

Flagship Species

Brown Pelican, Reddish Egret, Piping Plover, Snowy Plover, American Oystercatcher, Red Knot, Western Sandpiper, Semipalmated Sandpiper, Least Tern, Black Skimmer

Likely Implementing Agency or Partnership

Dauphin Island Bird Sanctuaries, Inc., Dauphin Island Park and Beach Board, Alabama Department of Conservation and Natural Resources, The Nature Conservancy, Birmingham Audubon

Project Overview

As Alabama's only barrier island, Dauphin Island hosts important habitats, including beach, dune, intertidal flats and wetlands, maritime forest, and freshwater ponds. The island also provides protection to about one-third of Mississippi Sound, including oyster reefs, marshes, seagrasses, and other estuarine habitats. It is recognized as a globally Important Bird Area because of its significance to resident and migratory birds. The Town of Dauphin Island and its partners will continue to restore beaches, dunes, interdune marshes, and maritime forests. The island faces numerous challenges, such as erosion and human development, resulting in a wide array of protection and restoration needs. To address this, the Dauphin Island Bird Habitat Acquisition and Enhancement Program will acquire and enhance an estimated 13 acres of undeveloped habitat to benefit coastal waterbirds. The project will include sand fencing, dune plantings, signage, stewardship, and, when necessary, additional sand placement.

Link to Injury

This project will increase foraging and nesting habitat area and quality for coastal shorebirds and marsh birds that were impacted by the BP *Deepwater Horizon* oil spill.

Piping Plover

Benefits and Rationale

The project will directly support nesting, stopover, and overwintering activities of breeding and migratory shorebirds, and additionally will improve ecosystem function and foraging opportunities for waterbirds and seabirds that nest on islands in coastal Mobile County, as well as for those that migrate or overwinter on Dauphin Island.

2 RESTORATION AND PROTECTION OF ISLANDS OF MISSISSIPPI SOUND, MOBILE BAY

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Cat Island, Marsh Island, Coffee Island (Isle aux Herbes), Mobile County, Alabama	$15–20 million	Undefined

Flagship Species

Brown Pelican, Reddish Egret, Clapper Rail, Piping Plover, Snowy Plover, American Oystercatcher, Red Knot, Western Sandpiper, Semipalmated Sandpiper, Least Tern, Black Skimmer

Likely Implementing Agency or Partnership

Alabama Department of Conservation and Natural Resources, U.S. Fish and Wildlife Service, The Nature Conservancy, Birmingham Audubon

Project Overview

The marsh islands within Mississippi Sound, Mobile Bay, and other estuaries in Alabama provide critical nesting and foraging habitat for migratory and resident coastal bird species, such as Reddish Egrets, Brown Pelicans, Black Skimmers, American Oystercatchers, Least Terns, and Clapper Rails. Various heron and egret species, including White Ibises, have historically nested on Cat Island within Mississippi Sound. However, erosion and recent hurricane events have degraded these islands. Coastal marsh restoration through the beneficial use of dredge material, vegetation plantings via sprigging, and renourishment will elevate suitable habitat and increase its availability to birds.

Link to Injury

This project will increase foraging and nesting habitat availability and suitability for shorebirds, marsh birds, and especially colonial nesting species that were impacted by the BP *Deepwater Horizon* oil spill.

Benefits and Rationale

These islands have historically provided important nesting habitat for colonial nesting species. Restoring and managing suitable island habitats will be directly beneficial to nesting, stopover, and overwintering activities of coastal bird species of conservation concern.

Least Tern

Florida

Sandy beaches and barrier islands, mangrove islands and spoil islands, sand shoals and tidal flats, inlets and estuaries, salt marshes and nearshore freshwater wetlands provide more than 700 miles of habitat along the Florida Gulf Coast for wading bird and pelican rookeries, as well as breeding habitat for shorebirds and colonial seabirds. A variety of migratory shorebirds stop over on Florida's coast to rest and refuel in spring and fall, while significant populations of Piping Plovers, Red Knots, and American Oystercatchers overwinter on these same habitats. Tar balls polluted Florida Panhandle beaches during the BP *Deepwater Horizon* oil spill, but the cleanup efforts took a larger toll on beach-nesting birds. In the face of an array of challenges that include rising sea levels, habitat loss, harmful algal blooms, and human alterations to the landscape, Audubon Florida is committed to growing the state's population of migratory and resident coastal waterbirds through acquisition, stewardship, restoration, and conservation initiatives.

Reddish Egret

1 CAPE SABLE RESTORATION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Create, restore, and enhance coastal wetlands	Everglades National Park	$5.3 million	1 year for bidding and construction; project is shovel-ready. Construction duration is 5 months.

Flagship Species	Likely Implementing Agency or Partnership
Reddish Egret	U.S. Department of the Interior

Project Overview

Audubon supports a resiliency plan for the Cape Sable region at the southwestern tip of the Florida peninsula, including reestablishment of the Flamingo Embankment, which formerly acted as a natural barrier between the saltwater in Florida Bay and the Gulf of Mexico and the vast freshwater marshes on Cape Sable in Everglades National Park (ENP). Drainage ditches were constructed in the 1930s to allow access to the interior of Cape Sable from Florida Bay and the Gulf of Mexico; these ditches breached the Flamingo Embankment, allowing saltwater intrusion into the historically freshwater wetlands of Cape Sable, with subsequent tidal action further eroding the embankment. In an effort to minimize the damage, ENP constructed dams at breached areas along the Flamingo Ridge, but time and continued erosion have undermined several of these structures, permitting unrestricted tidal flow from the Gulf and the Bay into the Everglades' freshwater marshes. ENP has made great strides in this effort by replacing two failed dams on the East Cape Canal and Homestead Canal between October 2010 and March 2011. However, this accomplishment could be futile if all of the remaining breaches through the ridge are not also addressed. Currently, unrestricted tidal flow through the ridge is occurring at two locations: Raulerson Brothers Canal and East Side Creek. Tidal exchange and the resulting hypersaline conditions of interior wetlands have killed freshwater vegetation that historically served to anchor the organic-rich substrate. With time, severe erosion of the wetland substrate is occurring, with deposition of the eroded material filling in what was formally open-water habitats adjacent to Cape Sable. Audubon proposes to repair the failed dams at Raulerson Canal and possibly East Side Creek, thereby restoring the natural function of the Flamingo Embankment and protecting the unique and vital habitat of the interior marshes.

Link to Injury

The marsh, foraging, and nesting habitat on Cape Sable supports wading birds such as Reddish Egrets, Roseate Spoonbills, herons, egrets, and ibises that were severely affected by oiling and cleanup activities during the BP *Deepwater Horizon* oil spill.

Benefits and Rationale

Restoration of the Flamingo Ridge is essential for increasing the reproductive success and persistence of birdlife in this vast freshwater ecosystem.

2 RICHARD T. PAUL ALAFIA BANK BIRD SANCTUARY BREAKWATERS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Protect and conserve marine, coastal, estuarine, and riparian habitats	Hillsborough Bay, Hillsborough County, Florida	$3.3 million	1-2 years

Flagship Species

American Oystercatcher, Reddish Egret, Brown Pelican

Likely Implementing Agency or Partnership

Audubon Florida, The Mosaic Company, Tampa Port Authority

Project Overview

Powerful tropical weather systems and freighter ship wakes in Tampa Bay continue to erode the unprotected northern shoreline of the Alafia Bank Bird Sanctuary, a state-designated Critical Wildlife Area. Oyster reef balls and wave attenuation devices (WADs), funded primarily by the NFWF, were installed along more than half of the island's shoreline in stages between 2011 and 2014. Audubon Florida has completed the design and obtained permits for installing WADs along the remaining mile of unprotected shoreline.

Link to Injury

Waterbird rookery islands were oiled during the BP *Deepwater Horizon* oil spill, and subsequent clean-up activities disrupted bird nesting. Oiled Brown Pelicans rescued in Louisiana were rehabilitated and released in Tampa Bay, and at least two rescued Louisiana pelicans nest annually on Alafia Bank.

Benefits and Rationale

The Alafia Bank Bird Sanctuary is currently the largest wading bird colony on the west coast of Florida, hosting 5,000 pairs of nesting birds from 16 species, including four state-listed species. The island hosts the largest Roseate Spoonbill colony, at 200 pairs, in Florida, and hosts one of the largest Reddish Egret colonies on the Gulf Coast. Protecting this large waterbird rookery from continued shoreline degradation into the future requires a refuge in Tampa Bay for waterbirds that can no longer nest on other islands degraded by erosion as sea levels rise.

Reddish Egret

3 GULL ISLAND ACQUISITION

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Oyster Bay, Wakulla County, Florida	County-assessed taxable value is $1,000; based on comparable sales, the island will likely cost ~$50,000, but there have been no discussions with the owner to date	1-2 years

Flagship Species

American Oystercatcher, Brown Pelican, Piping Plover, Red Knot, Semipalmated Sandpiper, Western Sandpiper

Likely Implementing Agency or Partnership

Audubon Florida, U.S. Fish and Wildlife Service

Project Overview

Gull Island is a 10-acre, privately owned island along the coast of the Florida Panhandle. The island is within the optimum acquisition boundary for the St. Marks National Wildlife Refuge and would be a strategic asset for the refuge's wildlife management. It is an important nesting and wintering waterbird island, comprised of multiple habitats: salt marsh, upper beach with a mosaic of native grass cover and bare sand, adjacent mudflats, and seagrass beds. Audubon will work with the USFWS and the owners to purchase the island and transfer management authority to the USFWS as part of the refuge.

Link to Injury

Marshes and bird nesting islands comprising the same habitat types were oiled during the BP *Deepwater Horizon* oil spill, and subsequent cleanup activities disrupted bird nesting. The acquisition of similar habitat provides resiliency for nesting and migratory shorebirds across the Gulf of Mexico.

American Oystercatcher

Benefits and Rationale

Low-lying islands to the southeast, along Florida's Big Bend coastline, continue to be lost as sea level rises, eliminating suitable nesting habitat for American Oystercatchers. The acquisition of Gull Island would secure 10 acres of pristine habitat historically used by nesting oystercatchers and ground-nesting Brown Pelicans. The island also provides critical wintering habitat for federally listed Piping Plovers, Red Knots, and other migratory shorebirds.

4 GREATER TAMPA BAY WATERBIRD ROOKERIES PROTECTION INITIATIVE

Restoration Approach	Project Location	Cost Estimate	Time Frame
Protect and conserve marine, coastal, estuarine, and riparian habitats	St. Joseph Sound and Boca Ciega Bay, Pinellas County, and Braden River, Manatee County, Florida	$2.2 million	2-3 years

Flagship Species

American Oystercatcher, Brown Pelican, Reddish Egret

Likely Implementing Agency or Partnership

Audubon Florida, Pinellas County, Florida Department of Environmental Protection, Carlton Arms of Bradenton

Project Overview

Rising sea levels and powerful tropical storms continue to erode shorelines of waterbird rookeries in the Greater Tampa Bay region. At all sites, ongoing erosion is toppling mangroves, palms, and other native vegetation used as nesting substrate. Nearshore breakwaters will be installed around four regionally important rookery islands to intercept wave energy, creating a calm lagoon between the breakwater and shoreline. The lagoon will provide foraging habitat for birds, retain native marsh grasses and mangrove vegetation communities, and protect nesting habitat for colonial waterbirds at historically used island refuges that are typically free of mammalian predators. Similar breakwater installation projects at Alafia Bank Sanctuary and other regional rookeries have been successful at slowing or halting shoreline erosion and will continue to protect nesting waterbirds for decades.

Link to Injury

Waterbird rookery islands on the north Gulf Coast were oiled during the BP *Deepwater Horizon* oil spill, and subsequent cleanup activities disrupted bird nesting. Oiled and rehabilitated Brown Pelicans were released in Tampa Bay, and two have been resighted nesting at Tampa Bay's Alafia Bank Critical Wildlife Area.

Benefits and Rationale

Protecting important waterbird rookery islands from continued shoreline degradation into the future will provide refugia in the Greater Tampa Bay region for waterbirds that must abandon islands degraded by erosion and sea level rise. These sites will add significantly to the network of protected waterbird rookeries throughout the Gulf of Mexico and provide population resilience for focal species.

Brown Pelican

Region-Wide

Birds and other animals do not adhere to the same geopolitical boundaries as people. Species move between and around these man-made boundaries, and restoration and conservation activities should do the same. Region-wide projects cross multiple jurisdictions to address bird injury.

Black Skimmer

1 AUDUBON COASTAL BIRD STEWARDSHIP

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting habitat	Gulf-wide	$15 million/year total across five states; existing funding toward this goal could be used as cost sharing and matching	Coastal nesting bird stewardship is already underway in many areas, and gaps in coverage and protection could be filled immediately in parts of all five states

Flagship Species	Likely Implementing Agency or Partnership
Snowy Plover, American Oystercatcher, Least Tern, Black Skimmer	National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners

Project Overview

Beach-nesting birds across the Gulf of Mexico encounter a wide array of challenges to successful reproduction. Because of this, a multidisciplinary approach is needed, with adaptive flexibility built in to address ever-changing conditions and threats like human disturbance, unbalanced predator populations, habitat loss, sea level rise, and increasingly intense storms. Building on a successful foundation already created by Audubon, a sustained region-wide program includes monitoring for reproductive success and assessment of threats, community engagement and education, habitat and predator management, policy action, and law enforcement training and support. Audubon's vision for beach-nesting bird management includes buy-in from a coalition of federal and state agencies, local municipalities, public and private land managers, and other conservation organizations.

Link to Injury

A variety of beach-nesting bird species were directly affected by the BP *Deepwater Horizon* oil spill, cleanup activities during and after the spill, and subsequent habitat loss.

Snowy Plover

Benefits and Rationale

Nesting colonial waterbirds (terns, skimmers, and wading birds) and solitary nesting species (plovers, sandpipers, and allies) face a range of challenges, but are particularly vulnerable to human disturbance.[23] Addressing predator and human-disturbance threats has improved nesting and breeding productivity, and ultimately population size, in several populations of Piping Plovers. This can serve as an important conservation model for other species and regions. Improving reproductive success in beach-nesting birds across the Gulf Coast by implementing a sustained, coordinated, multidisciplinary approach is needed to reverse population declines by buffering populations against future sea level rise, human disturbance and habitat loss, unbalanced predator populations, and other threats like oil spills.[24]

2 SUSTAINING SURVIVAL OF BEACH-NESTING BIRDS IN THE WAKE OF SEA LEVEL RISE

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Selected geographies within the Gulf of Mexico for building a priority parcel list of climate strongholds	**Phase One:** $500,000 per year for 2 years **Phase Two:** $1.5 million per year for 3 years for staff time and design/construction of small demo projects	3-5 years

Flagship Species	Likely Implementing Agency or Partnership
Least Tern, Black Skimmer, Snowy Plover, American Oystercatcher, Reddish Egret, Brown Pelican, Piping Plover (wintering habitat), Red Knot (wintering habitat)	National Audubon Society and its chapter network, NGO partners, academia

Project Overview

Coastal birds will be greatly affected by sea level rise, as many historic nesting islands and mainland beaches are predicted to disappear. Audubon proposes a two-phased project. The first phase is a two-part comprehensive analysis and modeling exercise. The first phase will identify key nesting sites and assess their characteristics along coasts and islands to better understand their future fate from different sea level rise risk models. The second phase will identify landward habitat that can support beach-nesting birds with modification by land managers. These locations will be prioritized for acquisition, restoration, and land management. Phase Two will implement one or more demonstration projects working to protect, manage, and restore projected future nesting sites to emulate the conditions ideal for coastal nesting birds.

Link to Injury

Coastal birds and their habitat were affected directly and indirectly by the BP *Deepwater Horizon* oil spill. By addressing the threats that are well understood (e.g., erosion, loss of nesting habitat), we can compensate for the less-understood long-term effects of oil spills on the food web and habitats.

Benefits and Rationale

Although we need to protect these species at their nesting sites now, ultimately our attempts to mediate erosion will be overcome by sea level rise. This doesn't make erosion management any less important—it is essential to protect these places while we work to find the future locations that can sustain these species. Although this process would have occurred naturally in an undisturbed system, the built environment in many places is in the way of upslope migration for the habitats upon which these birds depend. Similarly, sea level rise is likely to occur faster than some of these mature habitats (e.g., tree islands) can naturally migrate. As a result, migration of nesting sites is likely to require some human assistance. Identifying the best candidate sites and the timeline upon which they will be needed are the first steps in rendering this assistance.

3 DEVELOPING A DECISION-SUPPORT TOOL INFORMED BY BIRD POPULATION TRENDS RESPONDING TO HISTORIC AND FUTURE LAND COVER AND CLIMATE CHANGE FOR GULF OF MEXICO RESOURCE MANAGERS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	$4.91 million	5-10 years

Flagship Species

Reddish Egret, Piping Plover, Snowy Plover, Red Knot, Least Tern, Black Skimmer, Semipalmated Sandpiper, Western Sandpiper, Brown Pelican, Clapper Rail, American Oystercatcher

Likely Implementing Agency or Partnership

National Audubon Society and its chapter network, NGO partners, academia, state and federal agencies

Project Overview

We will develop a Gulf-wide bird data catalog and a decision-support tool for resource managers, informed by trend modeling and a projection of Gulf bird population trends in response to historic and future land cover and climate change. We will develop a data catalog to compile and enable querying of bird survey data from multiple protocols across the Gulf; document trends for multiple bird species across several guilds; and quantify the role that historic and future climate have on trends in abundance and distribution.

Link to Injury

Coastal birds that use habitats vulnerable to sea level rise were heavily affected by the BP *Deepwater Horizon* oil spill. Recovery of these species will be challenging if we do not take into account the changing environment in the wake of sea level rise.

Clapper Rail

Benefits and Rationale

Developing a central data repository and decision-support tools for resource managers to help project land-use changes, identify priority conservation and restoration areas, and improve restoration and management efforts are essential for conserving species injured by the BP *Deepwater Horizon* oil spill. The ability to predict the effects of marsh transition from sea level rise on coastal marshes, beaches, and surrounding habitats facilitates conservation planning to sustain critical bird habitat and habitat connectivity in ever-changing landscapes. Our primary goal is to empower resource managers and policy makers to make informed conservation and restoration decisions based on knowledge of historic, current, and future distributions of bird species and communities and the processes driving these trends.

4 IDENTIFICATION OF DISTRIBUTION, THREATS, AND RESTORATION NEEDS OF GULF OF MEXICO WADING BIRD ROOKERIES

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	$10 million (Phase One)	3 years (Phase One)

Flagship Species

Reddish Egret

Likely Implementing Agency or Partnership

National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners

Project Overview

Phase One of a regional two-phase project works to identify, protect, and assess the productivity of wading bird species on the Gulf Coast. Breeding wading birds are not regularly monitored across the Gulf, and their status, extent, and conservation needs are largely unknown. Phase One will identify breeding colonies of wading birds, document species' breeding densities on a monthly basis, assess site and regional productivity and connectivity, and identify threats to priority areas. Phase One will conclude with the creation of a management plan that addresses the primary threats identified through research. Phase Two of the project will implement management actions, which may include stewardship, predator control, invasive species removal, or other restoration actions, in order to sustain wading bird populations across the Gulf of Mexico.

Link to Injury

Areas used as rookeries by wading birds, such as the Biloxi Marsh in Louisiana, experienced habitat degradation and disturbance during the BP *Deepwater Horizon* oil spill, resulting in reduced nest counts of breeding birds in 2010.

Benefits and Rationale

A comprehensive assessment of wading bird breeding density and productivity will provide the necessary background information for prioritizing sites for restoration, and the baseline data from which to measure restoration success. The creation and protection of nesting and foraging habitat will increase the productivity of such flagship species as the Reddish Egret.

Reddish Egret

5 COMPREHENSIVE RESEARCH AND CONSERVATION OF BLACK SKIMMERS ACROSS THE GULF COAST

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	**Phase One:** $4.5 million for monitoring and assessment **Phase Two:** $150 million for island and habitat creation and management across the Gulf Coast	**Phase One:** 3 years of monitoring to determine year-to-year variation **Phase Two:** 2 years of habitat creation and or management

Flagship Species	Likely Implementing Agency or Partnership
Black Skimmer	National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners

Project Overview

Audubon and partner organizations across the Gulf will follow a coordinated survey effort in order to assess population size, distribution, and productivity of breeding Black Skimmers. This information will be used to identify areas in need of habitat restoration because of island erosion, or areas in need of management as a result of nest and chick predation or frequent human disturbance. Habitat creation and/or management will be implemented in partnership with site managers in each state, and will focus on areas identified during the research phase of this project.

Link to Injury

Thousands of Black Skimmers were injured during the BP *Deepwater Horizon* oil spill, and more than 1,000 miles of sand beach habitat across the Gulf was injured by direct oiling or cleanup activities.

Black Skimmer

Benefits and Rationale

Black Skimmers have declined by up to 70 percent in coastal areas across the Gulf of Mexico since the 1970s. This species is wide-ranging and experiences regular movement and failure of colonies, making it difficult to assess population status and productivity, or to quantify the effects of threats or conservation actions. A coordinated research effort is needed to identify key threats in different areas, and that data will be used to inform restoration actions that will increase reproductive output.

6 COMPREHENSIVE STUDY OF ISLAND CREATION AND RESTORATION FOR ISLAND-NESTING WATERBIRDS THROUGHOUT THE GULF OF MEXICO

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	$1 million for Gulf-wide comprehensive island study	2 years

Flagship Species	Likely Implementing Agency or Partnership
Brown Pelican, Reddish Egret, Least Tern, Black Skimmer, American Oystercatcher	National Audubon Society and its chapter network, U.S. Army Corps of Engineers, state land agencies, U.S. Fish and Wildlife Service, local port authorities

Project Overview

Gulf islands are critical habitat for many important bird species because they provide stopover habitat for migrating birds and nesting and foraging habitat for beach-nesting and wading birds. However, because of many factors, including sea level rise, coastal erosion, and human disturbance, islands are disappearing in the Gulf of Mexico. Therefore, island creation and restoration is an important component to any plan that will restore bird species and other wildlife that were injured by the BP *Deepwater Horizon* oil spill. A comprehensive Gulf-wide study is needed to identify and prioritize areas for resilient and sustainable island restoration and creation for colonial waterbirds. The National Audubon Society will convene experts to serve on regional technical advisory committees to ensure that local familiarity and knowledge guides the decisions. A contractor will review the most current climate change and relative sea level rise studies, and address the biological needs of this suite of species. This information will then be used to prioritize sites for island creation and restoration across the Gulf.

Link to Injury

This project will provide habitat for Brown Pelicans, Least Terns, Royal Terns, Sandwich Terns, and Black Skimmers, all of which lost thousands of individuals due to the BP *Deepwater Horizon* oil spill. Brown Pelicans were the second-most injured species, with between 12,720 and 27,613 individuals lost.

Benefits and Rationale

Diversifying the nesting habitat of bay systems will help protect the region's waterbird populations against major losses due to disasters like hurricanes or oil spills. With multiple islands available in the system, waterbird nesting areas would be more widely distributed, and a smaller percentage of the population would be affected by a major catastrophe.

7 PROTECTING HIGH MARSH HABITAT FOR SECRETIVE MARSH BIRDS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	**Planning:** $1 million **Land management:** $10 million **Land acquisition:** $100 million	**Field surveys:** 2-3 years starting in Year 1 **Site prioritization for acquisition and management:** 2-5 years **Acquisitions:** 5-10 years

Flagship Species	Likely Implementing Agency or Partnership
Clapper Rail	National Audubon Society and its chapter network, state and federal partners, NGO partners, land trusts

Project Overview

The Gulf Coast hosts an incredible diversity of coastal marsh habitats, with broad expanses of salinity gradients and a variety of geologies driving a rich diversity of plant and wildlife communities adapted to different components of this system. Coastal high salt marsh is one of the most threatened emergent wetland habitats in the region, with two centuries of development and ranching severely reducing its footprint, and with sea level rise quickly inundating what is left. High salt marsh is characterized by periodic and irregular storm surge inundation, allowing for a unique plant community dominated by *Spartina spartinae* and *Borrichia frutescens* in the western Gulf and a varied community composition in the eastern Gulf. These habitats provide critical breeding and wintering habitat for the Endangered Species Act-petitioned Black Rail, and also important winter habitat for Yellow Rails, a species of top conservation priority. A broad partnership is needed to strategically identify, prioritize, and protect remaining habitat through a combination of land acquisition, conservation easements, and improved habitat management.

Link to Injury	Benefits and Rationale
Clapper Rails and Willets are common in this habitat and were injured during the BP *Deepwater Horizon* oil spill, as was salt marsh habitat.	This has been an overlooked micro-habitat type along the Gulf Coast, and as such has not received strategic attention for conservation at scale. High salt marsh, being slightly elevated in the coastal marsh landscape, provides more storm-surge protection than other wetland habitats. Although Black and Yellow Rails were not specifically identified as injured species during the BP *Deepwater Horizon* oil spill, protecting their habitat will benefit other top conservation priority species.

8 IMPROVING SURVIVAL AND FITNESS OF NON-BREEDING SHOREBIRDS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Protect and conserve marine, coastal, estuarine, and riparian habitats	Gulf-wide	$1 million over 3 years	2-3 years

Flagship Species	Likely Implementing Agency or Partnership
Piping Plover	National Audubon Society and its chapter network, state and federal agencies, NGO partners

Project Overview

Shorebirds spend the majority of the year away from breeding areas. The non-breeding time of their annual cycle is essential to their survival and fitness because it affects their ability to return to breeding areas in good condition and breed successfully. Many species of shorebirds along the Gulf of Mexico depend on beaches, islands, tidal flats, and inlets that have high-quality foraging habitat, abundant food, and high-tide resting or roosting areas. Unfortunately, many of these same habitats experience high levels of disturbance from people, pets, beach driving, and other activities. Shorebird conservation plans, recovery plans, and published research highlight the need to protect shorebirds from disturbance at breeding, migration stopover, and overwintering areas. New research shows clearly that wintering Piping Plovers, federally threatened shorebirds that winter along the Gulf Coast, have reduced survival at wintering areas with high levels of disturbance. Audubon will build upon its existing modeling efforts to identify and prioritize critical wintering areas for Piping Plovers, engage partners along the Gulf of Mexico, and lead the protection and/or stewardship of non-breeding Piping Plovers and other shorebirds. We will use Audubon's Coastal Stewardship Toolkit and our extensive network of state offices, chapters, supporters, and partners to do so.

Link to Injury	Benefits and Rationale
Shorebirds along the Gulf of Mexico had incurred significant mortalities following the BP *Deepwater Horizon* oil spill, not only during the summer nesting season but in the non-breeding period that followed. Migratory and winter-resident shorebirds were also exposed to oil and related contaminants through physical contact on beaches, tidal flats, inlets, and marshes, and while foraging contaminated prey.	The Gulf of Mexico is an important migration stopover and wintering area for shorebirds that may breed as far north as the Arctic. It is exceptionally important for the Great Plains breeding population of Piping Plovers, and the Gulf supports individuals from the Atlantic and Great Lakes populations as well. This project will improve the survival and fitness of non-breeding Piping Plovers, Western Sandpipers, and Semipalmated Sandpipers that require coastal areas of the Gulf of Mexico, and help achieve goals outlined in the recovery plans for these species.

9 ESTABLISHING AN AUTOMATED TELEMETRY NETWORK ACROSS THE NORTHERN GULF OF MEXICO

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	$1 million for 3-5 years	3-5 years

Flagship Species	Likely Implementing Agency or Partnership
Red Knot, Least Tern, Black Skimmer, Semipalmated Sandpiper	National Audubon Society and its chapter network, National Park Service, state conservation divisions, NGO partners, universities

Project Overview

The Motus Wildlife Tracking System provides automated detection of birds carrying nanotags that emit uniquely coded radio frequencies. Individually tagged animals can be detected by receiving stations up to 15 kilometers away. This project will form a planning committee and work with partners to identify gaps in current coverage of the Motus network, a collaborative automated telemetry network that is used to study the long-distance movements of migratory birds. The committee will assess the greatest information needs that can be met with the Motus network for birds that use the Gulf of Mexico during at least part of their life cycle. This will be used to plan out the placement of Motus receiving stations, followed by ground-truthing to determine the suitability of proposed areas. Once a plan is in place, towers will be constructed at the selected locations and a long-term maintenance plan will be developed.

Link to Injury

Nanotags can be used to study a wide range of bird species, and current projects in the Gulf include nanotag studies of Least Terns, Black Skimmers, Wilson's Plovers, Red Knots, and Semipalmated Sandpipers. Filling in gaps between stations will provide more precise information not only about large-scale movements, but also localized use of restored and unrestored sites. These and a large number of other migratory shorebird species use the sand beaches, marshes, and mudflats of the Gulf Coast, all of which were affected by direct oiling during the BP *Deepwater Horizon* oil spill.

Benefits and Rationale

Nanotags are among the smallest telemetry tags currently available and allow researchers to track the long-distance movement of species too small for satellite or GPS tags. Filling in gaps in current receiving station coverage is critical to providing complete data on tagged birds passing through the Gulf Coast region, and will benefit ongoing research projects on species such as Black Skimmers, Least Terns, and Red Knots. Data on long-distance movements of birds can be used to link birds migrating through the Gulf to their breeding grounds, and show how restoration efforts in the Gulf benefit these species elsewhere.

10 UNDERSTANDING THE POPULATION DYNAMICS OF SNOWY AND WILSON'S PLOVERS IN THE NORTHERN GULF OF MEXICO

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Gulf-wide	$5 million	5 years

Flagship Species	Likely Implementing Agency or Partnership
Snowy Plover	National Audubon Society, state and federal conservation agencies, NGO partners, university researchers

Project Overview

This is a research-focused project that will fill current gaps in understanding Snowy Plover and Wilson's Plover status and population dynamics in the northern Gulf of Mexico. This project will build upon existing band-resight programs for these species in Texas, Louisiana, Alabama, and Florida by implementing a five-year banding study, which will launch in Mississippi and expand efforts elsewhere. Band resights and breeding productivity estimates from nesting areas will be used to estimate annual adult survival, juvenile survival, and dispersal patterns. The data will be analyzed to determine long-term population viability and to identify regions or habitat types that act as source or sink populations. This will ultimately inform adaptive management strategies where best management practices can be implemented to address factors on the breeding grounds that are limiting population growth.

Link to Injury

Snowy and Wilson's Plovers depend on sand beach and adjacent salt marsh habitat in areas with minimal human disturbance for breeding and foraging. More than 1,000 miles of sand beach habitat across the Gulf was injured by direct oiling or cleanup activities during the BP *Deepwater Horizon* oil spill.

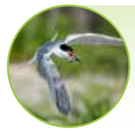
Snowy Plover

Benefits and Rationale

Snowy and Wilson's Plovers face numerous threats along the Gulf Coast, including habitat loss and erosion, sea level rise, and increasing levels of human disturbance. Band-resight studies of these species have been implemented in several states in order to better understand the regional movements and viability of some populations. By addressing gaps in monitoring efforts, this study will fill critical information gaps and will permit a region-wide analysis of population viability and source-sink dynamics across multiple states. A regional population analysis is needed to assess which breeding areas serve as important source populations or are in need of further management to increase productivity.

Open Ocean

The Gulf serves as an important migratory stopover and wintering ground for a wide array of bird species. Many of the birds that were injured during the BP *Deepwater Horizon* oil spill spend only a portion of their life cycle in the Gulf; they typically do not breed within the region or breed there on a very limited basis. Addressing threats to these birds at their primary breeding grounds outside of the Gulf of Mexico can be the most effective means to population recovery. The following projects target bird species that were injured by the BP *Deepwater Horizon* oil spill and primarily breed outside the Gulf. These species are representatives of the larger guilds of which they are a part, face significant threats to their global populations, and are Audubon priority species.

	COMMON NAME	SCIENTIFIC NAME	BREEDING GEOGRAPHY	CONNECTION TO THE GULF
	Audubon's Shearwater	*Puffinus lherminieri*	Atlantic Ocean, Caribbean Sea	Winters in the Gulf of Mexico
	Black Tern	*Chlidonias niger*	Northern United States & southern Canada, inland marshes and Great Lakes coastal marshes	Migrates through the Gulf of Mexico
	Bridled Tern	*Onychoprion anaethetus*	Caribbean islands	Winters in the Gulf of Mexico
	Common Loon	*Gavia immer*	Northern United States & Canada, in Great Lakes region's coastal and inland waters in Minnesota, Michigan, Wisconsin, and Ontario	Winters along the Gulf Coast
	Common Tern	*Sterna hirundo*	Northern United States and southern/central Canada, Great Lakes beaches and islands, Atlantic Coast	Winters on the Gulf Coast in Texas and Florida and migrates along beaches of the Gulf of Mexico
	Least Bittern	*Ixobrychus exilis*	Eastern United States and southern Ontario	Winters on the Gulf Coast in Texas, Mexico, and southern Florida

1 REDUCING INCIDENTAL MORTALITY OF COMMON LOONS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Prevent incidental bird mortality	Minnesota; northern Michigan; northern Wisconsin	$1.5 million	2-3 years

Flagship Species

Common Loon

Likely Implementing Agency or Partnership

National Audubon Society (Great Lakes, Minnesota), Michigan Audubon, Common Coast Research, Lake Superior State University, Minnesota DNR, Michigan DNR, Wisconsin DNR, Northland College, National Park Service, University of Minnesota-Duluth, U.S. Fish and Wildlife Service, USGS National Wildlife Health Center

Project Overview

Lead poisoning via fishing gear has been identified as a significant driver of Common Loon decline across its breeding range in North America. Specifically, this issue occurs most frequently in populated areas where loon breeding grounds and recreational fishing activities overlap, such as within the Great Lakes states. Audubon and partners will address this major threat to Common Loons by launching an advocacy campaign that targets lead contamination in the Great Lakes region. Audubon will work directly with fishing communities and retailers to advocate for safer alternatives to lead fishing gear. Ultimately, we hope this campaign will lead to stricter regulations on lead fishing gear in the Great Lakes region. Coordinated regional Common Loon nest monitoring will be used to assess the outcome of lead reduction while simultaneously collecting local threat data, which collectively will be used to inform adaptive management and additional restoration measures (e.g., platform installation, water control structures).

Link to Injury

An estimated 530 to 812 Common Loons were killed on their wintering grounds as a direct result of the BP *Deepwater Horizon* oil spill. Reducing incidental mortality during the critical breeding period will help restore Great Lakes Common Loon populations that were affected by the oil spill.

Common Loon

Benefits and Rationale

Common Loons serve as important environmental indicators because they are particularly sensitive to habitat degradation and contaminants. Audubon will work to reduce mortality at Common Loon breeding sites and migratory corridors by creating or amending policy to address one of the greatest threats to Great Lakes loon populations: lead fishing gear. Not only is this threat detrimental to loons, but lead contamination also severely affects other native wildlife, our economies, and human health. Because of our regional geography, strong partnerships, and extensive chapter network, Audubon is poised to tackle this important policy issue, making a real difference to conservation.

2 TRACKING AND RESTORING BLACK AND COMMON TERN POPULATIONS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Reestablish coastal breeding colonies	Buffalo, NY; Detroit, MI; Escanaba, MI; Duluth, MN; Green Bay, WI; Saginaw, MI	$2 million	2-3 years

Flagship Species

Black Tern, Common Tern

Likely Implementing Agency or Partnership

National Audubon Society (Great Lakes, Minnesota, New York, Science), Minnesota Department of Natural Resources, University of Minnesota-Duluth, Michigan Audubon, Detroit Audubon Society, Michigan Department of Natural Resources, Wisconsin Department of Natural Resources, University of Wisconsin-Green Bay, Northeast Wisconsin Audubon Society, Buffalo Audubon Society, New York State Department of Environmental Conservation, U.S. Fish and Wildlife Service

Project Overview

Breeding Black and Common Tern populations in the Great Lakes have suffered steep declines in recent decades, and it remains unknown whether the primary drivers of population dynamics occur on breeding or wintering grounds. Using USFWS breeding distribution models, eBird data, and Breeding Bird Atlas data, Audubon and partners will identify and prioritize current and historic breeding sites where Black Terns and Common Terns overlap along Great Lakes coasts. Our team will apply a triple-pronged approach to reestablishing nesting habitat at target coastal wetlands while identifying key threats. Audubon and partners will: 1) install nesting platforms for Black and Common Terns; 2) monitor productivity, survival, and recruitment of breeding pairs in response to management action; and 3) track movements of hatch-year birds to determine location and timing of mortality events, enabling an estimation of fledging success. Project results will inform regional population models while guiding next steps for conserving each species.

Link to Injury

Terns that winter in the Gulf of Mexico but nest elsewhere incurred some of the highest estimated mortalities following the BP *Deepwater Horizon* oil spill. Black and Common Terns migrate through the Gulf of Mexico, and some Common Terns that overwinter there were exposed to oil through physical contact and while foraging on contaminated prey.

Benefits and Rationale

Black and Common Terns are listed as either State Endangered or State Threatened within all eight Great Lakes states. Both species are sensitive to human disturbance and weather events that can extirpate productive colonies. The USFWS Upper Mississippi and Great Lakes Joint Venture has identified the need for coordinated monitoring at high-priority sites for Black and Common Terns to estimate regional population sizes and provide effective adaptive management. Because of our large spatial coverage and established partner relationships, Audubon is especially well positioned to coordinate monitoring, tracking, and adaptive management projects to enhance breeding success and conserve Great Lakes tern colonies.

3 RESTORING WETLANDS FOR MARSH BIRDS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	Buffalo, NY; Detroit, MI; Duluth, MN; Green Bay, WI; Rochester, NY	$4 million	2-3 years

Flagship Species

Least Bittern

Likely Implementing Agency or Partnership

National Audubon Society (New York, Great Lakes, Minnesota, Science), Michigan Department of Natural Resources, Minnesota Department of Natural Resources, Minnesota Land Trust, New York State Parks, Wisconsin Department of Natural Resources

Project Overview

Marsh birds like the Common Gallinule, Least Bittern, Pied-billed Grebe, Sora, and Virginia Rail were injured by the BP *Deepwater Horizon* oil spill and have suffered habitat loss-induced population declines across eastern North America. Native emergent vegetation that supports marsh birds has degraded since the mid-'80s due to altered hydrology and invasive species. Audubon will improve breeding ground conditions, the primary driver of marsh bird declines, to recover and stabilize Great Lakes populations of marsh birds that rely on the Gulf of Mexico through migration and winter. Audubon and partners will improve hydrology, remove invasive species, and plant native vegetation across five of the most critical wetland complexes of the Upper Midwest for breeding marsh birds. While benefiting numerous wildlife species, the restoration of these marshes will also build climate resiliency and provide valuable ecosystem services, including flood control and water purification.

Link to Injury

Great Lakes coastal wetlands provide breeding habitat for at least 13 species that were damaged following the BP *Deepwater Horizon* oil spill while migrating or wintering in the Gulf of Mexico. Several telemetry studies have established direct links between individual Great Lakes' breeding marsh birds and Gulf sites.

Least Bittern

Benefits and Rationale

Audubon will restore 4,500 acres of priority wetlands while strengthening local partnerships to restore, monitor, and sustainably manage these areas as system-wide wetland complexes. In urban areas of the Midwest, more than 50 percent of historical wetlands have been lost to development and agriculture. Many remnant wetlands suffer from altered hydrology, fragmentation, pollution, and invasive species. The loss of high-quality wetlands threatens the sustainability of many wildlife species and significantly reduces the capacity of our lands to absorb and filter water. Restoring Midwest marshes will help recover declining marsh bird populations, increase recreational and sportsmen activities, and improve water quality.

4 RECOVERING DEEPWATER HORIZON-AFFECTED AUDUBON'S SHEARWATER AND BRIDLED TERN POPULATIONS IN THE BAHAMAS

Restoration Approach	Project Location	Cost Estimate	Time Frame
Restore and conserve bird nesting and foraging habitat	The Bahamas, specifically Exuma Land and Sea Park, San Salvador Island, and San Salvador National Park	$6 million	5 years

Flagship Species

Audubon's Shearwater, Bridled Tern

Likely Implementing Agency or Partnership

Audubon's International Alliances Program, the Bahamas National Trust, Island Conservation

Project Overview

The Bahamas' rich fisheries and more than 2,000 islands and cays offer the best opportunity to recover priority seabirds affected by the BP *Deepwater Horizon* oil spill. Moreover, there are great opportunities not only to restore populations, but also to help fill knowledge gaps in the region and build climate resilience for seabird populations and their habitats. Our focus will be on extensive breeding colonies of Audubon's Shearwaters, White-tailed Tropicbirds, and Bridled Terns within existing protected areas that have been identified as critical sites for seabirds by BirdLife International. The focal areas include islands and cays within the Exuma Land and Sea Park, San Salvador Island, and San Salvador National Park. Currently, capacity for seabird conservation and management is extremely limited in the Bahamas. This project would build local capacity, strengthen management and governance at critical sites, eradicate invasive mammals that affect breeding success, and develop biosecurity measures to reduce the reintroduction of invasive species.

Link to Injury

The Bahamas is the major breeding ground for Audubon's Shearwater and other priority seabird species affected by the BP *Deepwater Horizon* oil spill, including Sooty Terns, Bridled Terns, Gull-billed Terns, Brown Noddies, White-tailed Tropicbirds, and Brown Boobies.

Bridled Tern

Benefits and Rationale

This project will improve seabird colony management within the protected area system, remove invasive mammals (mice and rats) and plants (Casuarina), and enhance habitats to support improved breeding success for at least seven colonial waterbird species injured by the BP *Deepwater Horizon* oil spill. Restoration and management efforts will also contribute to Loggerhead, Green, and Hawksbill sea turtle reproduction and benefit other affected bird populations, including Clapper Rails, Piping Plovers, Wilson's Plovers, and Reddish Egrets.

Opportunities for Impact

After years of devastating hurricanes and oil spills that have wreaked havoc on Gulf ecosystems, bird populations, and human communities, there now exists an unprecedented opportunity to help the Gulf recover. The coming years will prove critical to ensure that funding is secured for habitat restoration projects and monitoring and stewardship programs that will strengthen populations of flagship and priority species. Whether by enhancing green infrastructure to better protect communities from storm surge or improving habitat that will in turn benefit ecotourism and recreational opportunities, these efforts will also positively affect the people who live in or visit the Gulf Coast.

Whether you're an employee of a state or federal agency, an elected official, a business, an NGO or community leader, a private landowner, a wildlife manager, a scientist, or an avid birder,

You have an opportunity to strengthen the Gulf for birds and people alike!

Audubon has worked across the Gulf for more than a century, and we have built the experience, the network, and the credibility to help lead one of the biggest conservation efforts in U.S. history. Our wardens patrolled the first national wildlife refuges, which were established in the Gulf to protect vulnerable populations of egrets, herons and other birds that were being hunted to near-extinction. As landowners, land managers, and stewards, we have an authentic voice and local presence in communities from Florida to Texas, and Audubon has a team of staff dedicated to Gulf restoration efforts. We're known and respected from state capitols to the halls of Congress, and our national network empowers us to manage complex projects at scale and mobilize our one million members on behalf of birds.

Please consider making a financial gift in support of the National Audubon Society's restoration and recovery of Gulf birds and our shared ecosystems by visiting *Audubon.org* or contacting Olga Bellido de Luna, Vice President of Development for the Southeast Flyway, the Gulf, and International at *obellidodeluna@audubon.org* or 305-371-6399. The National Audubon Society is a 501(c)(3) accepting gifts of cash, stock transfer, and planned gifts.

MULTIPLE WAYS TO GIVE

Audubon.org
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You can support our efforts by working with our staff to advance the priority projects outlined in this report. **In particular, your support can help us:**

Improve our data-collection and analysis program to better understand and anticipate the needs of birds before the next disaster strikes.

Expand our stewardship work across all Gulf states to ensure birds are recovering and responding well to restoration efforts.

Manage, advise, and advocate for large-scale coastal restoration projects, such as barrier island restoration.

Integrate, align, and advance policy solutions by involving all parts of Audubon—the national policy and science office, four state offices, nature centers, and chapters.

Expand our capacity to address the damage done by the 2017 hurricanes, including habitat restoration, policy engagement, and further assessment of damaged areas.

From Florida to Texas, there are many opportunities to roll up your sleeves and help birds by volunteering. In particular, you can help protect birds on the Gulf Coast during nesting season or participate in a bird survey that will inform science needs. Please contact a member of one of our state offices to get involved!

Conclusion

The Gulf of Mexico, particularly its coastlines, is one of America's great ecological treasures. The region is home to a vast array of bird species and other wildlife, including 11 of Audubon's flagship species of concern and six additional Audubon priority species. These species use the Gulf at some point during their life cycles—for breeding, overwintering, or as a migratory stopover—and Audubon is committed to restoring the Gulf of Mexico by focusing on priority habitats from Texas to Florida.

The challenges facing the wildlife and human communities in the Gulf have been, and will continue to be, significant. For that reason, Audubon's vision for the Gulf is multilayered and involves working over many years to monitor the health of our flagship and priority bird species in the aftermath of the BP *Deepwater Horizon* oil spill. We will continue to develop and support conservation plans that strategically benefit these species and the habitats they need, advocate for the timely implementation of large-scale, science-based coastal restoration and conservation projects, and engage volunteers and communities to protect and steward bird populations across the Gulf.

The projects and programs highlighted in this report are critical for helping the region recover from devastating hurricanes, one of the worst oil spills in U.S. history, and other environmental and man-made disasters. Implementing these priorities will directly benefit the bird species highlighted, while setting the region on a path to long-term environmental health and resilience.

With deep roots and a continued presence in the Gulf, Audubon is committed to working to secure a brighter future for the birds and human communities of this vital region. Please join us in this journey by supporting our efforts.

Snowy Plover

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TABLE OF PRIORITY PROJECTS

	PROJECT NUMBER	LOCATION	STATE/ REGION	COST	FLAGSHIP SPECIES	TIME FRAME	ACRES RESTORED	PARTNERS	SUMMARY OF PROJECT
TEXAS	TX-1	Matagorda Bay	Texas	$820,000	Brown Pelican, Reddish Egret, Least Tern	2 years	85	Audubon Texas, U.S. Army Corps of Engineers	Adding dredged material to Chester Island, an important bird sanctuary, will restore and conserve bird nesting and foraging habitat.
	TX-2	Galveston Bay	Texas	$5–15 million	American Oystercatcher, Black Skimmer, Brown Pelican, Least Tern	1.5–2 years	95	Audubon Texas, Houston Audubon Society, U.S. Army Corps of Engineers, Texas General Land Office, Texas Parks and Wildlife	Due to erosion and subsidence, islands within Galveston Bay have lost significant acreage. Dredge material will increase elevation and prevent overwash of ground-nesting birds in this important bird nesting area.
	TX-3	Matagorda Bay	Texas	$10–40 million	American Oystercatcher, Black Skimmer, Brown Pelican, Least Tern, Reddish Egret	2–3 years	35	Audubon Texas, U.S. Fish and Wildlife Service, Texas Parks and Wildlife, U.S. Army Corps of Engineers, Calhoun Port Authority	Audubon will build new islands where eroded rookeries were once located to create more undisturbed nesting sites in Texas. This will address issues associated with overcrowding while boosting bird population growth.
	TX-4	Lower Laguna Madre	Texas	$5–7 million	Black Skimmer, Reddish Egret, Least Tern	2–3 years	132	Audubon Texas, U.S. Fish and Wildlife Service, Coastal Bend Bays and Estuaries Program	The Laguna Madre is a sequence of important rookery islands for birds, and one of only five hypersaline estuaries in the world. Analysis and restoration of these islands is needed as they are coming under increasing pressure and fragmentation.
	Texas Total			**$20.82–62.82 million**			**347**		
LOUISIANA	LA-1	Plaquemines Parish	Louisiana	$1.3 billion	Brown Pelican, Reddish Egret, Western Sandpiper, Semipalmated Sandpiper	Construction will begin in 2020	30,000	State of Louisiana, National Oceanic and Atmospheric Administration, Department of the Interior, U.S. Army Corps of Engineers	The Mid-Barataria Sediment Diversion will direct sediment, freshwater, and nutrients from the Mississippi River into degrading wetlands to reverse past and mitigate future land loss. This will create 30,000 acres in 50 years and safeguard critical habitat for birds.
	LA-2	St. Bernard Parish	Louisiana	$32 million	Brown Pelican, Reddish Egret, Snowy Plover, Piping Plover	Undefined	140	U.S. Fish and Wildlife Service	The Chandeleur Islands are a barrier island complex that supports a rich diversity and abundance of priority birds. Restoration would renourish and stabilize beach-nesting areas, back barrier island marsh and mangrove habitat, and the largest submerged aquatic vegetation beds found in the north-central Gulf of Mexico.
	LA-3	Grand Isle	Louisiana	$20 million	Brown Pelican, Reddish Egret, American Oystercatcher, Black Skimmer	Construction will begin in 2019	36	Louisiana Department of Wildlife and Fisheries	Once a historic nesting location for thousands of birds, Queen Bess Island has eroded, and only 5 out of 36 acres on the island are suitable for nesting. Restoration would elevate the island to create additional nesting areas.
	LA-4	Vermilion Parish	Louisiana	$27.92 million	Clapper Rail, Western Sandpiper, Semipalmated Sandpiper, Least Tern	1–2 years	401	Natural Resources Conservation Service, Coastal Protection and Restoration Authority, Rainey Conservation Alliance landowners, Audubon Louisiana	Hurricanes Rita and Ike converted large areas of degraded marsh to open water at the Paul J. Rainey Wildlife Sanctuary, which provides refuge for over 200 bird species. This project will rebuild 401 acres by restoring freshwater hydrology that strengthens marshes and maintains elevation through sediment capture and root growth.
	Louisiana Total			**$1.38 billion**			**30,577**		
MISSISSIPPI	MS-1	Coastal Mississippi	Mississippi	$1.8 million	Black Skimmer	3 years	Research	Audubon Mississippi, Mississippi Department of Marine Resources, National Park Service, Jackson County, Harrison County, Hancock County	A comprehensive assessment of Black Skimmer population demographics will provide the necessary background information for prioritizing sites for restoration and the baseline data from which to measure restoration success.
	MS-2	Coastal Mississippi	Mississippi	$750,000	Piping Plover, Black Skimmer	2 years	Stewardship	Audubon Mississippi, Jackson County Board of Supervisors, Jackson County Sheriff's Department, Harrison County Board of Supervisors, Harrison County Sand Beach Authority, Harrison County Sheriff's Department, Mississippi Department of Marine Resources	Introducing and establishing county ordinances, and designating certain regions of the coast as protected wildlife areas, will support critical habitat for migrant and wintering shorebirds.
	Mississippi Total			**$2.55 million**					

TABLE OF PRIORITY PROJECTS

	PROJECT NUMBER	LOCATION	STATE/ REGION	COST	FLAGSHIP SPECIES	TIME FRAME	ACRES RESTORED	PARTNERS	SUMMARY OF PROJECT
ALABAMA	AL-1	Mobile County	Alabama	$5–10 million	Brown Pelican, Reddish Egret, Piping Plover, Snowy Plover, American Oystercatcher, Red Knot, Western Sandpiper, Semipalmated Sandpiper, Least Tern, Black Skimmer	Undefined	13	Dauphin Island Bird Sanctuaries, Inc., Dauphin Island Park and Beach Board, Alabama Department of Conservation and Natural Resources, The Nature Conservancy, Birmingham Audubon	Dauphin Island is a barrier island that provides undisturbed habitat for Alabama's birds and storm protection for nearby ecosystems and communities. This program will acquire and enhance an estimated 13 acres of undeveloped habitat on Dauphin Island.
	AL-2	Mobile County	Alabama	$15–20 million	Brown Pelican, Reddish Egret, Clapper Rail, Piping Plover, Snowy Plover, American Oystercatcher, Red Knot, Western Sandpiper, Semipalmated Sandpiper, Least Tern, Black Skimmer	Undefined	100	Alabama Department of Conservation and Natural Resources, U.S. Fish and Wildlife Service, The Nature Conservancy, Birmingham Audubon	Mobile Bay's marsh islands provide critical nesting and foraging habitat for migratory and resident coastal bird species, but they have deteriorated from erosion and storm events. Renourishment and rehabilitation will restore and elevate suitable bird habitat.
	Alabama Total			**$20-30 million**			**113**		
FLORIDA	FL-1	Everglades National Park	Florida	$5.3 million	Reddish Egret	1–2 years	100,000	U.S. Department of the Interior	Cape Sable's marshes provide foraging and nesting habitat that supports many species of waterbirds. Creating, restoring, and enhancing marshes within this important ecosystem is essential for increasing reproductive success and the persistence of birdlife.
	FL-2	Hillsborough County	Florida	$3.3 million	American Oystercatcher, Reddish Egret, Brown Pelican	1–2 years	640	Audubon Florida, The Mosaic Company, Tampa Port Authority	The Alafia Bank Bird Sanctuary has eroded from extreme weather and ship wakes. Installing wave attenuation devices will help strengthen the coast and reverse degradation, further protecting the rookery for the thousands of birds that nest in and inhabit the sanctuary.
	FL-3	Wakulla County	Florida	$50,000	American Oystercatcher, Brown Pelican, Piping Plover, Red Knot, Semipalmated Sandpiper, Western Sandpiper	1–2 years	10	Audubon Florida, U.S. Fish and Wildlife Service	Gull Island is a privately owned island within optimum acquisition boundary for the St. Marks National Wildlife Refuge and would be a strategic asset for the refuge's wildlife management. Acquisition of Gull Island would secure 10 acres of pristine habitat historically used by nesting and migratory birds.
	FL-4	Pinellas and Manatee counties	Florida	$2.2 million	American Oystercatcher, Brown Pelican, Reddish Egret	2–3 years	7	Audubon Florida, Pinellas County, Florida Department of Environmental Protection, Carlton Arms of Bradenton	Rising sea levels and powerful tropical storms are eroding shorelines of waterbird rookeries in the Greater Tampa Bay region, harming mangroves, palms, and other native vegetation used as nesting substrate. Installing nearshore breakwaters around four rookery islands will intercept wave energy and create a lagoon between the breakwater and shoreline.
	Florida Total			**$10.85 million**			**100,657**		
REGION-WIDE	RW-1	Along the Gulf of Mexico's Coast	Gulf of Mexico	$15 million/year	Snowy Plover, American Oystercatcher, Least Tern, Black Skimmer	Undefined	Stewardship	National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners	Beach-nesting birds across the Gulf of Mexico face many challenges to reproduce successfully, including human disturbance, predators, habitat loss, sea level rise, and extreme weather. This project encompasses a large-scale beach-nesting bird management program that includes monitoring, reducing, and assessing threats, educating communities on beach-nesting stewardship, policy action, and law enforcement training.
	RW-2	Along the Gulf of Mexico's Coast	Gulf of Mexico	$5.5 million	Least Tern, Black Skimmer, Snowy Plover, American Oystercatcher, Reddish Egret, Brown Pelican, Piping Plover, Red Knot	3–5 years	Research	Audubon Florida, state and federal wildlife agencies, land trusts	To address the impacts of sea level rise on nesting islands and mainland beaches, this two-phase project will first identify key nesting sites and assess their characteristics along coasts and islands to better understand their future fate, and then implement demonstration projects working to protect, manage, and restore projected future nesting sites to emulate the conditions ideal for coastal nesting birds.

TABLE OF PRIORITY PROJECTS

	PROJECT NUMBER	LOCATION	STATE/ REGION	COST	FLAGSHIP SPECIES	TIME FRAME	ACRES RESTORED	PARTNERS	SUMMARY OF PROJECT
REGION-WIDE	RW-3	Along the Gulf of Mexico's Coast	Gulf of Mexico	$4.91 million	Least Tern, Black Skimmer, Snowy Plover, American Oystercatcher, Reddish Egret, Brown Pelican, Piping Plover (wintering habitat), Red Knot (wintering habitat)	5-10 years	Research	National Audubon Society and its chapter network, state conservation divisions, NGO partners, universities	Develop a decision-support tool for resource managers informed by trend modeling and the projection of Gulf bird populations in response to historic and future land cover and climate change.
	RW-4	Along the Gulf of Mexico's Coast	Gulf of Mexico	$10 million	Reddish Egret	3 years	Research	National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners	A comprehensive assessment of wading bird breeding density and productivity will provide the necessary background information for prioritizing sites for restoration and the baseline data from which to measure restoration success. The creation and protection of nesting and foraging habitat will increase the productivity of flagship species.
	RW-5	Along the Gulf of Mexico's Coast	Gulf of Mexico	$154 million	Black Skimmer	5 years	Research/ Stewardship	National Audubon Society and its chapter network, state and federal conservation agencies, NGO partners	Phase One of a regional two-phase project works to identify, protect, and assess productivity of wading bird species on the Gulf Coast. Phase Two of the project will implement management actions, which may include stewardship, predator control, invasive species removal, or other restoration actions, in order to sustain wading bird populations across the Gulf of Mexico.
	RW-6	Along the Gulf of Mexico's Coast	Gulf of Mexico	$1 million	Brown Pelican, Reddish Egret, Least Tern, Black Skimmer, American Oystercatcher	2 years	Research	National Audubon Society and its chapter network, U.S. Army Corps of Engineers, state land agencies, U.S. Fish and Wildlife Service, local port authorities	Barrier islands along the Gulf Coast are critical for nesting and migratory birds, but they are disappearing due to erosion and other factors. Island creation and renourishment will support birds, but a comprehensive, Gulf-wide study is needed to initially identify and prioritize areas for restoration.
	RW-7	Along the Gulf of Mexico's Coast	Gulf of Mexico	$111 million	Clapper Rail	9–18 years	Research	National Audubon Society and its chapter network, state and federal partners, NGO partners, land trusts	Coastal high salt marsh, one of the most threatened emergent wetland habitats along the Gulf, is crucial breeding and wintering habitat for birds. A broad partnership is needed to strategically identify, prioritize, and protect remaining habitat through a combination of land acquisition, conservation easements, and improved habitat management.
	RW-8	Along the Gulf of Mexico's Coast	Gulf of Mexico	$1 million	Piping Plover (wintering habitat), Western Sandpiper (wintering habitat), Semipalmated Sandpiper (wintering habitat)	2–3 years	Stewardship	National Audubon Society and its chapter network, state and federal agencies, NGO partners	Audubon will build upon its existing modeling efforts to identify and prioritize critical wintering areas for federally threatened Piping Plovers, engage partners along the Gulf of Mexico, and lead the protection and/or stewardship of non-breeding Piping Plovers and other shorebirds. We will use Audubon's Coastal Stewardship Toolkit and our extensive network of state offices, chapters, supporters, and partners.
	RW-9	Along the Gulf of Mexico's Coast	Gulf of Mexico	$1 million	Red Knot, Least Tern, Black Skimmer, Semipalmated Sandpiper	3–5 years	Research	National Audubon Society and its chapter network, National Park Service, state conservation divisions, NGO partners, universities	The Motus Wildlife Tracking System allows for the detection of individually tagged animals from receiving stations up to 15 kilometers away. This project will form a planning committee and work with partners to build upon existing efforts to strategically identify gaps in current coverage of the Motus network, a collaborative automated telemetry network that is used to study the long-distance movements of migratory birds.
	RW-10	Along the Gulf of Mexico's Coast	Gulf of Mexico	$5 million	Snowy Plover	5 years	Research	National Audubon Society, state and federal conservation agencies, American Bird Conservancy, universities	There are gaps in the understanding of status and population dynamics of Snowy Plovers and Wilson's Plovers in the northern Gulf of Mexico. This project will build upon existing mark-resight programs for these species by implementing a five-year banding study.
Region-Wide Total				**$308.91 million**					

TABLE OF PRIORITY PROJECTS

	PROJECT NUMBER	LOCATION	STATE/ REGION	COST	FLAGSHIP SPECIES	TIME FRAME	ACRES RESTORED	PARTNERS	SUMMARY OF PROJECT
OPEN OCEAN	OO-1	Minnesota, Michigan, Wisconsin	Minnesota, Michigan, Wisconsin	$1.5 million	Common Loon	2–3 years	Stewardship	National Audubon Society (Great Lakes, Minnesota), Michigan Audubon, Common Coast Research, Lake Superior State University, Minnesota Department of Natural Resources, Michigan Department of Natural Resources, Wisconsin Department of Natural Resources, Northland College, National Park Service, University of Minnesota–Duluth, U.S. Fish and Wildlife Service, USGS National Wildlife Health Center	Lead poisoning via fishing gear has been identified as a significant driver behind Common Loon decline across its breeding range in North America. Audubon and partners will address this major threat to Common Loons by launching an advocacy campaign that targets lead contamination in the Great Lakes states.
	OO-2	New York, Michigan, Minnesota, Wisconsin	New York, Michigan, Minnesota, Wisconsin	$2 million	Black Tern, Common Tern	2–3 years	Research	National Audubon Society (Great Lakes, Minnesota, New York, Science), Minnesota Department of Natural Resources, University of Minnesota–Duluth, Michigan Audubon, Detroit Audubon Society, Michigan Department of Natural Resources, Wisconsin Department of Natural Resources, University of Wisconsin–Green Bay, Northeast Wisconsin Audubon Society, Buffalo Audubon Society, New York State Department of Environmental Conservation, U.S. Fish and Wildlife Service	Breeding Black and Common Tern populations in the Great Lakes have suffered steep declines, and it remains unknown whether the primary drivers of population dynamics occur on breeding or wintering grounds. Using existing data, Audubon and partners will identify and prioritize current and historic breeding sites where Black Terns and Common Terns overlap along Great Lakes coasts, which will guide next steps for conserving these species.
	OO-3	New York, Michigan, Minnesota, Wisconsin	New York, Michigan, Minnesota, Wisconsin	$4 million	Least Bittern	2–3 years	4,500	National Audubon Society (New York, Great Lakes, Minnesota, Science), Michigan Department of Natural Resources, Minnesota Department of Natural Resources, Minnesota Land Trust, New York State Parks, Wisconsin Department of Natural Resources	Native emergent vegetation that supports marsh birds has degraded since the mid-'80s due to altered hydrology and invasive species. Audubon and partners will improve hydrology, remove invasive species, and plant native vegetation across five of the most critical wetland complexes of the Upper Midwest for breeding marsh birds.
	OO-4	The Bahamas	The Bahamas	$6 million	Audubon's Shearwater, Bridled Tern	5 years	Stewardship	Audubon's International Alliances Program, the Bahamas National Trust, Island Conservation	Currently, capacity for seabird conservation and management is extremely limited in the Bahamas. This project aims to pioneer restoration efforts of critically important island and cay habitat for seabirds by building local capacity, strengthening management and governance, and eradicating and reducing the reintroduction of invasive species.
Open Ocean Total				**$13.5 million**			**4,500**		
TOTAL				**$1.76–1.81 BILLION**			**136,194**		

Methodology for Habitat Suitability Modeling

To understand the distribution of habitat used by Audubon's 11 flagship species in the Gulf of Mexico, we compiled observational data from standardized surveys across the five Gulf states. With the help of Audubon staff in each state, we referenced data from any survey program conducting standardized and statistically valid monitoring. These programs included local, state, or federal resource management agencies, university monitoring projects, bird conservation partnerships, or NGOs conducting species assessments. We included observational data from eBird collected over the last 10 years (2008-2018) and aggregated and standardized this data for inclusion in the project database. Surveys varied depending on species and purpose. For the flagship species that breed along the Gulf Coast, the analysis used only breeding-specific data to model the spatial allocation to determine species distributions. Breeding data included either counts of breeding adults present, nest counts, or chick counts. Non-breeding data were used for those species that do not breed in the Gulf region. Data included counts of birds present along survey routes or island locations.

To identify high-priority areas for the 11 Gulf flagship species, we built a set of landscape-scale habitat suitability models. Habitat suitability models are built using two sets of data: bird observations gathered in the field by Audubon biologists and partners and habitat conditions measured through remote sensing. Bird occurrence and counts are linked to measures of habitat and environmental conditions in a one-square-kilometer area surrounding the point where the birds were observed. By relating bird counts with habitat conditions, we developed an understanding of how birds respond to their environment and, moreover, were able to use these relationships to predict bird abundance at sites where surveys were not conducted. These models show landscape-level suitability based on habitat conditions within an area of one square kilometer.

However, in some cases, birds require small amounts of certain habitat types on a much smaller spatial scale (e.g., a narrow shoreline or a small patch of shrubs on which to build nests) or require other characteristics that cannot be included in the models due to insufficient data (e.g., predator densities). In these cases, areas that have high landscape suitability will support the species only if the local-scale factors are present or restored. Therefore, areas of high landscape suitability represent locations that could support robust populations of flagship species if the necessary local-scale conditions are present.

We built separate models for each flagship species for up to two seasons: the breeding season (which we defined as April to August) and the non-breeding season (September to March for species that also breed in the Gulf, or all observations for non-breeding species). We filtered eBird records to reduce variability in the data, and produced models using 12 environmental covariates, including proportion land cover (e.g., wetland, shore, agriculture), impervious surface cover (a measure of human impact), distance to coast, distance to the nearest protected area, elevation, and human population density. We estimated the probability of the occurrence and relative abundance of each species in one-square-kilometer (selected due to the spatial scale at which bird surveys were conducted) grid cells across the Gulf. Open water areas were masked out for species that forage on land (e.g., shorebirds, waders), whereas one square kilometer of open water buffering coastal areas was retained for Black Skimmers, and 20 square kilometers of open water was retained for Brown Pelicans and Least Terns. We combined the occurrence and relative abundance models, keeping abundance estimates for one-square-kilometer cells in which occurrence met a minimum threshold determined by comparing predicted with actual occurrence. Relative abundance was scaled to range between 0 and 1 for comparison among species, using a logistic distribution to account for non-normal distributions. We summed these values across the seven breeding and 11 non-breeding species to estimate relative importance for each season as well as for the entire year.

References

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Sources:

1. What Is Blue Carbon? National Ocean Service. National Oceanic and Atmospheric Administration.
2. Mekonen, S. (2017). "Birds as Biodiversity and Environmental Indicator." *Advances in Life Science and Technology* **60,** 16-22.
3. "Birds as Environmental Indicators." *EnvironmentalScience.org.*
4. Deepwater Horizon Natural Resource Damage Assessment Trustees. (2016). Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement.
5. Deepwater Horizon Natural Resource Damage Assessment Trustees. (2016). Deepwater Horizon Oil Spill: Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement.
6. Deepwater Horizon Oil Spill Alabama Trustee Implementation Group. (2018). Draft Restoration Plan II and Environmental Assessment: Restoration of Wetlands, Coastal, and Nearshore Habitats; Habitat Projects on Federally Managed Lands; Nutrient Reduction (Nonpoint Source); Sea Turtles; Marine Mammals; Birds; and Oysters.
7. Haney J.C., Geiger H.J., Short J.W. (2014). Bird mortality from the *Deepwater Horizon* oil spill. I. Exposure probability in the offshore Gulf of Mexico. *Mar Ecol Prog Ser,* 513:225-237. https://doi.org/10.3354/meps10991.
8. Haney J.C., Geiger H.J., Short J.W. (2014). Bird mortality from the *Deepwater Horizon* oil spill. II. Carcass sampling and exposure probability in the coastal Gulf of Mexico. *Mar Ecol Prog Ser,* 513:239-252. https://doi.org/10.3354/meps10839.
9. Haney J.C., Geiger H.J., Short J.W. (2014). Bird mortality from the *Deepwater Horizon* oil spill. II. Carcass sampling and exposure probability in the coastal Gulf of Mexico. *Mar Ecol Prog Ser,* 513:239-252. https://doi.org/10.3354/meps10839.
10. Kossin, J.P. (2018). "A Global Slowdown of Tropical-Cyclone Translation Speed." *Nature* **558,** 104–107.
11. National Climate Assessment (2014). U.S. Global Change Research Program.
12. NOAA National Centers for Environmental Information (2018). U.S. Billion-Dollar Weather and Climate Disasters.
13. Smith, A.B. "2017 U.S. Billion-Dollar Weather and Climate Disasters: A Historic Year in Context." *climate.gov.*
14. National Audubon Society. (2017). "Hurricanes Harvey and Irma Rapid Assessment Report."
15. Baurick, T. (2017). "Tropical Storm Cindy Blamed for Killing Half of the Gulf's Newly Hatched Shorebirds." *Nola.com.*
16. Mcleod, E., et al. (2011). "A Blueprint for Blue Carbon: Toward an Improved Understanding of the Role of Vegetated Coastal Habitats in Sequestering CO2." *Frontiers in Ecology and the Environment*, **9**(10), 552–560. *doi:10.1890/110004*.
17. Gibson, D., et al. (2018). "Impacts of Anthropogenic Disturbance on Body Condition, Survival, and Site Fidelity of Nonbreeding Piping Plovers." *The Condor* **120**(3), 566-580.
18. DeRose-Wilson, A.L., et al. (2018). "Piping Plover Chick Survival Negatively Correlated with Beach Recreation." *Journal of Wildlife Management*. https://doi.org/10.1002/jwmg.21552.
19. Gibson, D., et al. (2018). "Impacts of Anthropogenic Disturbance on Body Condition, Survival, and Site Fidelity of Nonbreeding Piping Plovers." *The Condor* **120**(3), 566-580.
20. National Audubon Society. "Occurrence and Nesting Database for Gulf of Mexico Flagship Species Observations from 2007-2018." (2018). Microsoft access. Prepared by Matthew Love. Version 1.
21. Using the conservative sea level rise estimate of one foot, the lowest level predicted by the U.S. Interagency Sea Level Rise Task Force, which is predicted to occur by 2100 based on continuation of the recent 3 mm/year observed rate of sea level rise (https://science2017.globalchange.gov/chapter/12/), we mapped how sea level rise will potentially impact the areas Audubon currently works in and the areas of highly suitable habitat for the 11 flagship species.
22. Remsen, Jr., J.V., Wallace, B.P., Seymour, M.A., O'Malley, D.A., and Johnson, E.I. In press. The Regional, National, and International Importance of Louisiana's Coastal Avifauna. Wilson Journal of Ornithology.
23. Carney, K.M., and Sydeman, W.J. (1999). "A Review of Human Disturbance Effects on Nesting Colonial Waterbirds." *Waterbirds: The International Journal of Waterbird Biology*, **22**(1), 68–79. www.jstor.org/stable/1521995.
24. Gratto-Trevor, C.L. and Abbott, S. (2011). "Conservation of Piping Plover (*Charadrius melodus*) in North America: Science, Successes, and Challenges." *Canadian Journal of Zoology*, **89**(5), 401-418. https://doi.org/10.1139/z11-024.

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Pg. 1 Least Tern. Photo: Jim Verhagen.

Pg. 2 Reddish Egret. Photo: Tim Timmis.

Pg. 4 Piping Plover. Photo: Melissa Groo/Audubon Photography Awards.
Red Knot. Photo: Gail Deterra.
Brown Pelican. Photo: Linda Conroy.

Pg. 5 Willet and Western Sandpipers.
Photo: Jean Hall/Audubon Photography Awards.

Pg. 6 Least Tern. Photo: Jim Verhagen/Audubon Photography Awards. *(Nesting)*
Least Tern. Photo: Rajan Desai. *(Foraging)*

Pg. 7 Least Tern. Photo: William Dix. *(Migration)*
Least Tern. Photo: Vincent Legrand. *(Wintering Habitat)*

Pg. 8 Photo: Kim Hubbard. *(Oil Spill)*

Pg. 10 Chart: Flow of Deepwater Horizon Settlement Dollars.
Credit: Ocean Conservancy.

Pg. 11 Photo: Zachary West. *(Texas Army National Guard aids in the response effort following Hurricane Harvey)*

Pg. 13 Photo: Giorgio Viera/EFE Alamy Live News.

Pg. 14 Map: Audubon Coastal Stewardship & Monitoring Sites in the Gulf (14-15). Credit: Audubon science staff and Matt Love.

Pg. 16 Roseate Spoonbill. Photo: Dave Allen.

Pg. 18 Black Skimmer. Photo: Lynette Spence.

Pg. 19 Black Tern. Photo: Diana Whiting.

Pg. 21 Tricolored Heron. Photo: Karen Westphal.

Pg. 22 Photo: Mozart DeDeaux. *(Least Terns and decoys on Mississippi beach)*
Least Tern. Photo: Emily Falgoust *(Scientists examine two Least Tern chicks at Holly Beach in Louisiana)*
Least Tern. Photo: Emily Falgoust. *(Scientists examine two Least Tern chicks at Holly Beach in Louisiana)*

Pg. 23 Photo: Melinda Averhart/Audubon Louisiana. *(Scientists and volunteers stroll down Elmer's Island Beach in Louisiana)*

Pg. 24 Least Terns and decoys on a Mississippi Beach. Photo: Mozart DeDeaux.

Pg. 25 Least Tern chick shelters on a beach in Biloxi, MS. Photo: Mozart Dedeaux.

Pg. 26 Least Tern. Photo: Jim Verhagen.

Pg. 27 Chart: Beach-nesting bird sites restoration & conservation flow chart.
Credit: Erik Johnson, Audubon Louisiana, and Tim Meehan, National Audubon Society.
Least Tern feeds chick. Photo: Rajan Desai.
Predator fencing on Elmer's Island in Louisiana. Photo: Melinda Averhart.

Pg. 28 Black Skimmer. Photo: Barbara Bowen.
Snowy Plover. Photo: Kathy Cline.
Clapper Rail. Photo: Katie Barnes.
Red Knot. Photo: Gail Deterra.
Least Tern. Photo: Peter Brannon.
Piping Plover. Photo: Deborah Bifulco.
Brown Pelican. Photo: Brad Lewis.
Western Sandpiper. Photo: Ronan Donovan.
American Oystercatcher. Photo: Sheldon Goldstein.
Semipalmated Sandpiper. Photo: Elise Spata.
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Pg. 31 Maps: Sea Level Rise Threats to Audubon Stewardship Sites (31) Audubon science staff and Nicole Michael.

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Pg. 34 Reddish Egret. Photo: Tim Timmis.

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Pg. 38 Reddish Egret. Photo: David Pugsley.

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Pg. 40 Semipalmated Sandpiper. Photo: Elise Spata.

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Pg. 45 Black Skimmer. Photo: Barbara Bowen. *(left picture)*
Black Skimmer. Photo: Danny Sauvageau. *(right picture)*

Pg. 46 Piping Plover. Photo: Melissa Groo.

Pg. 47 American Oystercatcher. Photo: Nicholas Wetzel/Audubon Photography Awards.

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Pg. 49 Least Tern. Photo: Doug German/Audubon Photography Awards.

Pg. 50 Reddish Egret. Photo: David Moynahan/David Moynahan Photography.

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Pg. 53 American Oystercatcher. Photo: John Heidecker.

Pg. 54 Brown Pelican. Photo: Donald Quintana.

Pg. 55 Black Skimmer. Photo: Lynette Spence.

Pg. 56 Snowy Plover. Photo: Matthew Hansen.

Pg. 57 Reddish Egret. Photo: Apple Bass.

Pg. 58 Black Skimmer. Photo: Deborah Bifulco.

Pg. 63 Snowy Plover. Photo: Kathy Cline.

Pg. 65 Clapper Rail. Photo: Christopher Elliott.

Pg. 66 Audubon's Shearwater. Photo: Dominic Sherony.
Black Tern. Photo: Diana Whiting/Audubon Photography Awards.
Bridled Tern. Photo: Bryan White.
Common Loon. Photo: Glenn Bartley.
Common Tern. Photo: Robert Cook.
Least Bittern. Photo: Hannah Meddaugh/Audubon Photography Awards.

Pg. 67 Common Loon. Photo: Timothy Lenahan/Audubon Photography Awards.

Pg. 69 Least Bittern. Photo: Paul Ayick.

Pg. 70 Bridled Tern. Photo: Bryan White.

Pg. 71 Photo: Tim Mueller, Baton Rouge Business Report. *(Audubon Louisiana Avian Biologist Katie Percy demonstrates Prothonotary Warbler program to youth)*

Pg. 72 Photo: Amanda Odom. *(Scientists observe birds through binoculars in Mississippi)*

Pg. 73 Photo: Amanda Odom. *(Audubon employee sits at informational booth at Biloxi Beach in Mississippi)*
Photo: Mary Cowan. *(Young volunteer puts up sign to indicate nesting sites in Mississippi)*
Photo: Mary Cowan. *(Volunteers finish planting a nesting site sign in Mississippi)*

Pg. 75 Photo: Alexander Fink. *(Mudflat)*

Pg. 76 Snowy Plover. Photo: Vivek Khanzode.

Pg. 86 Paul J. Rainey Wildlife Sanctuary in Louisiana. Photo: Karen Westphal.

Pg. 91 Least Tern chicks nest on a rooftop in Jackson County, Mississippi. Photo: Melinda Averhart

Pg. 92 Western Sandpiper. Photo: Tom Ingram.

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