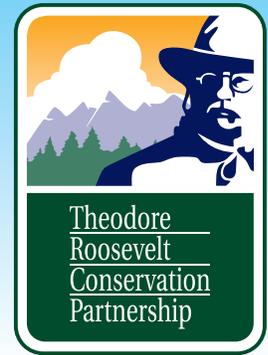


Gulf of Mexico Recreational Fisheries:

Priority Projects for Restoration, Recovery and Sustainability



Introduction

Almost five years ago, the Deepwater Horizon oil spill devastated the Gulf of Mexico, significantly impacting natural resources, local communities, coastal economies and the region's world-renowned fisheries. In the wake of the disaster, the Theodore Roosevelt Conservation Partnership began working with recreational anglers, charter captains and guides, business owners, fisheries managers, habitat conservation organizations and elected and appointed officials across the Gulf region. Our goal was to identify and prioritize projects and initiatives in the five Gulf States to help Gulf recreational fishing recover from the 2010 spill – and ensure the long-term health of the region's vital fisheries and fishing communities.

Working closely with partner organizations the American Sportfishing Association, Center for Coastal Conservation, Coastal Conservation Association and The Nature Conservancy, the TRCP convened workshops in all of the Gulf States during the spring of 2013 to identify overarching restoration priorities for recreational fishermen in the Gulf. The information from those workshops provided the basis for the report released in October 2013, "Gulf of Mexico Recreational Fisheries: Recommendations for Restoration, Recovery and Sustainability." The projects and initiatives in the report fall into three broad categories:

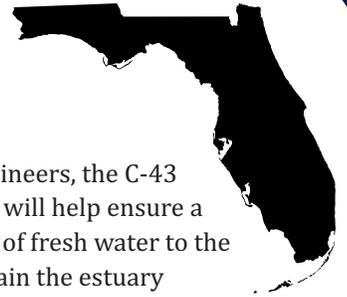
- **Habitat restoration and improvement**
- **Improved fishery monitoring, data collection, research and management**
- **Recreational fishing business impacts and restoration of angler interest, confidence and access**

Using the recommendations in the report as a guide, the TRCP continued to work extensively with anglers, organizations and government agencies throughout the Gulf to identify specific projects in each of the Gulf States that would help achieve the broader goals listed in the report. The projects recommended represent a wide range of habitat restoration efforts, improvements in fisheries data and science and in improving access for anglers to quality fishing opportunities.

The TRCP will work with state and federal officials and our partner organizations to advance these projects, initiatives and other similar efforts toward construction and implementation as oil spill recovery dollars continue to be appropriated and distributed to the Gulf States.

Recreational fishing is an intrinsic part of the Gulf of Mexico's culture and economy. Investing in the ecosystems, communities and facilities that encourage and sustain angling in the Gulf is an investment in a secure future for the region's economy and quality of life.

Florida



The Pensacola East Bay Oyster Reef Project

Project Estimate: \$4.175 million

The Pensacola East Bay Oyster Reef Project will take a comprehensive, science-based approach to restoration that includes pre-restoration monitoring, project design and permitting, implementation of restoration activities, and post-restoration monitoring. The selected methodology(s) will use the most appropriate natural substrate for oyster larvae to settle and colonize, ultimately serving as nursery habitat for commercially and recreationally important finfish and shellfish, providing forage areas for birds, and dampening wave energy to stabilize shorelines.

The proposed project will be Phase I of the total project and will result in the creation of two of the eight (total) miles of non-contiguous oyster habitat and restoration of salt marsh behind the breakwater. The goal of all the phases of the project is to implement and monitor a large-scale, scientifically based project. Implementation will promote settlement and colonization of oyster larvae and other encrusting organisms and the formation of a healthy, functioning oyster reef habitat. The marsh restoration component will increase finfish and forage nursery grounds as well as habitat for a variety of wading birds and other wildlife.

The Caloosahatchee River West Basin Storage Reservoir (C-43)

Project Estimate: According to the Corps of Engineers, the Corps and the South Florida Water Management District will share equally in the cost of the project, estimated to be \$584.6 million.

Coastal bays at the mouth of the Caloosahatchee River are being impaired by poor water quality due to unnatural pulses of storm water from the Lake Okeechobee basin during rainy periods and restrictions of freshwater during dry seasons. These wide fluctuations of freshwater supplies have had detrimental impacts on a variety of vital fish habitats including sea grass beds and oyster reefs. They also have caused increased nutrient levels, resulting in poor water quality.

According to the Corps of Engineers, the C-43 West Basin Storage Reservoir will help ensure a more natural, consistent flow of fresh water to the estuary. To restore and maintain the estuary during the dry season, the project will capture and store basin storm water runoff, along with a portion of water discharged from Lake Okeechobee, and water will be slowly released into the Caloosahatchee, as needed.

The project will consist of a 10,500-acre storage reservoir, pumps to fill the reservoir and system of canals to convey runoff and a recreational component. The project has received congressional authorization in the 2014 Water Resources Reform and Development Act (WRRDA) and is eligible for appropriations.

Florida-Gulf Coast Angler-engaged Fish Tagging Program

Project Estimate: \$10 million

Fish tagging programs can help fisheries scientists and managers track migration patterns, evaluate catch and harvest rates and determine health of fish stocks. With millions of anglers on the water annually across the Gulf, state fisheries management agencies have the opportunity to engage and utilize anglers to help tag fish and report the information when the fish are recaptured. Many states have employed angler-assisted tagging programs for legacy tagging programs as well as telemetry tagging efforts, in which anglers catch the fish and bring them alive to scientists who insert the tags. The telemetry tags then are tracked by a series of buoys within a basin to monitor fish movements.



Photo Credit: CCA Louisiana

A comprehensive angler-engaged tagging program, including education; distribution of tagging kits; deployment and maintenance of buoys to track telemetry tags; catch-and-release tournaments conducted for the purpose of tagging fish; and long-term data analysis, monitoring and maintenance, can help scientists and fisheries managers gather valuable data. This data should be shared with other Gulf states through a coordinated effort to establish a Gulf-wide network of acoustic buoys. This network will monitor migratory patterns and areas of heavy use for recreationally vital species, facilitate a better understanding of seasonal migration patterns, and help states coordinate the setting of season dates.

Reef Fish Barotrauma Reduction Education and Outreach Program **Project Estimate: \$4 million**

Reef fish such as snapper, grouper, amberjack and sometimes redfish, caught in waters deeper than 30 feet, can suffer from barotrauma, a buildup of gasses in the fish's swim bladder that can cause internal organs to be displaced and eyes to bulge from the fish's head. Recreational fishermen are practicing catch and release increasingly across the Gulf of Mexico. Restrictive seasons, creel limits and size limits are forcing the release of many reef fish and untargeted species caught out of season.

Barotrauma reduction devices, which allow the fish to be returned back to the depth from which it was caught without puncturing the skin or swim bladder, have been used successfully to increase survival of caught-and-released reef fish in other parts of the United States as well as other countries. The use of these devices is not widespread by anglers and charter operators in the Gulf of Mexico, but they can be a useful tool in reducing by-catch mortality of reef fish, allowing selective harvest and potentially increasing overall access in the recreational fishery.

This education and outreach program should be conducted by the Florida Fish and Wildlife Conservation Commission and Florida Fish and Wildlife Research Institute and coordinated with other appropriate state agencies and research institutions. Elements of outreach should include working with conservation organizations such as FishSmart, Coastal Conservation Association, Snook & Gamefish Foundation, International Gamefish

Association and others to engage the recreational fishing industry and community and the charter boat community through workshops, printed materials and videos demonstrating the use of barotrauma reduction devices on Gulf reef fish. The program also should include distribution of devices at reduced or no cost.

Florida Boater Sea Grass Education and Outreach Program **Project Estimate: \$6 million**

Sea grass beds play an essential role in Gulf coastal estuaries and bay systems by providing habitat for numerous finfishes and crustaceans, helping dampen wave activity and improving water clarity and quality. Sea grass beds along Florida's Gulf Coast and throughout the entire Gulf have been negatively affected by water pollution and excess sediment entering coastal estuaries. In isolated locations, sea grass beds also have been damaged by propellers and otherwise impacted by boating and fishing activity.

The recreational boating and fishing industry is trying to take proactive steps, working with state and federal agencies to reduce negative impacts to sea grasses from fishing and boating. An education and outreach effort that employs updated satellite imagery maps and other distribution materials, made available at no charge to boaters at popular marinas, can help expand awareness and avoidance of ecologically sensitive and shallow-water areas. Also, state and federal agencies should dedicate funding to working with the recreational fishing industry and the marine electronics industry to develop satellite imagery maps that identify sea grass beds and deep-water passages along the Florida Gulf Coast that can be loaded into GPS units to help boaters and fishermen identify sensitive areas on their marine electronics.

Alabama

Pointe aux Pines Restoration Project Estimate: \$4.5 million

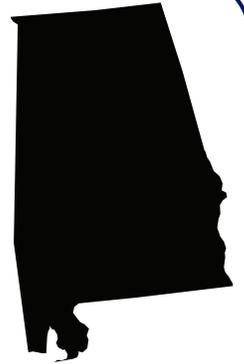
Alabama's coastal waters historically contained some of the most productive salt marshes, sea grass beds and oyster reefs along the northern Gulf Coast. However, coastal and submerged resources of Mississippi Sound have been significantly impacted by development, storm water runoff, altered hydrology, erosion and fisheries-related impacts.

Intertidal oyster reef restoration around Point aux Pines will benefit adjacent sea grass beds, coastal marshes and tidal creeks. All of these habitats are essential for finfish and shellfish, shorebirds and coastal birds and marine turtles. Habitats and water quality will be enhanced through decreased erosion and providing food, shelter and forage habitat for the resident fish and wildlife.

This project involves the restoration, enhancement and protection of an estimated 2.2 miles of shoreline, using living shoreline and reef breakwater techniques. Approximately 1.5 miles of reef will be constructed to help reduce shoreline erosion and provide for the potential reestablishment of emergent marsh. In addition to providing substrate for oyster larvae, the reefs are anticipated to provide shoreline benefits by reducing wave energy, enhancing local water quality and improving fisheries. The project will include pre- and post-construction monitoring during the project period.



Near-shore Reef Monitoring, Restoration and Enhancement Program Project Estimate: \$20 million



The Alabama Department of Conservation and Natural Resources, Marine Resources Division, has worked with recreational fishing and conservation groups to build 30 reefs in Mobile Bay and Bon Secour Bay using a variety of materials, including reefing structures, bridge rubble, limestone and recycled oyster shells. Many of these reefs have been constructed on sites of historic oyster reefs that have become less productive over the last several decades due to changes in salinity and sediment loading in the bay. Changes in water and sediment movement due to dredging of the Mobile Ship Channel, increased agricultural runoff, and tropical storms and hurricanes limited the productivity of natural reefs, making their enhancement and the construction of additional reefs necessary for quality oyster and finfish habitat. Reef construction and enhancement has increased productivity and angler access to popular species like speckled trout, redfish, black drum, sheepshead and flounder.

This project would provide the funds needed to add elevation and expand reefs that have become covered by sediment or otherwise damaged by hurricanes or oyster harvest. It also would allow for long-term monitoring of the efficacy of the existing reefs to determine which ones are more productive and how that productivity can be duplicated through additional reef construction in similar areas.



Photo Credit: The Nature Conservancy

Reef Fish Barotrauma Reduction Education and Outreach Program

Project Estimate: \$3 million

Reef fish such as snapper, grouper, amberjack and sometimes redfish, caught in waters deeper than 30 feet, can suffer from barotrauma, a buildup of gasses in the fish's swim bladder that can cause internal organs to be displaced and eyes to bulge from the fish's head. Recreational fishermen are practicing catch and release increasingly across the Gulf of Mexico. Restrictive seasons, creel limits and size limits are forcing the release of many reef fish and untargeted species caught out of season.

Barotrauma reduction devices, which allow the fish to be returned back to the depth from which it was caught without puncturing the skin or swim bladder, have been used successfully to increase survival of caught-and-released reef fish in other parts of the United States as well as other countries. The use of these devices is not widespread by anglers and charter operators in the Gulf of Mexico, but they can be a useful tool in reducing by-catch mortality of reef fish, allowing selective harvest and potentially increasing overall access in the recreational fishery.

This education and outreach program should be conducted by the Marine Resources Division and coordinated with other appropriate state agencies and research institutions. Elements of outreach should include working with conservation organizations such as FishSmart, Coastal Conservation Association and others to engage the recreational fishing industry and community and charter boat captains through workshops, printed materials and videos demonstrating the use of barotrauma reduction devices on Gulf reef fish. The program also should include distribution of devices at reduced or no cost.

Alabama Angler-Engaged Tagging Program

Project Estimate: \$5 million

Fish tagging programs can help fisheries scientists and managers track migration patterns, evaluate catch and harvest rates and determine health of fish stocks. With millions of anglers on the water annually across the Gulf, state fisheries management agencies have the opportunity to engage and utilize anglers to help tag fish

and report the information when the fish are recaptured. Many states have employed angler-assisted tagging programs for legacy tagging programs as well as telemetry tagging efforts, in which anglers catch the fish and bring them alive to scientists who insert the tags. The telemetry tags then are tracked by a series of buoys within a basin to monitor fish movements.

A comprehensive angler-engaged tagging program, including education; distribution of tagging kits; deployment and maintenance of buoys to track telemetry tags; catch-and-release tournaments conducted for the purpose of tagging fish; and long-term data analysis, monitoring and maintenance, can help scientists and fisheries managers gather valuable data. This data should be shared with other Gulf states through a coordinated effort to establish a Gulf-wide network of acoustic buoys. This network will monitor migratory patterns and areas of heavy use for recreationally vital species, facilitate a better understanding of seasonal migration patterns, and help states coordinate the setting of season dates.

Coffee Island Enhancement through Beneficial Use of Dredged Materials

Project Estimate: \$5 million

Coffee Island is a small landmass in Mississippi Sound located south of Fort Morgan that provides habitat for a variety of recreationally popular finfish such as speckled trout, redfish, flounder and black drum, as well as forage fish like shrimp, crabs and mullet. In the last decade, the island has been fortified by the construction of oyster reefs and the installation of reef balls and other reefing materials to attempt to dampen wave action and reduce erosion, especially from strong south and southeast winds. It is estimated that the island's shoreline has retreated as much as 90 feet per year over the last decade alone.

This project would place dredged materials taken from maintenance dredging of the Mobile Ship Channel and place them on the island's remaining landmass to encourage marsh growth and expansion of the island inside the oyster reef and other breakwaters. The funding also would include monitoring of the effort to determine benefits to fish and other wildlife and an examination of additional beneficial use opportunities on similar coastal islands in Alabama.

Mississippi

125-Acre Sub-tidal Oyster Reef Restoration: “Mississippi Sound Oyster Fishery Enhancement and Habitat Initiative”

Project Estimate: \$3 million

Mississippi’s coastal bays have historically held several thousand acres of oyster reef that foster important fisheries habitat, improve water quality, dampen wave activity and provide a harvestable food source. Over the last century, unsustainable fishing practices, shell extraction, water quality degradation and incompatible land use practices on the nearby mainland have led to a loss of these benefits and significant declines in the oyster harvest.

In recent decades, the Mississippi Department of Marine Resources has successfully managed a sustainable commercial oyster harvest. Although this represents an important success, commercially harvested oyster reefs do not maintain the same level of biomass that a large and complex unharvested three-dimensional reef structure holds. Mississippi currently retains only 8 percent of the oyster reef biomass that was historically present in the state. This biomass directly affects the amount of habitat available for fish, the capacity of the oyster reef to filter water and the effectiveness of wave attenuation and sediment sequestration.

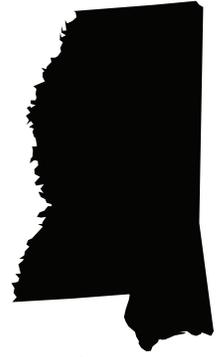
Long-term project benefits include enhanced habitat for important commercial and recreation species (fish, shrimp and crabs), and improved prospects for recreational and commercial fisheries. While these oyster beds will be located in waters closed to harvest, they will provide brood stock for nearby harvestable reefs and refuge and forage habitat for migratory finfish species of recreational and commercial importance. Additionally, this project aims to improve coastal water quality by placement of reefs to increase the overall filtering capacity of the Mississippi Sound.

East Mississippi Artificial and Oyster Reef Expansion and Enhancement

Project Estimate: \$6 million

Oyster reef habitat has been diminished across the Gulf of Mexico over the last century due to overharvest of oysters for commercial sale as well as harvest of oyster shells and substrate. Recreational fishermen in Mississippi have identified bays in eastern Mississippi as

places that are lacking in both natural and artificial reefs, which promote oyster production and support and provide habitat for recreationally important fish species.



This project would construct 30 or more total acres of reef structures in the Pointe Aux Chenes Bay Basin in eastern Mississippi’s coastal waters. First, suitable locations would be identified where salinity levels are likely to promote expansion of the reef through oyster production. The reefs would be constructed of limestone, recycled oyster shells and other materials such as crushed concrete to help promote attachment of spat oysters. The reef structures would be built with three feet of bottom relief to help promote attraction of finfish and help make reefs more resistant to damage from tropical storms and siltation.



Photo Credit: The Nature Conservancy

Reef Fish Barotrauma Reduction Education and Outreach Program

Project Estimate: \$1 million

Reef fish such as snapper, grouper, amberjack and sometimes redfish, caught in waters deeper than 30 feet, can suffer from barotrauma, a buildup of gasses in the fish’s swim bladder that can cause internal organs to be displaced and eyes to bulge from the fish’s head. Recreational fishermen are practicing catch and release increasingly across the Gulf of Mexico. Restrictive seasons, creel limits and size limits are forcing the release of many reef fish and untargeted species caught out of season.

Barotrauma reduction devices, which allow the fish to be returned back to the depth from which it was caught without puncturing the skin or swim bladder, have been

used successfully to increase survival of caught-and-released reef fish in other parts of the United States as well as other countries. The use of these devices is not widespread by anglers and charter operators in the Gulf of Mexico, but they can be a useful tool in reducing by-catch mortality of reef fish, allowing selective harvest and potentially increasing overall access in the recreational fishery.

This education and outreach program should be conducted by the Mississippi Department of Marine Resources and coordinated with other appropriate state agencies and research institutions. Elements of outreach should include working with conservation organizations such as FishSmart, Coastal Conservation Association and others to engage the recreational fishing industry and community and charter boat captains through workshops, printed materials and videos demonstrating the use of barotrauma reduction devices on Gulf reef fish. The program also should include distribution of devices at reduced or no cost.

Mississippi Coastal Angler-engaged Fish Tagging Program **Project Estimate: \$4 million**

Fish tagging programs can help fisheries scientists and managers track migration patterns, evaluate catch and harvest rates and determine health of fish stocks. With millions of anglers on the water annually across the Gulf, state fisheries management agencies have the opportunity to engage and utilize anglers to help tag fish and report the information when the fish are recaptured. Many states have employed angler-assisted tagging programs for legacy tagging programs as well as telemetry tagging efforts, in which anglers catch the fish and bring them alive to scientists who insert the tags. The telemetry tags then are tracked by a series of buoys within a basin to monitor fish movements.

A comprehensive angler-engaged tagging program, including education; distribution of tagging kits; deployment and maintenance of buoys to track telemetry tags; catch-and-release tournaments conducted for the purpose of tagging fish; and long-term data analysis, monitoring and maintenance, can help scientists and fisheries managers gather valuable data. This data should be collected and analyzed by the Mississippi Department of Marine Resources and Gulf Coast Research Laboratory and shared with other Gulf states through a coordinated effort to establish a Gulf-wide network of acoustic buoys. This network will monitor migratory patterns and areas of heavy use for recreationally vital species, facilitate a better

understanding of seasonal migration patterns, and help states coordinate the setting of season dates.

Offshore Artificial Reef Creation, Monitoring and Rehabilitation Program **Project Estimate: \$25 million**

Artificial reef development is used to create new habitat for mitigation and restoration, promote recreational uses such as diving and fishing, and is often a key management tool for fisheries managers to increase fisheries production. Artificial structures have the potential to positively affect fish populations by forming the base of the food web and providing structured habitat for a host of reef fish. However, the amount of enhancement compared to natural reef habitat remains largely unknown. In addition, information to guide best management practices for reef construction and placement is lacking. This gap in essential data hinders the management and stock assessment of several important reef fish species, and data on the role of artificial structures is essential to this process.

Mississippi recreational fishing groups have been successful in securing materials suitable for construction of productive reefs that can increase fisheries habitat as well as access for anglers. However, funds have historically been unavailable for monitoring and maintenance of existing reefs and for deployment of new reef materials. The offshore artificial reef creation, monitoring and rehabilitation program would provide the funds needed to monitor and enhance existing reefs as well as identify additional locations for reef construction in areas most suitable for reef habitat and where fisheries production can be maximized.

Louisiana

Interior Island Restoration Program: Barataria and Timbalier Basins Project Estimate: \$60 million

Southeast Louisiana's coastal bays and lakes contain a host of smaller islands located north of the barrier island systems that separate the interior bays from the Gulf of Mexico. These smaller islands, remnants of historic bayou banks and ridges made by sediment deposits from the Mississippi River, are generally 20-200 acres in size and are composed of marsh grasses, oyster and other shells, mud, sand and black mangroves. They play a vital role in coastal estuaries by dampening wave action, reducing suspended sediments and providing habitat for finfish and crustaceans. These islands are also important nesting habitat for pelicans and other coastal birds.

Many of the islands in the Barataria and Timbalier basins were heavily oiled during the 2010 Deepwater Horizon spill, exacerbating existing erosion and subsidence problems and causing the islands to sink and disappear. The loss of these interior islands reduces the productivity of coastal estuaries as well as opportunity for recreational fishermen. Restoration techniques will include the use of dredged materials to re-establish island footprints and innovative living shoreline oyster reefs to protect restored shorelines and trap suspended sediments. Interior Islands should be restored in conjunction with adjacent barrier island restoration projects to take advantage of already-deployed equipment and manpower, reducing project costs.

Islands to be restored and protected include Cat Island, Beauregard Island, Mendicant Island, Dutch Island and "Chinatown Cut" Island in Barataria Bay. Target areas in Timbalier Bay include Casse Tete Island, Calumet Island, Philo Brice Island and Brush Island.



Photo Credit: Louisiana Coastal Protection and Restoration Authority



Reef Fish Barotrauma Reduction Education and Outreach Program Project Estimate: \$1 million

Reef fish such as snapper, grouper, amberjack and sometimes redfish, caught in waters deeper than 30 feet, can suffer from barotrauma, a buildup of gasses in the fish's swim bladder that can cause internal organs to be displaced and eyes to bulge from the fish's head. Recreational fishermen are practicing catch and release increasingly across the Gulf of Mexico. Restrictive seasons, creel limits and size limits are forcing the release of many reef fish and untargeted species caught out of season.

Barotrauma reduction devices, which allow the fish to be returned back to the depth from which it was caught without puncturing the skin or swim bladder, have been used successfully to increase survival of caught-and-released reef fish in other parts of the United States as well as other countries. The use of these devices is not widespread by anglers and charter operators in the Gulf of Mexico, but they can be a useful tool in reducing by-catch mortality of reef fish, allowing selective harvest and potentially increasing overall access in the recreational fishery.

This education and outreach program should be conducted by the Louisiana Department of Wildlife and Fisheries and coordinated with other appropriate state agencies and research institutions. Elements of outreach should include working with conservation organizations such as FishSmart, Coastal Conservation Association and others to engage the recreational fishing industry and community and the Louisiana Charterboat Association through workshops, printed materials and videos demonstrating the use of barotrauma reduction devices on Gulf reef fish. The program also should include distribution of devices at reduced or no cost.

Restoration of East Timbalier Island Project Estimate: \$65 million

East Timbalier Island is a part of the barrier island chain, including Timbalier Island and Wine Island that separate the Timbalier and Terrebonne basins from the Gulf of Mexico. East Timbalier is one of Louisiana's most

popular recreational fishing destinations, attracting anglers from ports in Terrebonne, Lafourche and Jefferson parishes. Unfortunately, like many other Louisiana barrier islands, East Timbalier has been severely eroded. It has subsided over the last century, with beaches retreating as much as 70 feet or more every year over the last 100 years. The loss of the island has made marshes and islands in Timbalier Bay more vulnerable to wave action and tropical storms, reduced recreational fishing opportunity and increased the threat to Port Fourchon, Leeville and the lower Highway 1 corridor, all of vital importance to coastal industry and recreational fishing.

A comprehensive restoration of the island through the placement of dredged materials to reconstruct beaches and dunes and to restore back barrier marshes will reestablish the barrier between the Gulf of Mexico and Timbalier Bay and make fisheries habitat and access more sustainable in the Lafourche, Terrebonne and Jefferson parish region. Where appropriate, innovative shoreline protection efforts such as recycled oyster shells and engineered oyster reefs should be used to help stabilize the island and trap migrating sediments.

Louisiana Recreational Fishing Access Improvement and Hurricane Recovery Program **Project Estimate: \$8 million**

Louisiana's public fishing piers and boat launches are heavily used by recreational fishermen. These facilities often fall into states of disrepair or become unusable in the wakes of hurricanes and tropical storms and are in need of periodic, routine maintenance to ensure user safety and ease of use. Public boat launches and piers attract anglers and boaters from across Louisiana and visitors from other states, as well, and are important to coastal economies, especially businesses that sell food, fuel, ice and local motels and camp rental operations.

Establishment of a constitutionally protected fund, as well as a system to evaluate these public facilities, address maintenance issues and make them serviceable again quickly following tropical storm damage, is vital to sustainable recreational fishing and the economies of coastal communities. A system of evaluating these facilities and addressing maintenance issues should be coordinated among relevant state agencies such as the Department of Wildlife and Fisheries, Office of State Parks and parish-level agencies.



Photo Credit: CCA Louisiana

Two Miles of Oyster Habitat Restoration in St. Bernard Marsh **Project Estimate: \$4 million**

Robust, intertidal oyster reefs were once common estuarine features in coastal Louisiana and throughout the Gulf of Mexico. In the last century, however, they have been heavily degraded by disease, over-harvest, hurricanes and other activities. The reduction in height and coverage of these reefs impairs the overall function of oyster habitat, generally, and increases the susceptibility of adjacent marshes to shoreline erosion. The potential for oyster reef habitat to protect against the loss of shoreline and coastal resources has been recognized for some time, though it has been underutilized as a conservation strategy.

The recreational fishing community long has recognized the important role that oyster reefs play in providing habitat and fishing opportunity for numerous species of coastal fish and shellfish. This project would establish two miles of oyster habitat in St. Bernard Parish marshes that can increase oyster spat production, reduce wave action, improve water quality and provide shoreline protection to vulnerable marshes. The funding also would include the long-term monitoring of project benefits.

Texas

Maintenance Dredging and Long-term Monitoring Program for Cedar Bayou

Project Estimate: \$18 million

Cedar Bayou has historically served as the mouth of Aransas Bay, allowing tidal exchange between the bay, adjacent wetlands and the Gulf of Mexico. The mouth of Cedar Bayou and Vinson Slough were closed during the IXTOC spill in the late 1970s to prevent oil from entering environmentally sensitive areas. The lack of tidal exchange caused by the blockage diminished water quality and fisheries production. Past efforts to dredge the mouth were insufficient in removing enough sediment and reestablishing the hydrology needed to prevent the bayou's mouth from silting in again.

Currently, Texas Parks and Wildlife, Aransas County and Coastal Conservation Association-Texas are working on a \$9.5 million effort to reopen the pass through dredging and the connecting of Vinson Slough to reestablish the needed hydraulic pressure. Dedicating oil spill recovery funds to periodic maintenance dredging and long-term monitoring of water qualities and fisheries production can ensure the project's success.

Coast-wide Angler-engaged Fish Tagging Program

Project Estimate: \$8 million

Fish tagging programs can help fisheries scientists and managers track migration patterns, evaluate catch and harvest rates and determine health of fish stocks. With millions of anglers on the water annually across the Gulf, state fisheries management agencies have the opportunity to engage and utilize anglers to help tag fish and report the information when the fish are recaptured. Many states have employed angler-assisted tagging programs for legacy tagging programs as well as telemetry tagging efforts in which anglers catch the fish and bring them alive to scientists who insert the tags. The telemetry tags then are tracked by a series of buoys within a basin to monitor fish movements.

A comprehensive angler-engaged tagging program, including education; distribution of tagging kits; deployment and maintenance of buoys to track telemetry tags; catch-and-release tournaments conducted for the purpose of tagging fish; and long-term data analysis, monitoring and maintenance, can help



scientists and fisheries managers gather valuable data. This data should be shared with other Gulf states through a coordinated effort to establish a Gulf-wide network of acoustic buoys. This network will monitor migratory patterns and areas of heavy use for recreationally vital species, facilitate a better understanding of seasonal migration patterns, and help states coordinate the setting of season dates.

Oyster Reef Restoration in North Galveston Bay

Project Estimate: \$4 million

Oysters play a vital role in coastal ecosystems by improving water quality and providing habitat for a variety of fish and forage. The effort to restore and enhance oyster reefs in North Galveston Bay aims to create a mix of harvestable and sanctuary reefs. The reefs will be located off Cedar Point, at the mouth of the Trinity arm of Galveston Bay, and at Fisher's reef. This area has existing oyster reefs and the potential for hosting larger populations of oysters as salinity levels in the bay rise and migrate northward. Oyster reef restoration in the Galveston Bay system will benefit both the ecological health of the bay and oyster and sportfishing harvest.



Photo Credit: The Nature Conservancy

The recreational fishing and habitat conservation community seek to restore historic oyster resources in the Galveston Bay area through the creation of both sanctuary and harvestable oyster reefs. The sanctuary reefs would consist of 24 acres of three-dimensional,

segmented reef structures that enhance the recruitment and productivity of adjacent commercially harvestable native eastern oysters, create a biologically rich and diverse collection of reef-dependent estuarine organisms, supply multiple ecosystem services and help build coastal resiliency into the Galveston Bay estuarine ecosystem.

The restored harvestable reef would consist of several inches of oyster shell or artificial material spread over 40 acres. Completion of the project will be followed by several years of monitoring to assess the project's success and measure its effects on enhanced estuarine biodiversity and productivity, improved water quality and shoreline protection.

Reef Fish Barotrauma Reduction Education and Outreach Program **Project Estimate: \$2 million**

Reef fish such as snapper, grouper, amberjack and sometimes redfish, caught in waters deeper than 30 feet, can suffer from barotrauma, a buildup of gasses in the fish's swim bladder that can cause internal organs to be displaced and eyes to bulge from the fish's head. Recreational fishermen are practicing catch and release increasingly across the Gulf of Mexico. Restrictive seasons, creel limits and size limits are forcing the release of many reef fish and untargeted species caught out of season.

Barotrauma reduction devices, which allow the fish to be returned back to the depth from which it was caught without puncturing the skin or swim bladder, have been used successfully to increase survival of caught-and-released reef fish in other parts of the United States as well as other countries. The use of these devices is not widespread by anglers and charter operators in the Gulf of Mexico, but they can be a useful tool in reducing by-catch mortality of reef fish, allowing selective harvest and potentially increasing overall access in the recreational fishery.

This education and outreach program should be conducted by the Texas Parks and Wildlife Department and Harte Research Institute and coordinated with other appropriate state agencies and research institutions. Elements of outreach should include working with conservation organizations such as FishSmart, Coastal Conservation Association and others to engage the recreational fishing industry and community and the charter boat community through workshops, printed materials and videos specific to demonstrating the use of barotrauma reduction devices on Gulf reef fish. The program also should include distribution of devices at reduced or no cost.

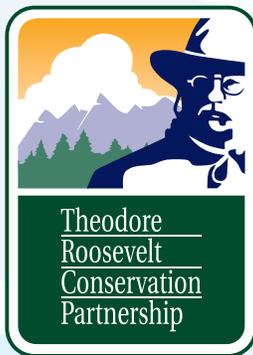
Texas State Waters Artificial Reef Development and Monitoring Program **Project Estimate: \$36 million**

Artificial reef development is used to create new habitat for mitigation and restoration, promote recreational uses such as diving and fishing, and is often a key management tool for fisheries managers to increase fisheries production. Artificial structures have the potential to positively affect fish populations by forming the base of the food web and providing structured habitat for a host of reef fish. However, the amount of enhancement compared to natural reef habitat remains largely unknown. In addition, information to guide best management practices for reef construction and placement is lacking. This gap of essential data hinders the management and stock assessment of several important reef fish species, and data on the role of artificial structures is essential to this process.



Photo Credit: Texas Parks and Wildlife Dept. Artificial Reef Program

Several sites have been permitted off the Texas coast for reef development, including some located entirely within Texas state waters. Near-shore reefs improve habitat and opportunity for anglers in bay boats and other smaller vessels, the bulk of recreational fishermen, to access quality fishing locations. The project goal is to monitor existing reefs to determine the efficacy of reefs located in specific locations, assess which of those reefs provide the desired outcome of habitat improvement and use that information to help identify and build additional reefs in near-shore locations.



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