Our Future Gulf

The Nature Conservancy's Recommendations for Restoration in the Gulf of Mexico

2016

The Nature Conservancy

Gulf of Mexico

JEROD FOSTER/TNC

Contents

Introduction

The Gulf of Mexico is a very large, biologically diverse and highly productive marine and estuarine ecosystem bounded by the U.S., Cuba and Mexico. The Gulf and its resources are the foundation of the economy of the entire region and are important to the nation's economic well-being. The human communities surrounding the Gulf have a rich, colorful, and diverse history and range from large metropolitan areas like Houston, Tampa and New Orleans to smaller working waterfront settlements like Cedar Key, Florida and Bayou La Batre, Alabama. All of the Gulf's cultural, biological and economic diversity is, however, united by the hard fact that, despite its assets, the Gulf of Mexico region faces many challenges.

The Nature Conservancy is a non-profit conservation organization with a mission "to conserve the lands and waters on which all life depends". Our vision is "a world where the diversity of life thrives, and people act to conserve nature for nature's sake and its ability to fulfill our needs and enrich our lives". Our work is based on developing and applying the best available science to solving conservation problems.

While the Conservancy has a global reach, it is locally based and has been working in the Gulf of Mexico region for more than 40 years. During that time, we have observed first-hand the problems of the region's coastal ecosystems, and we have been on the ground and in the water conserving and restoring the Gulf's natural resources. In recent years, despite the often-heroic efforts of government officials, non-profit organizations, businesses and engaged individuals, we have seen the condition of the Gulf and many of its bays, estuaries and tributary rivers continue to decline, jeopardizing the values the Gulf of Mexico provides to coastal communities and to the country as a whole.

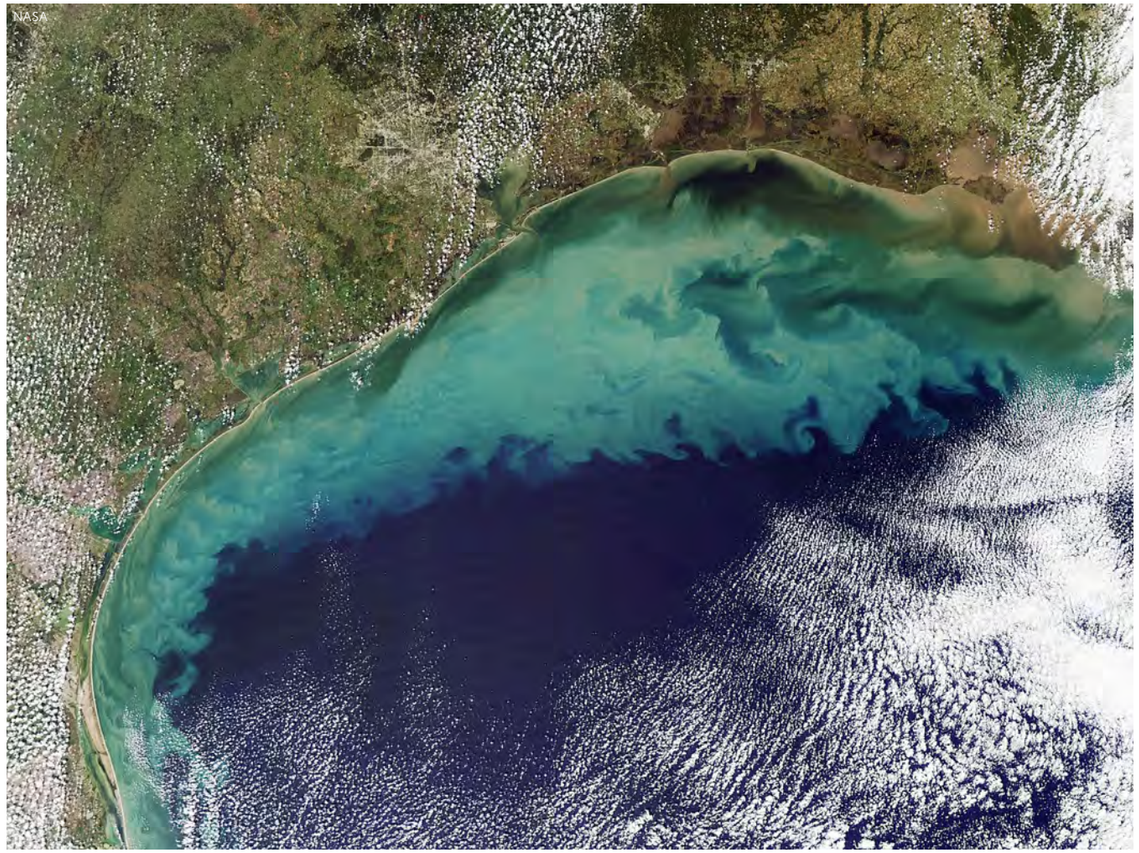
An acute example of that decline was the Deepwater Horizon (DWH) Oil Spill in 2010 which caused both loss of human life and unprecedented damage to the environment. Now, however, resolution of the fines and damages resulting from that spill offers a unique opportunity to respond to the impacts of the spill itself and to address the Gulf's long-term problems.

PURPOSE OF THIS DOCUMENT

We do not know of another instance where so much money has been guaranteed over the long term (15 years) for the restoration of a major ecosystem. The Nature Conservancy believes that, while we cannot put the Gulf ecosystem back to the way it once was, by investing the BP settlement money wisely and using it to leverage other public and private funds to restore the natural systems and features of the Gulf of Mexico, we can produce immense returns for the larger Gulf. We can also make the region's communities and economies more resilient to ongoing stresses, such as storms and sea-level rise intensified by climate change.

Beginning in 2012, The Nature Conservancy produced "Seize the Moment" which described site-specific project recommendations for Gulf of Mexico restoration. Now that the Deepwater Horizon settlement is in place and the agencies involved are planning and implementing Gulf restoration, the Conservancy has updated and broadened its recommendations for restoring and conserving the Gulf's natural resources. In "Our Future Gulf", we focus on the kinds of actions across the region and within specific watersheds that we believe will:

- Contribute to restoring the ecological and economic health of the Gulf as a whole
- Encourage cooperation across state and agency boundaries
- Create the foundation for long-term Gulf restoration
- Produce tangible and measurable results



"Our Future Gulf" does not recommend specific projects because we believe that projects are best advanced through selection processes now in place for the various Deepwater Horizon funding sources. We hope the proposals set out here, however, will help to advance the framework for the cooperative design and funding of projects that will work in concert to restore and save the overall Gulf ecosystem for its many benefits to people and nature.

The Multiple Values of the Gulf of Mexico

The Gulf of Mexico, including its bays, estuaries and shorelines and its deep and open water habitats, is one of the most productive and biologically diverse marine systems on Earth, with over 15,000 marine species of which more than 130 are listed as federally protected (USFWS). The Gulf is globally important for marine and avian species migration. More than 40 percent of all North American migrating waterfowl and shorebirds use the Mississippi Flyway (USFWS). Much of the Gulf Coast region is within the newly recognized North American Coastal Plain (NACP) Biodiversity Hot Spot (Noss, 2016). The Gulf's tributary rivers have the greatest number of freshwater fish, mussel, crayfish and snail species in North America. And the Gulf is not only diverse, it is highly productive—14% (1.3 billion pounds) of U.S. seafood landings come from the Gulf, including 83% of shrimp and 56% of oysters.

The Gulf's fish and wildlife resources make it an exceptional place for waterfowl hunting and sport-fishing. The Gulf averages 3.5 million anglers per year who spend $10 billion on fishing-related visits.

The Gulf of Mexico region is also home to 22 million people. The Gulf adds $234 billion to the regional economy, supports millions of jobs and is nationally significant for oil and gas production, shipping, military preparedness, and its seafood and tourism industries.

The character of the Gulf's communities is closely tied to the natural environment; the region has a rich culture of music, art, cooking, outdoor recreation and a distinct sense of history and place.

The Gulf's Values Have Been Damaged Over Time and Continue to Be Threatened

The ecological values of the Gulf have eroded over time and continue to be threatened by rapid environmental and socioeconomic changes, adding to the legacy of past stresses. The Gulf's ecological decline has resulted in significant adverse social and economic impacts. Threats to the Gulf environment include:

- Alteration of the Mississippi River through flood control and navigation projects deprive the Mississippi River Delta of freshwater and sediment and contribute to the loss of thousands of acres of marshland each year.
- Nutrients, primarily nitrogen and phosphorous from upstream sources in the Mississippi basin, produce a "dead zone" with very low oxygen surrounding the mouth of the river that extends well into the Gulf.
- Point and non-point discharges of polluted water into most of the Gulf's rivers, bays and estuaries, in addition to the Mississippi, cause widespread diminished water quality.
- Changes in freshwater flows into many of the Gulf 's estuaries caused by the withdrawal upstream of water for urban and agricultural uses and by the loss of forests and wetlands damage the health and productivity of those estuaries. In some cases, such as in southwest Florida, the addition of too much (often polluted) freshwater causes harmful algae blooms along the coast. In other cases such changes have affected the hydrology of tidal and non-tidal streams flowing into the Gulf, altering salinity regimes, increasing turbidity and severing aquatic habitat connectivity.
- Alteration of Gulf shorelines through bulk-heading, dredging, filling, dune removal, and the destruction of coastal habitats, including oyster and coral reefs, mangroves, seagrass beds and coastal marshes, have damaged or fragmented these and other critical habitats and reduced the resilience of the coastlines to recover from further harm or to provide protection from storms.
- Overfishing, bycatch mortality and habitat damage associated with unsustainable fishing practices continue to reduce fish and shellfish stocks and impact protected species.
- Climate change and associated sea level rise greatly increase the multiple risks to human and natural communities in the Gulf region.
- Coastal resource management practices have not kept pace with the cumulative impacts on the Gulf of past and current stressors.

The Opportunity Arising from the Settlement Agreement

The Deepwater Horizon settlement agreement, accepted by the Federal District Court in 2016, is an unprecedented opportunity to address the problems of the Gulf. Over the next 15 years, it will make more than $20 billion available for Gulf restoration. While this is not enough money to fix all that is wrong, it is enough, if invested well, to accelerate restoration activities, to leverage other funds, and to create a solid foundation and direction for long-term progress.

There are now four major sources of Gulf restoration funding (and several additional sources for science and research) as a result of the Deepwater Horizon oil spill:

- Settlement of the criminal cases relating to the spill allocated $2.4 billion (of $4.4 billion) to the National Fish and Wildlife Foundation (NFWF) in 2013 to create a Gulf Environmental Benefit Fund (GEBF). Projects are submitted by the states to NFWF and approved by the NFWF board in accordance with the terms of the settlement agreement establishing the GEBF. The remaining criminal penalties goes to the National Academies of Science for Gulf-related science research ($500 million), the North American Wetlands Conservation Fund ($100 million), the Oil Spill Liability Trust Fund ($1.2 billion), and the U.S. Department of Treasury ($6 million).
- The RESTORE Act makes more than $5.3 billion of the $6.7 billion in Clean Water Act civil penalties available over 15 years. The RESTORE funds are divided into four buckets, each of which has a different decision-making process.

BRIDGET BESAW/TNC

— $1.9 billion goes to the states and counties for ecological and economic restoration (Bucket 1).

— $1.6 billion goes to the Gulf RESTORE Council for support of environmental restoration projects across the Gulf (Bucket 2).

— $1.6 billion goes to states and counties for ecological and economic restoration projects in conformance with the RESTORE Comprehensive Restoration Plan (Bucket 3).

— $266 million goes to NOAA and Centers of Excellence for science and research on the Gulf.

- $8.1 billion is provided to satisfy Natural Resource Damage (NRD) claims. These funds are allocated to the five states, region-wide, and to open ocean projects in accordance with the natural resource damage assessment. Funding decisions will be made by each state's Trustee Implementation Groups (TIGs), by a Region-wide TIG that includes both state and federal officials, and by an Open Ocean TIG comprised of federal agencies.

*Other civil and administrative penalties exist that are not discussed in this report, which make up the remaining $1.6 billion of settlement funds.

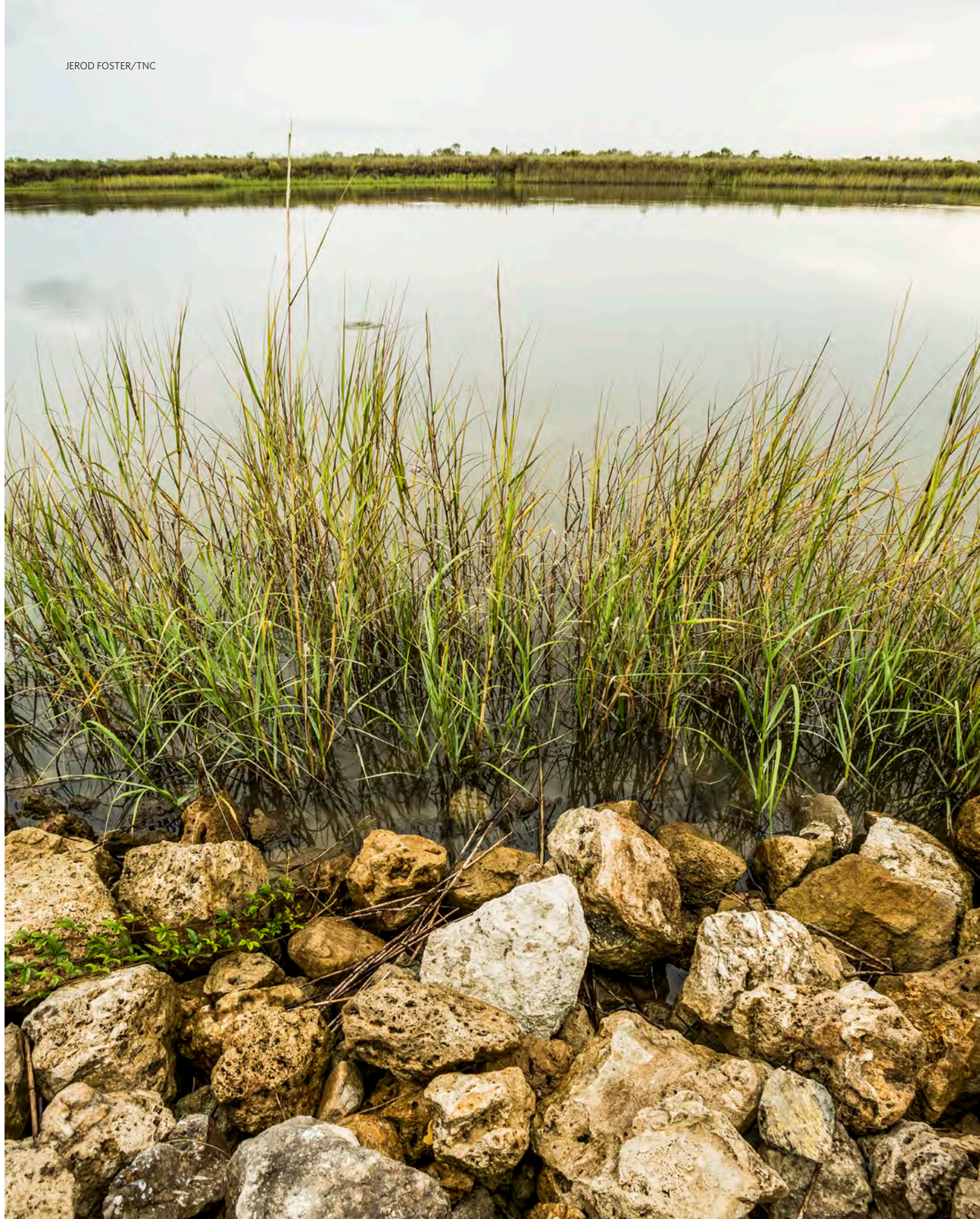
Past Studies and Analyses

In developing updated recommendations for Gulf restoration, The Nature Conservancy has reviewed and taken into account several science-based reports, most of which have also received extensive community review:

- Gulf of Mexico Ecosystem Task Force report (2011)
- Gulf of Mexico Programmatic Damage Assessment and Restoration Plan (PDARP) (2016)
- Comprehensive Conservation and Management Plans of various Gulf National Estuary Programs (NEPs), including the combined plan produced by the three NEPs in southwest Florida
- State of Louisiana Coastal Master Plan (2012)
- Various reports and findings of the Gulf of Mexico Alliance (GOMA)
- The Land Conservation Vision for the Gulf of Mexico Region from the Partnership for Gulf Coast Land Conservation (2014)

And The Nature Conservancy's own documents including:

- The three editions of "Seize the Moment" (2011-2015)
- "Charting Restoration", an analysis of funded Deepwater Horizon projects in relation to past Gulf of Mexico plans (2015)
- Gulf of Mexico Migratory Species Study (2016)
- Gulf of Mexico region Marine and Terrestrial Ecoregional Plans
- Watershed plans for Florida panhandle estuaries and the Springs Coast (2015)
- Watershed plans for coastal estuaries in Alabama


JEROD FOSTER/TNC

The Nature Conservancy's Overall Goal for Gulf of Mexico Restoration

The Conservancy suggests the following goal for Gulf of Mexico restoration: **To restore and sustain the natural systems within and that affect the Gulf of Mexico such that those systems provide habitat for the full range of native plant and animal species in Gulf lands and waters, ensure that people who depend on the Gulf benefit economically, ecologically and socially from Gulf restoration, and make human and natural communities more resilient to change.**

Recommendations

Categories of Action

Progress should be made toward this goal through three categories of action that will benefit both human and natural communities:

- **Restoring and conserving the diversity, productivity and utility of natural habitats, living resources and natural features of coastal and offshore areas.** Projects in this category often have multiple benefits. They conserve and restore habitat for the diversity of the Gulf region's plants and animals. They support the managed use of living resources, such as commercial and recreational fishing, observing wildlife, and tourism. And they make human communities more resilient by shielding them from storms and coastal erosion and by sustaining local economies.
- **Protecting water resources, including the quantity and quality of freshwater flowing into the Gulf's estuaries.** Restoring and protecting the Gulf's water quality benefits everyone and everything that lives in the Gulf or depends on it. Clean freshwater in the right quantity is the lifeblood of the Gulf's fishing, agriculture and tourism industries. Habitat restoration in the Gulf, no matter how diligent or effective, will not last without an accompanying focus on projects that protect the quality and quantity of freshwater that reaches the Gulf. Marshes and other coastal habitats in the Gulf region are highly dependent on healthy rivers, upstream wetlands and forests. Many of the Gulf's most important shoreline buffers—oyster reefs, mangrove forests and marshes—depend on appropriate flows of freshwater for survival.
- **Empowering diverse people and communities to benefit economically, ecologically and socially from Gulf restoration.** Gulf restoration requires that communities have a voice in decisions that affect their future and offers an opportunity for communities to participate in and benefit directly from restoration investments. Particular efforts are needed to involve people in Gulf restoration who have had difficulty finding employment in the changing regional and national job markets.

AMI VITALE/TNC

Principles for Gulf Restoration

The Nature Conservancy proposes several overall principles to guide Gulf restoration regardless of the program or funding sources. We are encouraged that the RESTORE Council has already adopted similar guiding ideas. Our recommended principles include:

- Base restoration on the best available science, engineering, monitoring and adaptive management; ensure that the majority of scientific research being done in the Gulf is designed to inform practical resource restoration and management decision-making.
- Reach out to, listen to and respect affected stakeholders at every stage of the restoration process.
- Support an integrated approach to project planning and implementation, with an emphasis on large-scale restoration projects, to maximize the environmental benefits and outcomes.
- Consider previous plans and studies for restoration of the Gulf and its estuaries when developing new plans; much good science and community input is already contained in those plans.
- Take a long-term view; short-term plans and projects should create the foundation for ongoing and long-term restoration strategies for the Gulf as a whole.
- Conserve or re-create natural features, systems and processes to provide services to human and natural communities.

- Benefit all communities throughout the Gulf through the restoration process, including those with low-income and under-served populations.
- Make the Gulf Region more resilient to the impacts of climate change, ocean acidification and sea level rise.

Crosscutting Strategy and Policy Recommendations

Specific actions to advance each of the three areas of restoration recommended by The Nature Conservancy are explained below, but a number of major strategies cross program areas. These include:

- Continue to advance restoration and conservation planning on an estuary/watershed basis. Much restoration in the Gulf is already structured in this way including the revised RESTORE Council's Comprehensive Plan and individual National Estuary Program (NEP) and National Estuarine Research Reserve plans. Citizens and local elected officials identify with their bays and estuaries and provide long-term support for their restoration. State-of-the-art conservation planning, including threat and situational analysis, can readily take place on an estuary/watershed basis. The estuary/watershed approach, such as that used by the NEPs in the Gulf, can organize, coordinate and rationalize the roles of local, state and federal agencies.
- Governmental, non-governmental organizations and the private sector should continue to strengthen their work together to conceive of, plan, and carry out, large-scale on-the-ground projects to advance Gulf restoration. Moving scientifically sound, large-scale restoration projects forward will depend heavily upon effective project development and design and upon building partnerships to accomplish efficient implementation. This may require the phasing of large projects in a systematic way.
- Leverage the expenditure of Deepwater Horizon spill-related funds at the federal, state and local levels among each other and with other sources of public and private investment to accomplish watershed and Gulf-wide restoration projects at scale.
- Seek private investment in Gulf restoration and management by partnering with individual companies on restoration that benefits the private sector and by exploring the use of private capital to accelerate restoration activities.
- Employ nature-based solutions, such as restoring oyster and coral reefs, seagrass beds, mangroves, sand dunes, marshes, coastal forests and barrier islands, to increase the resilience of natural and human communities.
- Develop new strategies to reduce the time required for the review of Gulf restoration projects to expedite restoration actions without compromising the function and intent of laws and regulations that protect the environment.
- Share state-of-the-art restoration information freely and promptly across the Gulf to reduce duplication of effort, adapt existing projects as needed, and move new restoration science into action on-the-ground.
- Involve under-served and disadvantaged communities and people in restoration activities with an emphasis on the training and employment of young people and veterans in Gulf restoration.

TNC

Proposed Actions

RESTORING AND CONSERVING THE DIVERSITY, PRODUCTIVITY AND UTILITY OF NATURAL HABITATS, LIVING RESOURCES AND FEATURES OF THE COASTAL AND OFFSHORE AREAS

1. **Restore and adapt the Mississippi River Delta.** Invest DWH funds in the adaptation of the Mississippi River Delta by rebuilding barrier islands and marshes and redistributing river flows in ways that reduce marsh loss, provide storm protection, continue traditional economic uses, and maximize the protection and restoration of fish and wildlife habitat. While these river diversions are complex and costly projects, they should move ahead as the only feasible way of reversing long-term land loss at the mouth of the Mississippi.
2. **Purchase coastal land and easements.** Purchase coastal land to protect fish, shellfish and wildlife habitat, provide opportunities for outdoor recreation, enable restoration of marshes and other coastal features, and shield communities from the impacts of storms.
3. **Restore and manage oyster populations to the Gulf for their multiple benefits.** Restore and manage oyster habitat at suitable locations where they can provide protection from coastal erosion, water filtration, fish habitat and carefully managed oyster production. Restore oyster production on designated harvestable reefs and expand environmentally compatible aquaculture enterprises. Achieving this goal will require modifications to current oyster management strategies and development of comprehensive state/watershed-based shellfish management plans to guide the restoration and management of oyster reefs for the full suite of ecological and economic services they provide.
4. **Restore and manage other coastal habitat types and features.** Barrier beaches and islands, salt and freshwater marshes, oak chenier, longleaf pine and other coastal forests across the Gulf region should be restored for their multiple benefits provided that they are sited and designed correctly.

5. **Enable community resilience.** One of the benefits of restoration is selection and design of natural system restoration projects, as well as hybrid projects (natural habitat with manmade features), that integrate both natural and hardened elements, with an express purpose of making human communities more resilient to the impacts of climate change and sea level rise, while enhancing habitat value and recreational opportunities.

6. **Protect the migratory corridors of marine species in the Gulf.** Many species of marine mammals, turtles, fish and birds migrate through the Gulf as part of their life cycles. These species play key roles in the Gulf ecosystem, but are vulnerable during their journeys. Additional research is needed to determine what kinds of habitat and management protection is needed to sustain Gulf migrations.

7. **Support restoration, improvement and expansion of protected areas.** National Marine Sanctuaries, National Wildlife Refuges, National Seashores, National Forests, National Estuarine Research Reserves and state parks, aquatic preserves, forests and wildlife management areas all play important roles in maintaining the Gulf's environment and its tourism economy. Investment in restoring and managing habitat within, and expansion of these public lands and waters are needed to ensure habitat for key species, maintain natural processes, and support nature-based tourism and recreation opportunities.

8. **Expand estuary and watershed planning and implementation.** In the first round of RESTORE Bucket 2 funding, the RESTORE Council selected a project submitted by EPA to create an NEP-like programs in the Florida panhandle. Given the success of NEPs in the Gulf, The Nature Conservancy believes that the NEP model can be replicated in priority coastal watersheds that do not have an existing NEP or NERR. The NEP's use of a collaborative, science-based approach to identifying major issues and prioritizing projects to address them will help ensure each watershed develops a suite of projects and long-term strategies that will result in the greatest improvement for the watershed.

9. **Further improve fisheries management.** Fish and shellfish management should be further improved to take greater account of the ecosystem role and benefits of managed species. Initial attention is needed for oyster management given the multiple economic and ecological benefits of restored oyster populations.

PROTECTING WATER RESOURCES INCLUDING THE QUANTITY AND QUALITY OF FRESHWATER FLOWING INTO THE GULF'S ESTUARIES.

The health of the Gulf of Mexico depends heavily on the health of its estuaries, and the health of its estuaries depends upon the quality of water and the flow of freshwater from uplands and tributary rivers.

1. **Use modeling tools to analyze existing conditions and plan for sufficient flows of clean water into the Gulf estuaries.** State governments have the primary responsibility to plan for and regulate the use and allocation of freshwater. States should continue to improve freshwater planning techniques and develop policies that protect or restore freshwater flows to Gulf estuaries. This requires that Gulf States develop and implement water management strategies in collaboration with local governments, with water users, and with neighboring states to ensure freshwater resources are restored, managed and monitored appropriately as a result of those strategies. The development of new analytical tools must be accompanied by a strong outreach effort to encourage understanding and use of such tools.

2. **Protect aquifer recharge areas, rivers and floodplains through acquisition of conservation easements and restoration of natural vegetation.** The Gulf's springs, marshes and estuaries are sustained by freshwater much of which originates in forested uplands. The hydrologic functions of strategically located forest lands can be protected by the voluntary purchase of conservation easements that keep land in forest uses while allowing for the sustainable production of wood products. Vegetated floodplains of tributary rivers reduce downstream flood impacts and improve water quality.

3. **Develop comprehensive river assessments that inventory and prioritize impaired sites along the Gulf's rivers and tributaries flowing into the Gulf, addressing sedimentation issues prevalent in many rivers.** The Yellow River Assessment developed by TNC for the Department of Defense and State of Florida, and which is being successfully implemented to restore the river and receiving bays, can be used as a model.

4. **Reduce the flow of nutrients into the Gulf from the Mississippi River.** The dead zone surrounding the mouth and extending westward of the Mississippi damages the Gulf's marine life and may interrupt or divert the migratory pathways that are part of the life-cycles of fish, sea turtles and marine mammals. Addressing this problem is a substantial undertaking that is important and complementary to the success of other aspects of Gulf restoration. Nutrient flows must be reduced upstream by improving agricultural practices and by restoring floodplains and wetlands along rivers. This will require private, state and federal sources of funding largely outside of the Deepwater Horizon settlement.

5. **Explore nutrient and water quantity trading to improve the quality and quantity of water flowing to the Gulf.** In other regions of the U.S., water quality and quantity trading have been useful in restoring water resources. It is worth evaluating such strategies in the Gulf. Nutrient trading with cities may be helpful on the Mississippi. In Texas, the Conservancy is already working with a broad group of partners and academic institutions to explore ways to activate market mechanisms to increase freshwater inflows to our bays and estuaries; this project focuses on Matagorda Bay, Galveston Bay, and San Antonio Bay. Increasing water quantity to the Gulf in an intentional way can improve estuarine habitat for our fisheries by reducing salinity during times of drought and restoring wetland habitat.

6. **Work with the Army Corps of Engineers and utility companies to alter dam operations on Gulf rivers to restore anadromous fish runs.** Anadromous fish, such as Gulf sturgeon and Alabama shad, once played a much more significant role in the Gulf ecosystem. The upstream spawning runs of these fish were reduced or eliminated by dam construction on rivers such as the Apalachicola and Alabama. Pilot projects, such as on the Jim Woodruff Dam, have demonstrated that changes in dam operations can yield significant increases in fish stocks. Where applicable, these techniques should be expanded and monitored across the region; further discussions of the options and benefits of altering dam operations should be held with dam operators, and barriers to fish passage should be removed or bypassed where practical.

HELPING DIVERSE PEOPLE AND COMMUNITIES BENEFIT ECONOMICALLY, ECOLOGICALLY AND SOCIALLY FROM GULF RESTORATION.

1. **Include conservation corps as an ongoing component of on-the-ground restoration across the Gulf.** The Conservancy's experience is that well- planned and managed conservation corps can accomplish very useful restoration and conservation work while also providing experience and training for local young people and veterans to equip them to enter the restoration economy. The allocation of $8 million in RESTORE funds for conservation corps is a positive step. The expenditure of these funds across the Gulf region should create the foundation for ongoing conservation corps use in Gulf restoration.

2. **Design and fund coastal resilience pilot projects that work with socially vulnerable communities to reduce the impacts of coastal storms.** A number of communities around the Gulf have populations whose homes and way of life are vulnerable to storms, flooding and sea level rise. Investments in natural and hybrid infrastructure, building design and community planning can reduce these risks and demonstrate strategies for adaptation to sea level rise that can be replicable across the region.

3. **Develop tools to evaluate opportunities for communities to earn FEMA Community Rating System (CRS) points through coastal restoration and land conservation.** The CRS program is an incentive for coastal communities to invest in the kind of natural infrastructure that can reduce storm risks, and,

thus, flood insurance payments, but most communities do not have the expertise to model the benefits from such investments. Tools and technical assistance such as the Coastal Resilience web mapping tool should be made available to local governments across the Gulf to facilitate CRS planning.

Priority Watersheds

Given The Nature Conservancy's emphasis on an estuary/watershed approach to Gulf restoration, we recommend an initial focus on the following estuaries which we believe represent the most immediate opportunities to benefit natural systems and human communities:

TEXAS
Laguna Madre
Matagorda Bay
Galveston Bay

LOUISIANA
Mississippi River Delta
Atchafalaya Basin
Calcasieu River and Lake

MISSISSIPPI
Mississippi Sound

ALABAMA
Mississippi Sound
Mobile Bay
Perdido Bay

FLORIDA
Florida Panhandle Bays
Apalachicola watershed
Suwanee/Big Bend watershed
Tampa Bay to Charlotte Harbor Estuaries
Florida Keys and Dry Tortugas

The table in Appendix 1 indicates which actions may be relevant in these watersheds.


JEROD FOSTER/TNC

Research Priorities

A large amount of DWH funding has been allocated to research in the Gulf. The Nature Conservancy believes that research priorities should be closely linked to restoration to inform investment and management decisions. Towards that end, the Conservancy recommends the following research priorities:

1. Further evaluate the effectiveness of natural infrastructure in reducing coastal erosion and risk from storms and riverine flooding.
2. Complete a Gulfwide ecosystem restoration plan. Over the long term, restoration of the Gulf's living resources requires a study and plan that brings together a wide range of ecological research to produce a better understanding of the functions and relationships of the most important parts of the Gulf ecosystem that can be used to evaluate the Gulfwide value of future restoration projects. This effort will require cooperation among multiple partners.
3. Better understand migratory marine species pathways across the Gulf and the threats to those pathways.
4. Estimate the historical impact of anadromous fish on the Gulf ecosystem and the impacts of restoration of spawning runs of these fish.
5. Continue to evaluate the extent of ecosystem benefits and services provided by oyster reefs and oyster aquaculture to inform reef restoration and management and fisheries activities.
6. Continue to research and document impacts to coral reef systems (disease, bleaching, other), and design and test existing and new restoration techniques to reverse the decline of the Gulf's coral reef systems.
7. Build on The Nature Conservancy's recent study of the benefits of open space conservation to reducing the impacts of coastal and riverine flooding.

Summary and Conclusion

The Nature Conservancy believes that good progress is being made toward Gulf of Mexico restoration and that the further implementation of the Deepwater Horizon settlement offers the opportunity to increase and accelerate that progress. This document describes actions to achieve a healthy and sustainable Gulf. Key among these are establishing clear long term goals and ensuring cooperation across and among agencies, organizations, businesses, and other stakeholders to achieve those goals.

But even with science-based goal setting and unprecedented levels of cooperation, the Gulf cannot be put back the way it once was—a vast wilderness, teeming with fish and wildlife and shaped by the dynamic forces of floods, hurricanes and wildfires. We can, however, work together to create a future Gulf based on the principles of nature and the restoration of natural features and natural functions—a future Gulf that will sustain the diversity of plant and animal species and the long-term economic and social vitality of its human communities. This will require new skills from all of us—to envision the region's future while respecting its past, to engineer restoration projects that work with rather than against natural forces, to conserve critical habitat and places for enjoyment of the outdoors, to forge a regional economy that protects and invests in our natural assets. Above all it will require the continuing involvement of the people of the region and the governments that represent them in every stage of the restoration process. The Gulf belongs to all of us—it is, after all, our place, our home, our heritage and our future.

Appendix 1. Action Matrix

	Laguna Madre	Matagorda Bay	Galveston Bay	Mississippi River Delta	Atchafalaya Basin	Calcasieu River and Lake	MS Sound- MS	MS Sound- AL	Mobile Bay- including Perdido Bay	FL Panhandle Bays	Apalachicola watershed	Suwanee/ Big Bend	Tampa Bay/ Charlotte Harbor	Florida Keys	Open Ocean	Region-wide
RESTORE AND CONSERVE THE DIVERSITY, PRODUCTIVITY, AND UTILITY OF NATURAL HABITATS, LIVING RESOURCES AND FEATURES FROM THE COAST TO OFFSHORE AREAS																
Restore and adapt the Mississippi River Delta				●												
Purchase coastal land and easements	●				●		●	●	●	●	●					●
Restore oyster populations to the Gulf for their multiple benefits		●	●			●	●		●		●	●	●	●		●
Restore other coastal habitat types and features	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●
Enable community resilience			●	●			●	●	●	●	●		●	●		
Protect the migratory corridors of marine species in the Gulf				●						●				●	●	●
Support restoration, improvement, and expansion of protected areas	●		●		●		●	●	●	●	●			●	●	●
Expand estuary and watershed planning and implementation			●		●		●	●		●	●		●			
Improve fisheries management		●	●			●	●		●	●	●		●	●	●	●
PROTECT WATER RESOURCES INCLUDING THE QUANTITY AND QUALITY OF FRESHWATER FLOWING INTO THE GULF'S ESTUARIES																
Use modeling tools to analyze existing conditions and plan for sufficient flows of clean water into the Gulf estuaries			●	●	●		●		●	●	●	●				
Protect aquifer recharge areas and river corridors including floodplains through acquisition of conservation easements and restoration of natural vegetation			●				●	●	●	●	●	●	●			
Reduce the flow of nutrients into the Gulf from the Mississippi River				●	●											
Explore nutrient and water quantity trading to improve the quality and quantity of water flowing to the Gulf			●	●							●					
Work with utility companies and the Army Corps of Engineers to alter dam operations on Gulf rivers to restore anadromous fish runs							●		●		●					
HELPING DIVERSE PEOPLE AND COMMUNITIES BENEFIT ECONOMICALLY, ECOLOGICALLY AND SOCIALLY FROM GULF RESTORATION																
Make conservation corps an ongoing component of on-the-ground restoration across the Gulf																●
Design and fund coastal resilience pilot projects that work with socially vulnerable communities to use multiple means to reduce the impacts of coastal storms				●			●	●	●		●		●	●		
Develop tools to evaluate opportunities for communities to earn FEMA Community Rating System (CRS) points through coastal restoration and land conservation		●	●				●	●	●		●		●	●		

JEROD FOSTER/TNC