RESTORE Council Activity Description

General Information

Sponsor:
U.S. Department of the Interior

Title:
Wind-Tidal Flat Restoration Pilot

Project Abstract:
The RESTORE Council has approved $321K in Council-Selected Restoration Component funding for the Wind-Tidal Flat Restoration Pilot project in support of decommissioning of onshore orphaned energy facilities. The sponsor is the U.S. Department of the Interior, on behalf of the U.S. National Park Services (NPS). This includes $21K in planning and $300K in implementation funds as FPL Category 1. Building on investments made in the Council's 2015 Initial FPL, the project will support the primary RESTORE Comprehensive Plan goal to restore and conserve habitat in coastal Texas, including Padre Island National Seashore. The Wind-Tidal Flat Restoration Pilot Project will test various restoration techniques and assess the efficacy and cost effectiveness of those techniques. The wind-tidal flat areas at Padre Island National Seashore are significant in that they protect portions of the largest freshwater wetland in Texas, conserve protected species, and provide wintering habitat for millions of migratory birds. However, impacts from previous energy exploration have impaired these important habitats. This project will lead to the restoration and improved resiliency for 5 acres of Gulf wind-tidal flat habitat and will provide lessons learned that can be applied to other tidal flat sites in need of restoration. Project duration is 2 years although key information will be gained within the first year of field work implementation.

FPL Category: Cat1: Planning/ Cat1: Implementation

Activity Type: Project

Program: N/A

Co-sponsoring Agency(ies): N/A

Is this a construction project?: Yes

RESTORE Act Priority Criteria:
(I) Projects that are projected to make the greatest contribution to restoring and protecting the natural resources, ecosystems, fisheries, marine and wildlife habitats, beaches, and coastal wetlands of the Gulf Coast region, without regard to geographic location within the Gulf Coast region.

Priority Criteria Justification:
This project will result in the restoration of coastal resources and habitats with the goal of achieving pre-disturbance levels. Techniques developed as part of this project will be used by state and federal land management agencies to provide accurate cost estimates for tidal flat restoration and reduced uncertainty about restoration success.

The pilot project will occur within Padre Island National Seashore.

This project will lead to permanent results and improved resiliency for 5 acres of Gulf coastal habitats and species due to tidal flat restoration. Restored natural processes will sustain habitats and enhance the overall health, availability, and diversity of natural resources that include migratory and protected species. The restoration of important wind-tidal flats will create habitat that supports 22 species of shorebirds and wading birds, which enhances bird populations that contribute to restored areas being designated as Globally Important Bird Areas by the American Bird Conservancy and Sites of International Importance by the Western Hemisphere Shorebird Reserve Network.

Project Duration (in years): 2

Goals

Primary Comprehensive Plan Goal:
Restore and Conserve Habitat

Primary Comprehensive Plan Objective:
Improve Science-Based Decision Making Process

Secondary Comprehensive Plan Objectives:
Restore, Enhance, and Protect Habitats

Secondary Comprehensive Plan Goals:
N/A

PF Restoration Technique(s):
Improve science-based decision-making processes: Develop tools for planning and evaluation
Protect and conserve coastal, estuarine, and riparian habitats: Habitat management and stewardship

Location

Location:
This project will occur in Texas at Padre Island National Seashore. (Figure 1)

HUC8 Watershed(s):
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(North Laguna Madre)
Texas-Gulf Region(Nueces-Southwestern Texas Coastal) - Southwestern Texas Coastal(Central Laguna Madre)

State(s):
Texas

County/Parish(es):
TX - Kenedy
TX - Kleberg

Congressional District(s):
TX - 34

Narratives

Introduction and Overview:

Public lands managed by the National Park Service (NPS) have impaired coastal habitat with impacts from previous energy exploration. The NPS along with the U.S. Fish and Wildlife Service (USFWS) originally proposed to the RESTORE Council under FPL 3b the program entitled "Decommissioning Onshore Orphaned Energy Facilities on NPS and FWS lands". After feedback received from the Restore Council's best available science review and further collaboration discussions with Texas, this original proposal was modified to just focus on the wind-tidal flat restoration component as a pilot project at Padre Island National Seashore. Seismic surveys conducted along the western shoreline at Padre Island resulted in compacted vehicle tracks that altered wind-driven inundation by Laguna Madre waters--thus affecting algal growth and degrading foraging habitat for migratory birds.

Wind-tidal flats are low, relatively flat areas inundated when high water conditions are created by northerly winds and left uncovered when low-water conditions are created by southerly winds (hence the term "wind-tidal flats"). The Laguna Madre is the largest hypersaline system in the world. These mats account for approximately 42% of the lagoon's area. These mudflats form an almost continuous band along the Laguna Madre side of Padre Island National Seashore. Tidal flat elevation changes range from sea level to 0.8 feet and change on the order of only 0.2 feet per mile (Watson 1979). In the southern areas of the park, wind-tidal flats may extend to high wind-tide levels. They are generally covered with a blue-green algal mat that ranges between a thin layer up to 0.4 inches (2 cm) thick. Forty-five (45) cyanobacterial taxa have been identified in Laguna Madre tidal flats using morphological analysis. These taxa are distributed in zones with large filamentous forms on the surface and smaller, motile filamentous and coccoid forms in subsurface mat layers. These mats of algae are quite distinct from the harmful algal blooms that have been increasing in frequency and extent in recent years in the Gulf of Mexico.

The Laguna Madre is located along the Texas Gulf Coast on the Central Flyway and is a significant feeding area during the winter and migration seasons for many endangered avian species. Wind-tidal flats in the Laguna Madre support extensive mats of blue-green algae, and include essential habitat for the piping plover, offer significant feeding areas for aquatic bird life, and play a crucial role in the life history of some of Texas' most important commercial fish and shellfish industries (Withers 1993). They provide abundant amounts of blue-green microalgae, which contribute to the primary productivity of estuarine systems. Their productivity is comparable to seagrass beds and to approximately 20-40 percent of a typical marshhay cordgrass (*Spartina patens*) marsh. These mats form the critical base of the food chain supporting the ecology and economy of the Gulf.

Macrobenthic invertebrates inhabit the wind-tidal flats in the Laguna Madre and create an abundant and diverse benthic community that exists throughout most of the year (Withers 1994). Detritus from other estuarine habitats such as seagrass beds is deposited in large quantities on the flats, and, combined with the large algal biomass, contribute to the high productivity found in this area. As a result of the high productivity, the wind-tidal flats are inhabited by a diverse set of benthic invertebrates, which are then preyed upon by demersal fish and crabs.

Anthropogenic disturbances such as tracks left behind from seismic exploration, addition of fill materials, and soil compaction adversely affect blue-green algal mat production. Approximately 3,038 acres of these flats have been damaged by past seismic surveys for energy resources that have altered surface hydrology and resulted in the loss of algal mats. Extensive blue-green algal mat production is dependent on flats that are alternately emergent and submerged in regular cycles. Vehicle tracks create depressions and channelization that disrupts the natural hydrology of the wind-blown tides. The use of

fill in the wind-tidal flat areas not only converts the flats to an elevated landform, it also disrupts the hydrological cycle. Both the tracks and the filled areas could act as a barrier to inundation or allow water to be retained behind. Irregular inundation and excessive water retention both adversely affect blue-green algal mat production. Soil compaction by vehicular traffic in wind-tidal flats disturbs the hydrological regime by allowing compacted areas to remain submerged. Wind-tidal flats that are submerged too frequently do not have extensive algal mats (Weise and White 1980).

Methods:

The project at Padre Island National Seashore will test restoration techniques on the impacted wind-tidal flats. The project proponents acknowledge, however, that restoration of wind-tidal flats has not previously been attempted within Padre Island National Seashore, and restoration of wind-tidal flats in the surrounding area has never been attempted. A literature search revealed that very few restoration projects of wind-tidal flats have been conducted in the United States, Canada, and Japan. Those projects that were undertaken focused on man-made habitats, rather than natural habitats. Though there are no established or standard methods to restore this type of wetland, NPS has considerable knowledge and tools that have been used for similar restoration. The NPS has substantial experience in beach restoration, including but not limited to: 1) Cape Hatteras National Seashore where 2.6 million cubic yards of beach quality sand was placed along approximately 2.2 miles of shoreline (USACE & DOI 2015), 2) Cape Lookout National Seashore where 3,850 linear feet of beach was restored (Schupp 2017), 3) several projects at Gulf Islands National Seashore where approximately 4.9 miles of shoreline was restored along the eastern end of Perdido Key (Gibson and Looney 1994), and 4) a beach nourishment project where approximately 500,000 cubic yards of beach quality sand was placed along 10,000 feet of the northern shoreline of West Ship Island, within the Mississippi District of Gulf Islands National Seashore (USACE & DOI 2016). Though tidal mudflat restoration is somewhat different, the basic principles are the same: establish a proper slope in the tidal range, restore with similar grain sized sediments, and plant with appropriate flora. The NPS also has considerable experience restoring tracks from seismic exploration at Big Cypress National Preserve in Florida, where 111 miles of exploration trails have been re-graded by hand to the natural contours.

Suzuki (2004) and Lee and Lee (2000) show that newly groomed sediments can be a successful platform for tidal flat restoration. In general, restoration will involve grooming of the tracks with the use of hand tools and ambient soils to prevent further impacts, removing fill, establishing the proper slope within the tidal range, and inoculating the soils with a mixture of the 12 dominant algal species-all of which can easily be grown in controlled conditions in roughly 30 days (Zimba, pers. comm. 6/3/2020). Only 0.2 grams of algal material has been shown to reestablish 1 square meter (1m2) of tidal flat. Salinity concentrations will be monitored using salinity recorders at low, medium and highest elevations. Up to 41-1.0 cm cores will be obtained monthly to determine the developing algal community structure. This information will help to determine how best to approach large-scaled restoration efforts.

Because of the experimental nature of this wind-tidal flat restoration pilot, our plan is to initiate an experimental design and test phase undertaken via a Cooperative Ecosystems Studies Unit (CESU) agreement with Texas A&M University-Corpus Christi, which has experience studying and researching wind-tidal flats. Because there has been no previous restoration of wind-tidal flats in the park or surrounding area, we have no successful restoration project to base an assured method to restore the wind-tidal flats. We plan to form an expert team including National Park Service staff from the park, region, and Washington offices, US Fish and Wildlife Service experts, and wetland scientists with local expertise. Experts likely include Dr. Kim Withers and Dr. Paul Zimba from Texas A&M Corpus Christi (TAMUCC) as well as wetlands restoration technical specialists from private industry and

nongovernmental organizations. The team will develop and test restoration methods on small plots. Upon completing the experimental phase, the team will recommend how to proceed with restoration on the remaining area.

Environmental Benefits:

These wind-tidal flat areas are significant in that they protect portions of the largest freshwater wetland in Texas, conserve protected species, and provide wintering habitat for millions of migratory birds. This program ultimately provides for public safety and restores important habitat on public lands along coastal Texas, while building upon investments made in FPL1.

Specific benefits to state resources and values include:

- Protection and restoration of water resources, water quality and hydrology restoring surface and subsurface habitats and ecological functions.
- Restoration and improvements of wildlife habitat, ecological health, and primary productivity in priority Texas landscapes where significant investment has been made.
- Increased public recreation at Padre Island National Seashore through restoration and transformation of native coastal habitat that support species of interest to visitors such as migratory and coastal birds.
- Wind-tidal flat habitat is a very limited and specialized environment. Wind-tidal flats are low, flat areas inundated when high water conditions are created by northerly winds and left uncovered when low-water conditions are created by southerly winds. Tidal flat elevation changes range from sea level to .8 feet and change on the order of 0.2 feet per mile (Watson 1979).

Wind-tidal flats provide winter and migration foraging habitats for 22 species of shorebirds and waterbirds, including the federally threatened piping plover and red knot (Withers 1994) and when flooded used by State-listed threatened reddish egrets (Koczur et al. 2018). Padre Island National Seashore is designated a Globally Important Bird Area by the American Bird Conservancy and a Site of International Importance by the Western Hemisphere Shorebird Reserve Network. Forty-five (45) species of algae have been identified in Laguna Madre tidal flats, with cyanobacteria representing the dominant taxa (Fisk 1959, Sorenson and Conover 1962, Zimba et al. 2017, Shalygin et al. 2019).

Metrics:

Metric Title: PRM010: Research - # studies used to inform mgmt.
Target: 1
Narrative: A technical report will be published for the Wind-Tidal Flat Restoration Pilot which will be used to evaluate the efficacy of alternative restoration practices and guide recommendations on future restoration method applications.

Metric Title: HR013: Wetland restoration - Acres restored
Target: 5
Narrative: An objective of this project is to restore tidal flats as part of a pilot project. The natural resources restored and protected by this project include 5 acres of tidal flats.

Risk and Uncertainties:

The major component of this program that presents risk is the project to reclaim vehicle tracks in wind-tidal flats caused by past seismic surveys. The project will mitigate these risks by only implementing a small trial to assess restoration techniques. If that trial proved successful the project proponent could, later seek funding for the extensive tidal flat restoration that is needed. Although there are no established and standard methods to restore wind-tidal flats, the NPS will test potential techniques on a relatively small portion of Padre Island National Seashore, based upon its experience in Big Cypress National Preserve reclaiming and restoring vehicle tracks from oil and gas work in sensitive habitats. To reduce uncertainty, the NPS will assemble an expert team including National Park Service staff from the park, region, and Washington offices, US Fish and Wildlife Service experts, and wetland scientists with local expertise. Experts likely include Dr. Kim Withers and Dr. Paul Zimba from Texas A&M Corpus Christi (TAMUCC) as well as wetlands restoration technical specialists from private industry and nongovernmental organizations. This expert team has conducted extensive studies, some of which are published in peer reviewed journals, on the wind-tidal flats, and will evaluate alternative restoration practices to develop one or more preliminary restoration methods to test in a small area. There is distinct value in developing and evaluating a transferrable method for this and future restoration efforts in wind-tidal flat systems. Based upon techniques established at Texas A&M University – Corpus Christi (Zimba pers. comm. 6/3/2020), starter colonies from the dominant taxa can be grown under controlled conditions and used to establish tidal flat algal communities.

A hurricane or other large storm could jeopardize revegetation success, particularly for projects along shorelines; however, risk could be avoided or minimized by scheduling reclamation around hurricane season or applying mitigation techniques to reduce damage by wave action. Additionally, timing restrictions will be defined to avoid impacting wildlife use of the flats and to maximize restoration success.

Monitoring and Adaptive Management:

The initial phases for reclamation of wind-tidal flats at Padre Island National Seashore will likely be conducted via an existing CESU agreement with Texas A&M University-Corpus Christi. Cooperative Agreements provide one method for tracking project status and budget.

Monitoring of the experimental design for reclaiming the vehicle tracks and/or removing fill in wind-tidal flats at Padre Island National Seashore will be conducted by graduate and possibly undergraduate students with guidance of a university professor under a scope of work developed by NPS and the professor. This project will be administered and managed by the NPS.

Data Management:

Data on the locations treated and monitoring results will be collected and maintained by NPS or its partners. Progress and accomplishment reports, which will include site data, will be shared with the RESTORE Council staff and Steering committee.

Collaboration:

There will be collaboration among the study pilot team, and results will be shared with other land managers including the US Fish and Wildlife Service, Texas Parks & Wildlife Department, Texas General Land Office, and others (e.g., National Audubon Society, Coastal Bend Bays & Estuaries Program,

American Bird Conservancy, and The Nature Conservancy). Most team members will be contributing their time as in-kind contributions except the Principal Investigators and any contractors.

Public Engagement, Outreach, and Education:

In addition to public engagement through the NEPA process, where necessary, public outreach will also be achieved by NPS posting updates on the agencies' public websites, in visitor centers and in entrance stations where projects will be implemented. During project implementation, particularly near park or refuge visitor use areas, interpretive information such as brochures, exhibits, social media postings, websites, interpretive programs, a banner or large sign, or similar items will be posted notifying visitors that the project is restoring the Gulf Coast. The initial phase of the project to restore wind-tidal flats at Padre Island National Seashore will be undertaken with local experts at Texas A&M University-Corpus Christi. The initial phase will enable students to participate in the development of experimental reclamation method(s) and conduct the test phase and monitoring on a small plot. The students could earn credit while learning how to design wetland restoration methods. Monitoring the restoration of tidal flats will likely involve students who will conduct field assessments, gather scientific information, implement actions to modify restoration efforts if needed, and report and publish findings. There will be opportunities for youth to learn about habitat restoration and work on revegetation projects.

Leveraging:

Funds: $1,371,567.00
Type: Bldg on Others
Status: Received
Source Type: Other
Description: This project is a continuation of the FPL1 project, "Plug Abandoned Oil and Gas Wells on Padre Island National Seashore" and addresses additional sites on the Seashore. This project also complements other FPL1-funded projects including the Bahia Grande Coastal Corridor.

Environmental Compliance:

The planning component of this project is covered by the Council's National Environmental Policy Act Categorical Exclusion for planning and related activities. DOI has advised the Council that the implementation component of this project is covered by a NPS Categorical Exclusion (CE). The Council is using this CE and the associated environmental compliance documentation to support the funding approval of this project, consistent with Section 4(d)(4) of the Council's National Environmental Policy Act (NEPA) Procedures, which enables the Council to use member CEs, where appropriate. In making this decision, the Council considered potential extraordinary circumstances, including potential negative effects to threatened and endangered species, essential fish habitat, tribal interests and historic properties, where applicable.

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Withers, K. 1993. Study to determine the abundance and distribution of benthic invertebrates and shorebirds on a North Padre Island blue-green algal flat. Unpublished paper, National Park Service, Corpus Christi, Texas.

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Budget

Project Budget Narrative:
The overall budget for this project is $321,000. Approximately $21,000 will be used for planning. The bulk of the funds ($300,000) requested will be used for implementation of the tidal flat restoration pilot project, including project management, monitoring and adaptive management (MAM).

DOI anticipates a Cooperative Agreement with a university will be the primary method of obligation, although we may use an existing Cooperative Agreement with the Railroad Commission of Texas, another small contract, or hire temporary staff.

Total FPL 3 Project/Program Budget:
$ 321,000.00

Estimated Percent Monitoring and Adaptive Management: 4 %
Estimated Percent Planning: 7 %
Estimated Percent Implementation: 86 %
Estimated Percent Project Management: 3 %
Estimated Percent Data Management: 0 %
Estimated Percent Contingency: 0 %

Environmental Compliance

Environmental Requirement	Has the Requirement Been Addressed?	Compliance Notes (e.g., title and date of document, permit number, weblink etc.)
National Environmental Policy Act	Yes	Council's Planning CE; NPS CE for implementation component (9/22/20)
Endangered Species Act	Yes	FWS letter (9/23/20)
National Historic Preservation Act	Yes	THPO letter (9/15/20); THC email (#202016495)
Magnuson-Stevens Act	Yes	NOAA email (9/16/20)
Fish and Wildlife Conservation Act	N/A	
Coastal Zone Management Act	Yes	TGLO letter (8/17/20)
Coastal Barrier Resources Act	N/A	TBD prior to financial award
Farmland Protection Policy Act	N/A	
Clean Water Act (Section 404)	No	Likely covered by NWP 27
River and Harbors Act (Section 10)	N/A	
Marine Protection, Research and Sanctuaries Act	N/A	
Marine Mammal Protection Act	N/A	
National Marine Sanctuaries Act	N/A	
Migratory Bird Treaty Act	N/A	
Bald and Golden Eagle Protection Act	N/A	
Clean Air Act	N/A	
Other Applicable Environmental Compliance Laws or Regulations	N/A	

Maps, Charts, Figures

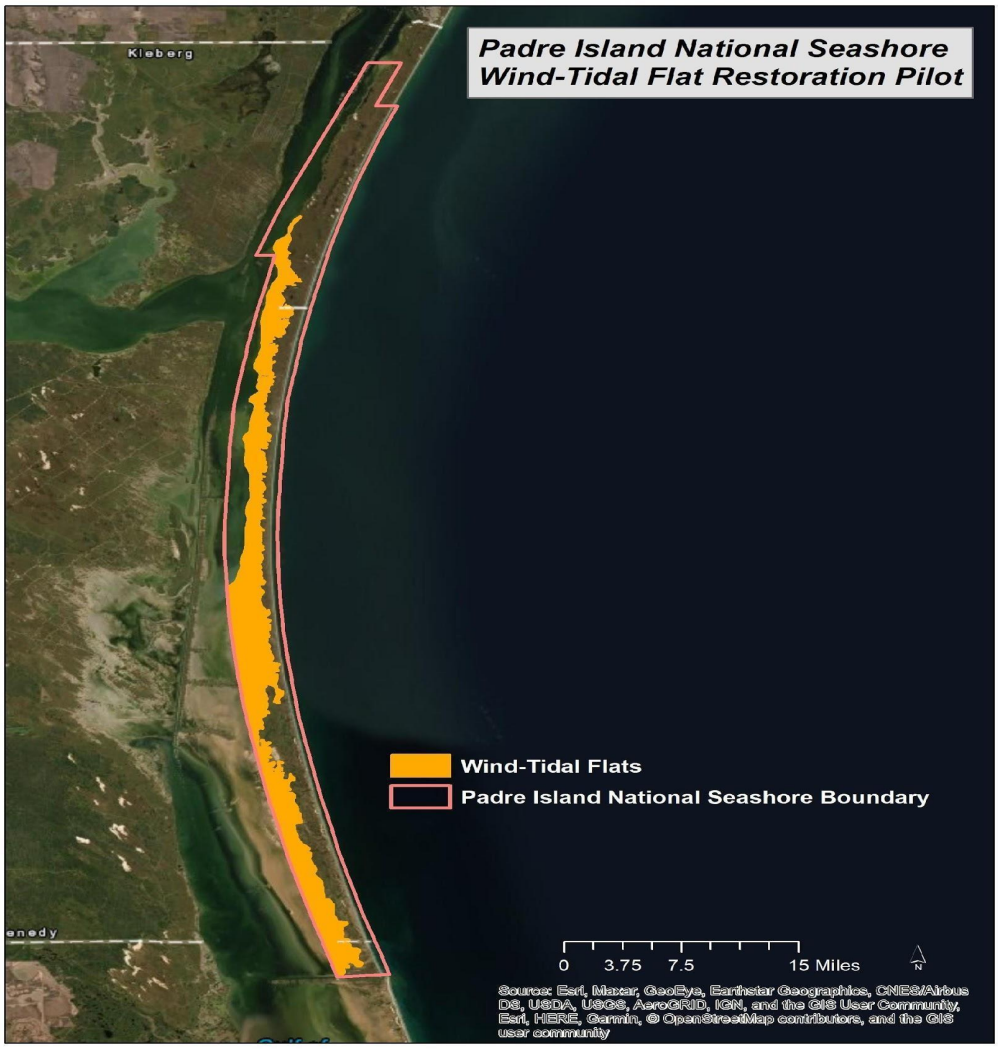

Figure 1: Map of FPL 3b Tidal Flat pilot project.