MATAGORDA BAY MITIGATION TRUST
2021 – 2022 Funding Cycle Projects
Contract 27
Final Report

Coastal Aquatic Plant Nursery and Restoration Outreach Palacios, Texas

Submitted by:

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MATAGORDA BAY MITIGATION TRUST

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Project Overview

This project afforded an opportunity to assess and develop a coastal aquatic plant nursery for ongoing and future habitat restoration in Matagorda Bay. Turtle Creek Aquaculture, a commercial redfish aquaculture operation near Palacios, Texas, provided the necessary infrastructure and water resources to establish and maintain a coastal aquatic plant nursery. Historically, there has been a bottleneck regarding availability of coastal plants for restoration projects and mitigation efforts. This project served as a testing and development effort to evaluate grow out concepts and techniques for multiple coastal plant species (black rush, smooth cordgrass, sedges, and submerged aquatic vegetation including Widgeon grass and Southern naiad (SAV)) with the result being aquatic plant production that would supplement mitigation and restoration efforts in the Matagorda Bay ecosystem.

This effort provided meaningful insights and lessons about cell construction, salinity levels, water level management in cells, equipment failures, well drilling, and extreme weather conditions. Severe summer temperatures, followed by short duration freezes in the winter had an unexpected detrimental effect on plant health and growth during spring and summer, particularly during 2023. The combined effects of all factors resulted in delays and partial mortality and poor growth of plants. Equipment and mechanical failures resulted in a 9-month delay in cell excavation and completion. Other logistical issues created further delays, and a no cost extension was requested and granted.

Our contractor/botanist inspected the cells during spring of 2025 and approved them (smooth cordgrass, black rush, sedge, and SAV) for plug harvest and transplant. Despite delays and weather-related setbacks, plants (smooth cordgrass and black rush, have been successfully harvested and transplanted at privately owned coastal fringe habitats. There are currently plans to harvest and transplant our SAV into ponds and enclosed brackish waterbodies frequented by migratory waterfowl. Matagorda Bay Foundation is currently partnered with Houston Wilderness, Sea Grant, US Army Corps of Engineers, engineering firms, and others, to assess and plan the use of wetland plants produced from this study. Plants will be provided at no cost to any organization, public or private, that is managing ecological restoration or mitigation projects. Also, plants raised for the MBMT would be used at the sole discretion of MBMT for on-going or future efforts, while the portion allotted to MBF would be used to support on-going local conservation groups' habitat restoration, enhancement, and rehabilitation efforts. The Matagorda Bay Foundation (MBF) will also use this Coastal Nursery pilot-project to support public education / outreach opportunities on this working aquaculture farm.

The Matagorda Bay Foundation would like to thank the MBMT Trustee for providing the flexibility to extend the contract and see the project to completion. In an ongoing informal partnership with Turtle Creek Aquaculture MBF continues to expand production capacity and the diversity of coastal plants available to conservation practitioners.

Contact information is publicly available via MBF website (www.matby.org) using the general inquiry email address provided.

Matagorda Bay Foundation History and Mission

Established in 2000, the Matagorda Bay Foundation (MBF) is a full-service resource and advocacy group on behalf of the overall Matagorda and San Antonio Bay systems. Moving forward, the MBF anticipates increased involvement in education, outreach, advocacy, and habitat conservation and expansion throughout the Matagorda Bay watershed. Through partnerships with stakeholders, local government, and state and federal agencies, the MBF plans to identify and evaluate conservation issues for these important estuaries (and watersheds) and engage in efforts to conserve, enhance, and restore important habitats. The MBF shares vital connections with central Texas via the Guadalupe and Colorado River watersheds; arteries that convey critical freshwater flows that sustain coastal health and productivity. The MBF seeks to take this conservation message "up the watershed" to engage central Texans, and advocate for wise stewardship practices to ensure healthy sustainable watersheds and coastal ecosystems for all Texans to enjoy.

MBF Vision Statement

"We envision a state where the relationship between freshwater inflow and a healthy, productive coast is understood and embraced by all Texans; a coast with diverse habitats and abundant wildlife and fisheries resources available for the use and enjoyment of future generations."

Project need/justification

The Matagorda Bay coastal marsh ecosystem supports some of the most critical nursery habitat for crab, shrimp, and fish along the Texas Gulf Coast. Sadly, most of these marsh ecosystems are presently under natural and anthropogenic stress and in fact, are in decline. Whether the decline is from sea level rise, development, nurdles, lack of sedimentation, etc., the fact is that restoration efforts and management along the Texas Gulf Coast has been and will be required into the future to ensure the sustainability of these critical habitats. Coastal management and development lead to construction requirements, permitting and often mitigation related activities. Additionally, conservations groups are actively working to restore these critical habitats along the coast.

Regardless of the entity or activity, an underlying necessity for success is an ample supply of coastal aquatic plants to support these endeavors into the future. At present, there is a bottleneck regarding availability of coastal plants for restoration projects and mitigation efforts that result in native plant harvest. Up to a point, the practice of plant harvest from the wild, if done properly, is sustainable. However, many resource managers feel the Texas Gulf Coast is at or past that point. That coupled with work that is not conducted in an ecological sustainable manner (to simply meet a requirement) has put cumulative pressure on the sustainability of native marshes in Matagorda Bay.

The goal of this project is to alleviate that pressure and prove sustainable ways to commercially grow and harvest aquatic plants for said efforts.

The Matagorda Bay Foundation feels this environmental research is paramount to the future sustainability of coastal marshes along the Texas Gulf Coast.

Goals and objectives of the project:

The ultimate long-term goal is to reduce the pressure from native aquatic plant harvest from the wild by providing plants for restoration and mitigation projects along the Texas Gulf Coast. Specific goals for the proposed Coastal Aquatic Plant Nursery and Restoration Outreach project are outlined below.

Goal 1: *Inform the development of effective and efficient coastal aquatic plant nursery facilities and practices for growing and harvesting multiple aquatic plant species.*

Goal 2: *Explore opportunities for conservation and restoration activities using the coastal aquatic plants produced during this study.*

Goal 3: *Explore public education opportunities via field trips to a working aquaculture facility and hands on opportunities for local students for coastal restoration.*

Methodology

Task 1 - Nursery pilot project development and maintenance

MBF proposes to work directly with Turtle Creek Aquaculture to modify their facilities to support a coastal aquatic plant nursery. It is envisioned that this modification would involve but not be limited to the following components:

- Up to five large-scale wetland growing cells.

These cells would be approximately five-thousand square feet and approximately 1 foot deep. These cells would be used to grow out plugs or bare root sprigs of *Juncus roemerianus* and *Spartina alterniflora*. It is anticipated that harvest within these grow out cells would be on a rotational basis over the course of the second growing season (2023). This allows development and plant establishment during the pilot experimentation activities in 2022.

- Up to two, 30 foot wide by 100 foot by 22-inch-deep dirt floor raceways. *

These proposed raceways will be used to grow out *Ruppia maritima* and / or larger plants of the *Spartina* / *Juncus*. These raceways will be provided with water from the existing aquaculture ponds.

- Up to two, 12 foot wide by 50-foot-long lined raceways. *

These raceways will be designed to accommodate growing seedlings. The facility has the perfect water setup to support these raceways with water coming directly from the brood tanks, ensuring high quality.

* *Two raceways were converted from drainage canals to satisfy this proposed goal. However, due to existing populations of Widgeon grass in the converted canals, it was determined the raceways would be better suited for grow-out of submerged aquatic vegetation. Planting of emergent species was done in the lined shallow cells that allowed better control of water levels and access to" planters and harvesters" with minimal impacts to surrounding cells and plants.*

Grow out and harvest.

(Black rush, smooth cordgrass, sedges, and submerged aquatic vegetation are currently the focus of the project. Experiments that involved different facilities (grow out cells and raceways), the use of water sources, water volume, continuous flow through or recirculation, were employed to determine the most effective and efficient way to grow harvest-ready plants (see notes following the Methodology section). Additionally, the project team will explore using seedling plugs and work on developing ecotypes of *Spartina* for specialized restoration opportunities.

Due to unanticipated issues related to weather and the innovative nature of developing the wetland plant nursery in this location, the proposed production of 30,000 plants available for harvest has not been met. However, the project can provide up to 10,000 plugs of the combined production of all species during a calendar year/growing season. Approximately 2/3^{rds} of the operations' full production will be directly provided to MBMT or their representatives, at MBMT's sole discretion, for use in on-going or future habitat restoration efforts. The remaining portion would be used by MBF be used to support on-going local conservation groups' habitat restoration, enhancement, and rehabilitation efforts.

Restoration Outreach and Public Education

MBF and Turtle Creek Aquaculture staff provided several on-site outreach opportunities to TPWD staff, Palacios Marine Agriculture Research Center staff and executives, Calhoun County YMCA, Texas Master Naturalists, and other local conservation-minded groups to establish relationships and demonstrate some of the challenges, successes, and needs of the pilot study. MBF anticipates it will provide plants to Palacios Seawall Commission, Freese and Nichols Engineering, Atkins Engineering, TPWD, and US Army Corps of Engineers for proposed and on-going restoration efforts. MBF continues to explore opportunities for local conservation organizations, environmental advocacy groups, and school children to participate in firsthand restoration activities associated with these local projects. Since 2022 MBF has engaged with Sea Grant, other Gulf States, Texas General Land Office, and Houston Wilderness to further evaluate the feasibility, cost and sustainability of a coastwide seed/plant bank to serve as a source of local genetic stocks to mitigate for catastrophic events like oil or chemical spills and tropical storms.

Project Impact and benefits.

The long-term goal is to reduce the pressure from native aquatic plants harvest from the wild to sustain the ecological integrity of Matagorda Bay into the future. This project directly supports local industry, conservation organizations, environmental advocacy groups, area school children, and the public. The Project also provides regional and coastal benefits by providing plants for environmental restoration projects as well as for mitigation efforts required for coastal permitting and development. MBF feels this is a key first step to a legacy project that will ecologically enhance the Texas Gulf Coast for future generations.

Financial information:

a)	Total budget for this project:	$265,000.00
b)	Funds spent (in-kind services or cash)	$202,621.00
	(*Not required but desirable)*:	$0,000.00
	Amount being returned to MBMT	**$62,379.00**

June 2, 2025

Attachments

Images and Project narrative - Coastal Aquatic Plant Nursery and Restoration Outreach

Project is located south of Palacios off State Highway 35 adjacent to Turtle Creek.

The map below was taken from satellite imagery that was rendered prior to the completion of all grow-out cells and is for location purposes only.

Work began at the Matagorda Bay Foundation coastal nursery in June 2022. Two freshwater wells were drilled to control salinity in the grow-out ponds and to sustain appropriate water quality for *Ruppia maritima.* Towards the end of last year (2022) one pond ½ acre in size was completed for grow out of *Ruppia maritima*.

Heavy equipment failure delayed the completion of excavation and preparation of grow out ponds for emergent marsh plants (Juncus and Spartina). Supply chain issues and the need to order replacement parts from overseas were the predominant causes of the delay. Repairs were made and work on the ponds began in February 2023.

In March and April 2023 work commenced on building the first of 5 wetland nursery cells around 10,000 square foot in size. The cells were lined with plastic sheeting to function as a root barrier and backfilled with 6 to 8 inches of sandy clay soil. In April, wetland cell number one was planted with 7,500 Black rush (*Juncus roemerianus*) root stock. These were collected from the Turtle Creek aquaculture property. They were dug by hand and small excavator and split into smaller clumps. Smooth cordgrass and sedge were harvested at Dog Island, Port of Palacios

Property, and in Sargent Texas. All were harvested by hand and transported to Turtle Creek Aquaculture and planted in grow-out cells. Turtle Creek staff attempted to maintain salinity at 10 to 20 ppt but heavy precipitation and drought complicated the effort. Water depth in the cells was maintained at 8 inches of depth and periodically drained to simulate tidal processes that exist in natural settings. Plants were observed throughout the grow-out period for health and "harvestability."

Harvest and transplant were approved in early 2025 and implemented in spring of 2025.

Cell Construction

Plant sourcing and cell planting.

Grow-out - emergent plants.

Submerged Aquatics

Harvest and Planting – emergent wetland plants – smooth cordgrass and black rush.

ACKNOWLEDGEMENTS

The Matagorda Bay Foundation would like to thank the staff at BioWest and the management at the Turtle Creek Aquaculture facility for their patience and dedication to this project.

We would also like to thank Diane Wilson and Steve Raabe for their dedication to protecting and conserving the ecosystems of the Texas coast and beyond; and for their patience and understanding as we found our way through the project and established the first coastal wetland plant nursery on the mid-Texas coast.