

**Texas Gulf Region CWMA: Dune Management & Restoration on Mustang
Island, Phase II
22-045-010-D107**

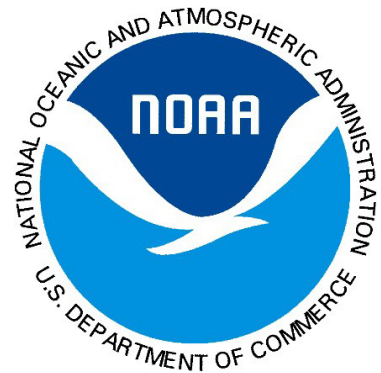
**Final Report
March 16, 2023**

Prepared By:

Leigh Perry, Project Manager
Coastal Bend Bays & Estuaries Program
1305 N Shoreline, Suite 205
Corpus Christi, TX 78401
lperry@cbbep.org
361-336-0310

This report was funded in part by a Texas Coastal Management Program grant approved by the Texas Land Commissioner, providing financial assistance under the Coastal Zone Management Act of 1972, as amended, awarded by the National Oceanic and Atmospheric Administration (NOAA), Office for Coastal Management, pursuant to NOAA Award No. NA21NOS4190136.

The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA, the U.S. Department of Commerce, or any of their subagencies.



Project Background:

Barrier island dunes are dynamic habitats that interact with geology, climate, and vegetation. Dunes provide critical habitat for wildlife and serve as defense for inland areas against storm surge and beach erosion by absorbing the impact of waves and water intrusion. Brazilian peppertree is an invasive, noxious, and prohibited species in Texas that negatively impacts dune habitats and other coastal environments. The Texas Gulf Region Cooperative Weed Management Area (CWMA) has removed Brazilian peppertree from over 240 acres and improved management on over 9,370 acres of public and managed lands. The CWMA now includes 9 partners and over 30 participating members, including representatives from the Coastal Bend Bays & Estuaries Program (CBBEP).

CBBEP used CMP Cycle 26 funds to advance the local Brazilian peppertree management efforts of the CWMA and restore dune habitats that have been highly impacted by Brazilian peppertree. CBBEP and the CWMA removed Brazilian peppertree from impacted dune habitat on Mustang Island and then replanted the treated dune areas. The removal efforts of the project focused on four zones of dune habitat located in Port Aransas on Mustang Island. These areas have high concentrations of Brazilian peppertrees, are owned by CWMA partners, and most areas have been previously treated using CMP funding. The restoration of treated areas began by using CMP Cycle 25 funds, but additional efforts were needed to continue these dune restoration efforts.

This project will provide habitat and dune stabilization, while also preventing the reintroduction of peppertrees by limiting the germination of seeds that are otherwise easily dispersed.




Map 1. Map showing CWMA activities during the CMP 26 contract period, including project site, workday and community event locations in Port Aransas, TX.


Task 1 Summary: Cooperative Weed Management Area Coordinator

The CWMA Steering Committee members selected Christina Marconi, with the University of Texas, Mission Aransas-NERR, to continue serving as the CWMA Coordinator. The contract was executed on October 28, 2021 between the Coastal Bend Bays & Estuaries Program (CBBEP) and the University of Texas (UT). The CWMA Coordinator duties included the implementation of the CWMA management plan, hosting bi-annual meetings, coordinating workdays and community events, leading monthly Steering Committee telecommunications, and producing outreach materials.

QUICK FACTS ON BRAZILIAN PEPPERTREE


- Brazilian peppertree (*Schinus molle* L.) is a tree native to Brazil, Argentina, and Paraguay.
- It was first introduced to Florida in the mid-1800s as an ornamental landscape plant.
- It was first discovered in Texas in the 1950s and has since spread rapidly from Texas City to Brownsville.
- It is a shrub or small tree that may attain over 40 feet in height, typically with a short trunk up to 3 feet in diameter, surrounded by a mass of branches.
- When crushed, its leaves smell like turpentine or pepper.
- Brazilian peppertree is found in many different "habitats" from dunes to swamps, where it grows as a semi-deciduous plant.





Learn more online at:
www.texasinvasives.org/professionals/gulfregion.php


TEXAS GULF REGION CWMA PARTNERS



TEXAS GULF REGION COOPERATIVE WEED MANAGEMENT AREA

CUT DOWN THAT TREE!

WHEN THE BRAZILIAN PEPPERTREE IS A THREAT TO NATIVE WILDLIFE & WHAT YOU CAN DO TO HELP!



IMPACTS OF INVASION

Brazilian peppertrees reduce native vegetation climbing over rudimentary trees and choking out other plants through shading. This loss in native vegetation can:

- Reduce biodiversity
- Reduce desirable habitats and resources for native and migratory wildlife
- Displace rare or threatened plants
- Encroach and add to the loss of wetland habitats
- Cause structural and chemical change within threatened areas

Brazilian peppertree can also:

- Cause allergic reactions: *Schinus molle* belongs to the family Anacardiaceae, which includes poison ivy, poison oak, and poison sumac. Touching the tree may cause skin irritation.
- Cost landowners money when trying to remove or control it, leading to negative economic impacts.

CONTROL METHODS


MECHANICAL
Digging or pulling can control small seedlings or trees. When mechanically removing, make sure to get as much root as possible to prevent regrowing. Be aware that cutting and digging create ideal conditions for seed germination, so these sites will need to be carefully monitored for new growth.

CUT STUMP CHEMICAL TREATMENT
Cut the trunk as low to the ground as possible. Within 5 minutes, apply a herbicide containing glyphosate or triclopyr to the stump.


BASAL BARK CHEMICAL TREATMENT
Apply triclopyr ester and oerie rolling oil (bark oil) to the outside of the bark from the ground up to 18".

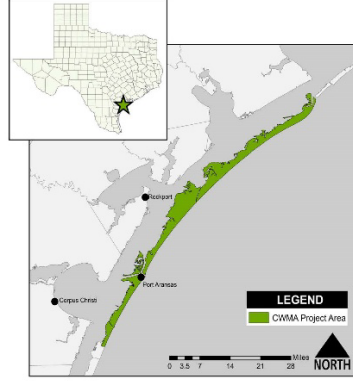
FOLIAR CHEMICAL TREATMENT
Whooping cranes are federally listed endangered species which depend upon coastal prairies. These precious areas have been heavily impacted by development, fragmentation, and invasive species such as the Brazilian peppertree.



The Texas Gulf Region Cooperative Weed Management Area (CWMA) is a collective group of local, county, state and federal agencies, non-profit organizations, university researchers and community representatives who have come together to fight invasive Brazilian peppertree on the Texas Gulf Coast.





LEGEND
CWMA Project Area

0 3.5 7 14 21 28 Miles

NORTH

WHAT WE DO

- Education, outreach, and training for home and landowners, businesses, and visitors
- Monitoring and research on habitat and wildlife impacts, removal techniques, and range expansion
- Removal of Brazilian peppertree with volunteer workdays and contractual work
- Restoration of native habitats through the removal of invasives and reestablishment of native plant species

GET INVOLVED

There are multiple ways to get involved and support the Texas Gulf Region CWMA:

- Volunteer at workdays or outreach events
- Remove Brazilian peppertrees from your own property
- Talk to your neighbors about the impacts of Brazilian peppertrees
- Donate resources or equipment
- Commit to planting native

www.texasinvasives.org/professionals/gulfregion.php

Email: gulfregioncwma@texasinvasives.org




Figure 1. Outreach material produced by the CWMA Coordinator. Top: Trifold flyer, Bottom: 4x9 Rack Card

Task 2 Summary: Biannual CWMA Meetings and Monthly Steering Committee Meetings

Biannual CWMA Meetings – Two biannual meetings were held during the project period.

Spring Meeting, February 24, 2022: The meeting was held in the Seminar Room of the Estuarine Research Center on the UT Marine Science Institute campus in Port Aransas, TX. A presentation was given by the CWMA coordinator and other Steering Committee members explaining the mission and goals of the CWMA and a brief history of the organization. Members went on to discuss and update the meeting attendees on current CWMA projects as well as future funding opportunities. Demian Gomez with the Texas A&M Forestry Service ended the meeting with a presentation on the continued study of thrips (*Pseudophilothrips ichini*) as biological control against Brazilian peppertree followed by a question-and-answer session.

Fall Meeting, November 10, 2022: The meeting was again held in the Seminar Room of the Estuarine Research Center on the UT Marine Science Institute campus in Port Aransas, TX. The meeting included background information on how to identify Brazilian peppertree and why it is considered an invasive species. The mission and goals of the Texas Gulf Region CWMA were discussed as well as CWMA accomplishments and lessons learned. Updates on completed and ongoing projects and plans for the future were discussed as well as an update on the use of thrips as biological control. There was also a discussion on how to increase citizen and public participation.

Steering Committee Meetings – A total of 17 Steering Committee meetings were held throughout the duration of the project. CWMA steering committee members discussed the status of current Brazilian peppertree removal and restoration projects, biological control of BP, new project opportunities along with funding opportunities, management plan updates, planned workdays and outreach events and discussed future goals of the CWMA. The meeting agendas and minutes were sent to the GLO-CMP as part of the project's required deliverables.

Task 3 Summary: Contracting a Vegetation Management Firm

A request for proposals to contract with a vegetation management firm to remove and treat Brazilian peppertrees within Zone 4 was developed and approved on December 21, 2022. Triton Environmental Solutions, LLC (Triton) was awarded the contract for the invasive species removal and retreatment services; the contract was executed on February 15, 2022.

During the bidding process the project team realized that more funds were needed to complete the vegetation management portion of the project. CBBEP discussed options with the GLO-CMP project manager and a budget amendment was initiated on February 23, 2022 to add an additional \$19,578 to the contract. The University of Texas (UT) provided \$7,000 to the project budget and an additional \$12,578 was provided by the GLO-CMP.

The budget amendment was approved and fully executed on March 21, 2022. Due to the CMP budget amendment and subsequent budget amendment between the CBBEP and UT, the purchase order for the Brazilian peppertree removal was not approved by UT until May 16, 2022.



Map 2. Map showing Zone 4 (red polygon) and Zone 4.3 (yellow polygon)

Vegetation Removal Summary

Project Timeframe: June 13 - July 6, 2022

June 13-17: cut stump, herbicide application within Zone 4.3

June 20-26: mulching of cut Brazilian peppertree within Zone 4.3

July 6, December 1, December 12: new growth retreatment within all of Zone 4

Acreage

Zone 4: 12.94 acres

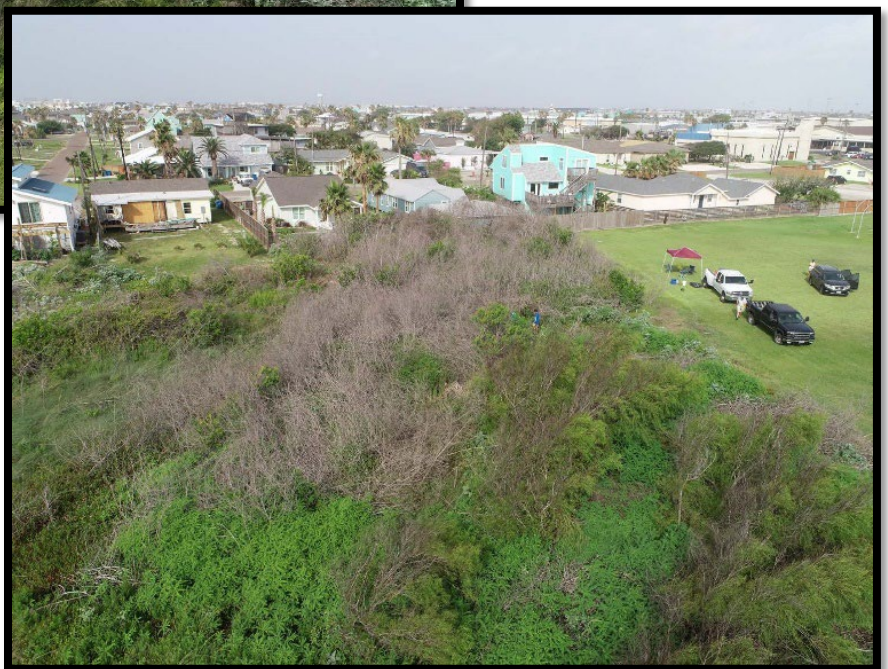
Zone 4.3: 1.85 acres

Herbicide

4 gallons of foliar applied- Mixed at 4% Triclopyr, 0.5% surfactant, 95.5% water

1 gallon of cut-stump formula applied- Mixed at 96% Triclopyr, 0.0% surfactant, 4% blue dye

Triton's summary report can be found in Appendix A and before and after photos of the areas treated can be found below:



Photos 1-2. Zone 4.3 before treatment
photos taken on June 13, 2022.



Photo 3. Freshly mulched Brazilian peppertree within Zone 4.3 on June 26, 2022.



Photo 4. After photo of Zone 4.3, photo taken on November 22, 2022.



Photo 5. After treatment photo taken on November 22, 2022 showing an area within Zone 4.3 that now holds water after Brazilian peppertree removal.



Photo 6-7. November 22, 2022 photos showing Brazilian peppertrees in Zone 4.3 that were cut and treated with an herbicide application in June 2022.



Photos 7-8. Photos showing before photo (left) of Zone 4 on June 13, 2022 and after photo (right) of Zone 4 on November 22, 2022.

Task 4 Summary: Contracting a Dune Restoration Firm

A request for proposals for dune restoration services was sent out on 8/15/2022 and Triton provided a signed estimate on October 21, 2022. A purchase order was approved by UT and delivered on that same day (October 21, 2022). Triton began work in early December 2022.



Map 3. Map showing approved borrow sites on UT-MSI property (blue polygons) and Zone 4.3 (red polygon) where harvested plants were transplanted.

Dune Restoration Summary

Project Timeframe: December 13 – December 30, 2022

December 13-14, 2022: harvested plants from approved borrow areas

December 15-16: transplanted native species in Zone 4.3

December 30, 2022 – site visit

Species Transplanted

440 1-gallon planting units of Coastal Little Bluestem (*Schizachyrium littorale*) taken from borrow areas near the site.

200 1-gallon planting units of *Paspalum* spp. taken from borrow areas near the site.

4,400 1-inch planting units of saltmeadow cordgrass (*Spartina patens*) taken from a borrow area near Rockport, Texas identified by Triton.

The planting units were harvested on December 13 & 14, 2022 and transplanted into the project site on December 15 and 16, 2022. These transplants covered an area of roughly 1-acre. A short, but hard freeze hit the area on December 22 – 24, however a site assessment conducted by Triton showed minimal impact to the plants put in the ground.

Triton's summary and site visit report along with photos can be found in Appendix B.

Task 5 Summary: Workdays and Community Event

Spring Workday Event – February 24, 2022

On February 24, 2022, CWMA members and volunteers gathered to treat an area in Port Aransas, Texas. Despite the cold weather, eighteen CWMA members from Texas Parks and Wildlife Department, Coastal Bend Bays & Estuaries Program, the Invasive Species Institute from Sam Houston State University, South Texas Master Naturalists, City of Port Aransas residents, and MA-NERR and UTMSI grounds crew removed Brazilian peppertree from the UTMSI Beach St. property (near the warehouse in Zone 4). The eighteen-person crew worked from 9am to eleven. Roughly 0.25 acres of Brazilian peppertree were removed.

Below are some pictures showing location and techniques used during the event:



Map 4. Map showing area of UTMSI property off Beach St, Port Aransas, TX (Zone 4) where volunteers removed Brazilian peppertree for the Spring 2022 CWMA workday event on February 24, 2022.



Photos 9-10. Volunteers working in a 1-acre area during the CWMA Spring Workday to remove Brazilin peppertree, finding some invasive Guinea grass to remove as well!



Photos 11-12. Volunteers included local members of the TX Master Naturalists and CWMA members with representatives from the City of Port Aransas, the Texas Forest Service, CBBEP, TX Parks & Wildlife Dept and staff from the Mission-Aransas National Estuarine Research Reserve.



Photos 13-14. Volunteers using a chainsaw (top left) and a battery powered Sawzall (right) to cut down larger Brazilian peppertrees. Once the peppertrees were cut down, an herbicide was applied to the stump.

Fall Workday Event – November 10, 2022

The CWMA hosted a Fall workday on November 10th, 2022. Fifteen CWMA members and volunteers worked for three hours to remove Brazilian peppertree on Port Aransas Nature Preserve property near the Leonabelle Turnbull Birding Center. Multiple trailer loads (approximately 0.50 acres) of Brazilian peppertree were removed from this area. Volunteers from the following organizations participated: Mission-Aransas NERR, Coastal Bend Bays & Estuaries Program, Texas Parks and Wildlife Department, South Texas Master Naturalists, City of Port Aransas Staff, and Port Aransas citizens.

Below are some pictures showing location and techniques used during the event:



Map 5. Map showing area of Port Aransas Nature Preserve property where volunteers removed Brazilian peppertree for the Fall 2022 CWMA workday event on November 10, 2022.



Photo 15. CWMA members and volunteers at the Port Aransas Nature Preserve during the Fall 2022 CWMA workday.



Photos 16-17. Volunteers removing Brazilian peppertrees during the Fall 2022 CWMA workday.



Photos 18-19. Before (photo on left) and after (photo below) showing Brazilian peppertree removal during the Fall 2022 CWMA workday.

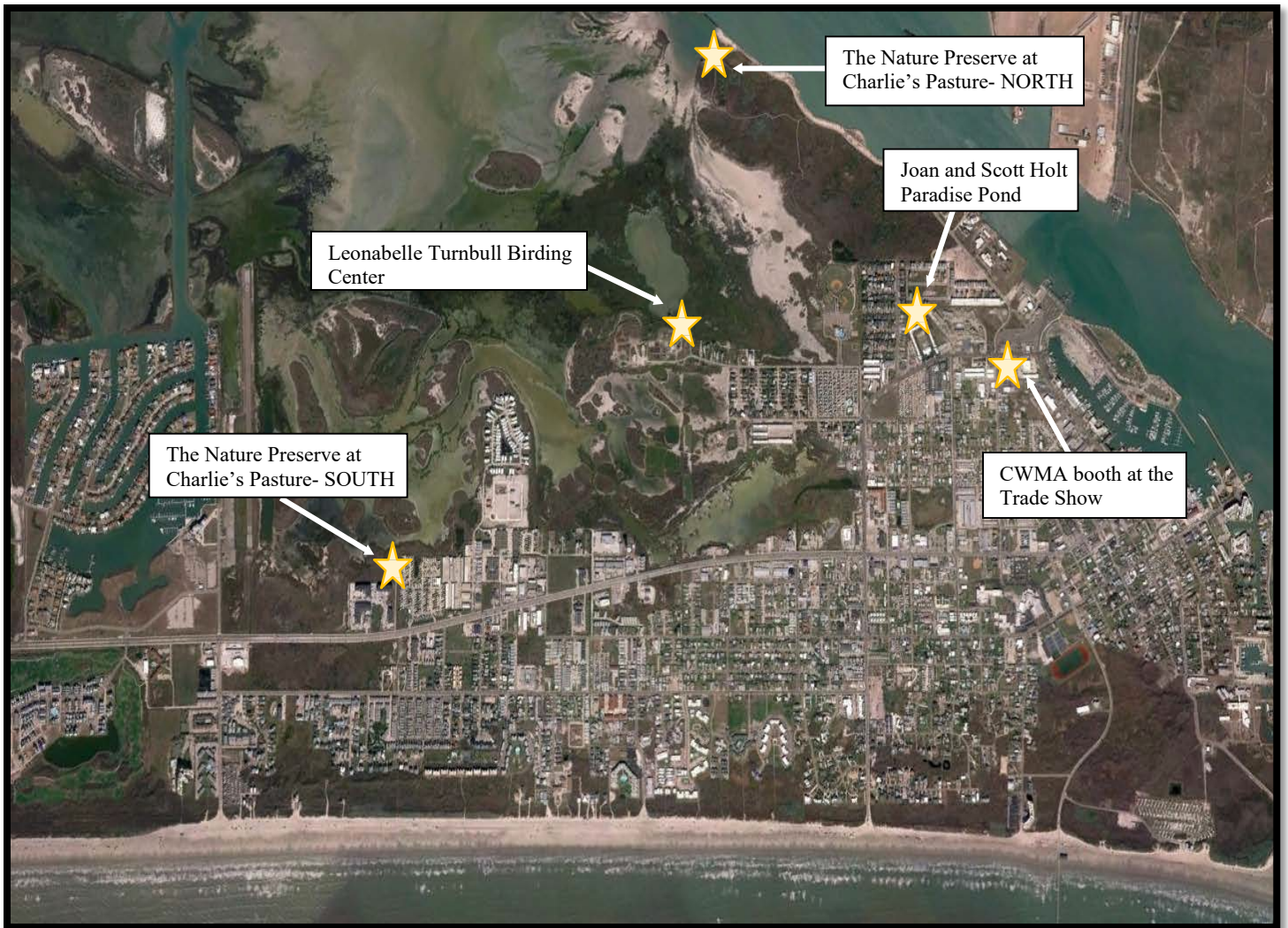


Note: Any BP remaining in photo was not on City property or a truck herbicide application was completed.

Community Event – February 24-26, 2023

The CWMA hosted their Spring Community Event on February 24-26, 2023 in conjunction with the 2023 Whooping Crane Festival held in Port Aransas, TX. CWMA members volunteered to provide outreach on the importance of invasive species control for native habitat and wildlife. Volunteers were posted at each of the Port Aransas Nature Preserve sites, as well as at a booth in the Whooping Crane Festival Trade Show. At the booth, brochures about the Texas Gulf Region CWMA, Brazilian peppertree removal, and free goodies were handed out anyone that stopped at the table. At the 2023 Festival, seven CWMA members volunteered. 329 individuals stopped by the table at the Trade Show booth and were educated on Brazilian peppertrees and native South Texas plants. Other Nature Preserve Sites were visited over 3,000 times. Some of these people were educated on Brazilian peppertrees, but all of these people were on site to enjoy the native, local habitats and wildlife.

A map of the volunteer locations and the CWMA booth can be seen below:



Map 6. February 2023 CWMA Community Event Volunteer Locations



Photos 20-22. CWMA volunteers talking with the public about the invasive Brazilian peppertree during the CWMA 2023 Community Event. 329 individuals stopped by the CWMA table at the Whopping Crane Festival Trade Show.

Task 6 Summary: Project Monitoring & Reporting

A total of 5 quarterly reports were submitted to the GLO-CMP project manager over the course of the project. The draft final report will be submitted by March 15, 2023, and the final report and closeout form will be submitted by March 31, 2023.

Appendix A

Summary Report and Photo Documentation for Brazilian Peppertree Removal

Submitted by Triton Environmental Solutions, LLC

Brazilian Pepper-tree Foliar Control				
Treatment type	Product(s)	Active chemicals	Mixture	4 Gallon 512 oz Total Volume
Foliar	Triclopyr Herbicide	Triclopyr	4% Triclopyr	20.48 oz
			0.5% surfactant	2.56 oz
			95.5% water	488.96 oz
Brazilian Pepper-tree Cut Stump Control				
Treatment type	Product(s)	Active chemicals	Mixture	1 Gallon 128 oz Total Volume
Cut Stump	Triclopyr Herbicide	Triclopyr	96% Triclopyr	122.88 oz
			0.0% surfactant	2.56 oz
			4% Blue Dye	5.12 oz

Zone 4
12.94-Acres
New Growth Treatment Area

Cut Stump And Mulch Area

Date	Project Summary	Start Time	Stop Time	Progress
6/13/2022	Cut Stump and Herbicide Treatment	7:00	3:00	20% Complete (1.85 Ac)
6/14/2022	Cut Stump and Herbicide Treatment	7:00	3:00	40% Complete (1.85 Ac)
6/15/2022	Cut Stump and Herbicide Treatment	7:00	3:00	60% Complete (1.85 Ac)
6/16/2022	Cut Stump and Herbicide Treatment	7:00	3:00	80% Complete (1.85 Ac)
6/17/2022	Cut Stump and Herbicide Treatment	7:00	3:00	100% Complete (1.85 Ac)
6/20/2022	Mulch Distribution	7:00	3:00	Approx. 7 cu yd mulched in place
6/21/2022	Mulch Distribution	7:00	3:00	Approx. 7 cu yd Hauled Off Site 5 yds mulched in Place
6/22/2022	Mulch Distribution	7:00	3:00	Approx. 7 cu yd mulched in place
6/23/2022	Mulch Distribution	7:00	3:00	Approx. 7 cu yd mulched in place
6/24/2022	Mulch Distribution	7:00	5:00	Approx. 7 cu yd mulched in place
6/25/2022	Cut Stump and Herbicide Treatment	7:00	5:00	Completed Area around Boat Storage
6/26/2022	Mulch Distribution	7:00	5:00	Approx. 7 cu yd Hauled Off Site
7/6/2022	New Growth Retreatment	8:00	12:00	Treated Zone 4 (12.94 Acres)

Zone 4.3
1.85-Acres
Cut Stump And Mulch Area

Date
6/13/
6/14/
6/15/
6/16/
6/17/
6/18/
6/19/
6/20/
6/21/
6/22/
6/23/
6/24/
6/25/
6/26/
7/6/

**University of Texas Marine Science Institute 1.85-Acre Site (Zone 4.3)
Brazilian Peppertree Cut Stump Herbicide Application Services
(Zone 4) Herbicide Treatment 12.94 Acres
Timeframe: June 13- 26, July 6, 2022**

Prepared By:

**Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, TX 78381**



Prepared for:
UT Marine Science Institute (UTMSI)
750 Channel View Dr.
Port Aransas, TX 78373-5015

Map Notes:
For planning and permitting purposes only, not for construction.
Map Preparation Date: July 7, 2022 (RKW).
Base Map Source: Low-Altitude Aerial Imagery Obtained from
Connect Explorer; Photo Date: January 26, 2021.
All created layers on this map are georeferenced from PDF files and are approximate



University of Texas Marine Science Institute (UTMSI)

Brazilian Peppertree Control: Treatment and Removal Project

Project Summary

- Project Timeframe: June 13 – July 6, 2022
 - Cut Stump and Herbicide Application: June 13 – 17, 2022
 - Mulch Distribution: June 20 – 26, 2022
 - New Growth Re-Treatment: July 6, 2022
- Approximate Acreage of Brazilian Peppertree Treated and Removed: 1.85 Acres



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Cut Stump, Treatment, and Piling of Cut Brazilian Peppertree
-Treatment and Removal Area: 1.85 Acres
-Project Initiation: June 13, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Cut Stump, Treatment, and Piling of Cut Brazilian Peppertree
-Treatment and Removal Area: 1.85 Acres
-Project Initiation: June 13, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Cut Stump, Treatment, and Piling of Cut Brazilian Peppertree
-Treatment and Removal Area: 1.85 Acres
-Project Initiation: June 13, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Cut Stump, Treatment, and Piling of Cut Brazilian Peppertree
-Treatment and Removal Area: 1.85 Acres
-Project Initiation: June 13, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Cut Stump, Treatment, and Piling of Cut Brazilian Peppertree
-Treatment and Removal Area: 1.85 Acres
-Project Initiation: June 13, 2022



Zone 4.3: Representative Photos of Mulching in Place

-Approximate Acreage of Brazilian Peppertree Removed from Project Area: 1.85 Acres

-Project Timeframe: June 13 – July 6, 2022



Zone 4.3: Representative Photos of Mulching in Place

-Approximate Acreage of Brazilian Peppertree Removed from Project Area: 1.85 Acres

-Project Timeframe: June 13 – July 6, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application
-Representative Photos of Clearing Brazilian Peppertree and Mulch Distribution
-Treatment and Removal Area: 1.85 Acres
-Project Timeframe: June 13 – July 6, 2022



Zone 4.3: Brazilian Peppertree Removal (Cut Stump and Mulch) and Herbicide Application

-Representative Photos of Clearing Brazilian Peppertree and Mulch Distribution

-Treatment and Removal Area: 1.85 Acres

-Project Timeframe: June 13 – July 6, 2022



Zone 4.0: Brazilian Peppertree Herbicide Re-Application
-Representative Photos of Re-Treatment Area: 10.0 Acres
-Project Timeframe: June 13 – July 6, 2022

Appendix B

Summary Report and Site Visit Report for Dune Restoration Work

Submitted by Triton Environmental Solutions, LLC



**Zone 4.3: Native Transplant and Restoration Services:
Beach Street Property
(Purchase Order No. 2023A06659)**

**University of Texas at Austin
Marine Science Institute (UTMSI)**

750 Channel View Dr.
Port Aransas, Texas 78373

Harvest & Transplant Summary:

-Triton harvested from approved UTMSI borrow areas and transplanted the following species:

- Approximately 400 1-gallon planting units of coastal bluestem (*Schizachyrium littorale*).
- Approximately 200 1-gallon planting units of *Paspalum spp.*
- Approximately 4,400 planting units of 1-inch planting units of saltmeadow cordgrass (*Spartina patens*).

Zone 4.3: Native Transplant and Restoration Services UTMSI Beach Street Property

Harvest Period: December 13 & 14, 2022



Representative photos of Triton harvesting coastal bluestem (*Schizachyrium littorale*) from approved borrow area, plant harvest location #2, located within UTMSI property off Beach Street in Port Aransas, TX. All coastal bluestem and *paspalum spp.* for the transplanting services were harvested from this location.

Representative photo of approved borrow area for saltmeadow cordgrass (*Spartina patens*). Borrow area is located in Rockport, TX and is one of Triton's preferred plant harvest locations.

Zone 4.3: Native Transplant and Restoration Services UTMSI Beach Street Property

Transplant Period: December 15 & 16, 2022



Representative photos of Triton transplanting native species within the transplanting and restoration area (Zone 4.3). Transplant units were spaced on 3-foot centers. Saltmeadow cordgrass transplants were planted throughout the entire site but were primarily concentrated at lower elevations surrounding the ponded area. The coastal bluestem and paspalum spp. transplants were planted at slightly higher elevations throughout Zone 4.3 with planting concentrations focused on the dune slopes and open ground areas.

**Zone 4.3: Native Transplant and Restoration Services
UTMSI Beach Street Property**

Transplant Period: December 15 & 16, 2022



Representative photo of individual saltmeadow cordgrass transplant.



Representative photo of individual coastal bluestem transplant.



Representative photo of individual Paspalum spp. transplant.

**Zone 4.3: Native Transplant and Restoration Services
UTMSI Beach Street Property**

Transplant Period: December 15 & 16, 2022



Representative photos of native transplant and restoration service area (Zone 4.3), post-transplanting.

Zone 4.3: Native Transplant and Restoration Services UTMSI Beach Street Property

Transplant Period: December 15 & 16, 2022



Representative photo of native transplant and restoration service area (Zone 4.3), post-transplanting and Triton staff performing irrigation of transplanting units.



Representative photo of Triton's water pump set-up utilized for irrigation. Triton used water sourced from the ponded area on-site to irrigate transplanting units.

Legend

 UTMSI Approved On-Site Harvest Locations



Approved On-Site Harvest Location #2

Approved On-Site Harvest Location #1



Legend

 UTMSI Approved Off-Site Harvest Location



Approved Off-Site Harvest Location

Note: UTMSI approved off-site location provided by Triton Environmental Solutions, LLC located in Rockport, TX.



Overview Map: Approved Borrow Areas

Zone 4.3: Native Transplant Services
Beach Street Property Project
Port Aransas, Texas

Prepared By:

Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, Texas 78381





Prepared For:
University of Texas at Austin Marine Science Institute (UTMSI)
750 Channel Dr.
Port Aransas, TX 78373

Map Notes:
For planning and permitting only, not for construction.
Base Map Source: ESRI World Imagery.
Map Preparation Date: 12/19/2022 (SP).



Legend

-  Zone 4.3 Restoration Area (1.85-Acres)
-  Native Transplant Area (1.0-Acres)



Overview Map: Zone 4.3 Native Transplant Area

Zone 4.3: Native Transplant Services
Beach Street Property Project
Port Aransas, Texas

Prepared By: Triton Environmental Solutions, LLC
P.O. Box 1755
Rockport, Texas 78381



Prepared For: University of Texas at Austin Marine Science Institute (UTMSI)
750 Channel Dr.
Port Aransas, TX 78373

Map Notes:
For planning and permitting only, not for construction.
Base Map Source: ESRI World Imagery.
Map Preparation Date: 12/19/2022.





**Zone 4.3: Native Transplant and Restoration Services:
Beach Street Property
(Purchase Order No. 2023A06659)**

**University of Texas at Austin
Marine Science Institute (UTMSI)**
750 Channel View Dr.
Port Aransas, Texas 78373

- Triton conducted a site visit December 30, 2022, to assess the health and condition of the planting units installed December 15 & 16, 2022.
- Site Visit occurred after an extended hard freeze event that moved through the area on December 22nd – December 24th.
- No irrigation is recommended at this time.

**Zone 4.3: Native Transplant and Restoration Services
UTMSI Beach Street Property**

Transplant Period: December 15 & 16, 2022; Hard Freeze Event: December 22 – 24, 2022; Site Assessment: December 30, 2022



Representative photo of individual coastal bluestem transplant.



Representative photo of individual saltmeadow cordgrass transplant.



Representative photo of individual saltmeadow cordgrass transplant.

**Zone 4.3: Native Transplant and Restoration Services
UTMSI Beach Street Property**

Transplant Period: December 15 & 16, 2022; Hard Freeze Event: December 22 – 24, 2022; Site Assessment: December 30, 2022



Representative photos of native transplant and restoration service area (Zone 4.3), post-transplanting and one-week following the December 22nd hard freeze.