GALVESTON BAY FOUNDATION

PROTECT TODAY. PRESERVE TOMORROW.

Native Plant Program

Ricci Simmons, Conservation Stewardship Manager

Our Mission & Vision

Mission

The mission of Galveston Bay Foundation is to preserve and enhance Galveston Bay as a healthy and productive place for generations to come.

Vision

We envision a future Galveston Bay that is brimming with vitality, connected to people, and contributing to the community in every possible way.

Program Areas

Education

Habitat Restoration

Land Conservation

Water Protection

Research

Advocacy

Land Conservation

“Conservation is a state of harmony between men and land” -Aldo Leopold

“The world, we are told, was made especially for man- a presumption not supported by all the facts” – John Muir

“A people without a land ethic is a people without a future.” – Aldo Leopold

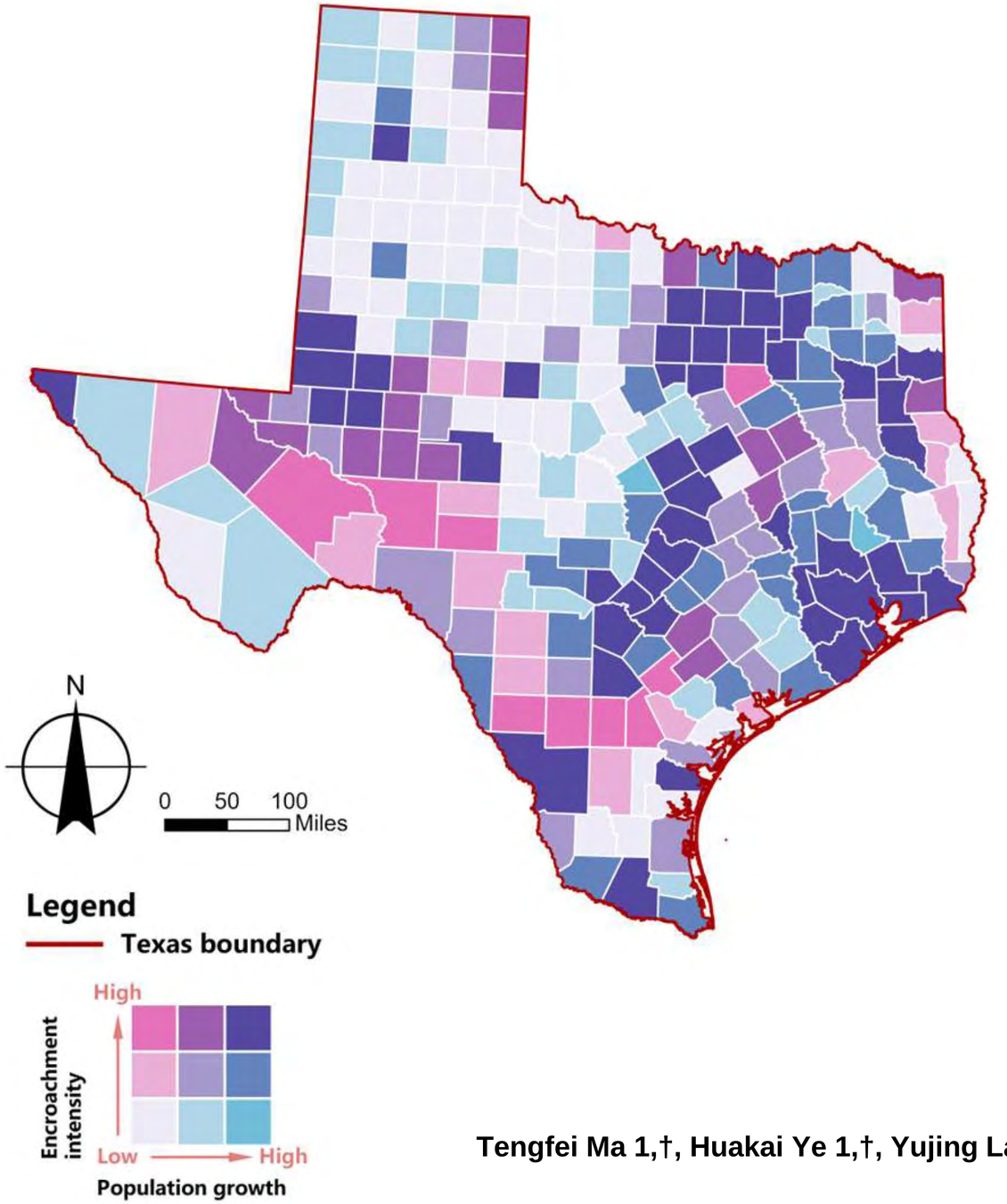
Land Conservation | How and why we protect land?

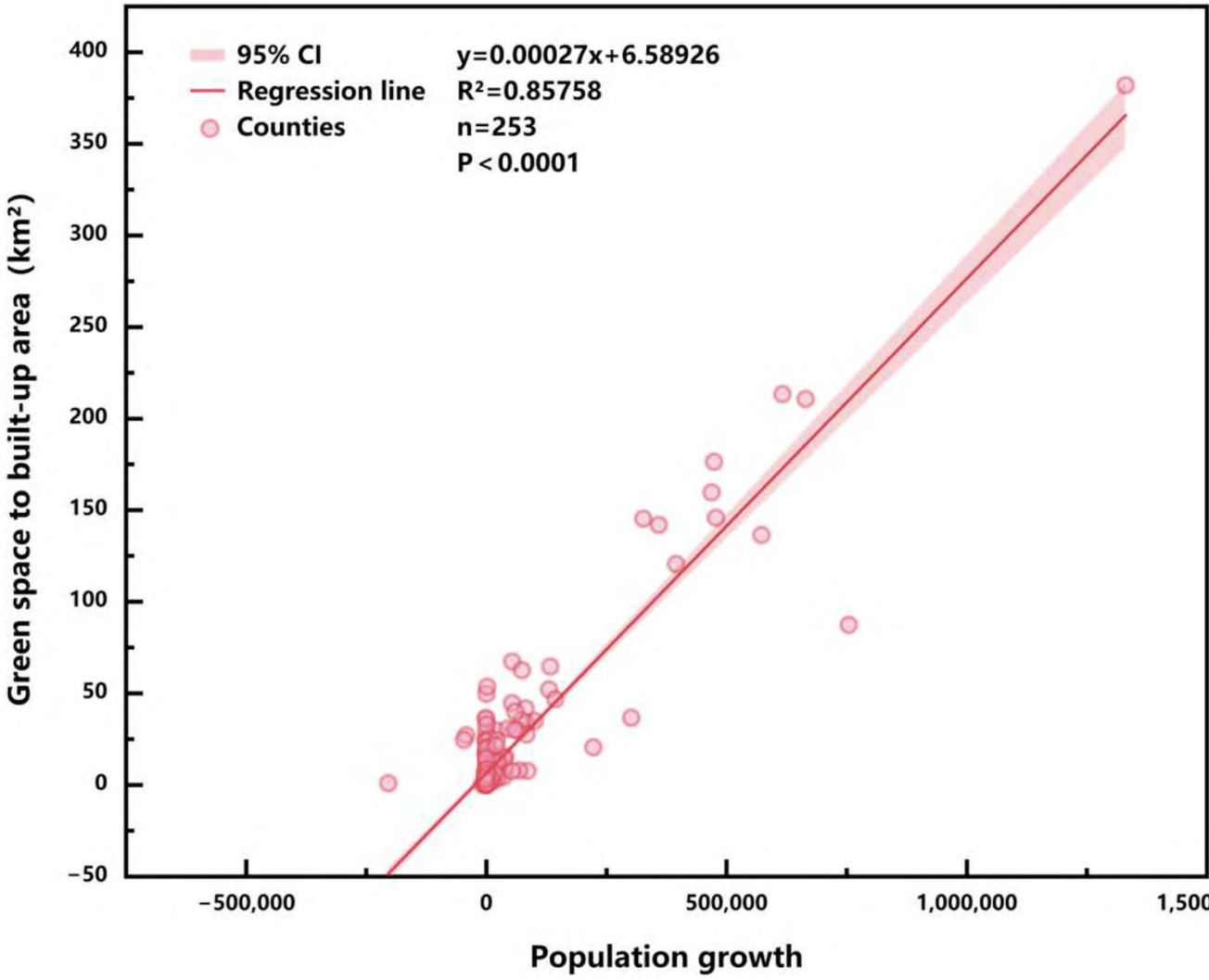
Accredited Land Trust 17,000+ acres protected

Stewardship

Loss of habitat or green space

- Conversion
- Erosion and Subsidence
- Sea Level Rise
- Water Management Issues/Pollution

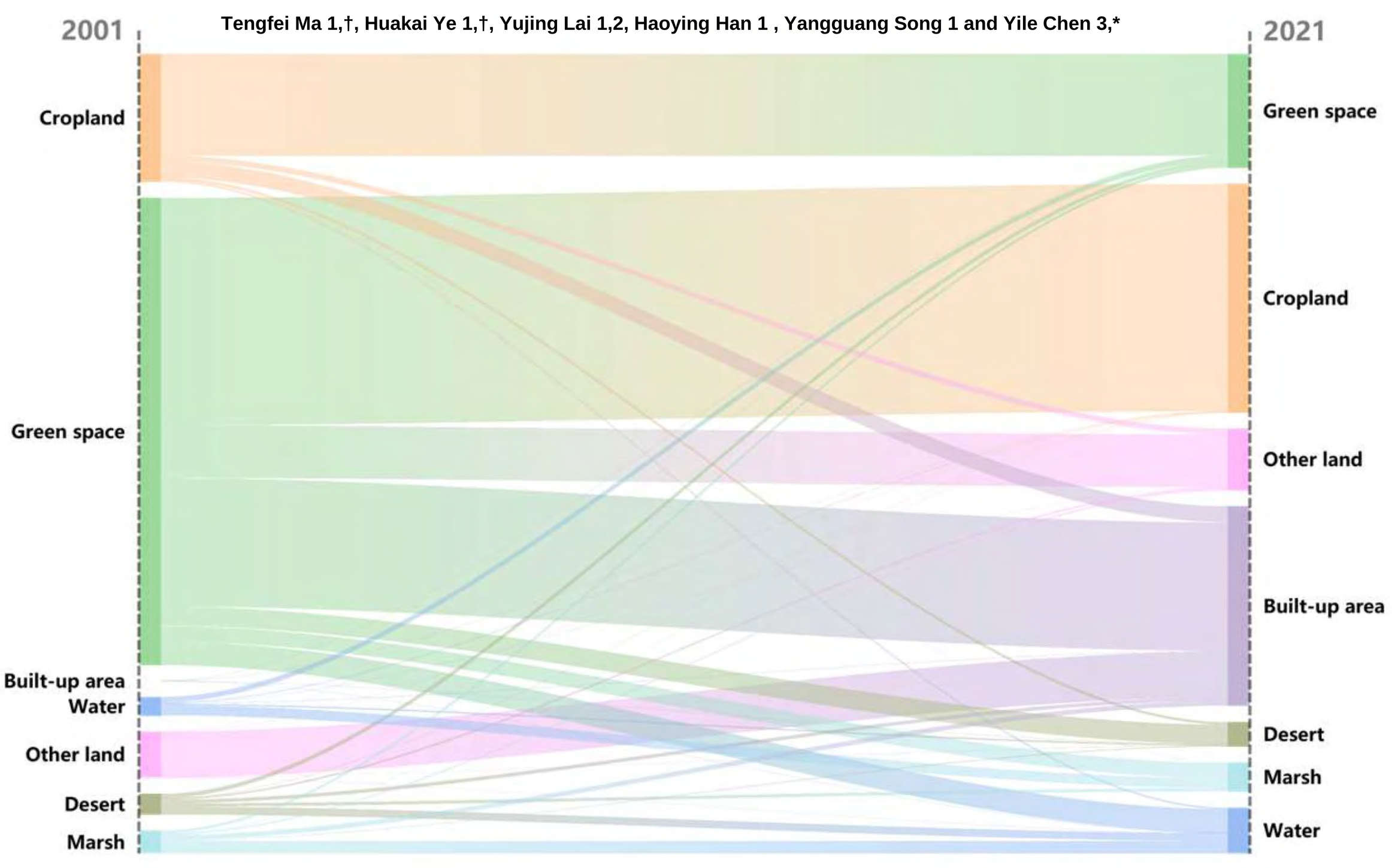


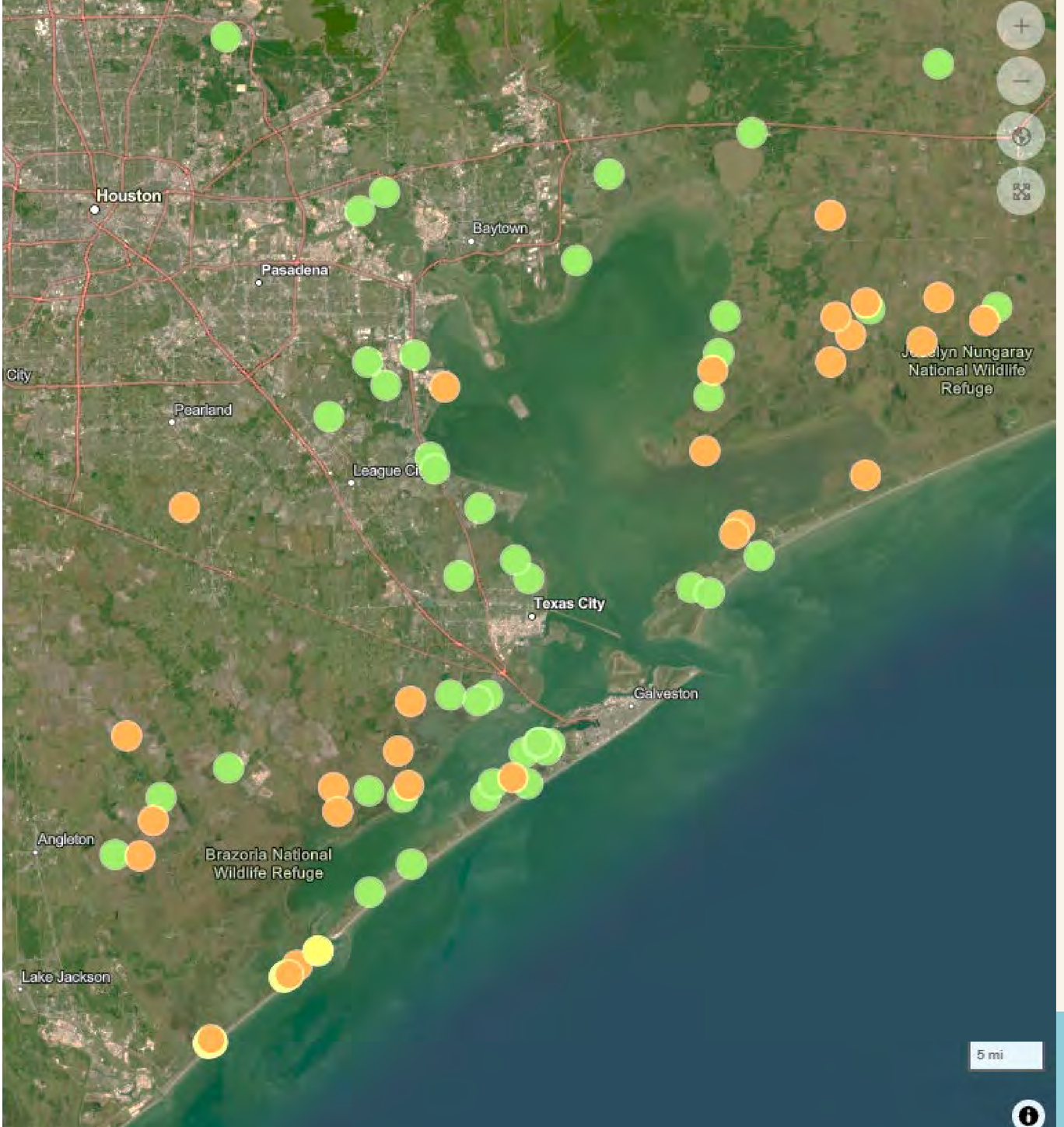


Tengfei Ma 1,†, Huakai Ye 1,†, Yujing Lai 1,2, Haoying Han 1 , Yangguang Song 1 and Yile Chen 3,*

(a) (b)

Tengfei Ma 1,†, Huakai Ye 1,†, Yujing Lai 1,2, Haoying Han 1 , Yangguang Song 1 and Yile Chen 3,*





Land Conservation | Where ?

Marsh- Living shorelines, oyster reef revitalization, BU projects

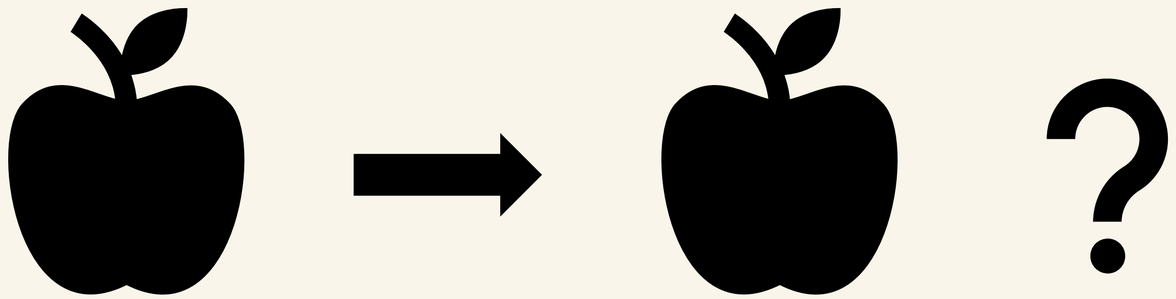
Prairie- local seed sources using seed drill or live plant material

Freshwater wetland- rescued live plant material

Land Conservation | Why Native?

Genetic advantage

- Micro-climate
- Symbiosis with biota
- Stress tolerance
- Defense



Native Plant Program | Ecocenter

- Galveston Bay Foundation (GBF) staff, volunteers, and the Department of Agriculture (NRCS) collect, germinate, and grow over 100 species on site and produce up to 10,000 upland prairie plants and 100,000+ estuarine plants.
- The facility is owned by NRG power plant and allows GBF to lease the facility in Baytown, TX.

Land Conservation | Ecocenter - Marsh grass


TAN XD
SV 4x4

Land Conservation | Wetlands at Kemah


FUTURE HOME OF THE
GESSNER CENTER
FOR
GALVESTON BAY
FOUNDATION
Robbins' Prairie
RESTORED NATIVE PRAIRIE FOR GALVESTON BAY
Visit galvbay.org
GALVESTON BAY
FOUNDATION


SHIMS
WATER JET
LASER
WIRE EDM
STAMPING

Public Market Plant Sales

- 4 sales annually
- ~$10 - $12, 1-gallon pots
- ~$4 - $6, 4-inch pots


2388 AXIAL-FLOW
CASE IH
Shelbourne
REYNOLDS

GALVESTON BAY FOUNDATION

Protect Today.

Preserve Tomorrow.

galvbay.org | 1725 Highway 146, Kemah, TX 77565 | 281-332-3381

GALVESTON BAY FOUNDATION

PROTECT TODAY. PRESERVE TOMORROW.

Construction and Monitoring of the Dollar Bay-Moses Lake Marsh Terraces

Jeffrey Fato; Habitat Restoration Manager

Our Mission & Vision

Mission

The mission of Galveston Bay Foundation is to preserve and enhance Galveston Bay as a healthy and productive place for generations to come.

Vision

We envision a future Galveston Bay that is brimming with vitality, connected to people, and contributing to the community in every possible way.

Program Areas

Education

Habitat Restoration

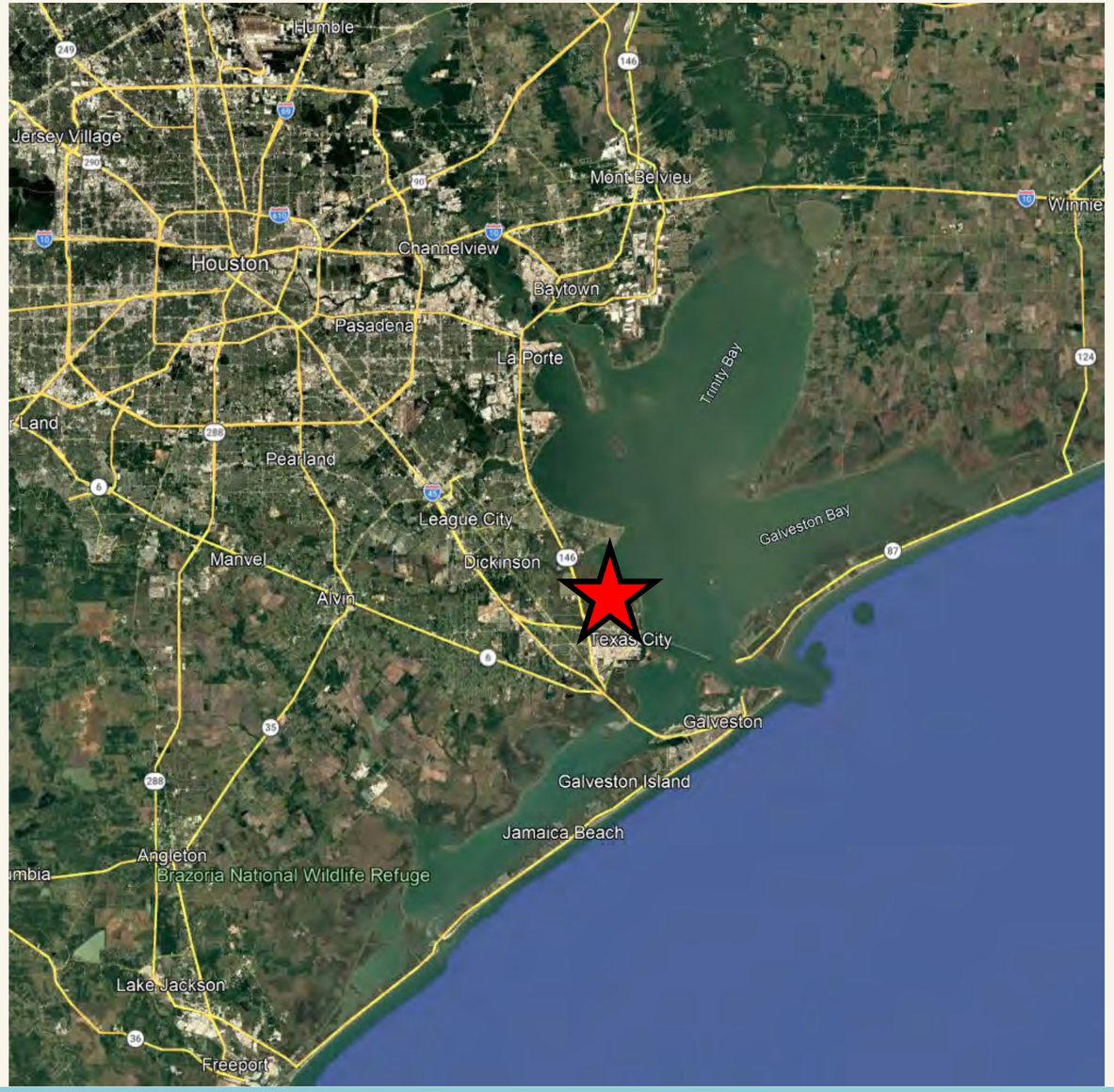
Land Conservation

Water Protection

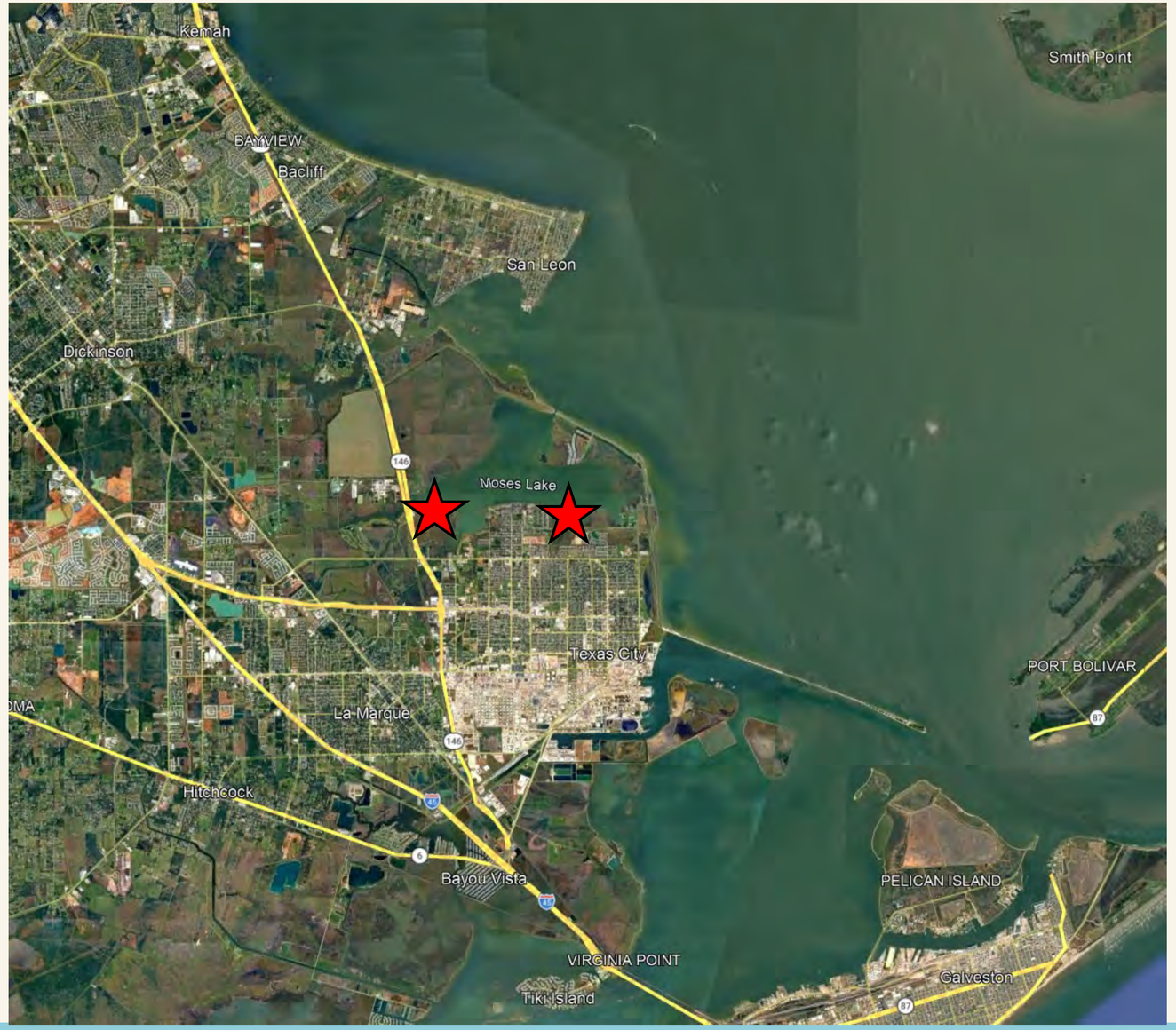
Research

Advocacy

Dollar Bay-Moses Lake | *Location*

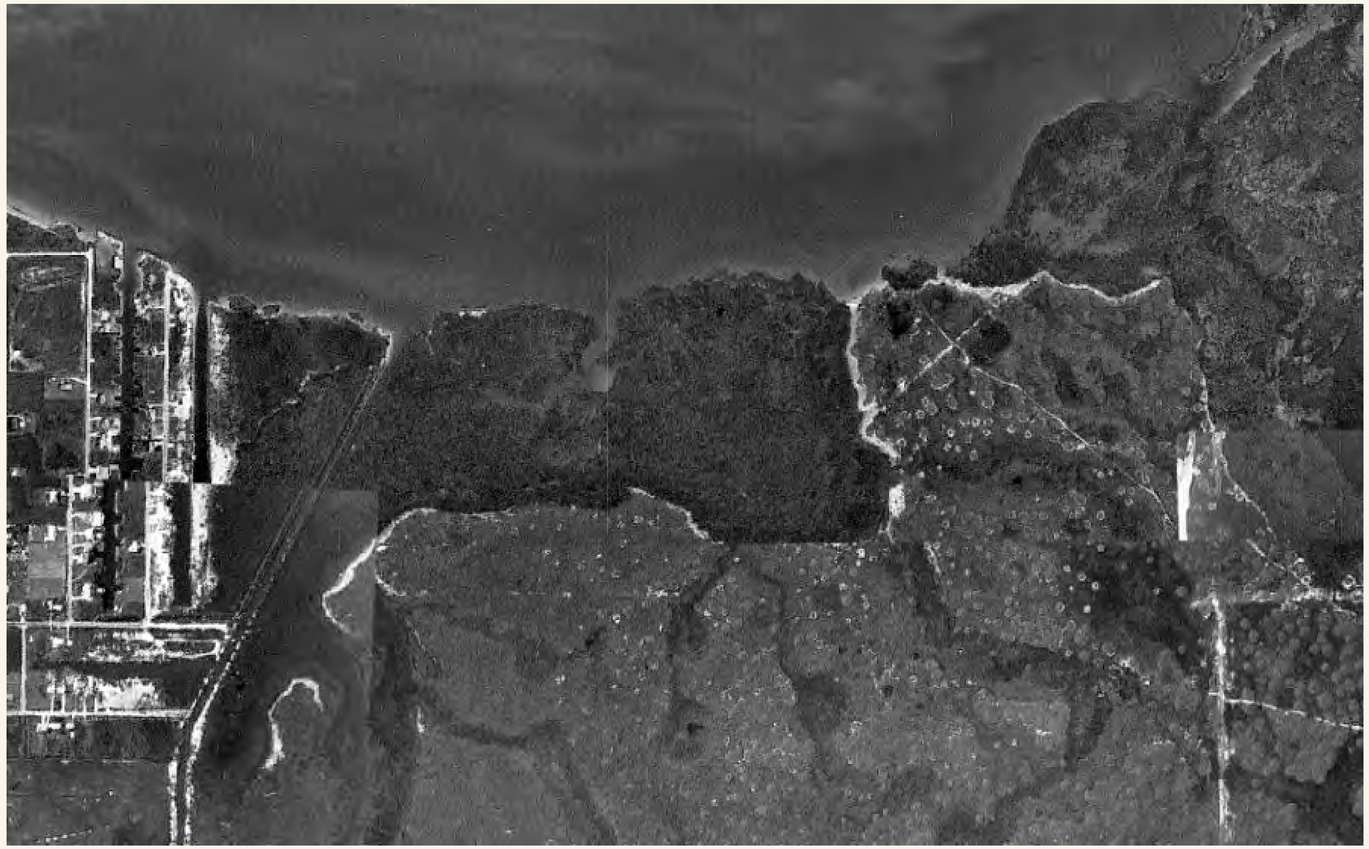


Dollar Bay-Moses Lake | *Location*



Dollar Bay-Moses Lake | *Location*

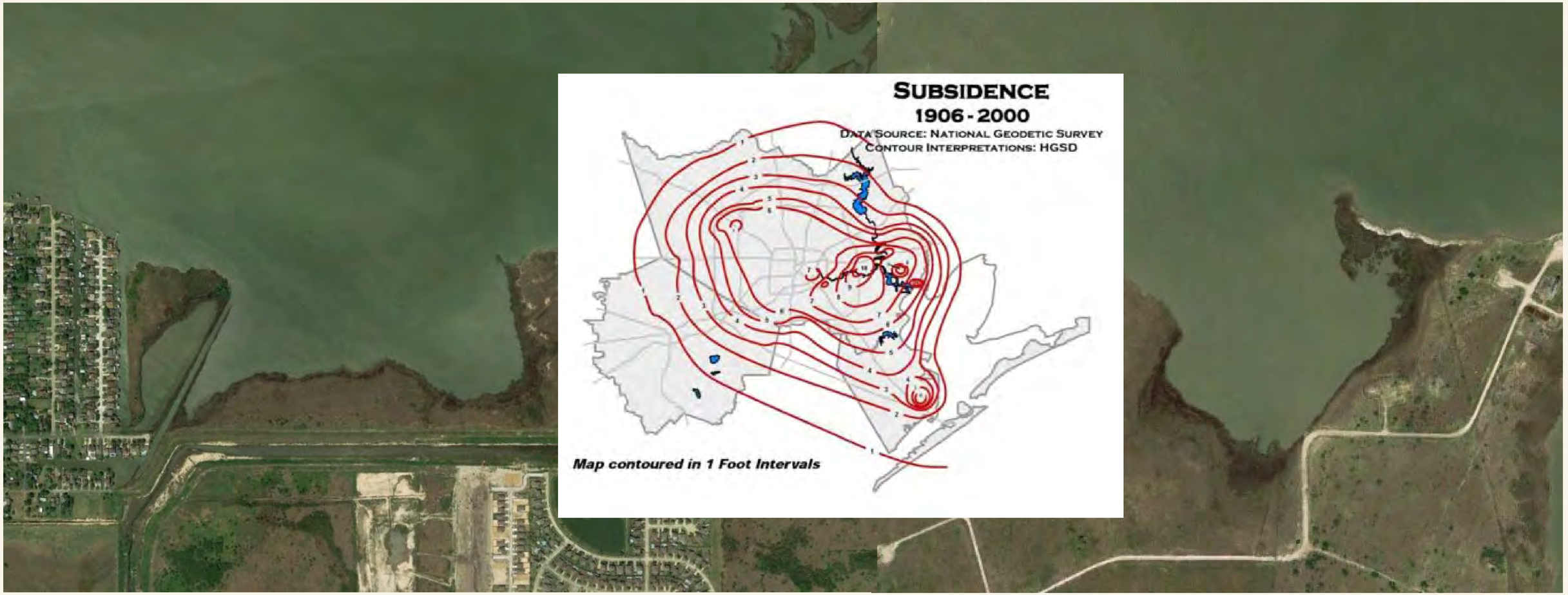
Dollar Bay-Moses Lake | *1968*



Site 1

Site 2

Dollar Bay-Moses Lake | *2018*



Site 1

Site 2

Dollar Bay-Moses Lake | *Wetland Restoration and Protection to Reduce Erosion*

Tier 1 Project in the 2019 Texas Coastal Resiliency Master Plan

Funded by:

NFWF National Coastal Resilience Fund

NFWF Gulf Environmental Benefit Fund

GLO Coastal Erosion Planning & Response Act

CCA Habitat Today for Fish Tomorrow and Building Conservation

TCEQ Galveston Bay Estuary Program

City of Texas City through Ducks Unlimited

USFWS Coastal Program

Accenture

Various private donations

Project Cutsheets | Region 1 | Galveston County

Dollar Bay Wetland Protection, Restoration, and Acquisition *(9066)*

Estimated Project Cost: $9,700,000

ABILITY TO ADDRESS VULNERABILITIES

Land Change | Flooding | Degraded Water Resources

LOCATION:
Locations along the shorelines of Dollar Bay and Moses Lake in Texas City

STATUS:
Engineering & Design

STAKEHOLDERS:
- ***Galveston Bay Foundation***
- National Fish and Wildlife Foundation
- National Oceanic and Atmospheric Administration
- U.S. Fish and Wildlife Service
- Texas General Land Office
- Ducks Unlimited
- City of Texas City
- The Nature Conservancy
- Natural Resources Conservation Service
- Coastal Conservation Association
- Shell Oil

ACTIONS:

PROJECT TYPE(S):
Habitat Creation and Restoration; Shoreline Stabilization; Land Acquisition

Project Description

The first phase of this project included constructing marsh terraces at two sites in the Dollar Bay and Moses Lake system, with breakwaters also constructed to protect the newly restored marsh. That project included acquisition of approximately 102 acres of coastal prairie habitat directly adjacent to the wetland restoration site at 50% of the appraisal value. The parcel was owned by a willing seller and was in immediate threat of development, with permitted development plans in place, but is now under conservation easement. Additional funding is necessary for the current project to construct additional shoreline protective breakwaters in front of the recently acquired 102-acre property. This project will build upon past projects at the site, including a living shoreline along The Nature Conservancy's Texas City Prairie Preserve in the same Dollar Bay and Moses Lake system.

Project Need

This area provides highly productive habitat, which is important to the life cycle of a number of marine and avian species. Subsidence, shoreline erosion, and saltwater intrusion have negatively impacted these ecologically important areas. The previously completed restoration project restored 72 acres of intertidal estuarine wetlands and provides shoreline protection for the area. The expansion project would protect approximately 102 acres of coastal prairie that is under conservation easement. This would expand the wetland corridor and better protect the overall ecological health of the area by preventing fragmentation of the wetlands.

POTENTIAL LOCAL BENEFITS

2 Wetland Types

✓ Avoided Future Flood Risk

165 Existing Wetland Carbon Sequestration (tons C)

For more information on cost estimates and project benefits calculations, see page 182 of the 2023 Texas Coastal Resiliency Master Plan.

238 2023 Texas Coastal Resiliency Master Plan

Texas General Land Office

Dollar Bay-Moses Lake | *2019 – Conservation Easement Established*

Dollar Bay-Moses Lake Marsh Terraces | *Engineering & Design*

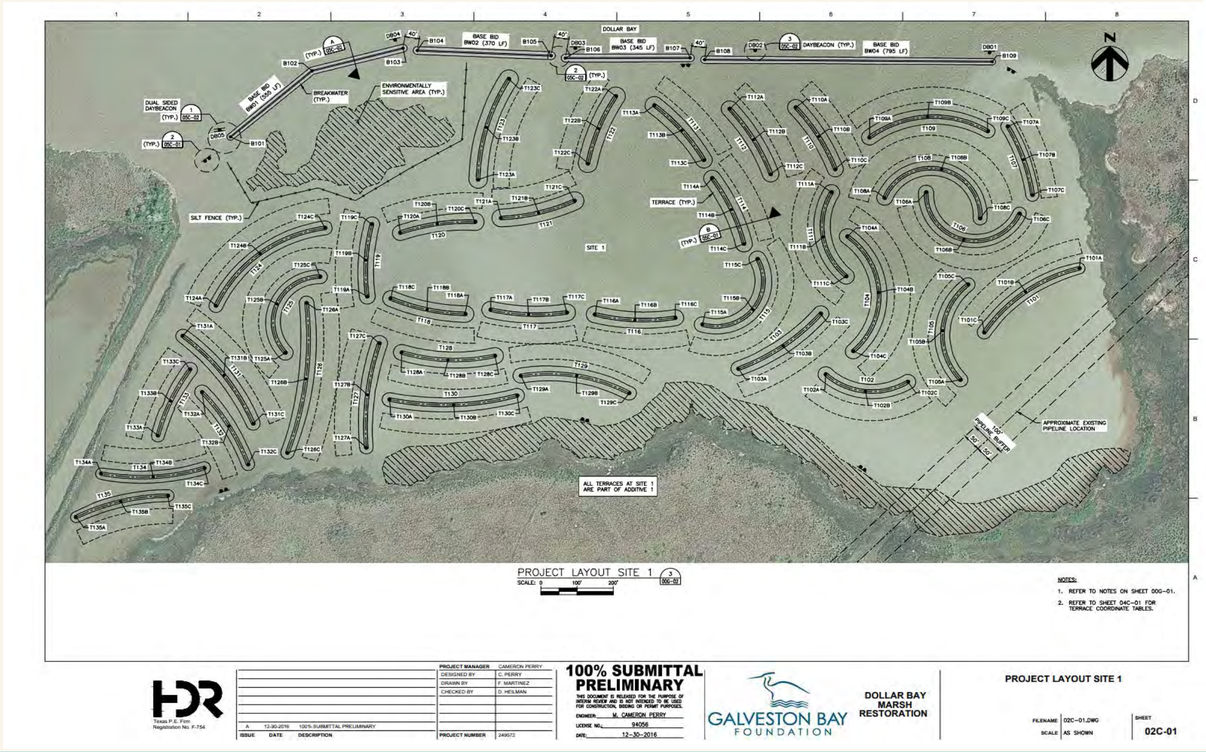
GBF worked with a project advisory committee with representations from NOAA, USFWS, TPWD, GLO, TNC, NRCS, GBEP, and NRG Energy to finalize project designs.

Construction of the breakwaters and marsh terraces was completed June 2021.

3,970 ft of high-profile breakwater

13,902 ft of terrace centerline length

- 26,000 ft (almost 5 miles) of marsh edge habitat created



Dollar Bay-Moses Lake Marsh Terraces | *Construction*

Site 2 - February 2021

Dollar Bay-Moses Lake Marsh Terraces | *Construction*

Site 1 - March 2021

Dollar Bay-Moses Lake Marsh Terraces | *Construction*

Site 2- April 2021

Dollar Bay-Moses Lake Marsh Terraces | *Post Construction Transients*

Black Skimmers on Site 1 Terraces, June 2021

Dollar Bay-Moses Lake Marsh Terraces | *Post Construction Transients*

Site 2, October 2022

Dollar Bay-Moses Lake Marsh Terraces | *Monitoring*

5 years of monitoring post-construction (2022 – 2026)

<u>Monitoring Parameters</u>

- Vegetation Establishment
  - o Stem Density
  - o Percent Aerial Coverage
  - o Productivity
- Elevation

<u>Objective</u>

- 100 stems per sq meter
- 70% aerial coverage (smooth cordgrass)

Site 2 Marsh Terrace Transects

Site 1 Marsh Terrace Transects

Dollar Bay-Moses Lake Marsh Terraces | *Monitoring: Lee College*

Site 1, October 2022

Dollar Bay-Moses Lake Marsh Terraces | *Monitoring: Lee College*

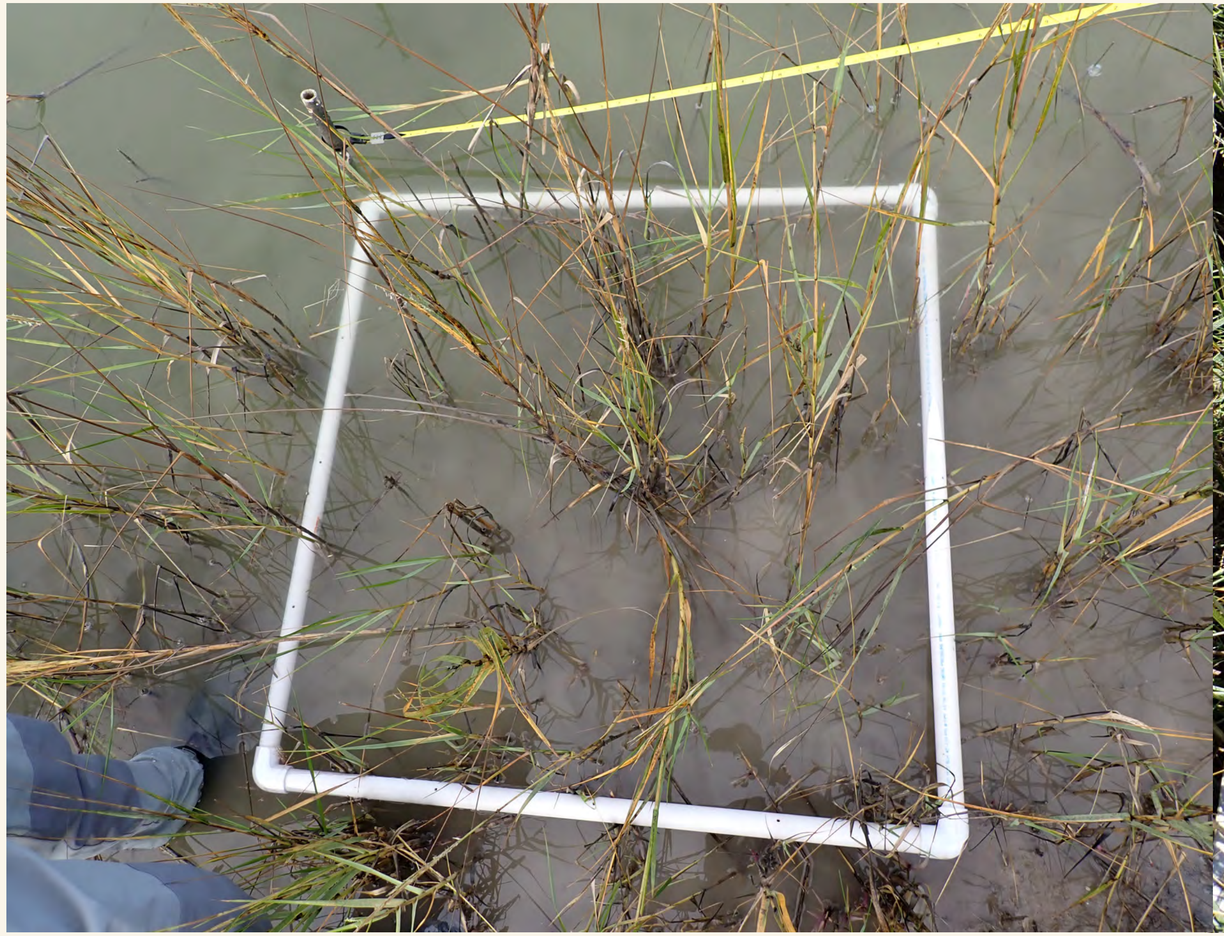
Site 1, October 2022

Dollar Bay-Moses Lake Marsh Terraces | *Monitoring: Lee College*

Site 1, October 2023

Site 1, October 2023

Dollar Bay-Moses Lake Marsh Terraces | *Observations*



Site 2, November 2025

Site 1, November 2025

Dollar Bay-Moses Lake Marsh Terraces | *Observations*

Dollar Bay-Moses Lake Marsh Terraces | *Observations*

Dollar Bay Terraces Elevation Map 2025	
Project Name: Dollar Bay Wetlands Restoration and Protection to Reduce Erosion	
Project Location: Dollar Bay, Galveston County, TX	
Image Source: ESRI World Imagery	
Projection: NAD 1983, UTM Zone 15N	
Date Drawn: 10/16/2025	Drawn by: Jeffrey Fato

GALVESTON BAY FOUNDATION
1725 Highway 146, Kemah, TX; (281) 332-3381

Dollar Bay-Moses Lake Marsh Terraces | *Phase 2 Living Shoreline*

Site 1, October 2022

Dollar Bay-Moses Lake Marsh Terraces | *Best Restored Shores Award 2024*

Site 1, May 2023

ASBP
American Shore & Beach Preservation Association
Coastal Summit
100th Anniversary
Centennial Celebration

Dollar Bay-Moses Lake Marsh Terraces | *Special Thanks to Our Project Partners*

Texas General Land Office — Established 1836

Ducks Unlimited

Seal of the City — 1911 — Texas City, Texas

National Fish and Wildlife Foundation — NFWF

National Oceanic and Atmospheric Administration — NOAA — U.S. Department of Commerce

A Natural Partnership

Building Conservation Trust

Coastal Conservation Association Texas

USDA

accenture — High performance. Delivered.

Coastal Program

MEMORIAL PARK
CONSERVANCY

An upstream piece of Galveston Bay's Ecosystem:

findings from an urban park’s native habitat restoration

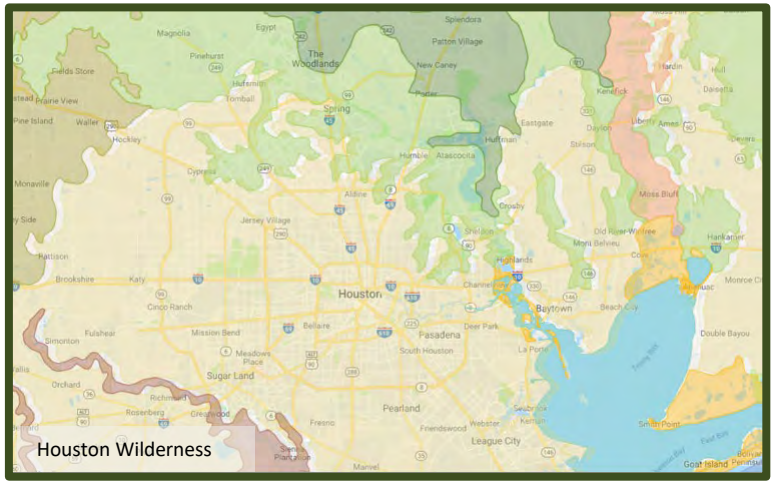
Courtney Hall & Sam Lutfy

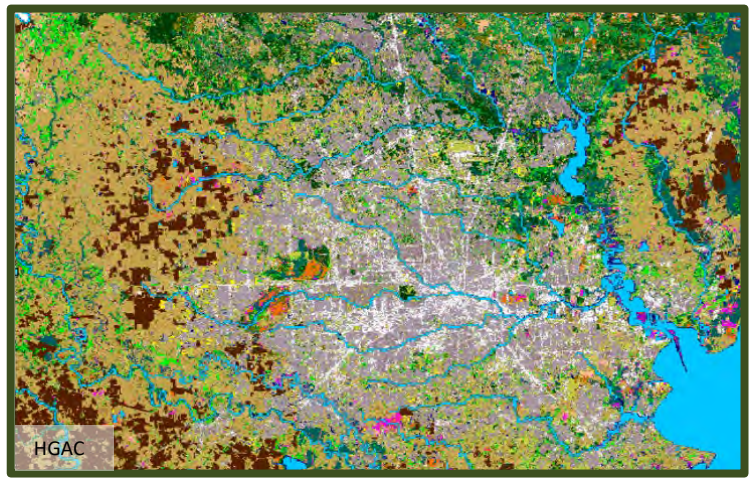
State of the Bay

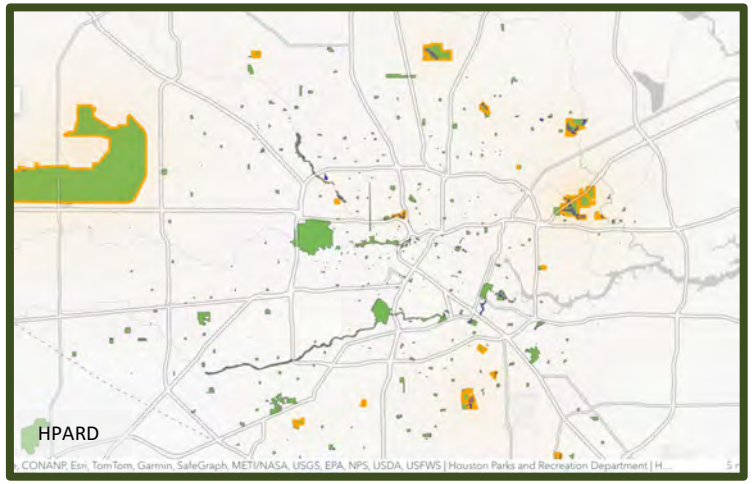
February 2026

MEMORIAL PARK CONSERVANCY

Dispersed Urban Ecosystems





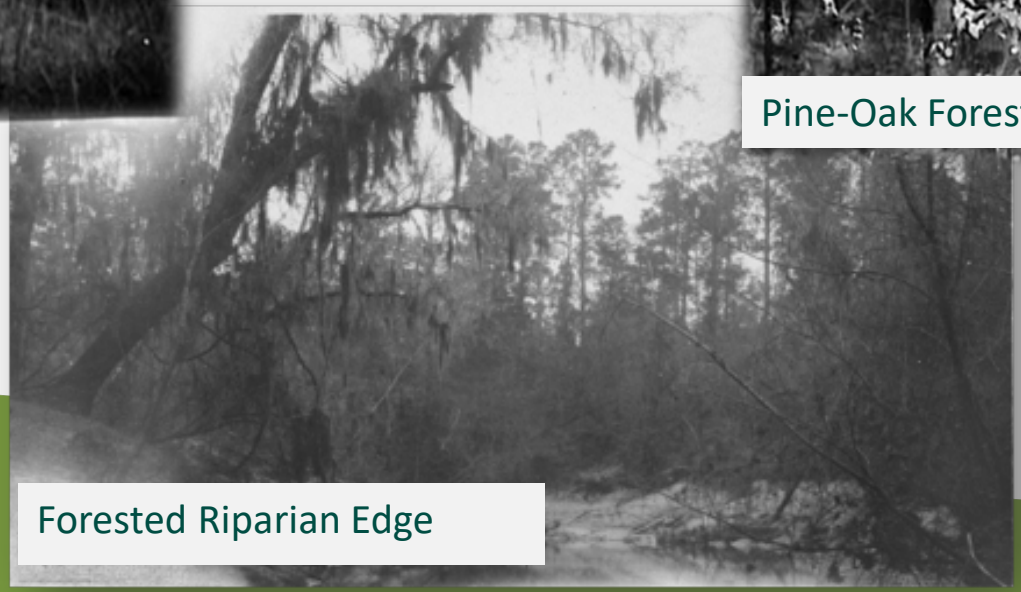


MEMORIAL PARK CONSERVANCY

Park Native Ecosystems

Pine-Oak Savanna

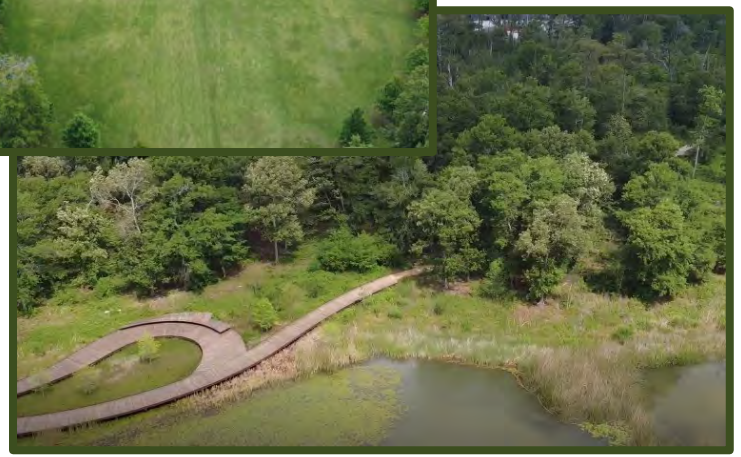
Pine-Oak Forest with American beautyberry



Forested Riparian Edge

MEMORIAL PARK CONSERVANCY

10 Year Master Plan-Eastern Glades



MEMORIAL PARK CONSERVANCY

Habitat Conversion & Management

2017-2019
- Canopy Reduction
- Thicket Thinning

2020
- Herbicide
- Mowing
- Soil Prep

2021
- Soil Prep
- Seeding
- Mowing
- Plugging

2022
- Mowing
- Seeding
- Plugging
- Herbicide

2023
- Herbicide
- Mowing
- Seeding
- Plugging

2024
- Herbicide
- Mowing
- Seeding

2025
- Mowing

MEMORIAL PARK CONSERVANCY

Habitat Conversion

MEMORIAL PARK CONSERVANCY

Flora Surveys

Fall 2014

- Winged elm
- Yaupon
- Common carpetgrass
- Dogfennel
- Deeprooted sedge
- Trumpet vine

- Berg Oliver
- 5 plots, 37’ & 26’ radius plots
- Woody vegetation count
- Herbaceous vegetation percent cover

Summer 2022

- Rustyseed paspalum
- Bushy bluestem
- Common carpetgrass
- Tall goldenrod
- Yellow sorgi
- Virginia buttonweed

- MPC Staff
- 5 transects
- 5 $1m^2$ quadrants per transect
- Herbaceous vegetation percent cover

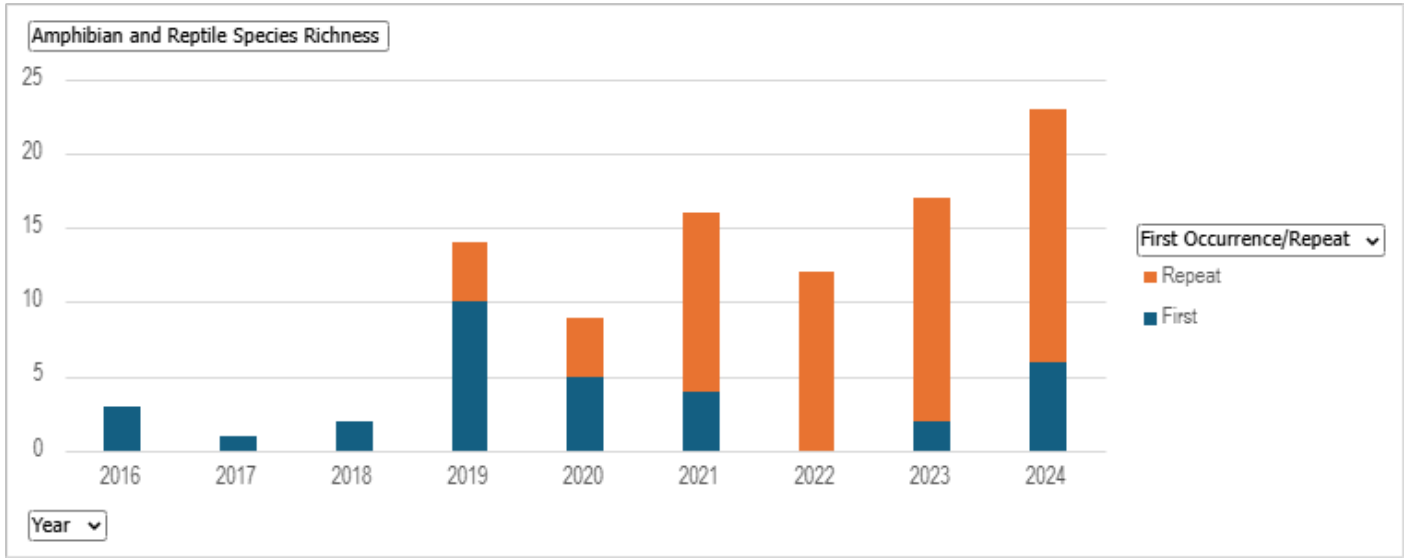
MEMORIAL PARK
CONSERVANCY

Habitat Management

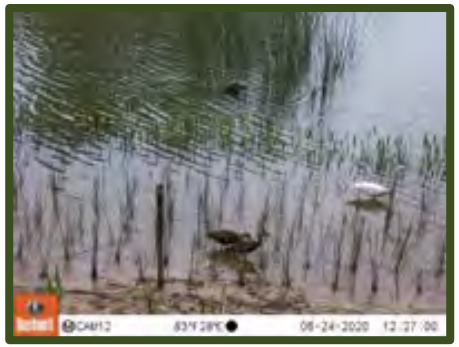
MEMORIAL PARK CONSERVANCY

Fauna Surveys

Speices	Common Name
Eptesicus fuscus	Big brown bat
Lasionycteris noctivagans	Silver-haired bat
Tadarida brasiliensis	Mexican (Brazilian) free-tailed bat
Nycticeius humeralis	Evening bat
Lasiurus borealis	Eastern red bat
Lasiurus seminolus	Seminole bat
Lasiurus cinereus	Hoary bat
Perimyotis subflavus	Tricolored bat/Eastern pipistrelle
Lasiurus intermedius	Northern yellow bat
Nyctinomops macrotis	Big free-tailed bat
Myotis austroriparius	Southeastern myotis



- SWCA Spr/Fall 2016: 24 bird species
- SWCA Spring 2019: 25 bird species
- SWCA Spring 2022: 34 bird species
- eBird since 2019: 187 bird species



MEMORIAL PARK CONSERVANCY

10 Year Master Plan-Land Bridge & Prairie

MEMORIAL PARK CONSERVANCY

Habitat Installation & Management

2020
- Earthwork Begins

2021-2022
- Soil Prep
- Seeding

2023
- Soil Prep
- Seeding
- Project Opens
- Spot Mowing
- Monitoring

2024
- Seeding
- Plugging
- Herbicide
- Mowing

2025
- Herbicide
- Mowing
- Seeding
- Haying

2026
- Mowing

MEMORIAL PARK CONSERVANCY

Habitat Installation

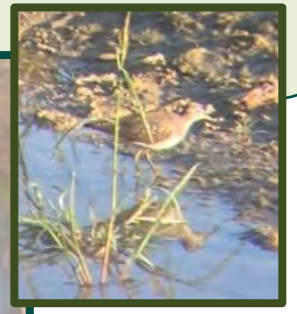
MEMORIAL PARK
CONSERVANCY

Habitat Management

MEMORIAL PARK CONSERVANCY

Fauna Surveys

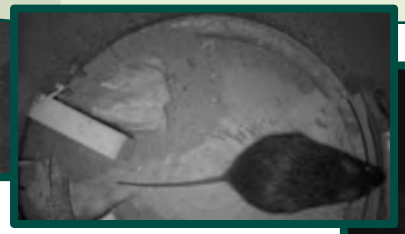
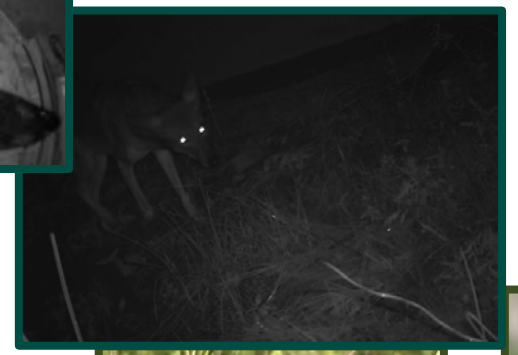
- SWCA Spr/Fall 2016: 30 bird species
- eBird: 20 -52 species

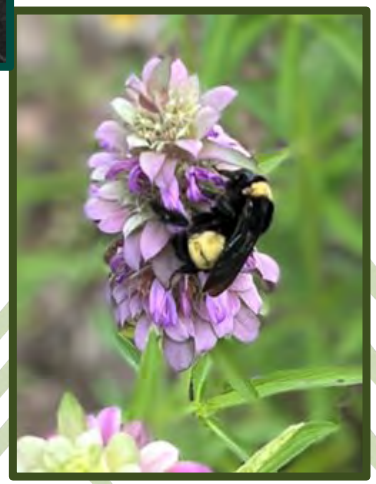



- SWCA Spr/Fall 2016: 3 herp species
- iNaturalist thru 2024: 13 herp species



- SWCA Spr/Fall 2016: 3 mammal species
- iNaturalist & game cameras thru 2024: 11 mammal species



MEMORIAL PARK CONSERVANCY

Conservation Operations Team

HOUSTON ARBORETUM & NATURE CENTER

Building Ecological Resilience Through Urban Restoration and Community Science at the Houston Arboretum & Nature Center

PRESENTED BY:
Nova Lozano Morales, CERPIT
Research Specialist I (Current)

Institute for a Disaster Resilient Texas
Texas A&M University

Natural Resource Specialist, Restoration (Former)
Houston Arboretum & Nature Center

TEXAS A&M UNIVERSITY

Overview

1. **Who is Nova?**
    1. TAMU Geoscience Graduate
    2. TX Gulf Coast Master Naturalist (Fall 2022)
    3. 2x AmeriCorps Conservation Corps crew member (Eugene, OR & Houston, TX)
    4. Houston Audubon Young Professional Advisory Council Member (2024-)
2. **What is the Arboretum?**
3. **What is IDRT?**
    1. Urban Ecologist for the Disaster Data Reconnaissance Center (DDRC)
4. **How do the two intersect?**
5. **Case studies #1 & #2**
6. **Bigger picture**

DDRC
DISASTER DATA RECONNAISSANCE CENTER

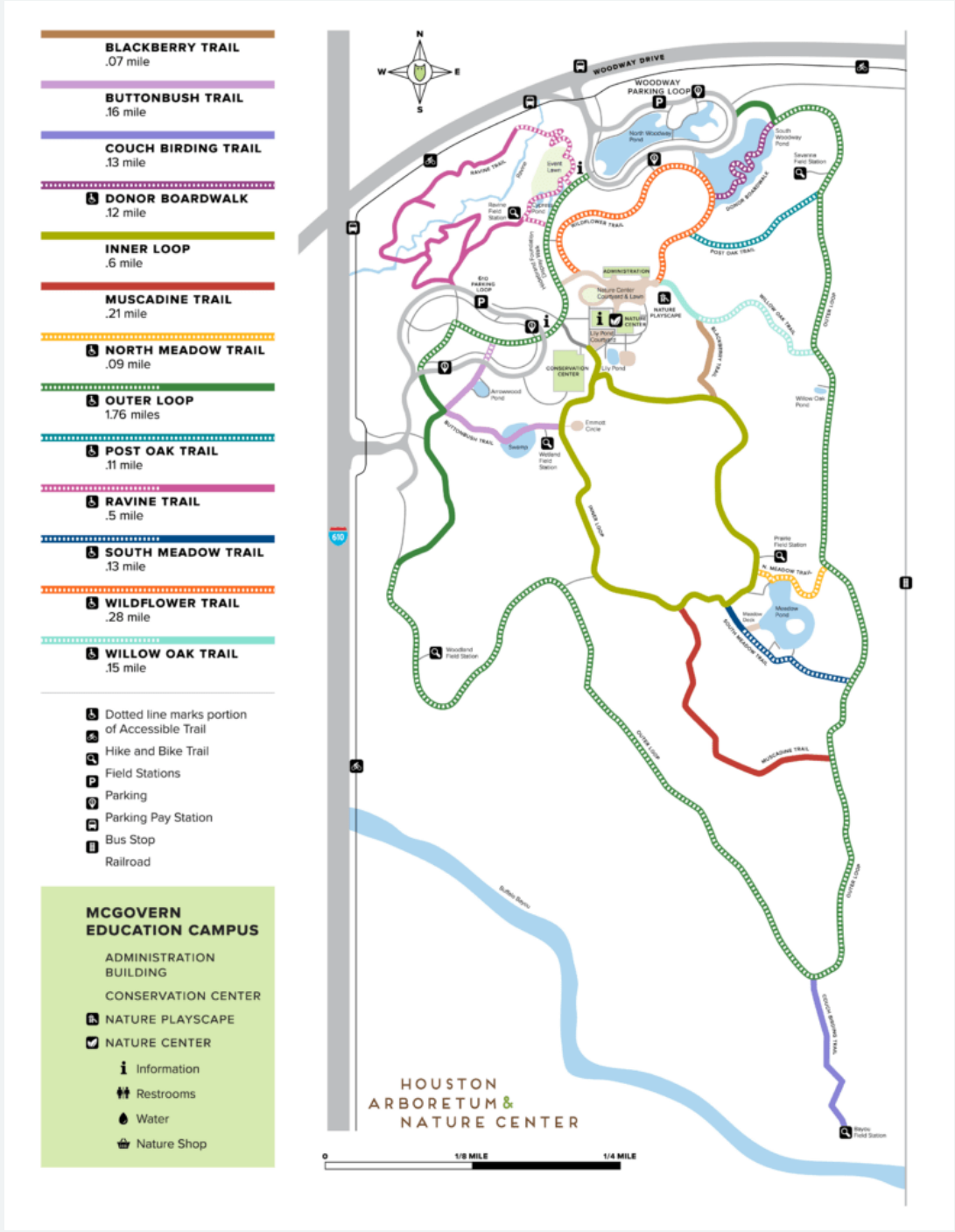
INSTITUTE FOR A DISASTER
RESILIENT TEXAS

What is the Houston Arboretum & Nature Center

The Arboretum is a non-profit organization whose mission is to provide education about the natural environment to people of all ages and to protect and enhance the Arboretum as a haven and as a sanctuary for native plants and animals.

Programs: Nature Camps • Guided Hikes • Plant & Gardening Classes • Art & Photography • Field Trips • Internship Programs • Volunteer opportunities

HOUSTON ARBORETUM & NATURE CENTER



What is the Institute for a Disaster Resilient Texas?

Formed in 2020, The Institute for a Disaster Resilient Texas (IDRT) was established by the Texas A&M University System Board of Regents following the passage of House Bill 2345 by the 86th Texas Legislature in 2019.

Our vision is a disaster resilient Texas.

Our mission is to enhance disaster resilience by bridging the gap between research and decision making.

FOCUS AREAS

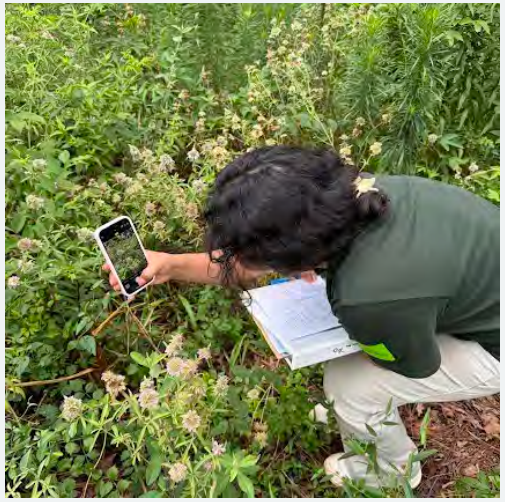
How do the two intersect?

HOUSTON ARBORETUM & NATURE CENTER

INSTITUTE FOR A DISASTER RESILIENT TEXAS

Research-driven restoration = long-term resilience
Data-driven restoration guides targeted, adaptive interventions
Urban ecosystems function as living infrastructure
Community science helps monitor change and sustain systems over time

Nature-Based Solutions: Prairies • Vegetated wetlands • Urban Forests



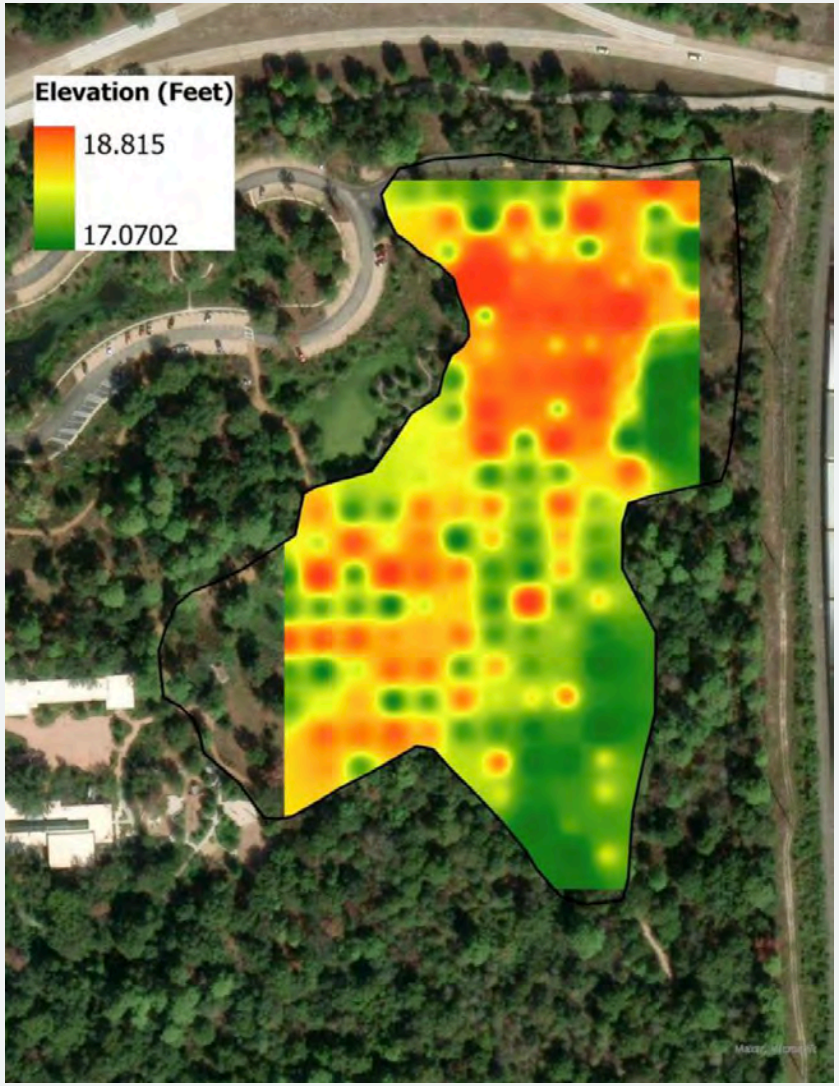
Case Study #1. Sedges in the Spotlight (2024)

- **Hypothesis**
  - Deep rooted sedge population density is influenced by site-specific landscape topography and light availability
  - **Greater DRS population density will negatively impact native vegetation diversity and habitat quality**
- **Why?**
  - Evaluate the Arboretums ecological resilience and capacity to maintain ecosystem functions under urban pressures
  - **Inform restoration strategies and contribute to broader urban ecology and climate adaptation efforts**

HOUSTON ARBORETUM & NATURE CENTER

Case Study #1. Sedges in the Spotlight (2024)

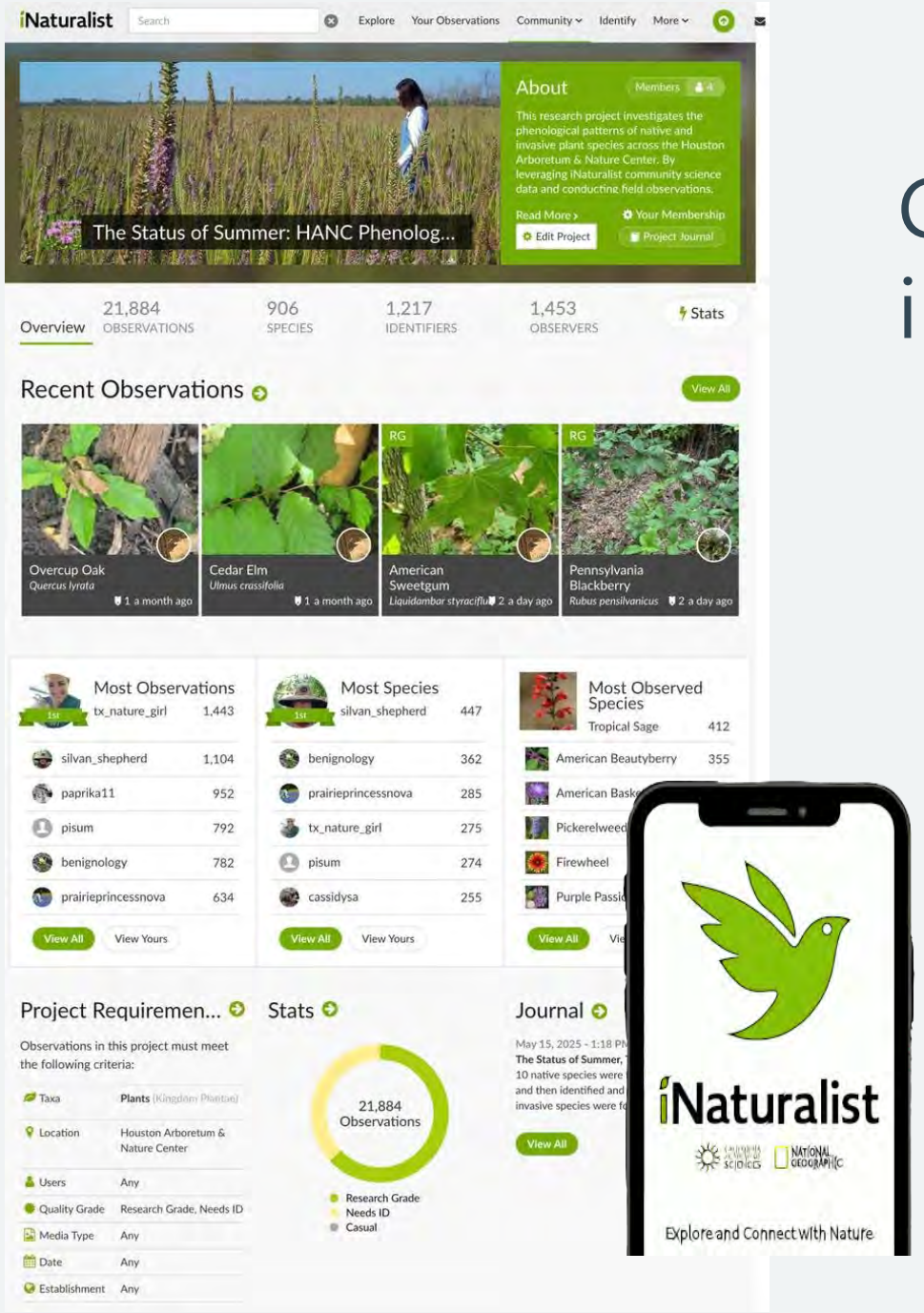
HOUSTON ARBORETUM & NATURE CENTER



- **Where DRS population is higher, elevation is lower**

Case Study #1. Sedges in the Spotlight (2024)

- **Why?**
  - Evaluate the Arboretums ecological resilience and capacity to maintain ecosystem functions under urban pressures
  - **Inform restoration strategies and contribute to broader urban ecology and climate adaptation efforts**



Community Science iNaturalist Projects

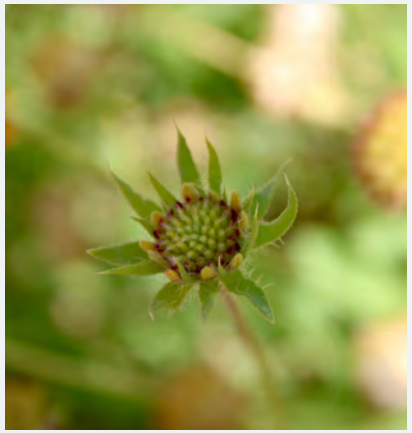
- Summer 2024
  - **Straight line winds (Derecho)**
  - **Hurricane Beryl**
  - **Relentless heat**
- Inaturalist helps you identify life around you while generating data for science and conservation
- Proof of concept study: The Status of Summer, HANC, 2024
  - **14 years of observations to be analyzed**

HOUSTON ARBORETUM & NATURE CENTER

The Status of Summer (2025)

HOUSTON ARBORETUM & NATURE CENTER

- Research Questions
  - **How do phenological events** (e.g., flowering, fruiting, and leaf out) **of native and invasive plant species differ across time and space** at HANC?
- Why?
  - Phenology plays a critical role in ecosystem interactions (e.g., pollination, seed dispersal)
  - Tracking changes help identify which species are:
    - Thriving
    - Struggling
    - Shifting their seasonal patterns in response to environmental pressures.




Why the interest in phenology in the realm of ecological restoration/disaster resilience?

Documents ecological change through time
Identifies climate and disturbance signals early
Tracks native and invasive species responses
Connects urban stressors to biological outcomes
Guides adaptive restoration and recovery decisions

HOUSTON ARBORETUM & NATURE CENTER

Phenology field datasheet used in summer 2025 surveys at HANC

Phenology Field Datasheet – Summer 2025 Survey at HANC
Surveyor Name: _____
Date: ___ / ___ / 2025 Time: _____ AM/PM
Weather Conditions: Temperature: ____ °F Humidity: ____%
Site ID / GPS Coordinates: _____
Canopy Cover (% estimate or tool-based): _____
Nearby Anthropogenic Features (check all that apply):
☐ Trail ☐ Road ☐ Building ☐ Fence ☐ Bench/Signage ☐ Other: _____

Plant Observation Table

Species Name	Shade:	Phenophase(s) Present (circle all that apply)	Notes (Condition, Size, Nearby Plants, etc.)
☐ Native ☐ Invasive	☐ Full Sun ☐ Partial Shade ☐ Full Shade	Leaf-out Bud Flower Fruit Seed Leaf-drop None	
☐ Native ☐ Invasive	☐ Full Sun ☐ Partial Shade ☐ Full Shade	Leaf-out Bud Flower Fruit Seed Leaf-drop None	
☐ Native ☐ Invasive	☐ Full Sun ☐ Partial Shade ☐ Full Shade	Leaf-out Bud Flower Fruit Seed Leaf-drop None	
☐ Native ☐ Invasive	☐ Full Sun ☐ Partial Shade ☐ Full Shade	Leaf-out Bud Flower	

Assessing Impacts….

HOUSTON ARBORETUM & NATURE CENTER

Impact isn't just about restoration outcomes
It's about learning HOW ecosystems respond to change and using that as a guide

INSTITUTE FOR A DISASTER RESILIENT TEXAS

Why?

Things of Importance: Community • The next generation • Diversity of all living things • Native Plantings



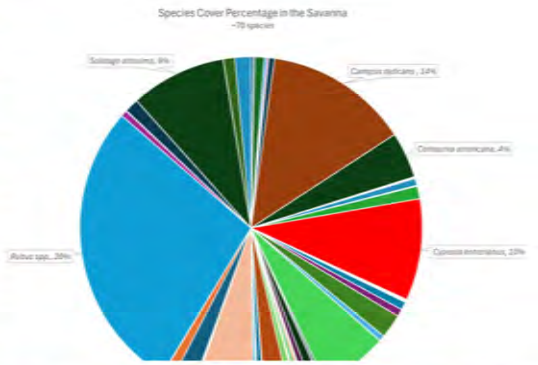

HOUSTON ARBORETUM & NATURE CENTER
INSTITUTE FOR A DISASTER RESILIENT TEXAS

How do we fare & Bigger Picture

Monitoring reveals both resilience and vulnerability
Data-driven restoration improves adaptive capacity
Change is ongoing, requiring long-term commitment and flexibility

Monitor

Analyze



Respond

Adapt

HOUSTON ARBORETUM & NATURE CENTER

INSTITUTE FOR A DISASTER RESILIENT TEXAS

What does Ecological Resilience in 2026 look like?

Ecosystems designed to adapt

Long-term, data driven restoration

Native species at the core

Nature as infrastructure

Community as data contributors

Design and ecology working together across scales

Thank You!

nova.morales65@tamu.edu