



Watershed-based Planning and Implementation

12th State of the Bay – Panel Session

February 25, 2026

Panelists

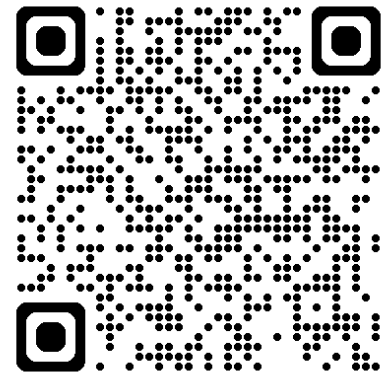


- Nicole Hall, Texas Commission on Environmental Quality (TCEQ)
- Lucas F. Gregory, Ph. D., Texas Water Resources Institute, Texas A&M University
- Rachel Windham, Houston-Galveston Area Council (H-GAC)
- Celina Gauthier-Lowry, Texas A&M AgriLife, Texas A&M University
- Natasha Zarnstorff, Galveston Bay Foundation

Bacteria Impairments and Concerns

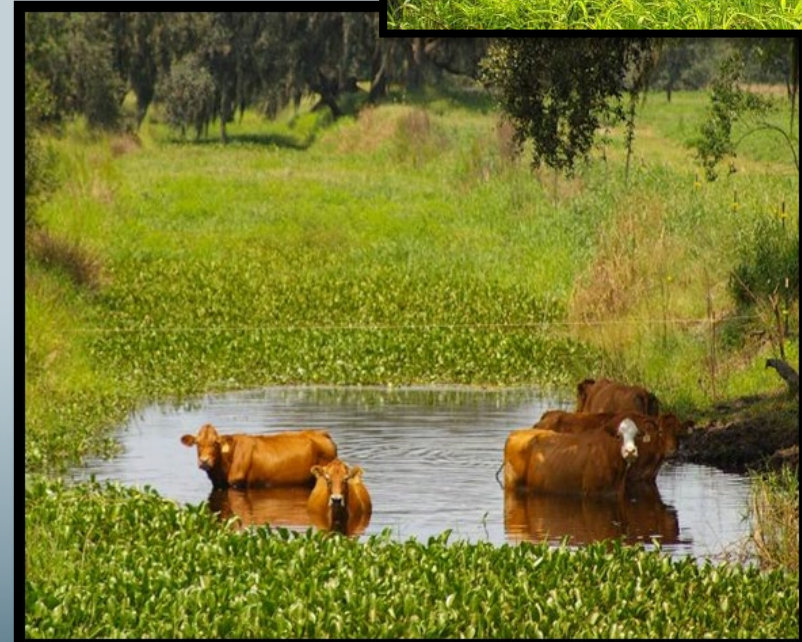


- TCEQ's 2024 Integrated Report for Surface Water Quality



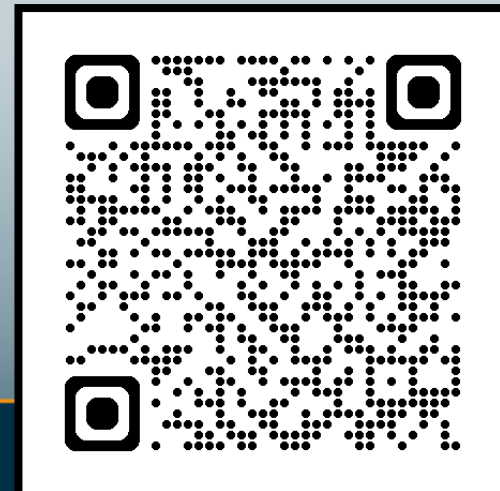
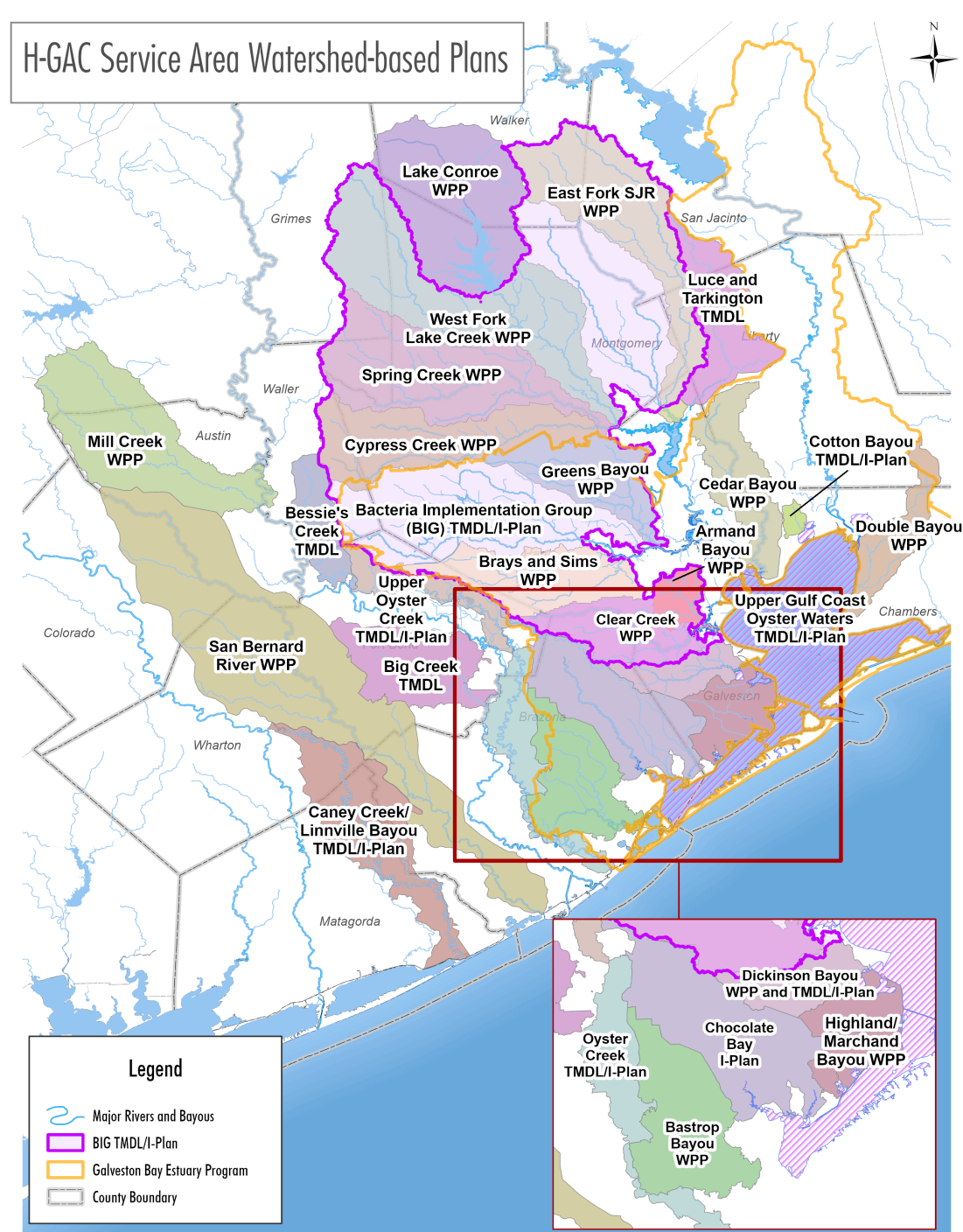
Watershed -based Planning

- Total Maximum Daily Load (TMDL)
 - TMDL Implementation Plan (I-Plan)
- Watershed Protection Plans (WPPs)

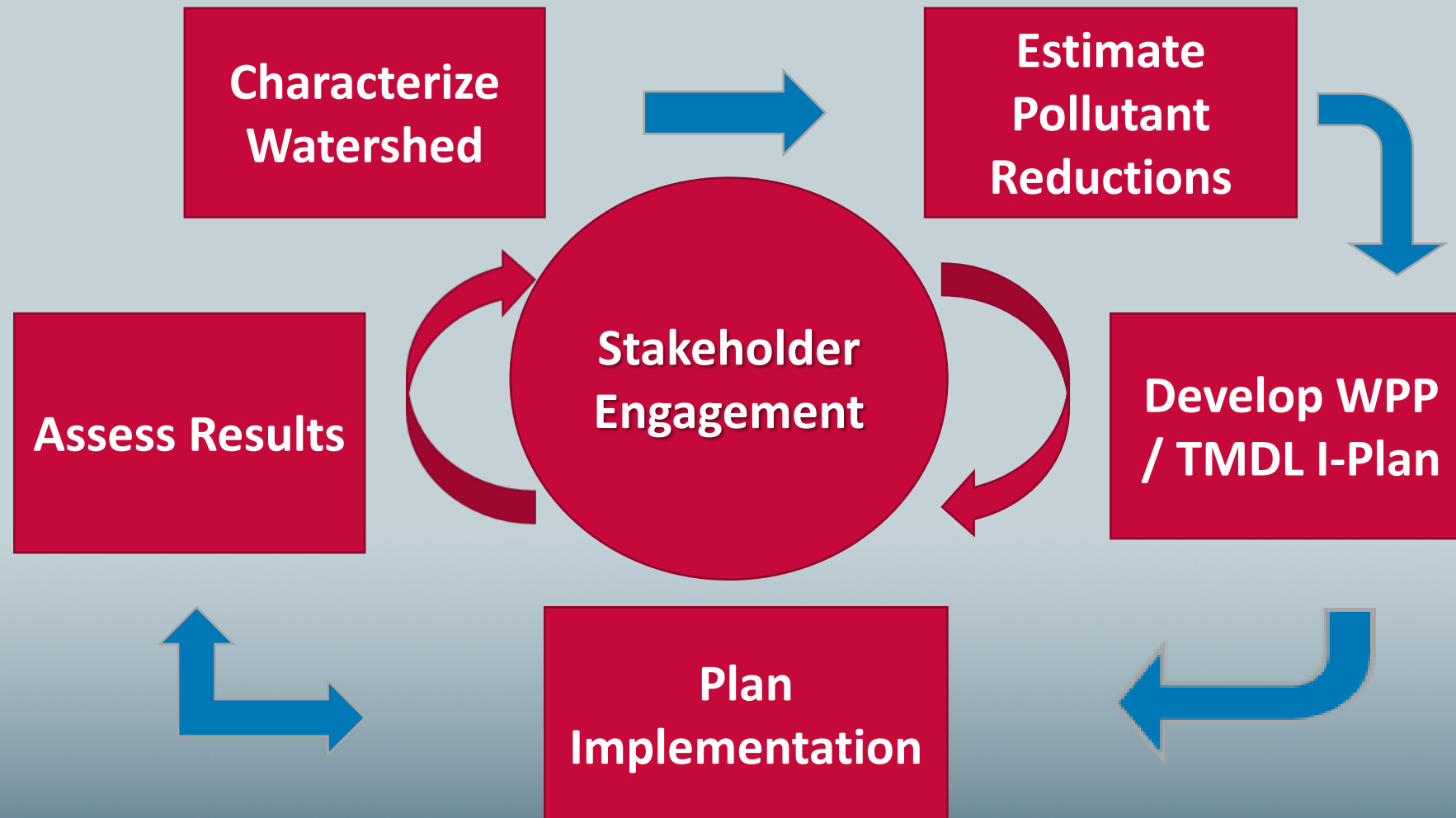


Watershed -based Planning

- 15 TMDL Projects
- 15 WPPs
- One Estuary Program



Steps in a Watershed - Based Plan

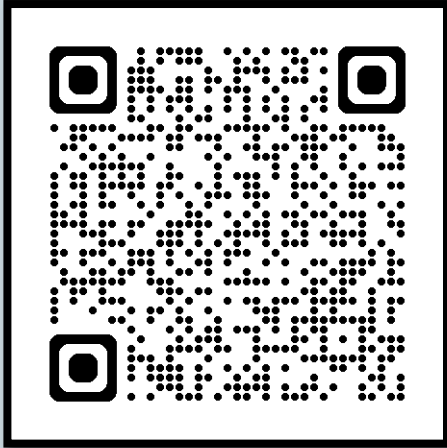


Topic Du Jour Watershed -base Planning



- Project/ Program Overview
- Successes
- Challenges

BIG Project Area

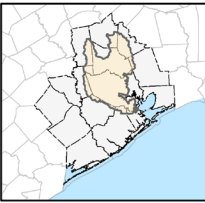


BIG Project - TCEQ Segments



Legend

- City
- TCEQ Assessment Unit
- Major Road
- TCEQ Segment
- County Boundary



0 5 10 20 Miles
Source- Houston-Galveston Area Council



KEY ISSUES



SANITARY SEWER OVERFLOWS

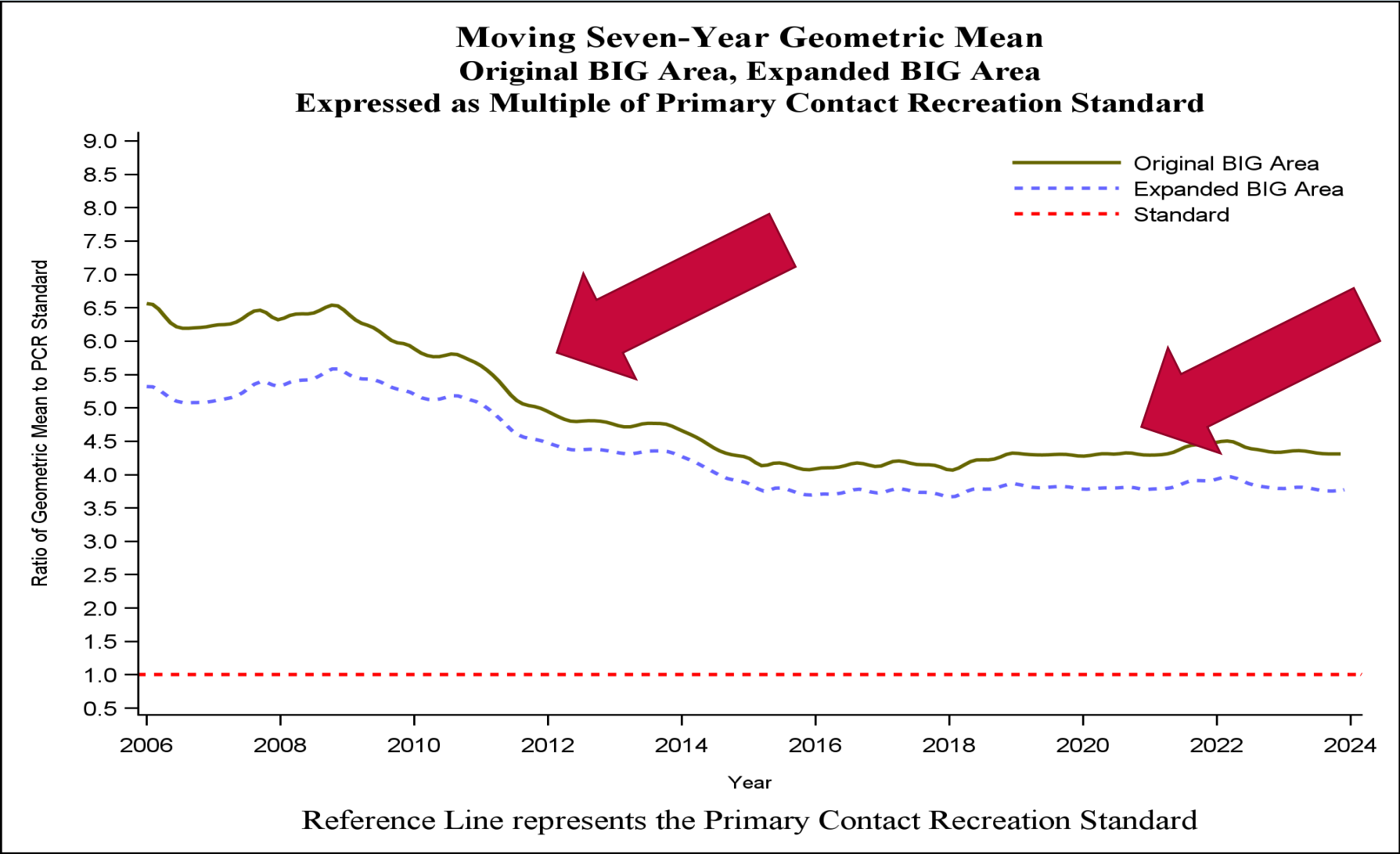


STORMWATER POLLUTION



FAILING ON -SITE SEWAGE SYSTEMS

BACTERIA TREND IN BIG PROJECT AREA

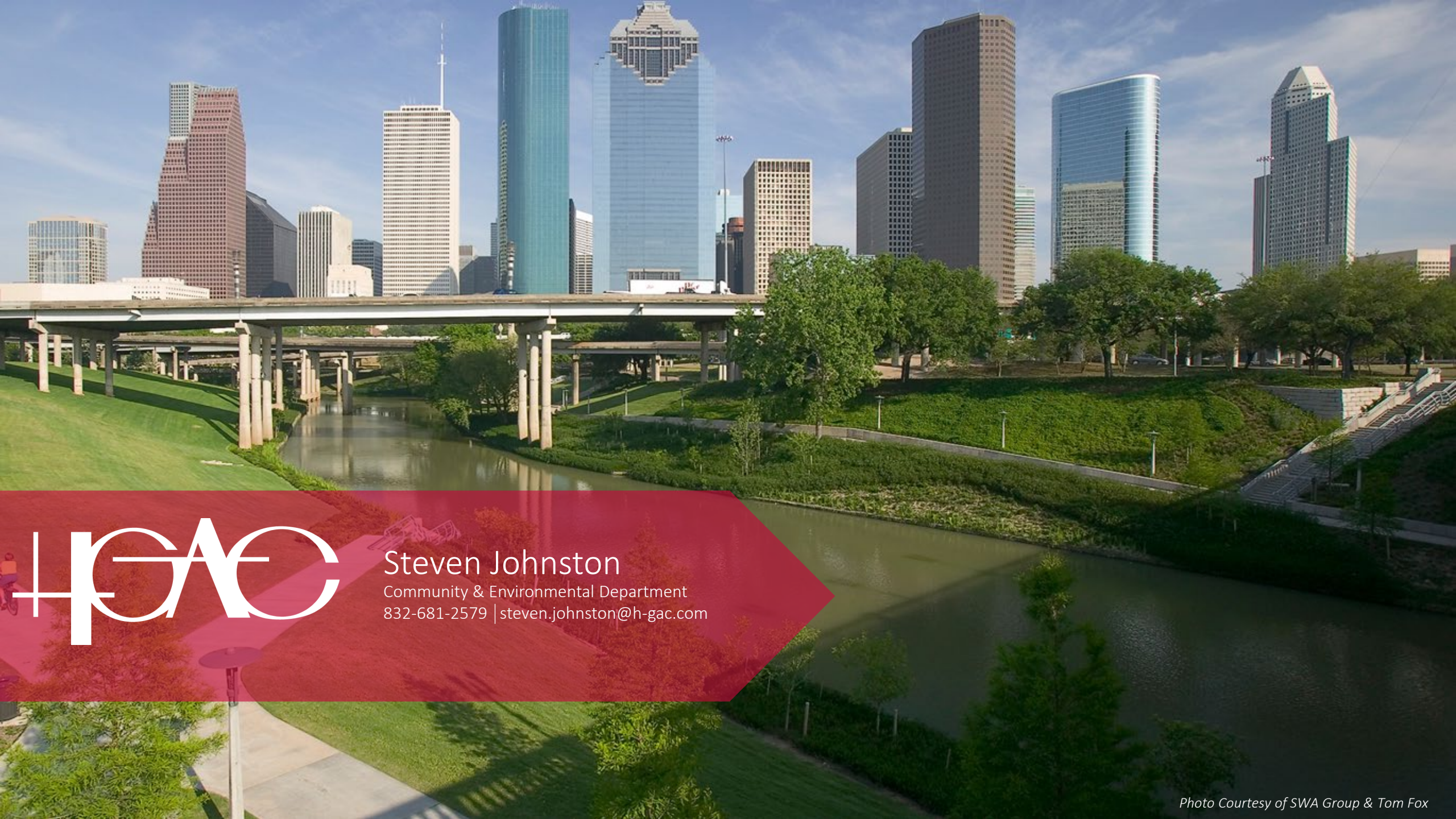


Headwinds and Opportunities

■ Challenges

- Stakeholder Involvement –
 - Reach
 - Sustain
- Implementation
 - Long Plan Horizon
 - Lack Funding Commitments
 - No Quick Returns
- What Priority
 - Water Quality Not The First Priority





Steven Johnston

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Watershed Planning in Texas

Nicole Hall

Texas Commission on Environmental Quality

State of the Bay Symposium

February 2026



Watershed Planning in Texas

Watershed Protection Plans

- Addresses nonpoint source pollution through voluntary implementation
- Jointly administered through TCEQ and TSSWCB
- Federal grant funds
- Reviewed and accepted by EPA
- Once accepted, they become eligible for federal implementation funds

Total Maximum Daily Load Implementation Plans

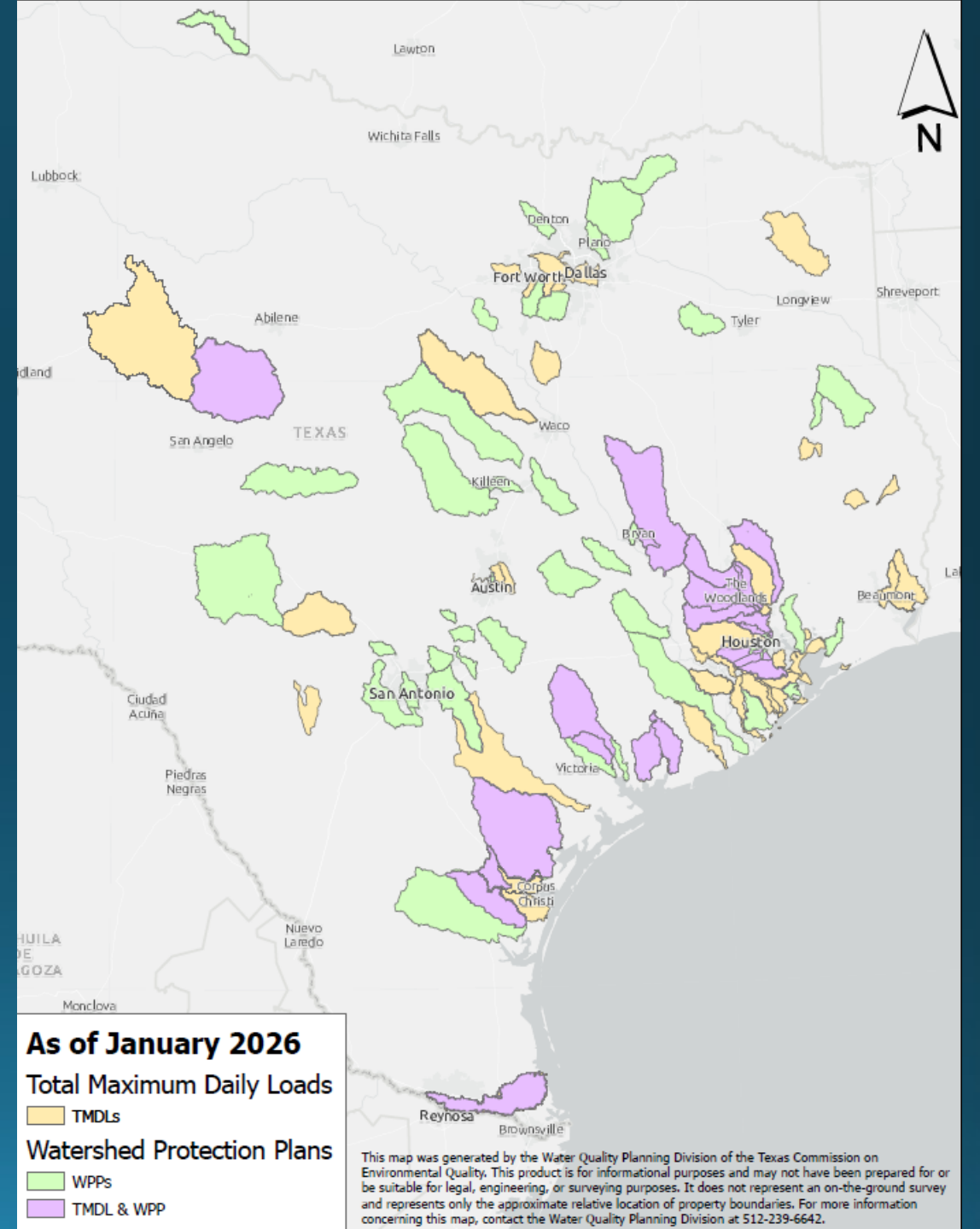
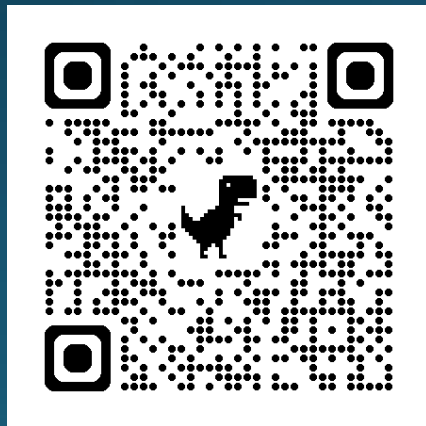
- Addresses nonpoint source pollution through voluntary implementation
- Addresses point sources through permits
- Federal grant funds and state funds
- Reviewed and approved by TCEQ Commission

Completed TMDLs and WPPs

NPS Program Viewer



TMDL Program Viewer



Commonalities of Successful Plans

Planning

- Detailed but flexible, needs to be usable
- Multiple implementing entities

Stakeholder Engagement

- Include stakeholders in the planning process
 - those who can implement management measures
 - those who need to approve management measures

THE UPPER SAN MARCOS RIVER
WATERSHED PROTECTION PLAN
AUs 1814_01, 1814_02, 1814_03, and 1814_04



Challenges



- Resource restraints – whether it be direct funding, match, or personnel vacancies
 - Many watershed partners have too much on their plate already, they can't take on voluntary management measures



- Keeping stakeholders and project partners engaged long-term and continuing to expand



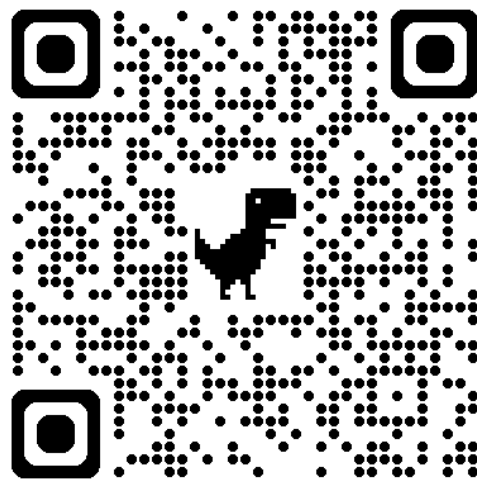
- Attracting new applicants to the Nonpoint Source Program grant

For More Information

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TCEQ NPS Program

TCEQ TMDL Program



2025 Annual Report

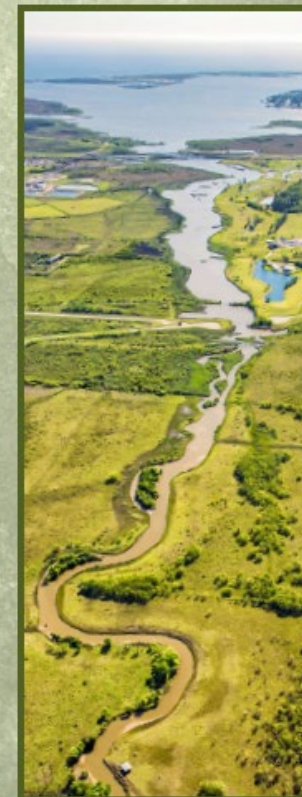
Nonpoint Source Pollution Management IN TEXAS



River flows to the coast in the city of Lake Jackson. (Source iStock)



The Buffalo Bayou winding its way toward downtown Houston. (Source iStock)



Rural landscape south of Houston near the Gulf Coast. (Source iStock)



Texas Commission on
Environmental Quality

Funding provided by the Environmental Protection Agency
through Clean Water Act Section 319(h) grant funds



Texas State Soil & Water
Conservation Board

SFR-066/25 January 2026

Watershed Planning in Texas: Tres Palacios Creek

Lucas Gregory, Ph.D.

Associate Director & Chief Science Officer
Texas Water Resources Institute

Galveston Bay Estuary Program State of the Bay Symposium
February 25, 2026

LFGregory@ag.tamu.edu

Texas Watershed Planning Program

- Training to watershed coordinators
 - develop and implement watershed-based plans
 - promote sustainable proactive approaches to managing water quality
- Tools needed to develop watershed-based plans that meet EPA's 9 Key Elements of a Successful Plan
- Develop skills needed to lead stakeholders through a plan development process
- Build a network of watershed coordinators to share ideas and discuss challenges



Watershed Short Course

- Multi-day course provided by experts in the field on tools, resources, data, and knowledge needed to assemble effective watershed-based plans
- Course based on EPA's Handbook for Developing Watershed Plans to Restore and Protect Our Waters
- Covers 9 EPA Elements of a Successful Watershed Plan
- Extra emphasis on historically deficient elements: A, B, C
- Numerous examples provided – good and not so good
- Lots of peer and pro discussion time
- EPA Staff
- State Agency Staff
- Experts in the Field
- Significant opportunities to network and discuss issues, questions, ideas



Watershed Short Course

6 Steps In Watershed Planning

- Building Partnerships
- Characterize the Watershed
- Set Goals and Identify Solutions
- Design Implementation Program
- Implement Watershed Plan
- Measure Progress & Adjust

Discussion/Presentation Topics

- Engaging & working with stakeholders
- Identifying pollutant sources
- Estimating needed pollutant reductions
- Prioritizing management areas

Lectures

Outdoor Activities

Case Studies

Demonstrations

Assignments

Watershed Coordinator's Roundtable

Semi-Annual meeting of folks engaged in watershed planning: federal & state agencies; regional & local agencies/districts; watershed coordinators; watershed planners

Content varies but remains focused on topics relevant to attendees

- Advances in science or tools
- New guidance or regulations
- Discussions regarding challenges faced
- Examples of successful planning and/or implementation approaches
- Tours of relevant facilities or operations

Texas Watershed Planning Program

Accomplishments Since Inception

- Hosted 103 events
- Educated 3,940 participants
 - Resulted in 47 EPA accepted Watershed Protection Plans
 - 13 EPA Nonpoint Source Success Stories
- Awarded 2024 Universities Council on Water Resources Education and Public Service Award



Texas Watershed Planning Short Course

2008-Present



One-of-a-kind

The only watershed planning educational program in the state.

Texas water contribution

In Texas alone, at least 62 watersheds have directly benefited from this course.



Knowledge transfer

Pre- and post-tests are administered to measure knowledge transfer during the course, and results indicate that students' knowledge increased between 23% and 110%.

23%

110%



Continued success

In 17 years, 14 courses have been held, training 399 students.

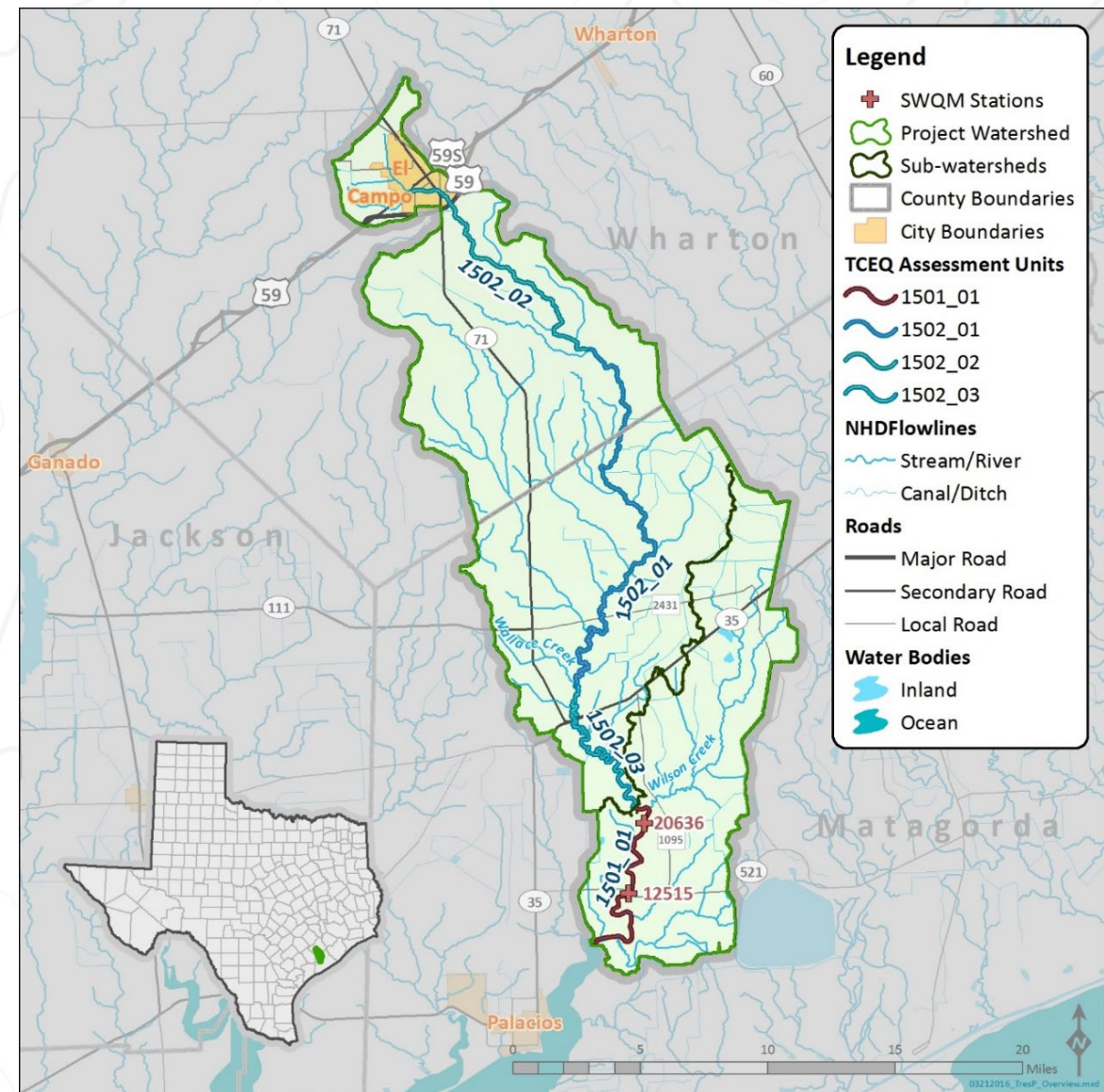
Nation-wide impacts

Roughly 15% of students to date are from outside Texas. Most are from surrounding states within EPA Region 6, and some students have come from as far away as Pennsylvania and Washington.

15%

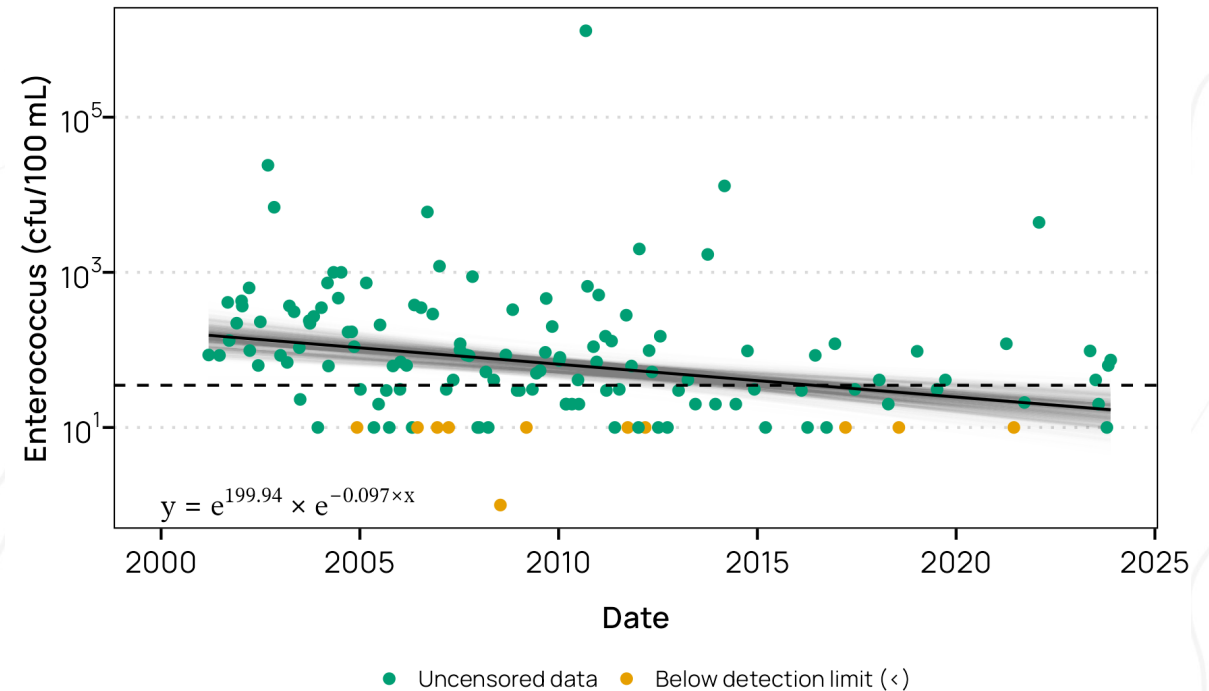
Tres Palacios Creek Tidal

- Listed as impaired for depressed DO and elevated bacteria in 1999 & 2006 respectively
- 2017 co-developed TMDL, I-Plan, and WPP
- Bacteria sources identified
 - Cattle
 - Pets
 - Deer
 - OSSFs
 - Feral hogs
 - Horses
 - Wastewater treatment facilities
 - Urban runoff



Tres Palacios Creek Tidal – WPP Implementation

- Since 2018, 430 conservation practices implemented covering 62,000 acres through NRCS programs.
- >10,000 feral hogs in two years with trapping program
- 2 stakeholder workshops annually
- Legacy Park pet waste stations and signage
- \$2 million invested in WWTP/Sewage Line upgrades in El Campo
- 7.4% decrease in bacteria concentrations annually (controlling for streamflow variation)
- 238 MPN/100mL in 2006 → 34 MPN/100mL in 2024



Tres Palacios Creek Tidal – Implementation Challenges

- Septic System repair and replacement programs (Costs, Administration, Time, Property owner buy in)
 - 319 Program replaced 8 systems within 500 yards of the river
- Sustaining feral hog removal (Costs, local administration and management, tracking)
- Current local water priorities are irrigation water availability and flood management
- Watershed Plan Update (when and how)



SUBSCRIBE

STAY CONNECTED!

Follow us on social media:



Stay up to date on the latest information for programs, events and opportunities you can get involved in!

twri.tamu.edu/subscribe

PROTECTING OUR WATER

Taking Action to Improve Water Quality

Rachel Windham, *Senior Planner*
Houston-Galveston Area Council

State of the Bay Symposium
February 25, 2026





Taking Action

Protecting Our Water

- Under Section 319 of the Clean Water Act, states, territories and tribes receive grant money to support activities that address nonpoint source pollution
- With this funding, H-GAC has been able to facilitate the development of watershed protection plans

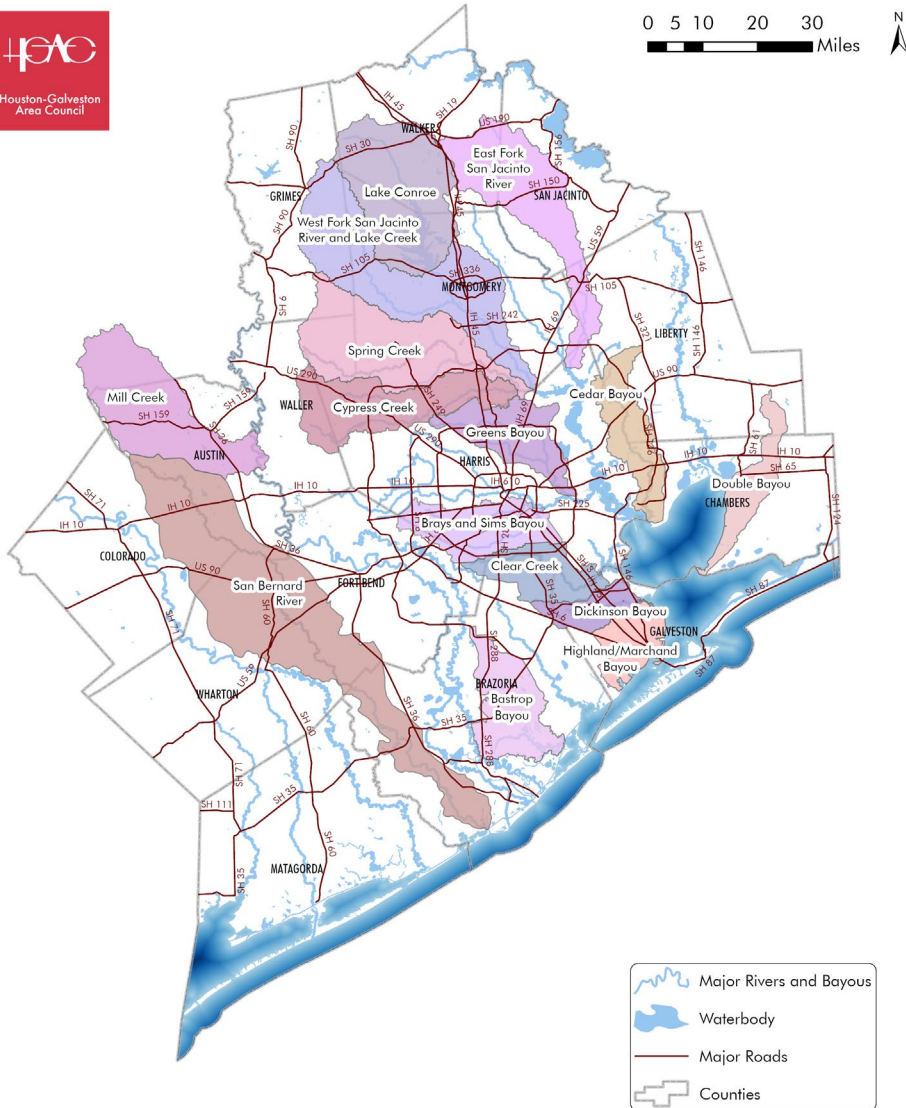


Watershed Protection Plans (WPPs)



- **Community-led**, non-regulatory documents
- **Data-based** strategies enhanced by local knowledge
- **Adaptable** roadmap for continued improvement
- Can target multiple water quality concerns

Regional WPPs



- H-GAC and other agencies facilitated the development of plans throughout the region
- All projects indicated in the map have completed or are currently drafting WPPs



Addressing Water Quality

- Manage wastewater
 - Includes on-site sewage facility remediation and maintenance
- Manage stormwater
- Use agricultural best management practices
- Manage pet waste
- Control invasive species
- Preserve/enhance natural areas



Other Plan Priorities

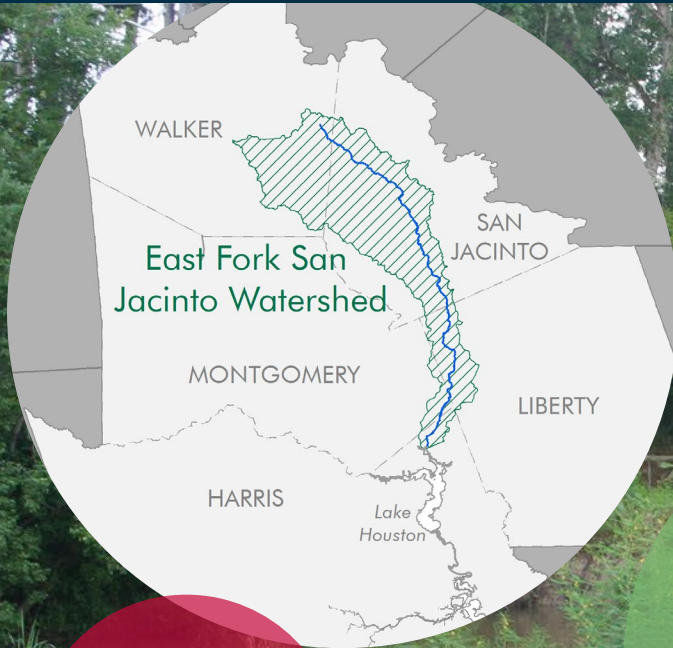
- Continue partnerships
- Coordinate volunteer events and enhance collaboration opportunities
- Help spread awareness through education and outreach





Highlights

East Fork San Jacinto River



EAST FORK SAN JACINTO RIVER WATERSHED PARTNERSHIP

Primarily
rural
watershed

Project
initiated in
2022

WPP accepted
by EPA in 2024

Continuing
outreach and
education

Seeking
opportunities for
implementation

Greens Bayou



Developed watershed

Project initiated in 2024

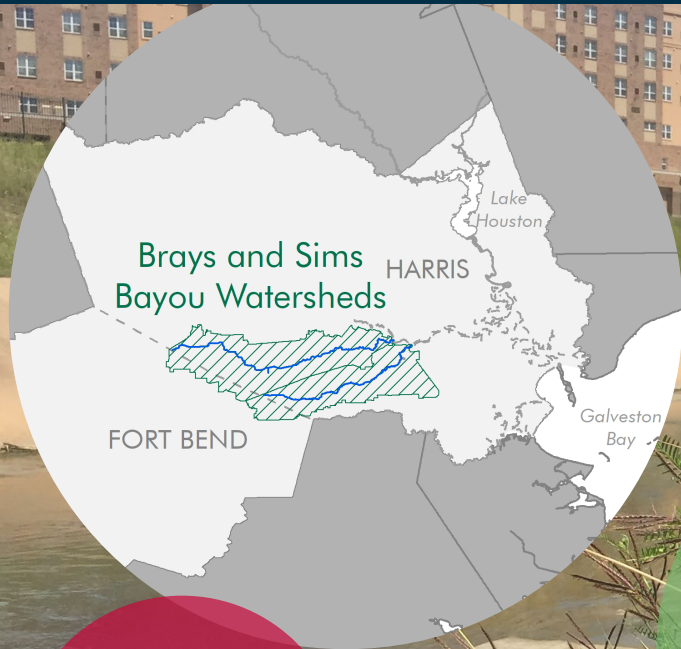
Draft WPP available for public review and comment in March 2026

Priority area for outreach and education

Progress with OSSF remediation

Brays and Sims Bayou

Brays & Sims Bayou Watershed Partnership



Developed watershed

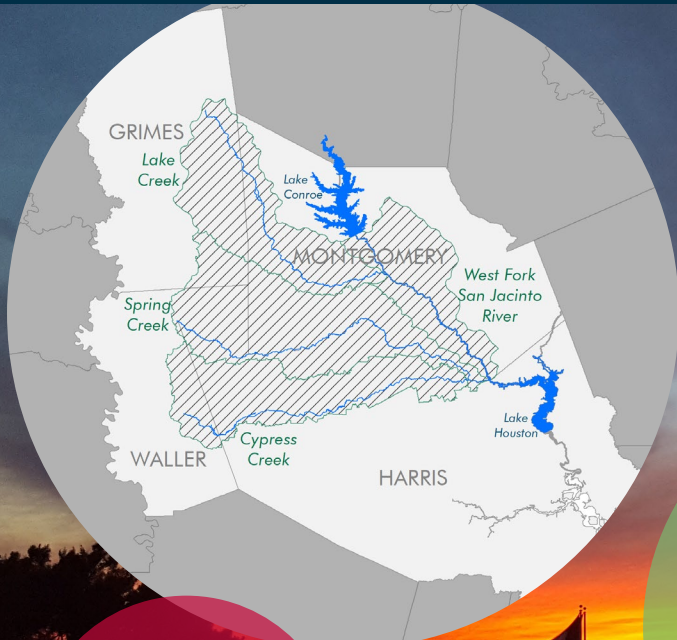
Project initiated in 2025

Hosting public meetings throughout 2026 to develop WPP with stakeholders

Seeking nominees for steering committee

Seeking opportunities for outreach and education

Implementation Project



Mixed
land use
watershed

Project
initiated in
2023

Coordinating
with key
stakeholders on
implementation
priorities

Continuing
outreach and
education

Seeking further
implementation
opportunities

More Information

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Cornell Evans, Jr.

Planner

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These projects are funded by Clean Water Act 319(h) and 320 grants from the US Environmental Protection Agency, administered by the Texas Commission on Environmental Quality, and are facilitated locally by the Houston-Galveston Area Council.



EPA



<https://www.h-gac.com/watershed-based-plans>



Scaling Impact: Coalition Building for Watershed Implementation

Celina Gauthier Lowry
Extension Program Specialist II
Green Infrastructure for Texas
Disaster Assessment and Recovery Unit Mitigation Branch
Texas A&M AgriLife Extension Service

State of the Bay Symposium | Galveston Bay Estuary Program
February 24, 2026



Reitan Point, part of Scenic Galveston's
Nature Preserve Complex off I-45

Green Infrastructure for Texas



Education

- Workshops
- Presentations
- Technical Assistance
- High School Internships



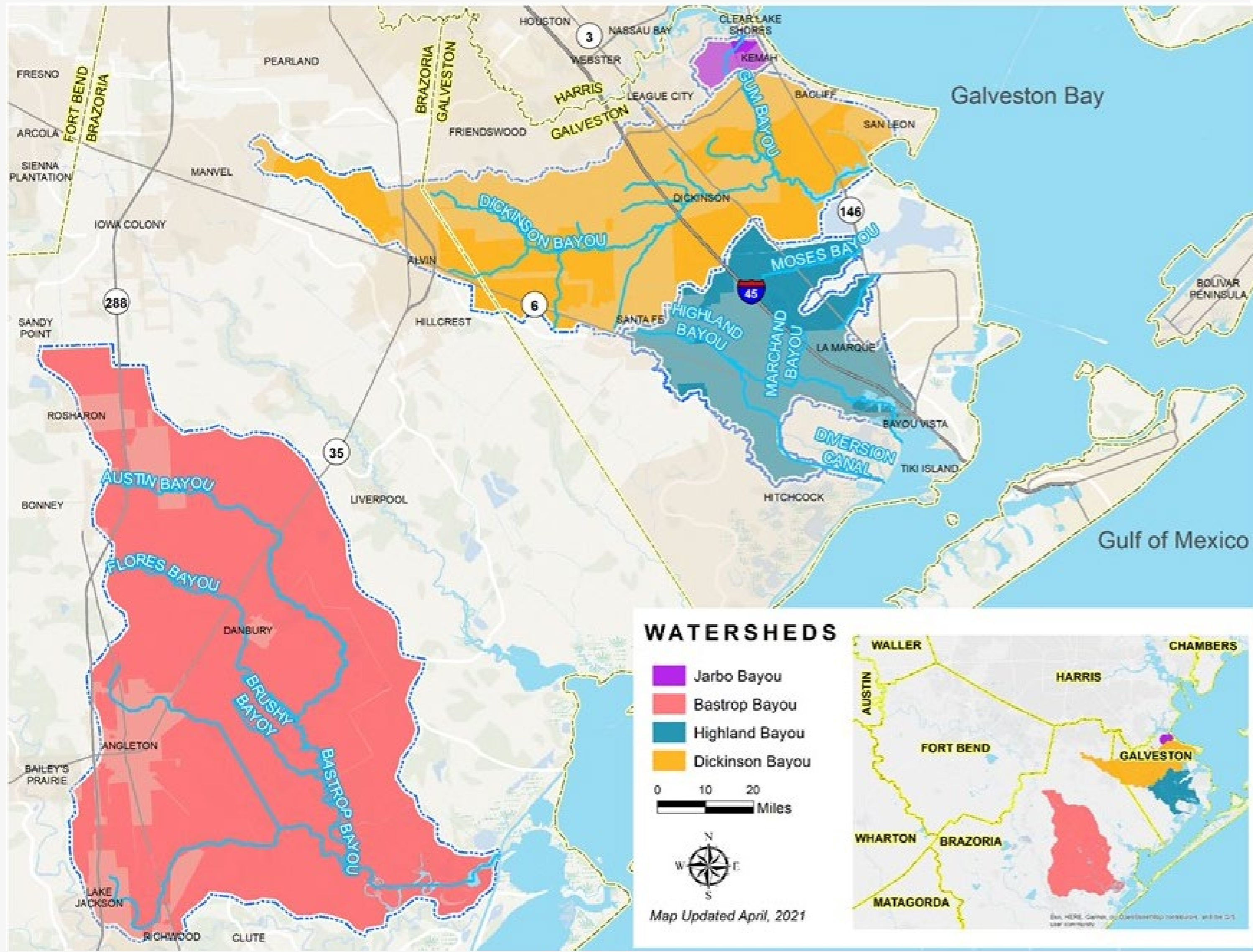
On-the-Ground Projects

- Exploration Green
- Ghirardi Family WaterSmart Park
- Sheldon Lake State Park
- Hitchcock City Parks



Research

- Water quality
- BMP Performance
- Plant propagation



What is the Coalition all about?

Coalition Vision

Partnering for healthy watersheds.

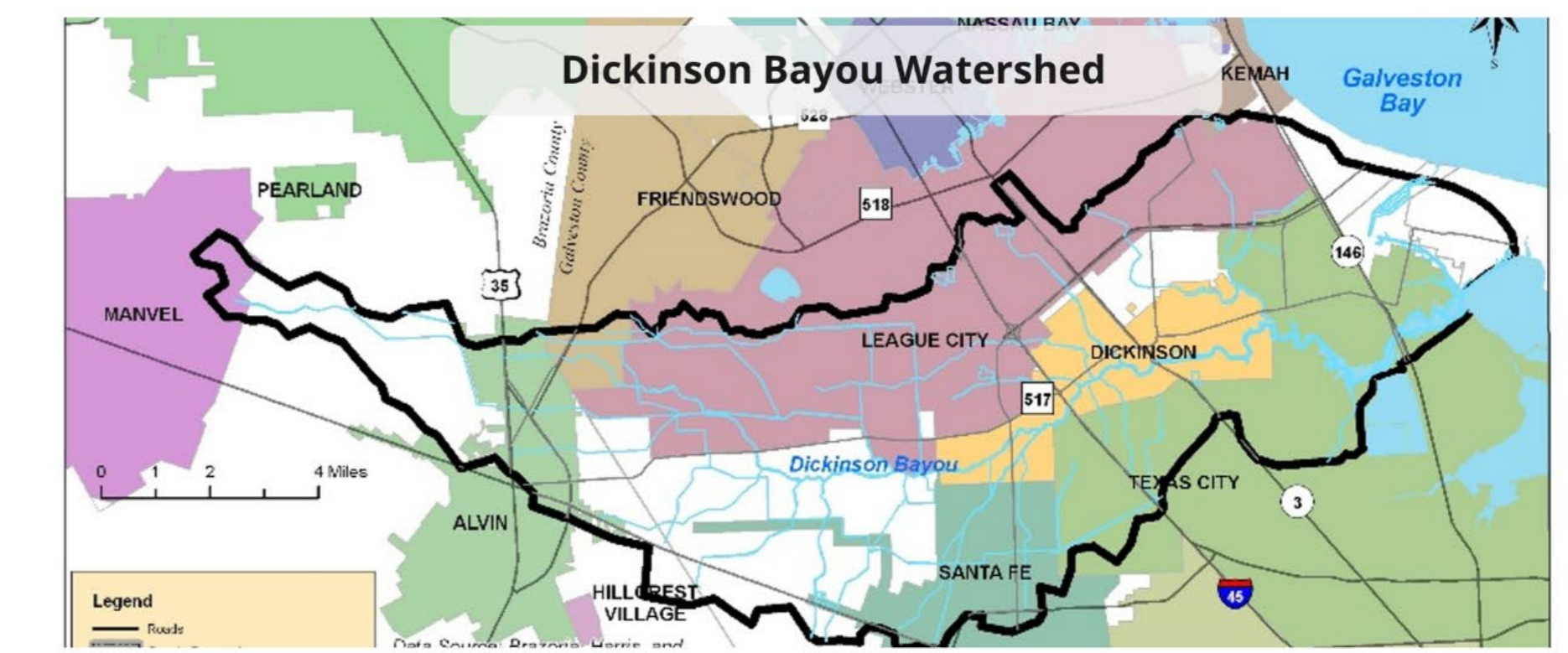
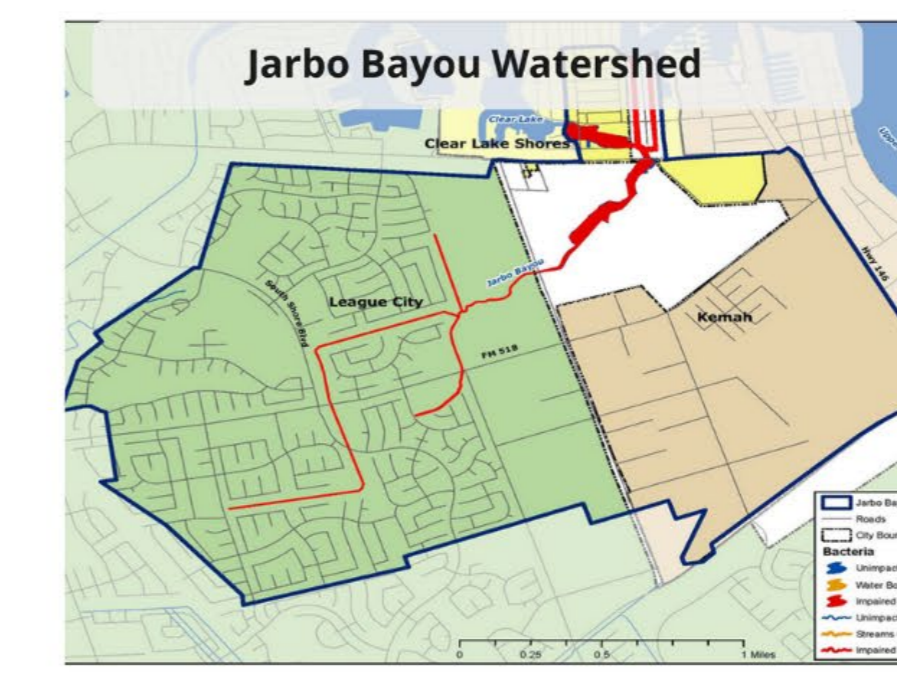
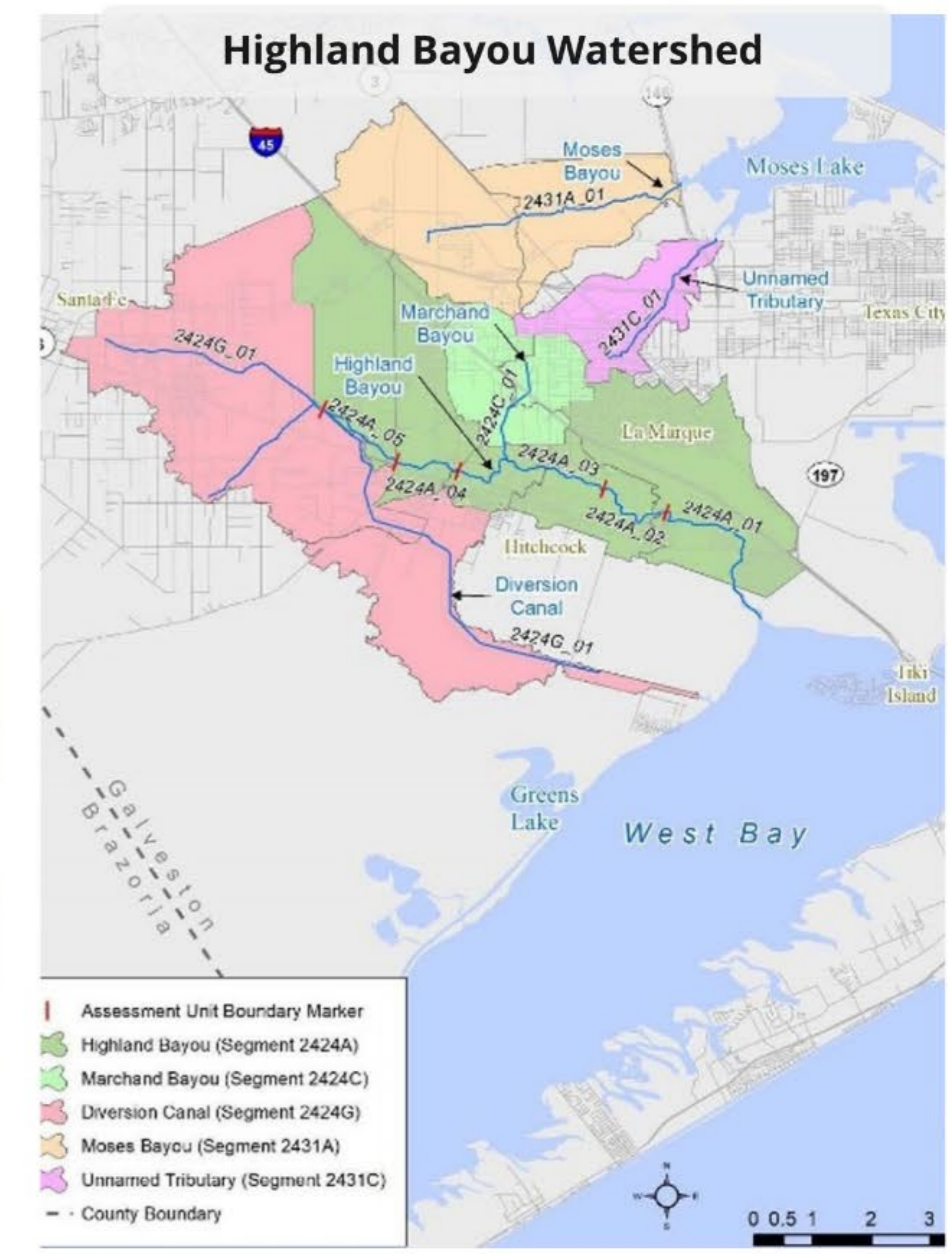
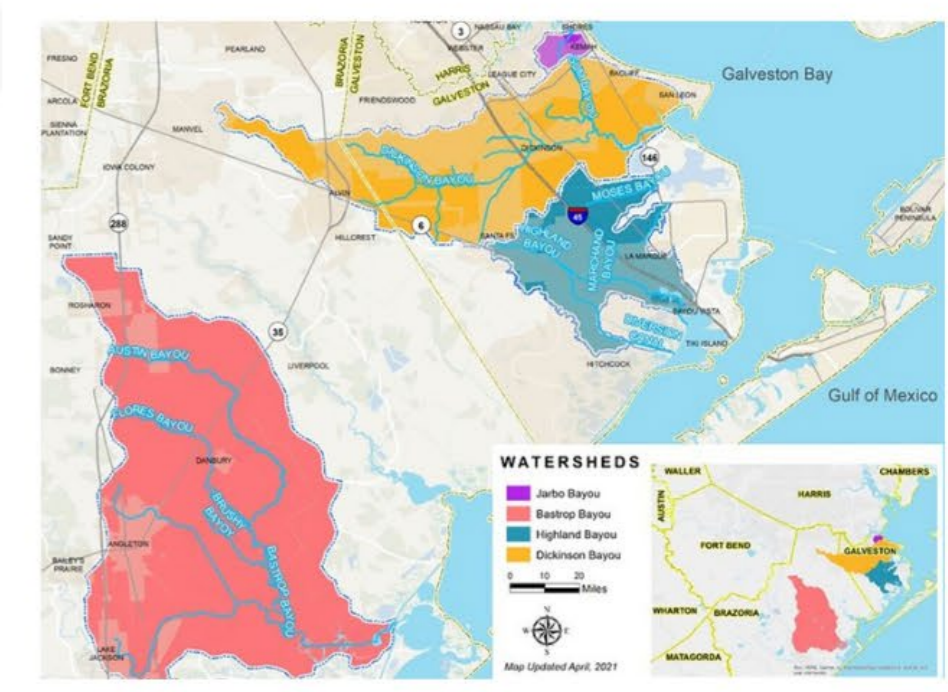
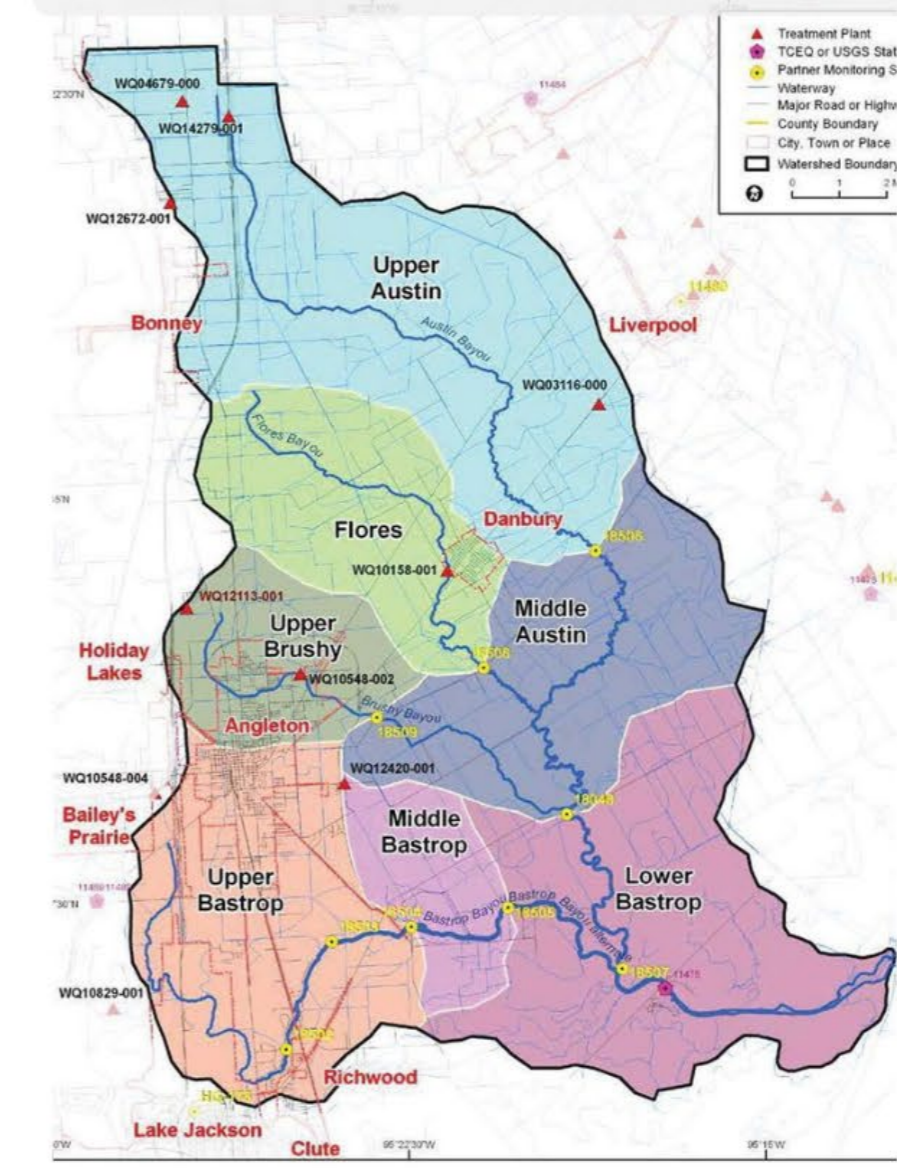
- Implement existing watershed-based plans for Bastrop, Dickinson, Highland, and Jarbo Bayou
- These watersheds have similar implementation activities

agriLife.org/coalitionofwatersheds/

Sanitary Sewer Collection Systems
 Conservation Programs
 Land Preservation
 Flow & Dredging
 On-Site Sewage Facilities
 Agriculture and Livestock
 Stormwater Runoff
 Wastewater Treatment Facilities
 Pet Waste
 Education
 Illegal Dumping

Common Themes
 Multiple Jurisdictions

IASTRO Bastrop Bayou Watershed HEDS



Implementation – Education and Outreach



FOG and Wipes in Sanitary Sewers

- New Apartment Residents
- Commercial Businesses
- Residents (digital)
- Utility District/Water and Sewer Utility Customers
- Interactive Booth at Events
- Grease Collection Awareness



Stormwater Management through Green Infrastructure

- Floating Wetlands
- Green Stormwater Infrastructure
- Supporting Permeable Alternatives
- Incentives for Developers



Debris and Dredging in Coalition Bayous

- Public Misconceptions About Bayous, Dredging, and Land Use
- Outreach to Policy Makers on Drainage Practices

Challenges

- Partner interest and priorities vary.
Ensuring value and widespread impact.
- Investing in social capital takes time, even with strong partner commitment.
Maintaining relationships with intention – both individually and as a group.
- Facilitating meaningful collaboration across jurisdictions demands dedicated resources.



Highland Bayou @ FM 519, La Marque

What we do on the land... we read in the water

James Karr



AgriLife.org/GIFT

Celina Gauthier Lowry
Extension Program Specialist II
celina.lowry@ag.tamu.edu

Highland Bayou Diversion Canal, Hitchcock, Texas

TEXAS A&M
AGRI LIFE
EXTENSION

DISASTER ASSESSMENT
AND RECOVERY



TEXAS COMMISSION ON
ENVIRONMENTAL QUALITY



United States
Environmental Protection
Agency



GALVESTON BAY FOUNDATION

PROTECT TODAY. PRESERVE TOMORROW.

Gulf Coast Oyster Waters and Non-Profit
Participation in Watershed-Based Planning
Natasha Zarnstorff Water Protection Manager



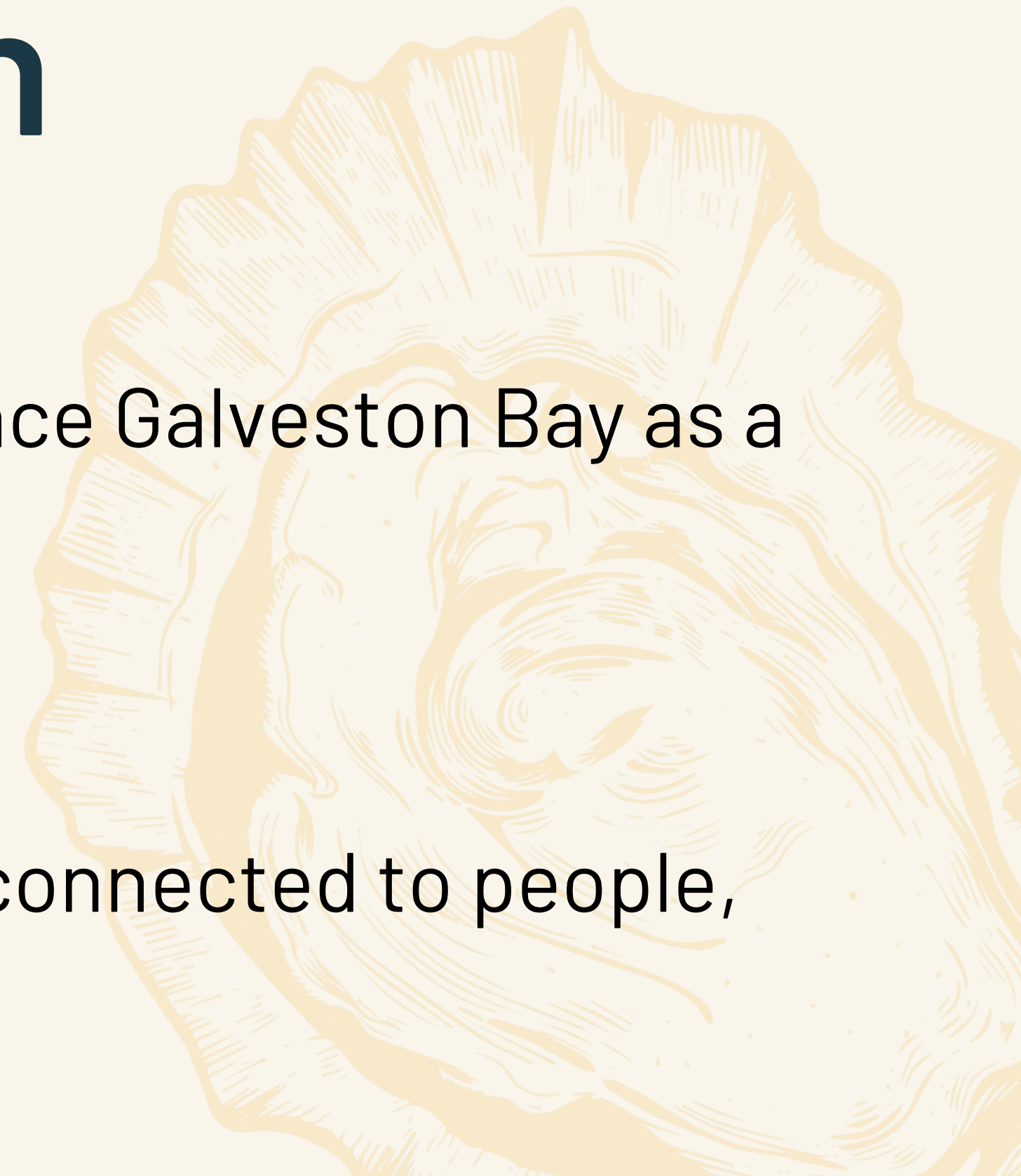
Our Mission & Vision

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



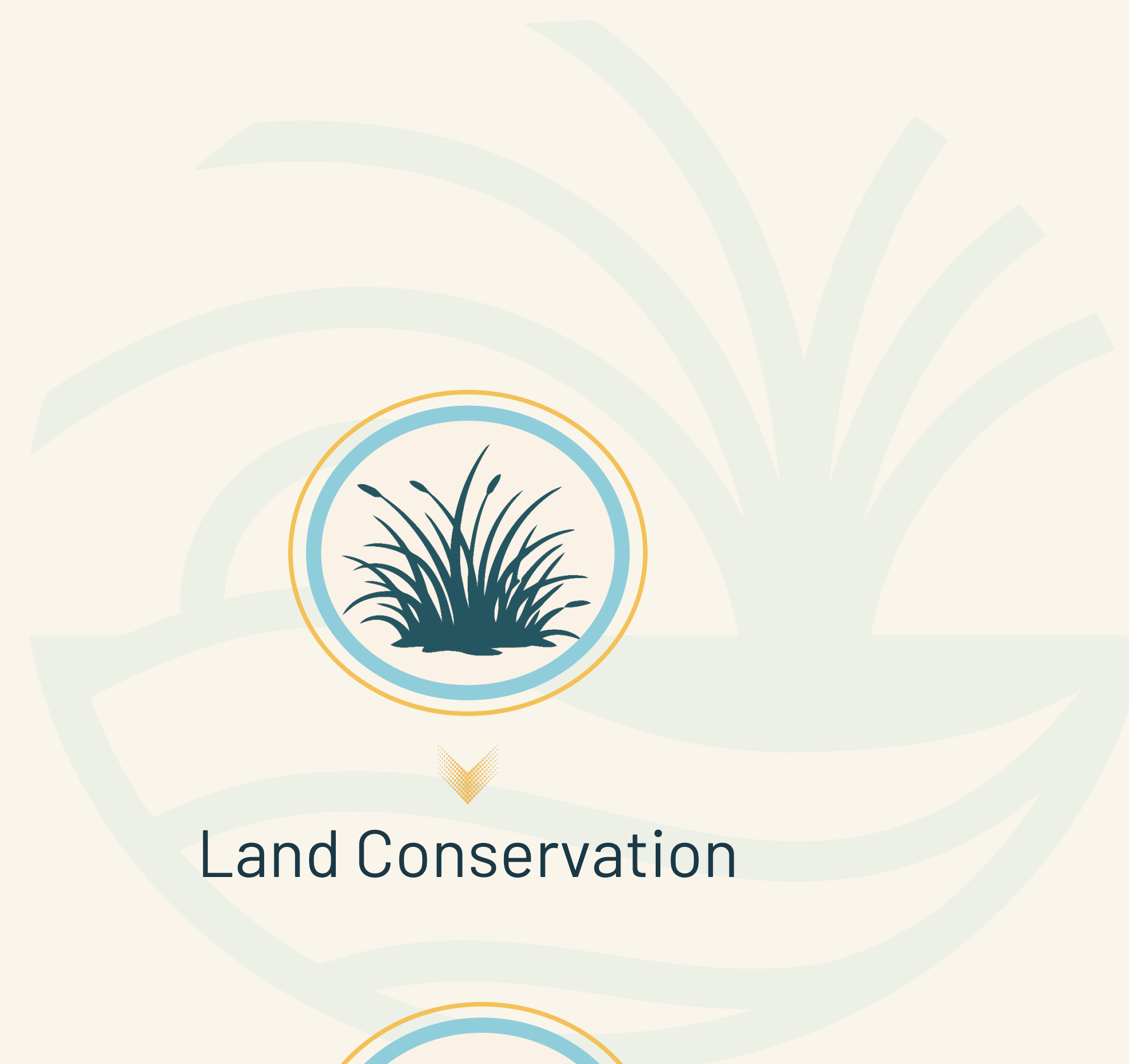
Water Protection



Research



Advocacy



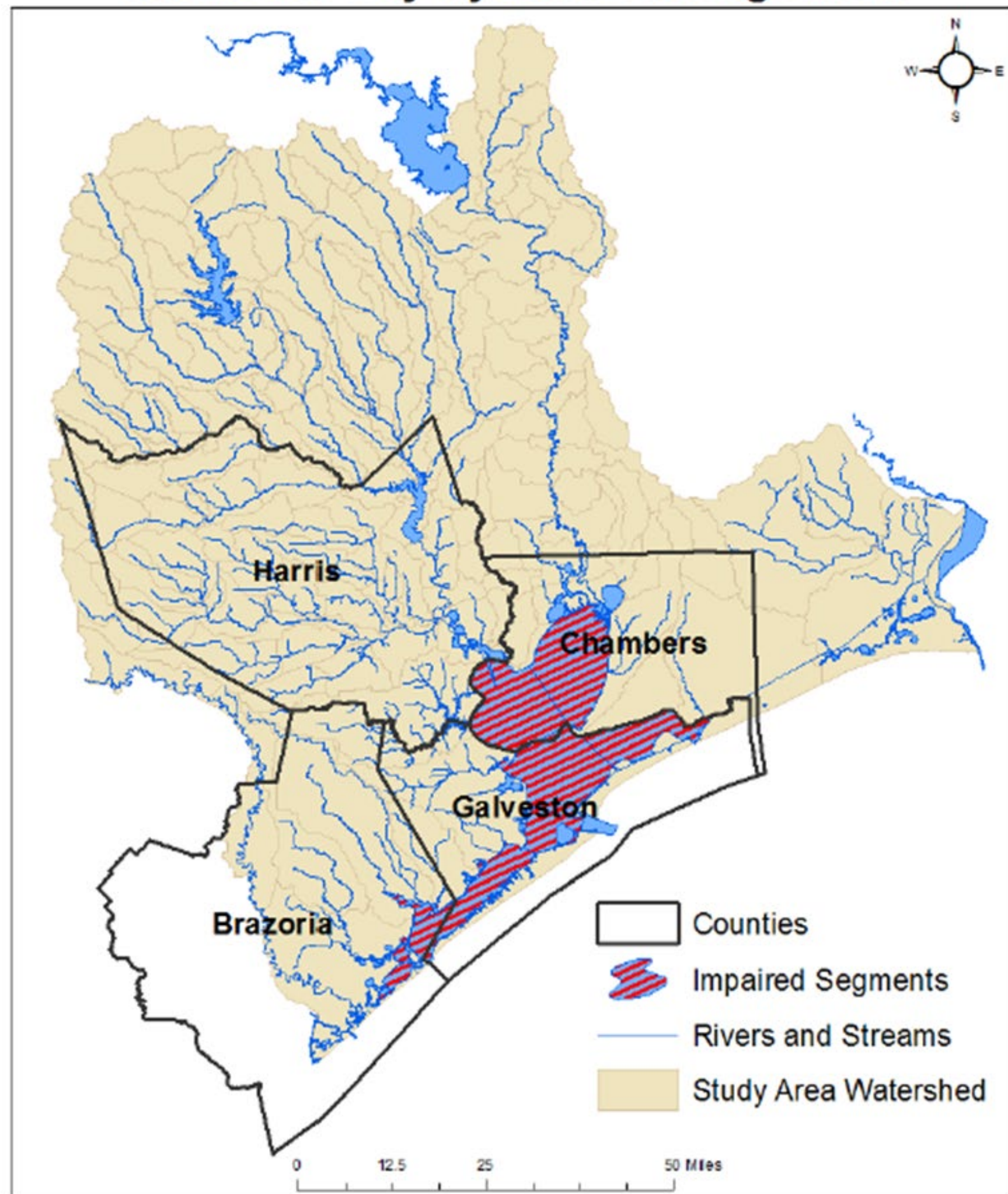
Implementation Plan for Eleven Total Maximum Daily Loads for Bacteria in Waters of the Upper Gulf Coast



- Started in 2002 when data showed sections of bays along the Upper Texas Coast had elevated levels of bacteria
- Put the “Oyster Waters Use” at risk
- Goal was to improve water quality to keep oysters safe for harvest



Galveston Bay System Drainage Area



Author: Neally Rhea
Galveston Bay Foundation



City of Galveston
City of La Porte
City of League City
Clear Lake Water Authority
Clear Lake Marina Association
Galveston Bay Estuary Program
Galveston County Health District
Gulf Coast Waste Disposal Authority
Harris County Pollution Control Services
Houston-Galveston Area Council
Houston Soil and Power Squadron
Marine Association of Texas
Maritime Sanitation
Texas AgriLife Extension Service
Texas Coastal Watershed Program
Texas Department of State Health Services
Texas Parks and Wildlife Department
Texas Sea Grant College Program
Texas Water Utilities Association-Gulf Coast Chapter
University of Houston-Clear Lake
U.S. Coast Guard
U.S. Coast Guard Auxiliary





Implementation Measures



Wastewater Treatment Facilities

Guidance and Training
Pre-permit Renewal Sampling
Increased Compliance and Enforcement
Decreased SSO



On-site Sewage Facilities

Ensure On-Site Sewage Facilities are maintained properly by homeowners



Boater Waste

Pump waste out at designated facilities.

How To Be A Bay-Friendly Boater



At Galveston Bay Foundation, we want to help you protect the natural beauty of your Bay for future generations.

3 Great Ways To Be A Bay-Friendly Boater:



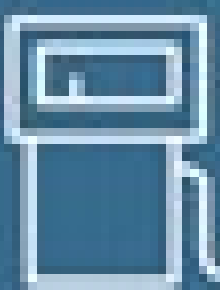
Pump Don't Dump

Exposure to fecal bacteria can make you sick. Do your part to reduce bacteria levels by pumping out your wastewater tanks at a designated facility. Find a pumpout station near you at pumpdontdump.org



Report Pollution

The Galveston Bay Action Network enables community members to easily report pollution relating to storage, abandoned vessels, discarded water, fish kills, septic systems, trash and debris, and more. Report any pollution you see at galvbay.org/GBAN



Contain Your Gas

Be cautious to avoid any accidental discharge of oil or gas into the water. Use oil absorbing materials when fueling or performing engine work, secure hoses, and never discharge oily bilge water over the side.

Galveston Bay Action Network



SEE POLLUTION? REPORT IT!

DOWNLOAD
THE APP NOW

KEEP YOUR
COMMUNITY CLEAN

REPORT POLLUTION ON GBAN



I Pump Out



Galveston Bay Foundation pumpdontdump.org

THIS PROJECT IS FUNDED BY A TEXAS COASTAL MANAGEMENT PROGRAM GRANT APPROVED BY THE TEXAS LAND COMMISSIONER PURSUANT TO THE TEXAS COASTAL MANAGEMENT ACT AND THE TEXAS COASTAL MANAGEMENT ACT. NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AWARD NO. NA17NOS4190139.

KEEP OUR MARINA CLEAN USE PUMP-OUTS

AVOID FINES UP TO \$500 PER DAY

Learn how and where to pump out waste:



Galveston Bay Foundation

Visit pumpdontdump.org

Galveston Bay Action Network

Report suspected boat sewage or pollution:



Download the Galveston Bay Action Network app or report at galvbay.org/GBAN

ENSURE THE FASTEST POLLUTION CLEANUP!

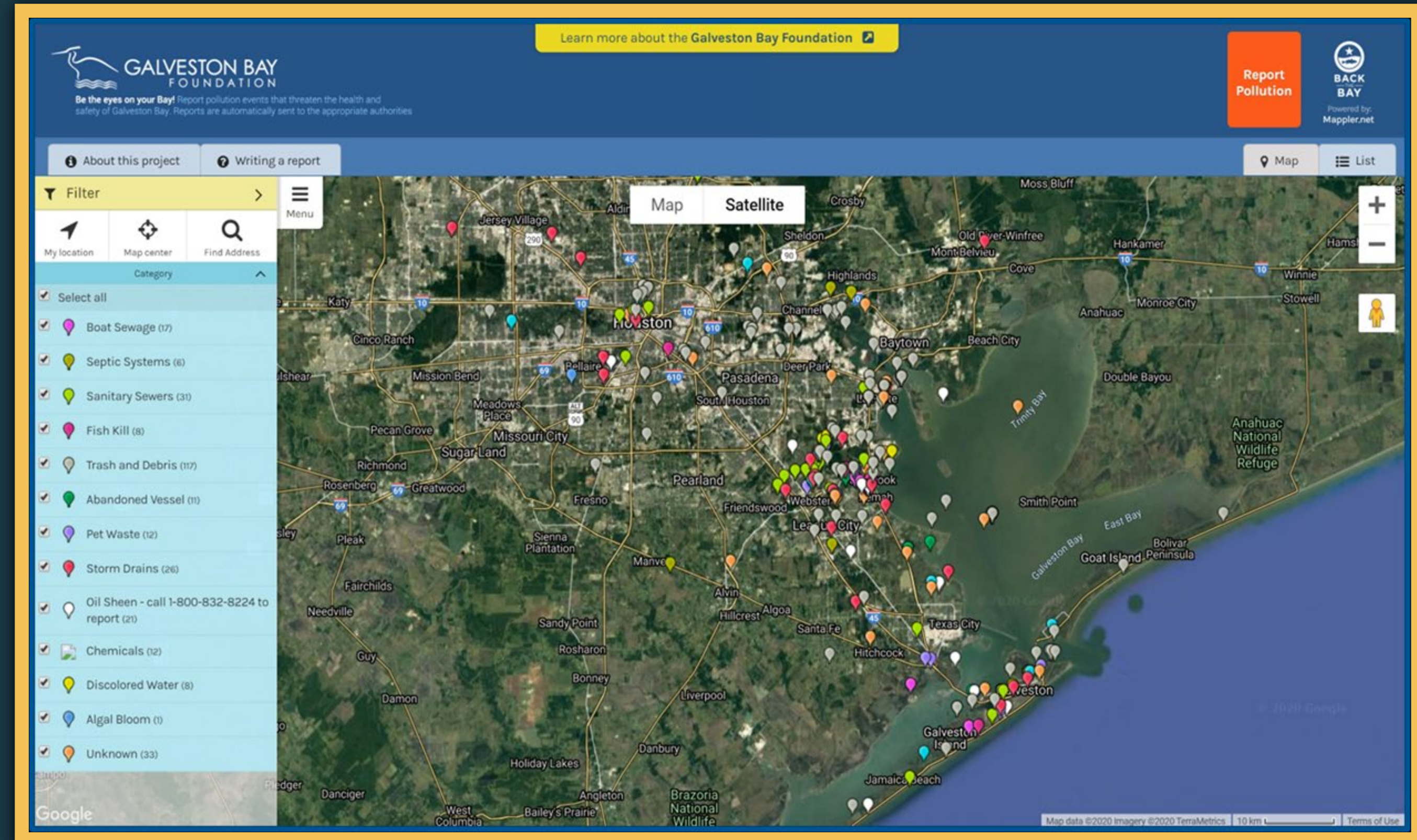


Galveston Bay Foundation



Challenges

- Keeping Stakeholders Engaged
 - Especially with staff changeover
- Funding to keep tools updated and technologically relevant





GALVESTON BAY
FOUNDATION

Protect Today.
Preserve Tomorrow.