



# Matagorda Bay Ecosystem Assessment

Informational Meeting  
September 26, 2019



**GALVESTON CAMPUS.**





**Glenn Hegar**  
Texas Comptroller of Public Accounts



Woody Woodrow



Colin McDonald





**Glenn Hegar**

Texas Comptroller of Public Accounts

# Why Matagorda Bay?



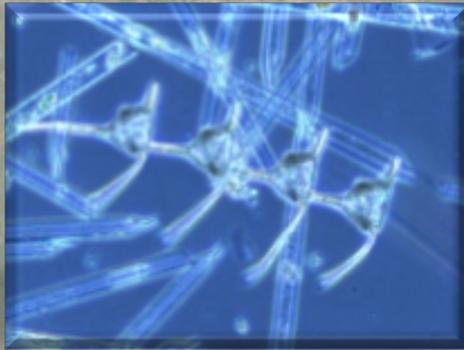


**Glenn Hegar**  
Texas Comptroller of Public Accounts

# Program Goals



# Matagorda Bay Ecosystem Assessment



# Overall Project Goals

**Ecosystem Approach**



**Ecosystem-based Management**

- (1) Inform the development of effective restoration and conservation strategies for endangered sea turtles and birds.**
- (2) Explore future priorities for conservation, mitigation, and restoration using a multi-disciplinary ecosystem assessment.**

96°40'W

96°30'W

96°20'W

96°10'W

96°0'W



# Matagorda Bay Ecosystem Assessment



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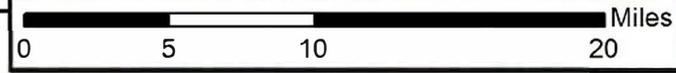


28°50'N

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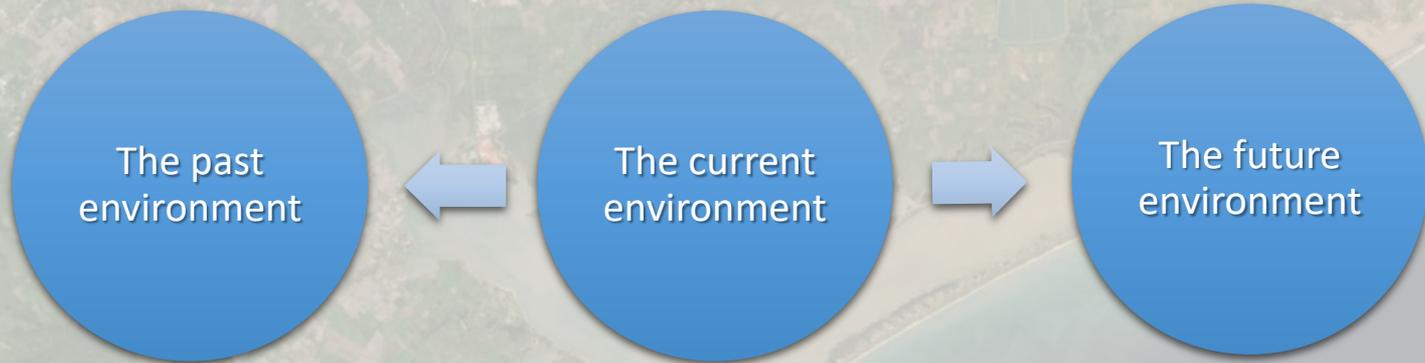


- Habitat Mapping**
  - Expanded Mapping Area
  - Marine Remote Sensing Survey
- Animal Movement**
  - Acoustic Receivers
- Biological Sampling**
  - Nekton Sampling  
(\*habitats dependent upon availability)
  - Bird Surveys/Marsh Assessment
- Water Quality and Plankton Monitoring**
  - Sampling Stations
  - TCEQ Stations

# Expert Science Team



What is the current state of key habitats?  
How have they changed over time?  
How could they change in the future?



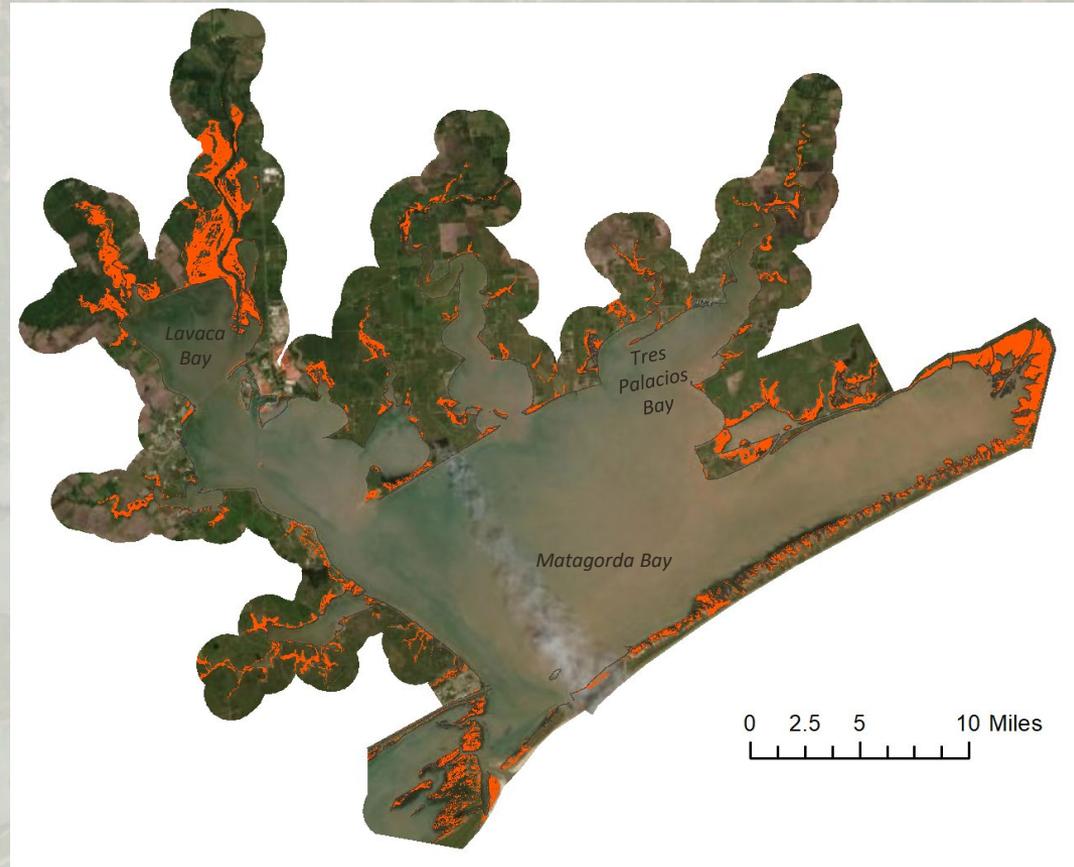
# Mapping the Current Environment

- Understand the current environment by mapping habitats and elevations → baseline characterization
- Habitat mapped using high-resolution aerial and satellite imagery, plus ground-truthing to verify
- Elevation determined using best available lidar surveys to make a digital elevation model



# Past and Future Changes to Habitats

- Understand how the environment has changed since the 1990s
  - 1990s - Colorado River freshwater diversion project
  - 1998 - Colorado River flood
  - 2017 - Hurricane Harvey
- Modeling how habitats could change in the future due to climate change and flooding events
- Analysis will help identify vulnerable areas that are sensitive to change



 Wetlands vulnerable to 3 feet of sea level rise by 2100

# Sunrise on Matagorda Bay



Ed Oborny and Marty Heaney



# Reconnaissance



# Benthic Habitat Mapping

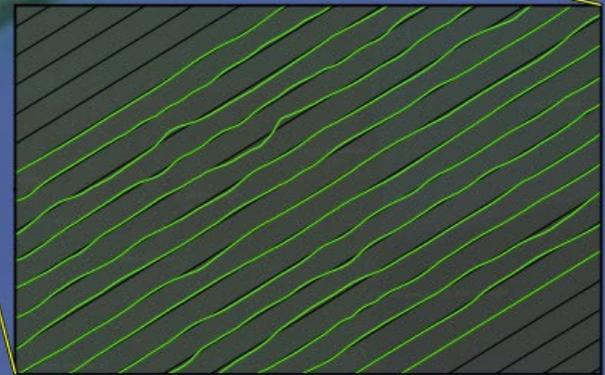


**Marine Remote Sensing Survey Progress - 09/20/2019**

-  Survey Boundary
-  Planned Survey Lines - 3,530 Miles
-  Survey Lines As-Ran - 586.59 Miles (16.62%)



# Benthic Habitat Mapping



# Coastal Habitats Sampling



# Coastal Habitats Sampling



# Coastal Habitats Sampling



# Sea Turtle Movement and Ecology

**Primary Goal:** To understand the distribution, migration, and movement patterns of sea turtles to inform the development of effective restoration and conservation strategies.



## **Some key questions we will answer:**

1. Identification of critical habitat for sea turtles in Matagorda Bay?
2. Do threatened and endangered sea turtles reside in Matagorda Bay year-round?
3. What are the environmental drivers of their movements?
4. What are the ecological roles of sea turtles in these habitats?
5. Where are sea turtles feeding and at what trophic level? What are their prey? What preys on them?
6. What is the seasonal and annual habitat variability?
7. What is the overall health, and are there seasonal and temporal changes to the nutritional state?
8. How do distribution, abundance, demography, and movements compare to historical available data?

# Sea Turtle Movement

## Milestones to Date:

- Surveyed Matagorda Bay for sea turtle occurrence.
- Began sea turtle entanglement net captures.
- Attached a new, experimental satellite transmitter. This is the smallest transmitter ever built to accommodate small, juvenile sea turtles.
- Collected skin sample for isotope analysis for trophic ecology/food webs.

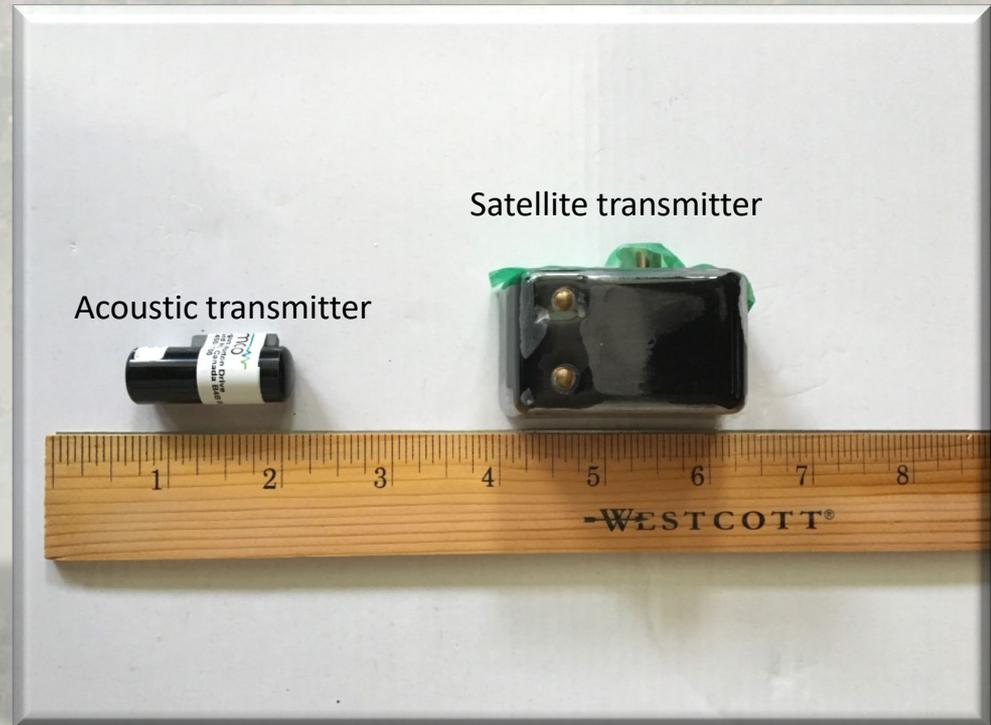


All activities were conducted pursuant to  
NMFS Permit #18029

# Sea Turtle Movement

## Planned Activities 2019:

- Continue entanglement net captures
- Attach 3 more satellite transmitters and 2 acoustic transmitters.
- Analyze location data from transmitters, assess methods and apply these methods for 2020 field season.
- Launch an outreach and engagement program for Matagorda Bay communities and end-users.



# Coastal Conservation and Restoration Ecology

Dr. Jennifer Pollack  
[jennifer.pollack@tamucc.edu](mailto:jennifer.pollack@tamucc.edu)



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RESEARCH INSTITUTE  
FOR GULF OF MEXICO STUDIES

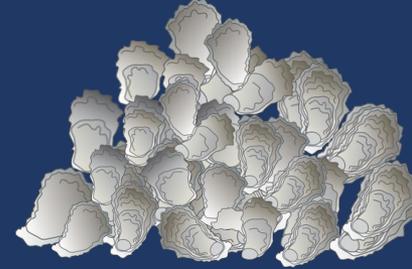
# Primary Goal:

## Inform conservation and habitat restoration

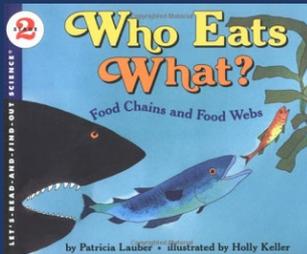
Fisheries production



Habitat provision



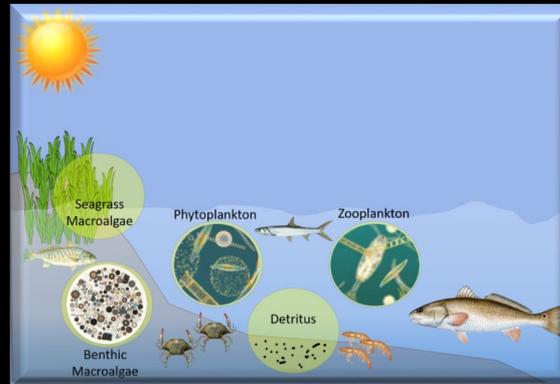
Food webs



Economic benefits



# What fuels the food web in Matagorda Bay?



Compare the area and biomass of primary food sources available to consumers among dominant habitat types

# Oyster reef ecology



Compare faunal communities and food resources on reefs

# Estuarine Nekton Assessment of Matagorda Bay Nursery Habitats

- Compare seasonal nekton (fish, shrimp, crabs) communities among nursery habitats (seagrass, marsh edge, oyster reef) to better understand habitat value and ecosystem function





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Epibenthic Sled



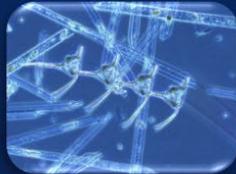
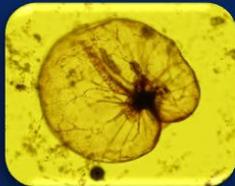
0 5 10 20 Miles

# Matagorda Bay Ecosystem Assessment – Water Quality & Harmful Algae

Coastal Ecosystem Processes Lab  
Dr. Mike Wetz



What are we doing?



Phytoplankton & Harmful Algae:

- 1) Identifying HAB “hot spots”.
- 2) Studying drivers, impacts of blooms.
- 3) Exploring solutions.

Coastal Water Quality:

- 1) Studying causes of water quality degradation.
- 2) Engaging stakeholders to find solutions.

Studying linkages between environmental change, coastal ecosystem processes, and ecosystem health



Who funds us?



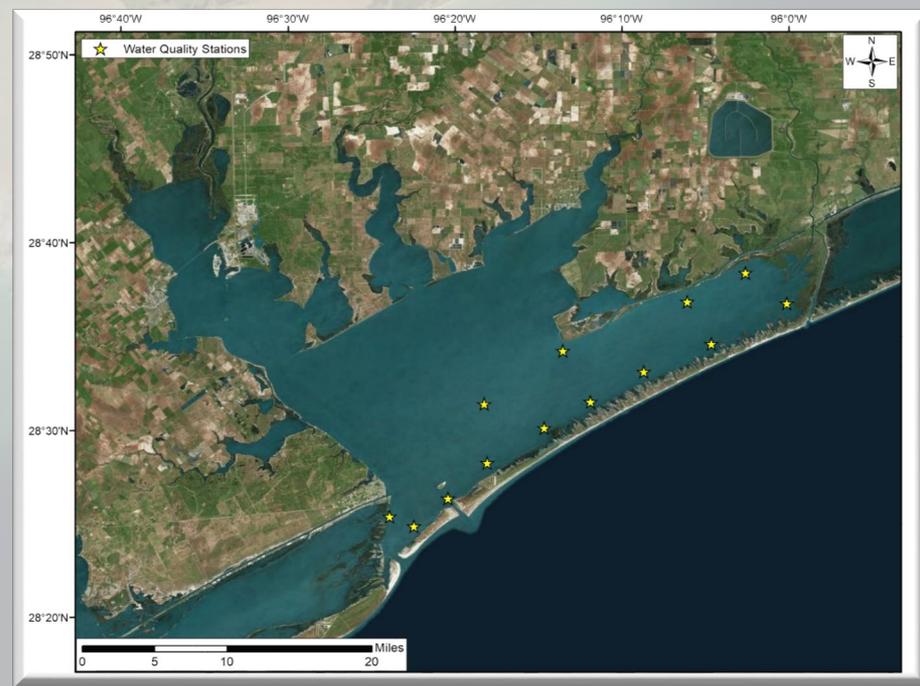
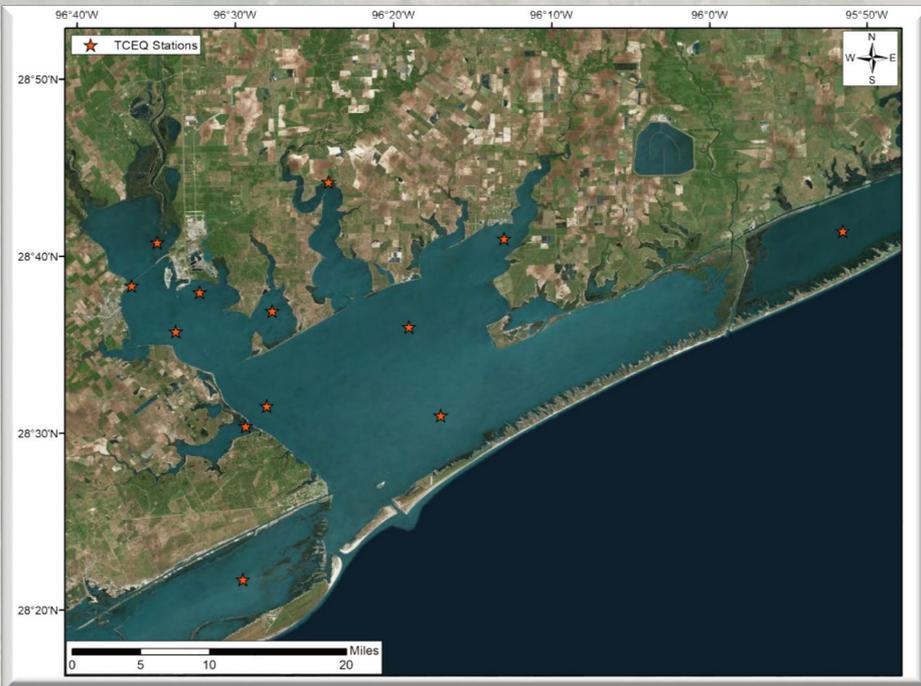
# Water Quality Assessment of Matagorda Bay

Goal #1: Quantify long-term trends and identify “hot spots” of concern

Approach: Analysis of historical (to present) TCEQ water quality data

Goal #2: Quantify water quality patterns & variability at critical habitat(s)

Approach: Monthly boat-based water quality sampling + deployment of monitoring sensors at select locations



# The Baffin Bay Model – Citizen Scientists Assist with Water Quality Monitoring



PHOTO BY GABRIEL DENNY CLOW, CORPUS CHRISTI CALLER-TIMES  
Rachel Denny Clow/Caller-Times Volunteer John Sutton (left) and Mike Wetz, assistant professor of Marine Biology at Texas A&M University Corpus Christi, check the water depth at a test site in Baffin Bay on Thursday. The testing is part of the Baffin Bay Water Quality Study, which is organized by the Coastal Bend Bays & Estuaries Program. Testing, under the supervision of Wetz, began in May and is funded through August 2014.

## Baffin Bay water quality sampling turned over to volunteers

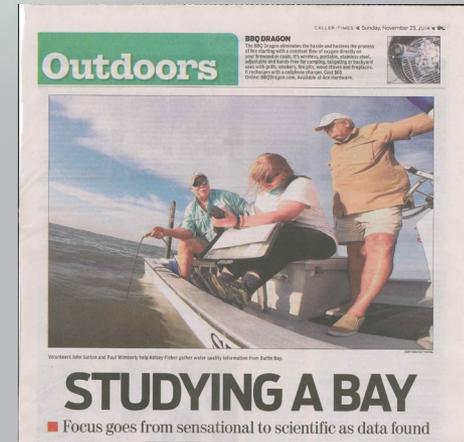
By Rachel Denny Clow  
Thursday, August 15, 2013

CORPUS CHRISTI — Four months of training concluded Thursday as volunteers took over the task of collecting data and water from Baffin Bay for two to three years to help determine [why water quality is deteriorating in the system](#).

Fishing guides, recreational anglers and other volunteers will collect the data as part of the [Baffin Bay Water Quality Study](#), organized by the Coastal Bend Bays & Estuaries Program. Testing began in May under the supervision of Mike Wetz, a marine biology professor at Texas A&M University-Corpus Christi, and is funded through August 2014.



- Volunteers led Baffin Bay sampling for 4 years
- Findings are now leading to actionable watershed restoration to fix Baffin Bay water quality issues



# Overall Project Goals

**Ecosystem Approach**



**Ecosystem-based Management**

- (1) Inform the development of effective restoration and conservation strategies for endangered sea turtles and birds.**
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# Major Milestones:

1. Develop detailed habitat maps forming the basis for the study.

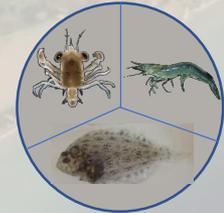


2. Establish an extensive animal tracking component for key species of interest.

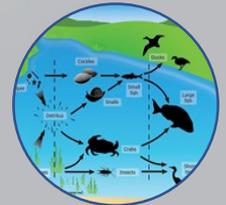


3. Perform detailed ecological assessments of:

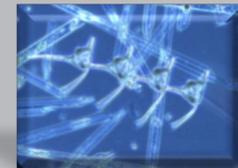
1. Specific habitat communities
2. Macrofaunal density, richness, and community composition
3. Bird abundance, richness, and community composition
4. Determine ecological hotspots of biological diversity and productivity



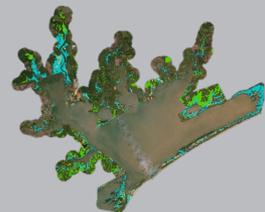
4. Conduct detailed food web evaluations using isotopic and amino acid analyses to determine key ecological interactions among species of interest and their habitats.



5. Perform strategic water quality assessments and monitoring.



6. Habitat changes through time: past, present, and future.



View this video at [this link](#).



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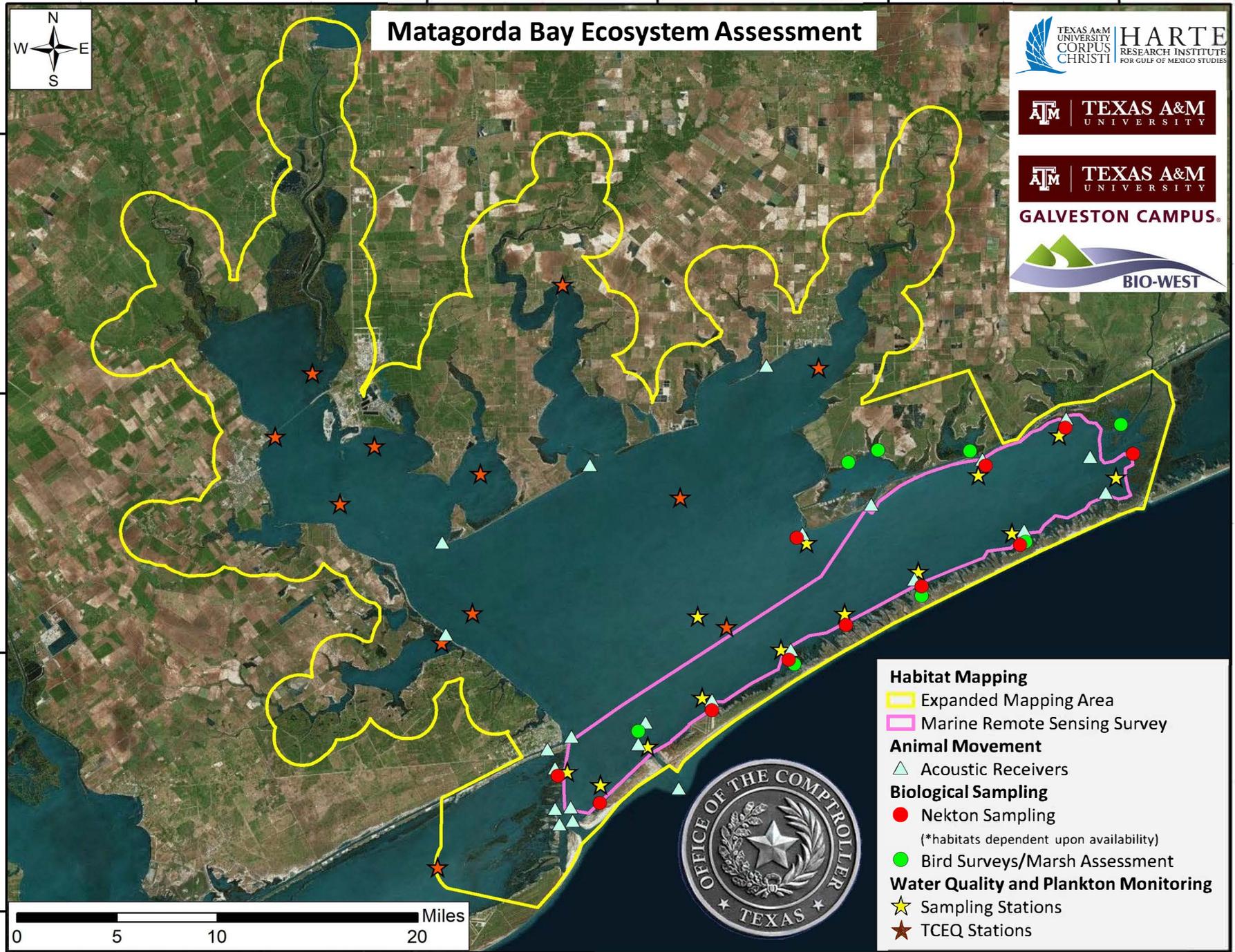


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