Matagorda Bay Mitigation Trust 2023-2024 Funding Cycle

Title: **Evaluating Ecological and Human Health Risk of PFAS in Matagorda Bay**

Contract #067

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Y2 Q2 August 2025 Progress Report

Y2 Q2 Update:

We are actively advancing Phase 1 through method development and optimization to support PFAS body burden analyses in eastern oyster tissues collected from Matagorda Bay. This work focuses on modifying EPA Method 1633 to accurately quantify PFAS in edible tissue. In Phase 2, we are in the preparation and planning stage, working with collaborators at the Texas A&M University–Corpus Christi oyster hatchery to design exposures for both adult and larval oysters using environmentally relevant PFAS. Phase 3 is pending data generation from phases 1 & 2 and will proceed once tissue and exposure data are available.

Phase 1:

We have begun analysis of water samples from Matagorda Bay oyster reefs PFAS using EPA method 531.1. Water samples were sent to the Mass Spectrometry Facility of the Department of Chemistry at the University of Texas at Austin and run on the Shimadzu 8060 LC MS/MS Triple Quadrupole with PFAS. PFAS levels in water samples from directly above oyster reefs (Figure 1) were all non-detectable or below detection limits of the instrument (Table 1). However, other water samples from locations surrounding these reefs in Matagorda Bay shows detectable levels of PFOS (Table 2, Figure 2). This further emphasizes our need to analyze oyster tissues for PFAS burdens as oysters which are filter feeders could be actively sequestering PFOS from the water column which would be evident by their tissue load of PFOS. Field-collected oyster samples are being prepared for PFAS body burden analysis. To ensure robust and reproducible measurements, we are modifying EPA Method 1633 for use with oyster tissues. This includes evaluating sample preparation (homogenization steps), testing extraction protocols (different acid-based extractions), and validating recoveries across key PFAS analytes. Extraction protocol currently includes homogenization using a stainless-steel grinder followed by a mortar and pestle. Extraction involves an acidic solvent added to the tissue sample and then centrifuged. The solvent is decanted from the tissue, and the process is repeated three times. The decanted solvent is blown dry under a gentle stream of nitrogen gas and reconstituted with deionized water. Tissue samples are then processed using solid phase extraction, SPE, and ran on a Liquid Chromatography-Quadrupole Time-of-Flight, LCMS-QTOF. These optimizations are necessary due to the complexity of oyster tissue matrices. Once finalized, the method will be applied to commercial-sized oysters collected from multiple locations in Matagorda Bay to access PFAS concentrations relevant to human consumption.

Phase 2:

Laboratory exposures are in the design and planning stage. We are coordinating with Texas A&M University–Corpus Christi (TAMUCC) hatchery staff to establish controlled exposures of adult oysters to PFAS profiles representative of Matagorda Bay conditions. Dr. Chris Hollenbeck at TAMUCC has an established oyster aquaculture facility which can provide useful tools and resources for our own establishment of facilities for running exposure experiments in both adults and larval oysters. Our adult exposure studies will evaluate reproductive success and PFAS bioaccumulation. A complementary larval exposure study is also planned to examine PFAS effects on growth, pre-settlement success, and early-stage PFAS uptake. Experimental system

setup and scheduling are being aligned with oyster spawning periods to ensure best practices. Plans to begin exposures this next quarter have begun.

Phase 3:
Quantitative risk assessment activities will be informed by the completion of Phases 1 & 2. Once PFAS tissue concentrations and bioaccumulation data are available, they will be integrated with occurrence data to model exposure pathways and evaluate potential human health risks associated with oyster consumption.

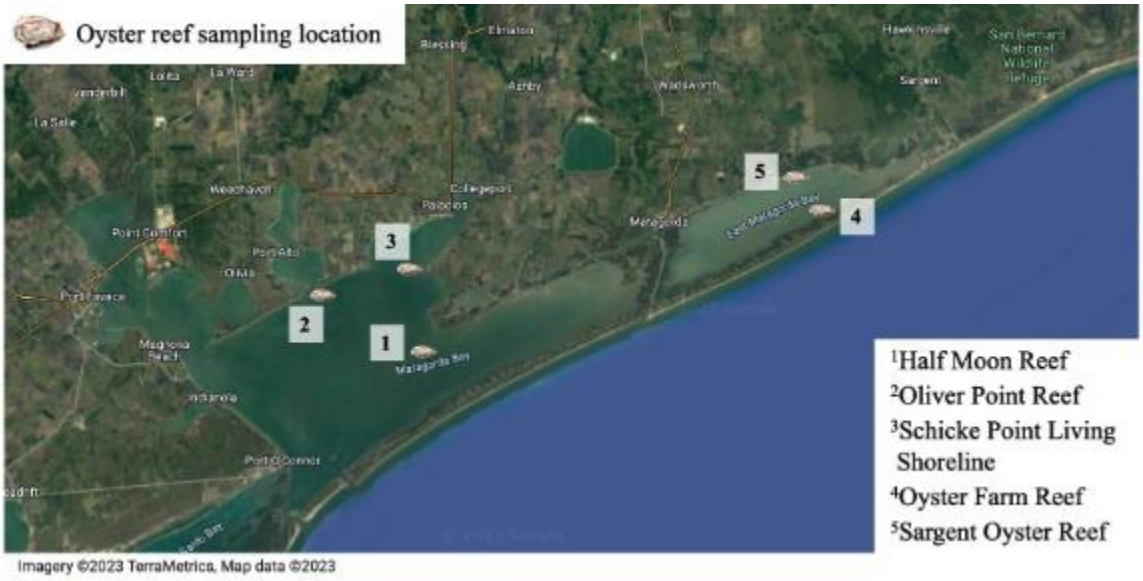

Figure 1: Oyster sampling locations for assessment of PFAS bioaccumulation.

Compound	Limit of Detection (ppt)
PFDA	0.3
PFDoA	30
PFTrDA	30
PFBA	10
PFOA	7.5
PFOS	10
PFHpA	4
PFNA	5
PFHxS	10
PFTeDA	300
PFHxA	17
PFUnA	3

Table 1: Limits of Detection in parts per trillion (ppt) for the Shimadzu 8060 LC MS/MS Triple Quadrupole in Austin, Texas at the Mass Spectrometry Facility of the Department of Chemistry at the University of Texas at Austin.

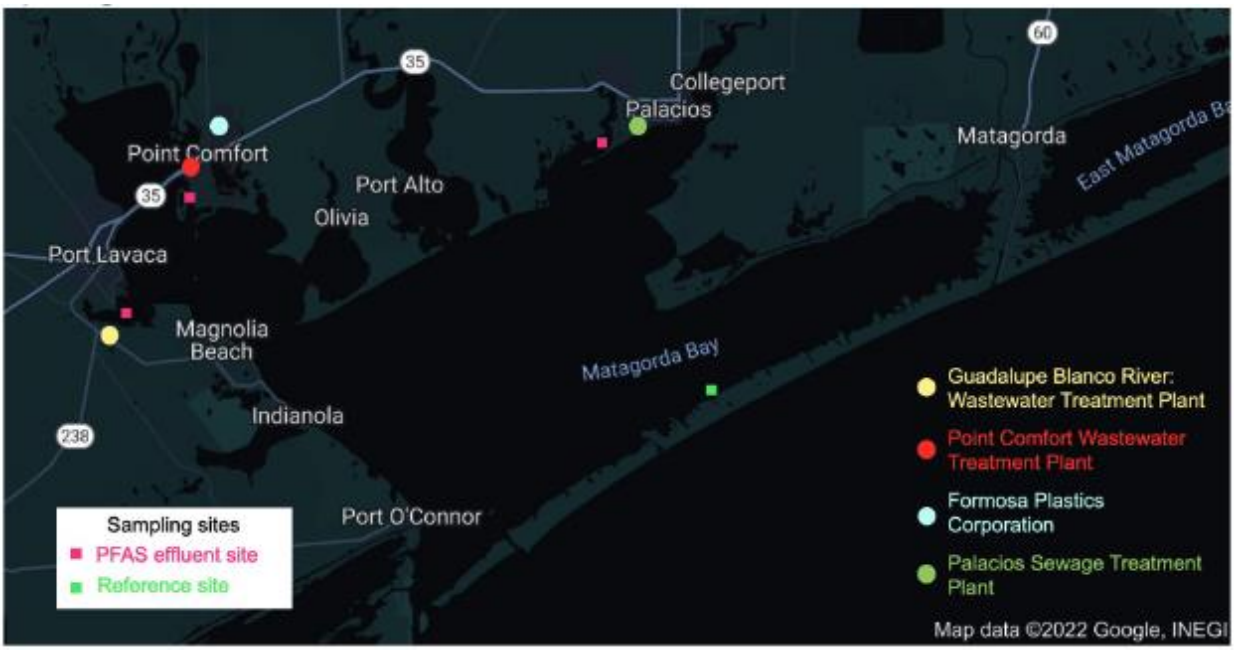

Figure 2: Water sampling sites near PFAS effluent in Matagorda Bay.

Site	PFOS (ppb)
Chocolate Bay	1.60
Palacios	0.40
Point Comfort	0.40
Reference Site	2.08

Table 2: PFOS levels in Matagorda Bay in parts per billion (ppb). Water samples were collected in transects with three replicates per location and three replicates per transect. Water samples were extracted using the EPA method 531.1 and run on the Shimadzu 8060 LC MS/MS Triple Quadrupole in Austin, Texas at the Mass Spectrometry Facility of the Department of Chemistry at the University of Texas at Austin.