

## Matagorda Bay Mitigation Trust—Progress Report

**Project Name:** Assessing multi-trophic impacts of microplastic pollutants across macroinvertebrate food webs in Matagorda Bay, Texas

**P.I.:** Adam Mitchell, Tarleton State University

**Contract No:** 0046

**Reporting Period:** 12/01/2023-02/29/2024

**Task I: Collect free plastic pollutants found along coastal and wetland environments in Matagorda Bay to develop baseline information on chemical composition and pollution level within microplastic loads.**

Status of the task during this reporting period:  not started  in progress  completed

- Describe the major accomplishments for this reporting period
  - *Hire of graduate student to conduct research (employed January 2024)*
  - *Received external funding to hire additional undergraduate student technician to assist in Task 1 (employed January 2024).*
  - *Collected additional water, sediment, vegetation, and invertebrate samples at Matagorda Bay and adjacent bays (East/West Matagorda, Tres Palacios, Turtle, Vaes, Keller, Cox, Lavaca, and Chocolate) for continued calibration and assessment of chemical composition and pollution loads.*
  - *Performed training for Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDS) and Sputter Coating equipment for students at University of Houston-Clear Lake*
  - *Purchase of reagents for Differential Scanning Calorimetry (DSC), equipment for Sputter Coating supplies for SEM; can now conduct experiments in-house to determine chemical composition and pollution loads of microplastics in water and sediment (equipment received 20 February 2024).*
  - *Water and sediment analysis for microplastic density and identification ongoing; initial calibration and assessment conducted. Initial FTIR Spectroscopy and Raman Spectroscopy conducted.*
- List the deliverable(s)/milestone(s) completed during this reporting period
  - *Nothing to report*
- Were there any problems or obstacles encountered during this reporting period (e.g., delays, remedial action taken, schedule revision).  Yes  No If Yes, please explain:
  - *Current Sputter Coating equipment does not acquire accessories to calculate the number of deposited nano-layers. Thus, deposition time is currently under exploration to evaluate the coating process. Several experiments are conducted to optimize the coating thickness/layers such that the coating layers would not have interference with the micro/nanoparticles of the plastics in the sample. Coating must be sufficient to provide a clear image under SEM; additional*

*assessment needed to determine if purchase of accessory is needed to determine coating layers at no additional cost to the contract.*

- *Samples are showing a strong signal of Magnesium Chloride that is dominant and interfering with other signals.*
- *Graduate student hired to Task I and III left program December 2024; additional external funding was received to support the student to continue research tasks at Texas A&M University Corpus-Christi as part of the team's IP. We will interview and hire a replacement graduate student to continue research for Tasks I and III of the project at Tarleton at no additional cost to the contract.*
- Briefly describe plans for the next reporting period.
  - *We will interview and hire a replacement graduate student to continue research for Tasks I and III of the project.*
  - *We will develop additional procedures to remove Magnesium Chloride from the samples to proceed.*
  - *The team will compare inventories of baseline samples and historical record to identify taxa for microcosm experiments as part of Task II and Task III.*

**Task II: Determine the presence, identity, and concentration of toxic or unique chemicals/elements found in plant tissues following the introduction of free plastic pollutants and how these pollutants impact plant growth, development, and nutritional content.**

Status of the task during this reporting period:  not started  in progress  completed

- Describe the major accomplishments for this reporting period
  - *Graduate student for Task II developed thesis proposal and will begin sampling in Spring/Summer 2024.*
- List the deliverable(s)/milestone(s) completed during this reporting period
- Were there any problems or obstacles encountered during this reporting period (e.g., delays, remedial action taken, schedule revision).  Yes  No If Yes, please explain:
- Briefly describe plans for the next reporting period.
  - *The team will compare inventories of baseline samples and historical record to identify taxa for microcosm experiments as part of Task II and Task III.*

**Task III: Determine the presence, identity, and concentration of toxic or unique chemicals/elements of free plastic pollutants found in macroinvertebrates (herbivores, detritivores, and their predators) and how these pollutants impact macroinvertebrate growth, development, and behavior.**

Status of the task during this reporting period:  not started  in progress  completed

- Describe the major accomplishments for this reporting period
- List the deliverable(s)/milestone(s) completed during this reporting period

- Were there any problems or obstacles encountered during this reporting period (e.g., delays, remedial action taken, schedule revision).  Yes  No If Yes, please explain:
- Briefly describe plans for the next reporting period.
  - *Graduate student will be selected for hire pertaining to partial completion of Tasks I and III by June 2024.*
  - *We will purchase tanks and other materials necessary for microcosm study upon selection of candidate taxa.*