

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: 6/01/2024-08/31/2024

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
 - Graduate student officially hired as of 01 June 2024 to continue ongoing research associated with Tasks I and III of project.
 - Undergraduate student technicians hired to continue ongoing research associated with Tasks I and III of project.
 - Performed training for Scanning Electron Microscopy (SEM), Energy Dispersive Spectroscopy (EDS) and Sputter Coating equipment at University of Houston-Clear Lake for samples from remainder of 2023 samples and samples obtained in February 2024. FTIR analysis ongoing.
- List the deliverable(s)/milestone(s) completed during this reporting period
 - Developed manuscript of standard protocol for filtering, sorting, and calibrating sediment and saltwater samples for microplastic and nanoplastic assessment. Manuscript will be submitted for publication by December 2024.
- 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:
 - Sampling for free plastic pollutants along coastal and wetland environments for Summer 2024 sampling period was delayed due to severe weather associated with Hurricane Bailey. Sampling was rescheduled for September 2024 and is ongoing.
- Briefly describe plans for the next reporting period.
 - Will complete sampling of water, sediment, vegetation, and macroinvertebrates from Matagorda Bay and adjacent bays (East/West Matagorda, Tres Palacios, Turtle, Vaes, Keller, Cox, Lavaca, and Chocolate) for 2024 calendar year for continued calibration and assessment of chemical composition and pollution loads.
 - Review manuscript of standard protocol for microplastic assessment and submit to professional journal for publication by December 2024.
 - The team will continue to 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 research associated with Task II (i.e., field sampling and experimental microcosm) is ongoing. Microphyte taxa selected for study include three algal genera (Rhodomonas, Tetraelmis, and Isochrysis) for inclusion with copepod and jellyfish microcosm as part of Task III. Selection of macrophyte candidate species for study include three plant genera (Cymodoeca, Halophila, and Haoldule) for inclusion with macroinvertebrate microcosm as part of Task III.*
- 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 continue to compare inventories of baseline samples and historical record to identify taxa for microcosm experiments as part of Task II and Task III.*
 - *We will purchase tanks and other materials necessary for microcosm study upon selection of candidate taxa.*
 - *Will continue to collect additional water, sediment, vegetation, and macroinvertebrates from 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.*

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
 - Graduate student officially hired as of 01 June 2024 to continue ongoing research associated with Tasks I and III of project.
 - Undergraduate student technicians hired to continue ongoing research associated with Tasks I and III of project.
 - Microcosm experiment ongoing for partial completion of Task III including Calanoid copepods (*Acartia spp.*) and cannonball jellyfish (*Stomolophus meleagris*).
 - Microcosm experiment in preparation for other macroinvertebrates (e.g., crustaceans, gastropods/mollusks, insects) pending approval of animal use protocols (AUP) at primary institution.
- List the deliverable(s)/milestone(s) completed during this reporting period
 - Graduate student presented proof-of-concept research at Texas Plastic Pollution Symposium in Corpus Christi, TX.
 - Graduate student presented preliminary results of findings at the 21st International Symposium on Toxicity Assessment (ISTA 21) in Fukouka, Japan.
- 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:
 - Recent changes in primary institution compliance office requests animal use and wellness protocols for specific invertebrate taxa to go into effect 2025; protocols are under review at primary institution to proceed with development of microcosm experiment.
- Briefly describe plans for the next reporting period.
 - Microcosm ongoing; study to continue into 2025
 - We will purchase tanks and other materials necessary for additional microcosm study upon selection of candidate taxa and approval of animal use protocols.