



**Matagorda Bay Mitigation Trust (MBMT)**  
**Quarterly Progress Report (QPR): FY24, Quarter 1 (Sep. 2023 – Nov. 2023)**

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**TITLE OF MBMT CONTRACT No. 033:**

Microplastic Distribution and Impacts to Diamond-backed Terrapin, Highlighting Public Education and Future Effects of Sea-Level Rise

**Performing Party** University of Houston-Clear Lake (UHCL)

**Funding Agency** Matagorda Bay Mitigation Trust (MBMT)

**Contract No.** MBMT 033

**Contract Amount** \$499,999.01

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This QPR describes the FY24 Quarter 1 portion of the MBMT Project undertaken by UHCL under Contract No. 033 between the MBMT and UHCL. Questions about this project or QPR should be directed to Mandi Gordon ([gordon@uhcl.edu](mailto:gordon@uhcl.edu)).

**Objective 1:** Compile historic and current spatial data related to dispersion and accumulation of microplastic contaminants within Matagorda and San Antonio Bays.

*Task 1.1: Compile historic spatial data for use in projection models (see Objective 2 for model description).*

**FY24 Q1 Progress:** Data compilation has begun. As of this QPR, data compilation is ongoing and will be continued through the fiscal year.

**TASK STATUS:** Ongoing

*Task 1.2: Identify locations for field surveys focused on topographic and bathymetric data collection.*

**FY24 Q1 Progress:** As historic data are compiled (see Task 1.1), survey locations will be identified. Preliminary locations may be surveyed as part of a pilot study in FY24 Q2 or Q3.

**TASK STATUS:** Ongoing

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*Task 1.3: Procure Federal Aviation Administration (FAA) remote pilot certificates for new project personnel.*

**FY24 Q1 Progress:** Co-PI M. Mokrech is currently certified by the FAA. Other current UHCL project personnel have begun the training and certification process for FAA remote pilot certificates. As new project personnel are on-boarded, they will be trained on an as needed basis.

**TASK STATUS:** Ongoing

*Task 1.4: Obtain access permissions for field surveys focused on topographic and bathymetric data collection.*

**FY24 Q1 Progress:** Task has not been started. As survey locations are identified, access permissions will be coordinated with landowners and/or managers.

**TASK STATUS:** Pending

*Task 1.5: Conduct field surveys in select areas to compile current topographic and bathymetric data.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

**Objective 2:** Investigate the implications of sea-level rise on coastal habitats and evaluate its effect on current and future roles of shoreline habitats in filtering microplastic contaminants.

*Task 2.1: Incorporate historic and current spatial data into dispersion and habitat projection models.*

**FY24 Q1 Progress:** Data compilation has begun. As of this QPR, data compilation is ongoing and will be continued through the fiscal year.

**TASK STATUS:** Ongoing

*Task 2.2: Perform models incorporating accommodation space, sediment supply, and rate of relative sea-level rise to simulate wetland losses over time and quantify future habitat changes and distributions.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 2.3: Examine use of adaptation options that aim to minimize habitat losses under future conditions.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 2.4: Use current data to conduct micro-level modeling at selected sites and evaluate potential for shoreline habitats in filtering microplastic contaminants.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 2.5: Generate a publicly accessible web application to document historic, current, and projected microplastic dispersion within Matagorda and San Antonio Bays.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

**Objective 3:** Expand Nurdle Patrol survey methods to areas otherwise inaccessible to the public within Matagorda and San Antonio Bays and apply newly developed standardized protocols for microplastic shoreline sediment sampling.

*Task 3.1: Identify locations for field surveys focused on shoreline sediment sampling.*

**FY24 Q1 Progress:** Collection of spatial data for survey location selection has begun. As of this QPR, three locations in Matagorda Bay have been identified for pilot surveys during FY24 Q3. These sites represent a range of anthropogenic influence and point/non-point source inflows for potential microplastic accumulation/deposition. A full list of survey locations will be identified concurrent with Tasks from Objectives 1 and 4.

**TASK STATUS:** Ongoing

*Task 3.2: Obtain access permissions for field surveys focused on shoreline sediment sampling.*

**FY24 Q1 Progress:** Task has not been started. As survey locations are identified, access permissions will be coordinated with landowners and/or managers.

**TASK STATUS:** Pending

*Task 3.3: Conduct expanded Nurdle Patrol surveys and standardized shoreline sampling protocols.*

**FY24 Q1 Progress:** Current UHCL project personnel have reviewed available Nurdle Patrol protocols and have been trained in survey methods. As new project personnel are on-boarded, they will be trained on an as needed basis.

No Nurdle Patrol surveys or standardized shoreline sediment samples have been conducted or collected as of this QPR.

A standardized sediment sampling protocol development and training session was conducted in Galveston Bay. These protocols will be implemented as part of a pilot study during FY24 Q3.

**TASK STATUS:** Ongoing

*Task 3.4: Submit all nurdle observations directly to the Nurdle Patrol global database.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 3.5: Analyze shoreline sediment samples for presence of microplastic particles of varying sizes and types.*

**FY24 Q1 Progress:** Protocols for shoreline sediment sample processing have been developed and are currently being refined. Current project personnel are involved in this process and will be trained in standardized processing protocols when finalized. As new project personnel are on-boarded, they will be trained on an as needed basis.

Sediment processing protocols will be implemented as part of a pilot study during FY24 Q3. As of this QPR, no samples have been processed.

**TASK STATUS:** Ongoing

**Objective 4:** Evaluate the relationship between dispersion, habitat use, and bioaccumulation of microplastic contaminants in a sentinel wildlife species, the Diamondbacked Terrapin (herein referred to as “terrapin”, *Malaclemys terrapin littoralis*).

*Task 4.1: Obtain an updated Texas Parks and Wildlife (TPWD) Aerial Wildlife Monitoring (AWM) Permit.*

**FY24 Q1 Progress:** Task has not been started. As project personnel become certified for FAA remote piloting (see Task 1.3), survey locations are identified, and survey dates are scheduled, TPWD AWM permit(s) will be obtained for field surveys.

**TASK STATUS:** Pending

*Task 4.2: Update existing TPWD Scientific Permit for Research (SPR) and current Institutional Animal Care and Usage Committee (IACUC) Protocols.*

**FY24 Q1 Progress:** UHCL currently holds a TPWD SPR permit for wildlife surveys coast-wide in Texas and an approved IACUC protocol for handling and collecting samples from aquatic turtles in Texas. These documents require annual review and will be maintained throughout the project duration. Reviews for both documents are due in FY24 Q3.

**TASK STATUS:** Ongoing

*Task 4.3: Identify locations for field surveys focused on terrapin detection and capture.*

**FY24 Q1 Progress:** Two locations in Matagorda Bay have been identified for field surveys based on previous surveys conducted by Guillen et al. (2015). Project personnel have partnered and are coordinating with researchers from other universities and state agencies to identify other known population locations in the Matagorda Bay complex. These institutions have research projects focused on terrapin and surveys will be coordinated to not disrupt ongoing studies.

Due to a lack of established population locations in Texas, species distribution models will be conducted to identify areas of highest likelihood (e.g., “hotspots”) of terrapin presence. These hotspots will be used to identify supplemental survey locations if enough locations cannot be established between historic UHCL surveys and partner agency projects.

As of this QPR, compilation and organization of terrapin occurrence data for use in species distribution models has begun with nearly 300 occurrences retrieved from open access databases, previous surveys, and anecdotal reports.

**TASK STATUS:** Ongoing

*Task 4.4: Conduct field surveys to capture terrapin for assessment of microplastic contaminant bioaccumulation.*

**FY24 Q1 Progress:** Current project personnel were trained in standardized terrapin survey protocols in Galveston Bay during October and November of FY24 Q1. Another round of these training sessions is planned for FY24 Q3 and as new project personnel are on-boarded, they will be trained on an as needed basis.

During training sessions, 19 terrapin were captured. Project personnel were trained in tissue (blood) sample collection, morphometric data collection, permitted animal handling techniques, and general project logistics.

Additionally, modified crab trap techniques were refined in the context of the current study. These standardized protocols will be implemented as part of a pilot study during FY24 Q3.

**TASK STATUS:** Ongoing

*Task 4.5: When conditions allow, conduct surveillance drone flights to pinpoint location(s) of terrapin.*

**FY24 Q1 Progress:** Task has not been started. Surveillance flights may be implemented during FY24 Q3, pending FAA remote sensing pilot certification(s) (see Task 1.3) and TPWD AWM permitting (see Task 4.1).

**TASK STATUS:** Pending

*Task 4.6: Hold captured terrapin overnight (up to 24-hours) in individual containers to collect stomach and/or fecal contents for evaluation of “ingested” microplastic contaminants.*

**FY24 Q1 Progress:** Fecal sample collection protocols are being refined based on a previous study in Texas by Alleman and Guillen (2017). As of this QPR, no terrapin have been held overnight for fecal sample collection. Fecal sample collection protocols may be implemented as part of a pilot study during FY24 Q3.

After discussions with veterinarians from the Houston Zoo, we have decided not to collect stomach contents from live terrapin as this procedure would require anesthesia, is invasive, and has the potential for harm to the animal (J. Flanagan, Chief Veterinarian, Houston Zoo, *personal communication*). Protocols for obtaining stomach contents from dead terrapin through necropsy are being developed. As of this QPR, no stomach content samples have been collected.

**TASK STATUS:** Ongoing

*Task 4.7: Collect blood and/or tissue samples to perform traditional blood panel “health” analyses to elucidate patterns in changes of health indices resulting from increased particle ingestion.*

**FY24 Q1 Progress:** Standardized blood sample collection, handling, and processing techniques have been developed and are being refined. Sample processing equipment has been ordered and will be used for training purposes during training sessions in FY24 Q3. Project personnel are in the process of coordinating with internal and external laboratories to identify the most efficient and effective way to analyze samples (e.g., shipping to an external lab, coordinating with existing partners, or conducting some/all analyses in-house). As of this QPR, no blood or tissue samples have been collected for analysis in this study, though samples are planned for collection as part of a pilot study during FY24 Q3.

**TASK STATUS:** Ongoing

*Task 4.8: Examine reproductive structures (follicles and eggs) in female terrapin using a portable ultrasound.*

**FY24 Q1 Progress:** Task has not been started. Project personnel are currently coordinating with external vendors to procure updated portable sonographic technology. Personnel may be trained in sonographic techniques in FY23 Q2 or Q3, depending on the timing of equipment procurement.

**TASK STATUS:** Pending

*Task 4.9: Analyze results of blood and/or tissue collection, health indices, and reproductive data for correlations between microplastic bioaccumulation and/or habitat accumulation.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

**Objective 5:** Provide educational opportunities for residents of areas in and around Matagorda and San Antonio Bays to raise awareness of microplastic contaminants and their potential impacts to shoreline habitats.

*Task 5.1: Coordinate with local educators to identify areas of interest for education and/or outreach programs.*

**FY24 Q1 Progress:** Project personnel have begun conversations with high school teachers about current projects their students are involved in. Additional teacher contacts, projects, and the local Master Naturalist chapter will be identified in FY24 Q2.

**TASK STATUS:** Ongoing

*Task 5.2: Develop a program outline for environmental education targeted to communities around Matagorda and San Antonio Bays.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 5.3: Generate easily incorporated modules on topical areas of interest which utilize data collected (see Objectives 1-4) to make learning exciting and relevant.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 5.4: Host up to four environmental education workshops for students, teachers, and other interested groups in communities around Matagorda and San Antonio Bays.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

*Task 5.5: Partner with the UHCL Pre-Service Educator program to develop a workshop aimed at exposing future educators outside of the Matagorda and San Antonio Bay systems to ongoing environmental topics of interest.*

**FY24 Q1 Progress:** Task has not been started.

**TASK STATUS:** Pending

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### Literature Cited

Alleman, B.J., Guillen, G.J. 2017. Prey availability and diet analysis of Texas Diamond-backed Terrapin (*Malaclemys terrapin littoralis*). *Chelonian Conservation and Biology*. 16(1):52–61.

Guillen, G., Moss, A., Oakley, J., Mokrech, M., George, R., Alleman, B., Bush, D. 2015. Population survey of the Texas Diamondback Terrapin in San Antonio Bay, Matagorda Bay, and Sabine Lake. Environmental Institute of Houston, University of Houston-Clear Lake. EIH Report #15-001. 194 pp.