

**Quarterly Progress Report**

**September 2023**

**Project Title**

**Sediment Mercury Concentrations in the Closed Area of Lavaca Bay and the Risk to  
Wildlife from Mercury Remobilization During Dredging**

**Contract # 041**

**Submitted to**

**Matagorda Bay Mitigation Trust**

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## **Project Summary**

The Closed Area of Lavaca Bay is a mercury (Hg) Superfund site that is undergoing long-term environmental monitoring. The proposed Matagorda ship channel expansion project will dredge in the Closed Area and could remobilize Hg stored in sediment back into the bay. This study will investigate how sediment Hg concentrations vary with depth throughout the proposed dredging area and undertake lab-based toxicity and bioaccumulation experiments to determine whether the Hg-rich sediment is toxic to benthic organisms. Agencies can use the data to make informed decisions about how to dredge and dispose of the Hg-rich sediment to minimize its environmental impact.

## **Project Goals and Objectives**

The goal of this project is to investigate sediment Hg concentrations in the Closed Area of Lavaca Bay (with a focus on the area that will be dredged) and determine whether sediment Hg concentrations are high enough to pose a threat to the health of benthic organisms if Hg is remobilized during the proposed dredging activities. This study can be broken down into six objectives:

Objective 1: Investigate how THg concentrations change with sediment depth to determine 1) at what depth the greatest THg concentrations are found; 2) how thick the Hg layer is; and 3) how THg concentrations vary spatially throughout the Closed Area.

Objective 2: Map the bay floor and investigate the relationship between sediment THg concentrations and sediment characteristics (grain size and organic carbon content).

Objective 3: Use radioisotopes ( $^{210}\text{Pb}$  and  $^{137}\text{Cs}$ ) to create sediment age-depth profiles and determine sedimentation rates.

Objective 4: Speciate THg in the surface and Hg layer sediment to determine the MeHg concentration and percent MeHg and determine the bacterial composition of the sediment.

Objective 5: Calculate how much Hg could potentially be released into Lavaca Bay from the proposed dredging activities.

Objective 6: Determine whether sediment Hg concentrations are high enough to cause toxicity to benthic organisms (polychaete worms, amphipods, bivalves, gastropods) using laboratory-based toxicity tests and bioaccumulation experiments.

## **Project Update**

This quarter was spent processing the cores collected in June 2023 (Table 1) for further analysis. In total, there are approximately 2000 sediment samples to process. Each core interval has been subsampled and divided up for various analyses (Hg concentrations, grain size analysis, organic carbon content, aging). Sediment samples are now being freeze dried to determine the percent moisture content and homogenized. Twenty samples can be freeze dried every 48-72 hours. This step takes the longest time due to the time needed to dry the samples.

Mercury (Hg) analysis has started on the dried samples (Objective 1). Once the Hg analysis has been completed for a core, other analyses can start. The Hg analysis must be completed first so the PIs know if they are handling sediment that is elevated in Hg and can take appropriate precautions to minimize exposure (e.g., wear face masks to avoid breathing in fine sediment particles).

### **Goals for the Next Quarter**

- Continue drying all the sediment samples.
- Complete the Hg analysis on all cores that have been dried (Objective 1).
- Purchase the muffle furnace and start the organic carbon content analysis (Objective 2).
- Start the grain size analysis (Objective 2).

**Table 1.** Collection date, location, water depth, and core length for the 32 sediment cores collected during June 2023.

<b>Core ID</b>	<b>Collection date</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Water depth (cm)</b>	<b>Core depth (cm)</b>
LB23-01	6/12/2023	28°39'42.31085"N	96°34'05.90487"W	172.7	102
LB23-02A	6/12/2023	28°39'25.90933"N	96°34'23.10856"W	96.5	40
LB23-02B	6/12/2023	28°39'25.85028"N	96°34'23.26292"W	96.5	141
LB23-03	6/12/2023	28°39'06.18588"N	96°34'31.49129"W	106.7	119
LB23-04	6/12/2023	28°39'13.67991"N	96°34'05.19001"W	40.6	66
LB23-05	6/12/2023	28°39'37.12456"N	96°34'22.07283"W	127.0	158
LB23-06	6/14/2023	28°38'39.94144"N	96°33'26.05159"W	477.5	43
LB23-07	6/13/2023	28°38'37.61193"N	96°33'30.49775"W	104.1	94
LB23-08	6/14/2023	28°38'36.43114"N	96°33'28.88230"W	269.2	32
LB23-09	6/13/2023	28°38'34.51271"N	96°33'35.96964"W	121.9	139
LB23-10	6/14/2023	28°38'33.45216"N	96°33'33.12059"W	281.9	31
LB23-11	6/13/2023	28°38'31.41176"N	96°33'40.73990"W	134.6	120
LB23-12	6/14/2023	28°38'30.34704"N	96°33'38.92905"W	170.2	152
LB23-13	6/12/2023	28°38'29.43531"N	96°33'49.72564"W	190.5	105.5
LB23-14A	6/13/2023	28°38'27.92569"N	96°33'45.15590"W	195.6	43.5
LB23-14B	6/13/2023	28°38'27.92569"N	96°33'45.15590"W	195.6	119.5
LB23-15	6/14/2023	28°38'27.50750"N	96°33'43.82768"W	264.2	90
LB23-16	6/13/2023	28°38'27.19897"N	96°33'51.87453"W	91.4	91
LB23-17	6/13/2023	28°38'24.64368"N	96°33'49.03493"W	152.4	128
LB23-18	6/14/2023	28°38'24.89089"N	96°33'47.31254"W	274.3	73
LB23-19	6/13/2023	28°38'21.28173"N	96°33'53.01940"W	144.8	99
LB23-20	6/14/2023	28°38'20.02780"N	96°33'50.73311"W	274.3	61
LB23-21	6/14/2023	28°38'15.65252"N	96°33'55.40691"W	254.0	67
LB23-22	6/14/2023	28°38'15.41006"N	96°33'53.90006"W	266.7	46
LB23-23	6/14/2023	28°38'11.97553"N	96°33'58.53639"W	657.9	74
LB23-24	6/15/2023	28°38'08.72761"N	96°33'55.94438"W	538.5	10
LB23-25	6/15/2023	28°38'04.26207"N	96°34'01.40136"W	274.3	49.5
LB23-26	6/15/2023	28°37'58.26566"N	96°34'03.05826"W	236.2	110
LB23-27	6/15/2023	28°37'50.42967"N	96°34'02.67699"W	254.0	128
LB23-28	6/15/2023	28°37'43.49040"N	96°34'04.38390"W	259.1	130.5
LB23-29	6/15/2023	28°37'35.84904"N	96°34'03.72827"W	226.1	158
LB23-30	6/15/2023	28°37'27.08942"N	96°34'03.64905"W	231.1	85