Researchers Collaborate in Multi-Institution Investigation to Develop State of Texas's Beneficial Use of Dredged Material Master Plan

Impact Statement: ERDC's Coastal and Hydraulics Laboratory (CHL) and Environmental Laboratory (EL) take the next step in their collaboration with the USGS, DU, USFWS, and TPWD to develop a BUDM master plan for Texas. The team spent a week within the McFaddin National Wildlife Refuge and J.D. Murphree State Wildlife Management Area to assess wetland surface, soil, and vegetation conditions across a range of BUDM sites.

Coastal wetland loss is a significant concern along the Gulf of Mexico as extreme storms become more frequent and flooding events intensify. Marsh resilience is dependent upon biogeomorphic feedbacks between inundation, sedimentation, and plant growth, which allow marshes to adapt to a changing environment. Restoration efforts often seek to maximize these feedbacks and increase marsh elevation through the implementation of Beneficial Use of Dredged Material (BUDM), however much remains unknown about the design and long-term viability of these sites.

Ducks Unlimited (DU) conservation staff have been working on establishing a Texas BUDM Master Plan. To assist, a team consisting of USGS, ERDC, USFWS, DU, LSU, and TPWD staff spent a week within the McFaddin National Wildlife Refuge and J.D. Murphree State Wildlife Management Area in southeastern Texas to perform surface, soil, and vegetation surveys across a range of ages since BUDM. Specifically, the team will determine elevation/inundation (i.e., flooding frequency) thresholds for plant community transitions for *Spartina patens* (which is the desired community) dominated areas, *Spartina alternifora* dominated areas, and open water areas across four (4) BUDM placements and a reference site. In addition, the team will assess the time-rate and magnitude of the placement dredged material and underlying soil foundation consolidation to provide the State of Texas with design heights during BUDM projects.

ERDC's team consisted of Dr. Brian Harris and Daniel Gallegos (CHL) and Nia Hurst (EL). Harris and Gallegos lead the geotechnical component of the investigation that consisted of 80 cone penetrometer tests (CPTs), 40 dynamic cone penetrometer (DCP) tests, and 15 soil cores that will be utilized to perform constant rate of strain (CRS) consolidation tests. Hurst led the soil science component of the study where 20 cores were collected and will be utilized to determine soil moisture, bulk density, conductivity, pH, nutrients, and other elements.

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Figure 1. (Left) Collection of soil core and dynamic cone penetrometer test. From left to right is Taylor Ashier (DU), Philip Pauling (TPWD), Nia Hurst (EL), Dr. Brian Harris, Colt Sanspree (USFWS), and Matt Nelson (DU). Photo by Daniel Gallegos (CHL, LSU). (Right) Collection of surface elevations and vegetation characteristics. From left to right is Dr. Jena Moon (USFWS), Rachel Villani (USGS), Colt Sanspree (USFWS), Emily Fromenthal (USGS - Contractor), Dr. Camille Stagg (USGS). Photo by Brian Harris (CHL).

Figure 2. (Left) Collection of soil cores, vegetation plots, and surface elevations. (Right) Collection of soil cores in open water areas. Photos by Brian Harris (CHL).

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