

Progress Report for Contract # 026
Saving the Integrity of Keller Bay and Sand Point Peninsula

End of 3rd quarter: March 31, 2023

Rusty A. Feagin, Texas A&M Agrilife / Texas A&M University

Project Summary: Our overarching goal is to protect the unique estuarine resources of Keller Bay by stopping the Sand Point Peninsula from breaching. Our strategy is to develop a living shoreline solution that incorporates public and private partners. Specific objectives include to:

- (1) Identify and model the best actions to stop the peninsula from breaching
- (2) Engage a working group, composed of stakeholders and agencies, to help design and identify a preferred action plan
- (3) Produce engineering/design plans and obtain permits for the Sand Engine

Task 1: Identify and model the best actions to stop the peninsula from breaching

Progress this Quarter: The team at Texas A&M University (TAMU) conducted several field trips during this quarter. TAMU personnel visited the field to maintain the existing sensors focused on the collection of wave and current data. TAMU also installed a new sensor array focused on measuring sediment flux. The collected datasets were then downloaded and taken to the lab. We began to analyze the field datasets. Several graphs were created and discussed among the larger team to include the sub-contracted engineering firms (Aqua Strategies and West Inc.).

In the next report coming this summer, we will give a longer written report with many figures and graphics that back up the findings described in greater detail below. However in general terms for now, the primary discoveries for Task 1 have been:

- (1) For the majority of time, the currents move from the northeast to the southwest along the Sand Point Peninsula. There is generally a counter-clockwise “wheel” of currents in West Matagorda Bay, the upper portion of which sweeps along this shoreline. When the wind is from the NE, E, SE, or S – which it is the large majority of the time in this location – this wheel moves counterclockwise. As the wind calms, the wheel slows down. At times, the wheel can reverse slightly, if the wind is from the NW or W. The field data that we have collected shows this phenomenon, and it matches the early modeling work that we have performed in Delft3D. This finding is important because it determines the effectiveness of a potential Sand Engine or even a rocky living shoreline towards solving the problem of the sediment deficit at the breach point on the Peninsula.
- (2) Early analysis shows that the sediment flux is exceptionally high along the Sand Point Peninsula for a bay shoreline. It appears to be so great as to reduce the potential effectiveness of a solution such as a sub-aqueous Sand Engine, as the required quantities

of sediment would be too large for us to reasonably obtain. Essentially, while added sediment could make a difference at a single point in time, the gross quantity of sediment that is entrained within the entire “wheel” is so large, that a placement would quickly dissipate downstream into the larger wheel. This reality might preclude a Sand Engine solution. Modeling work is needed however, before we can finalize this conclusion.

Next Quarter: We expect to finalize and provide a written report about the first two deliverables described below. We also expect to begin the Delft3D modeling work in earnest.

Deliverables:

- (1) High resolution topo-bathymetric map of study area - **about halfway done**
- (2) Wave and flow velocity exceedance graphs for living shoreline design criteria – **almost completed**
- (3) Maps and videos of future morphologic evolution of study area, with and without various living shoreline alternatives, including a single or multiple Sand Engines – **not started**

Task 2: Engage a working group, composed of stakeholders and agencies, to help design and identify a preferred action plan

Progress this Quarter: Personnel from TAMU conducted one meeting with the Matagorda Bay Foundation, to discuss the latest news on the Matagorda Ship Channel (MSC). Since the USACE has rescinded the permit for new dredging in the MSC, there is now no obvious source for shoreline renourishment projects, such as a Sand Engine. Personnel from TAMU, Aqua Strategies, and West had been discussing the potential for the beneficial use of this sediment at Sand Point with many stakeholders over the past year, in particular several at the US Army Corps of Engineers (USACE) and the Texas General Land Office (GLO).

Our team has been very aware of the larger goals of the MBMT and its funded partners (namely Drs. Montagna and Gibeaut) to show that the USACE/Max Midstream plans were not properly taking into account the potential ecological impacts of the planned MSC expansion. Our work with the Matagorda Bay Foundation and others was supplementary to these efforts, and could have served as a back-up option in the event that the MSC expansion did indeed come to pass. Our goal was to get the sediment to be used most optimally – which is to the east on the Sand Point Peninsula where it is needed to save Keller Bay by preventing the breach of the Peninsula, rather than on the western flank of West Matagorda Bay where it would have negatively impacted oysters, seagrass, and several small tidal creek entrances (in fact, in 2015 we hydrologically restored the Old Town Lake inlet and a spot known as Fish Pass, which ensured the survivability of all of the marshes between Indianola and Magnolia Beach – the USACE planned Placement Areas (PAs) would have negatively impacted this inlet by increasing the likelihood that it would simply re-block the inlet and recreate the hypersaline issues in the marshes).

A Sand Engine was a difficult concept - to get the USACE to move some of the sediment to new and better PAs on the east rather than on the west of the MSC – but it would have resulted in a net benefit over what they had planned. With both the USACE and GLO, we had already calculated the rough differential costs for moving some sediment to this beneficial location, and indeed used those numbers for a funding estimate in the GLO’s Texas Coastal Resiliency Master Plan. Some progress towards convincing the USACE of the net benefit had been made through our efforts and discussions with them.

The team is now exploring other potential solutions to prevent the breach of the Peninsula and the loss of Keller Bay. Given the new reality that (a) the MSC will not be expanded, at least not for any time in the foreseeable future, and (b) the sediment flux is exceptionally high (see Task 1 for more details), our work will begin to look into alternative designs.

Towards this end, the team has brainstormed in meetings about alternate sediment sources and different types of solutions altogether. Possibilities include obtaining the sediment from upland terrestrial sources on the Peninsula itself, from the ebb-tidal shoal offshore of Carancahua Bay, or from trucking it in from somewhere more distant. Alternate solutions include the construction of a rock living shoreline or an estuarine dune system.

We are now beginning to converge on the concept of an estuarine dune system, as potentially the best possible and most cost-effective solution to prevent the breach of Keller Bay through the Peninsula. The idea would be to put the sediment onto supra-tidal terrestrial portions of land, effectively building a berm. The exact design of this natural solution could be developed to match existing portions of the shoreline. The quantity of sediment required for an estuarine dune solution would be much smaller, the cost much lower, and the sediment source less critical – as compared to any solution that would have been placed in the open waters.

However, a dune/berm solution will also present challenges in terms of funding, because the supra-tidal terrestrial portions of land are privately-owned. The many potential sources of GLO funding, that were made possible by this project’s listing on the Texas Coastal Resiliency Master Plan, would no longer work in an ideal manner if the construction effort takes place on private land. Towards these ends, we have spoken with a private landowner on the Peninsula (Sand Point Ranch Limited Partnership), and two firms (BCarbon, Inc. and Vesta, Inc.) about the potential for private funding or donations for the restoration effort. These are unlikely to work out, but the conversations have been started.

Next Quarter: The team will soon invite members of the MBMT, local officials, and adjacent private landowners to visit the site in person and discuss the project. The team plans to hold a broader stakeholder meeting in the Fall and additionally to begin K-12 student programming at the site.

Deliverables:

- (4) Working group meeting recordings – **started and some saved for later submission**
- (5) Report on working group’s regional strategy and funding plans – **not started**

Task 3: Produce engineering/design plans and obtain permits for the Sand Engine

Progress this Quarter: Not started.

Next Quarter: Expect to begin this work within the next month.

Deliverables:

- (6) 30% E&D plans and alternatives for Sand Engine on state/federal-owned land – **not started**
- (7) Coastal Boundary survey – **not started**
- (8) Support package for permitting of Sand Engine – **not started**
- (9) Section 404 and other required permits for Sand Engine, 80% E&D – **not started**