

# South Padre Island Beach and Dune Assessment Project

## February 2021 Progress Update

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### Summary Overview:

#### Subcontracts

- Work Order BIO-West – in progress

#### Task 1

- Obtained lidar data from GLO and BEG
- Shorelines and shoreline change results requested from BEG
- Beach profile data converted to common format, graphs completed in Excel for analysis
- Literature review, beach and dunes: historical response & state – in progress
- Initial analysis of tide gage data – completed
- Began digitizing historical vegetation lines from aerial photographs

### **Progress Narrative: Subcontracts**

The work order with BIO-West is in the final stages of approval.

### **Progress Narrative: Beach and Dune Analysis**

Lidar data sets were obtained from GLO and BEG, and we began an evaluation of beach and dune change from 2016 to 2018 for SPI. An example of the elevation difference map for the area adjacent to Brazos Santiago Pass is shown in Figure 1. The data clearly show substantial beach erosion (elevation loss) and gains in the dune areas. The gains in the dune could be due to increases in vegetation heights, or could be natural growth of the system dune following the beach nourishment in 2016. The highest areas of erosion are focused in the upper beach and may be scarping of the beach from storm events. We'll begin an assessment of the beach profile data for similar date ranges to confirm morphologic change and evaluate the wave record to understand what processes may be responsible for the erosion.

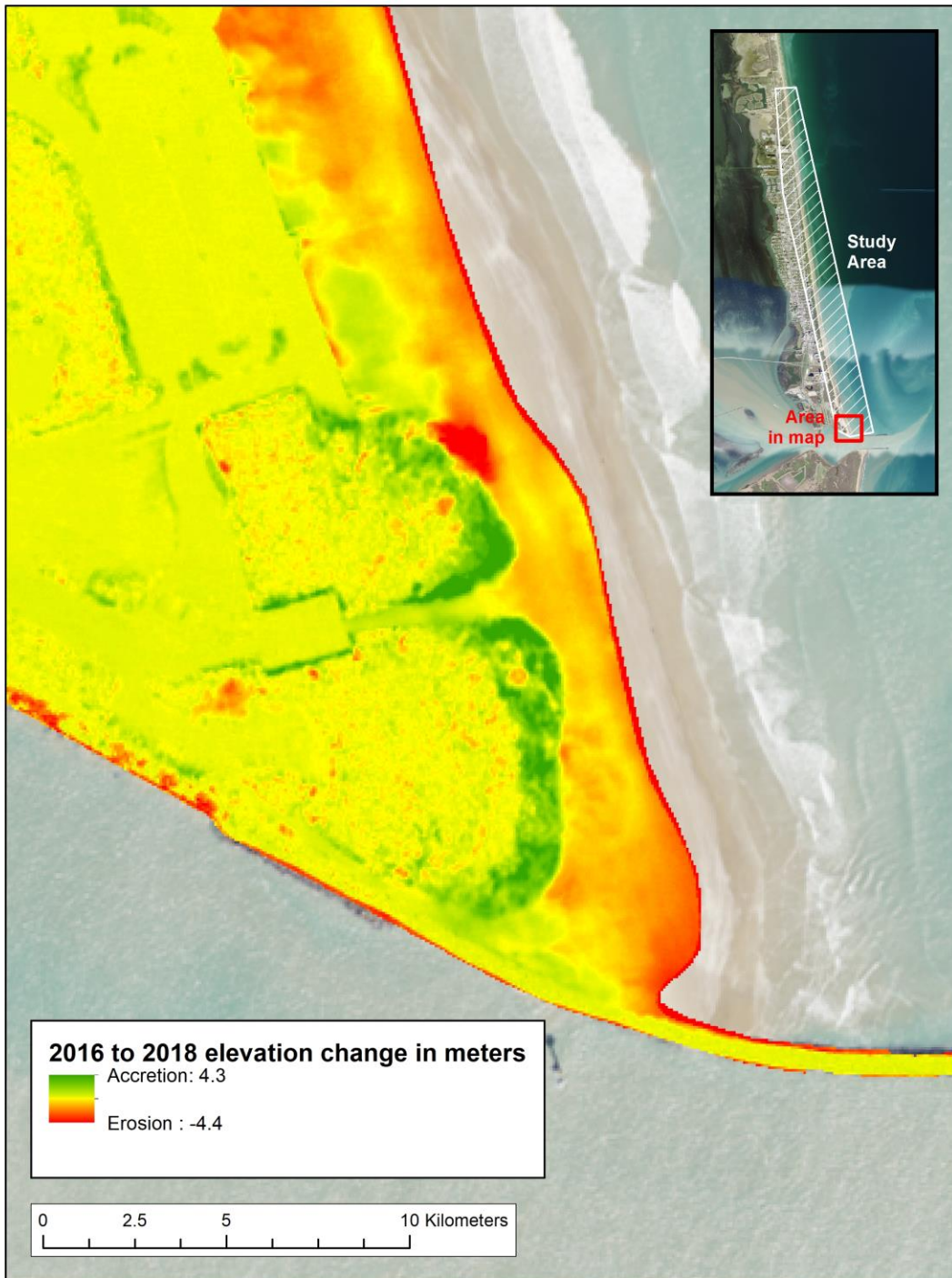


Figure 1. Lidar surface subtraction for the portion of South Padre Island just north of the Brazos Santiago Pass showing change from 2016 to 2018.

In addition to the analysis of elevation change using lidar, we also began evaluating changes to the vegetation line. Using National Aerial Imagery Program aerial photos from 2016, we digitized the vegetation line. Figure 2 shows the 2016 line as compared to the vegetation line obtained from BEG from 2013 for the same area shown in Figure 1. There was substantial retreat of the vegetation line in this area, primarily due to human modifications in the form of creating non-elevated beach walkways, and eradication of the dunes for the creation of recreational areas. Both of these types of activities result in increased vulnerability to storm waves.



Figure 2. Changes to the vegetation line from 2013 to 2016 in the area of SPI adjacent to the Brazos Santiago Pass show substantial loss of vegetation due to human activities.

**Progress Narrative: Water Level Analysis**

In addition to the wave data analysis reported in the January 2021 progress report, we also began analyzing water level data from NOAA tide gages in the region. We included this analysis because the closest wave buoy available to analyze historical data is located 60 nm south-southeast of Corpus Christi and therefore may not always capture high water level events at SPI. The water level record from 2017 to 2021 captures a number of higher than average water levels in 2017-2019 that fall in October (Figure 3). These are not relatable to any known tropical storms and may represent astronomical yearly high tides, since they consistently occur in late October. It appears that the tide gage record does capture elevated waters levels from storm surge associated with Hurricane Hanna and Tropical Storm Beta in 2020.

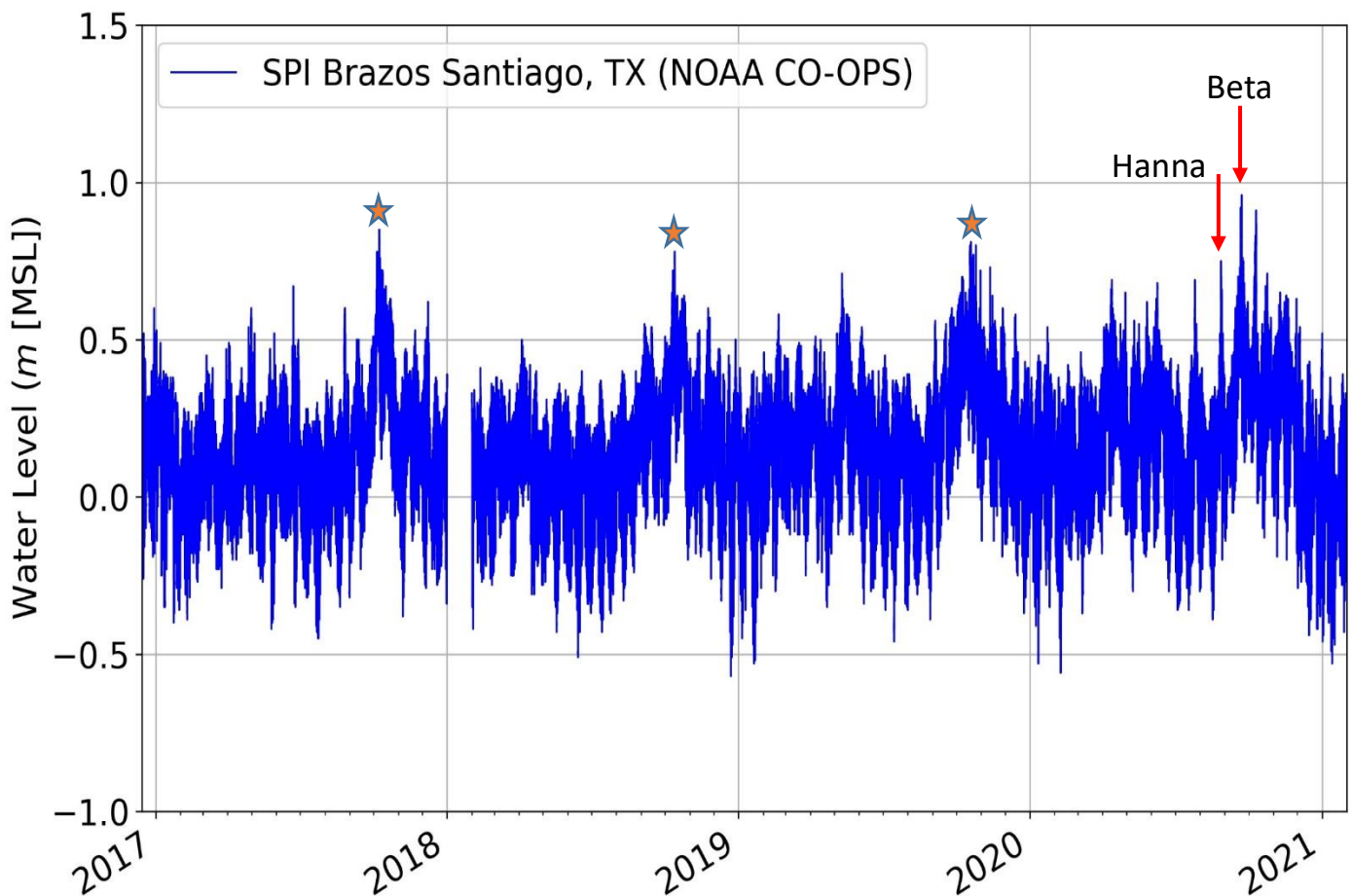


Figure 3. Water level data from a NOAA tide gage at Brazos Santiago Pass. The data time series appears to capture yearly astronomical high tides (orange stars) as well as storm surge from Hurricane Hanna and Tropical Storm Beta in 2020.