

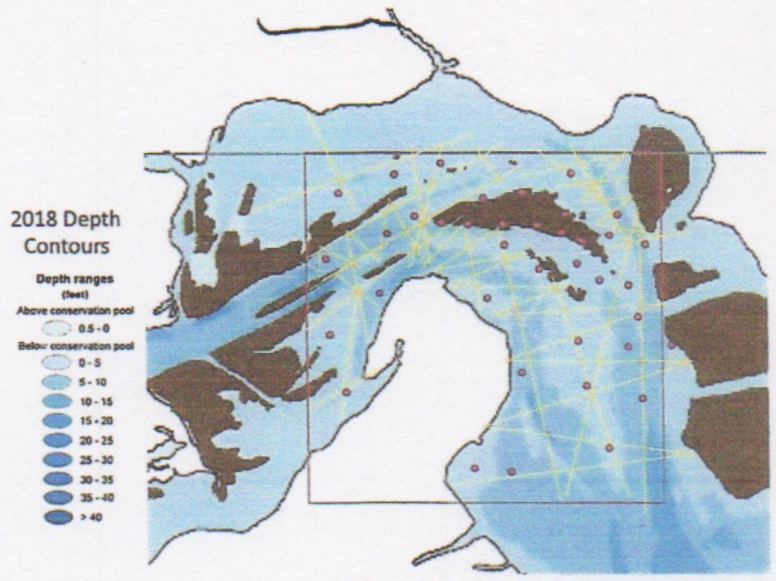
**Delineation and Quantification of Hurricane Harvey Deposits within upper Lake Houston**

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**Introduction**

Between August 26-30, 2017, Hurricane Harvey delivered 92.7 billion cubic meters of rain across Texas and Louisiana. This resulted in an estimated 4.3 billion cubic meters of water flowing out of Lake Houston into Galveston Bay (Du et al., 2019). The question this project addresses is, how much sediment did Hurricane Harvey deliver to the delta region of upper Lake Houston (as delineated in the red box in Figs. 1 and 2)?

The Texas Water Development Board (TWDB) collected bathymetry throughout Lake Houston in 2018, providing a post-Hurricane Harvey assessment (Fig. 1). A comparison of a pre-Hurricane Harvey bathymetric survey conducted for the Texas Water Development Board (TWDB) in 2011 and a post-Harvey survey in 2017 provides a preliminary assessment of the Hurricane Harvey deposit within upper Lake Houston is shown in Figure 2.



*Figure 1. Post Harvey (2018) bathymetry-TWDB showing preliminary proposed seismic track lines (yellow) and proposed core locations. Note: locations of both are likely to change*



*Figure 2. Comparison of pre-(2011) and post Harvey (2018) bathymetry- TWDB- showing thickness of Harvey deposit. Preliminary proposed seismic track lines (yellow) and proposed core locations. Note: locations of both are likely to change*

To delineate and quantify the Hurricane Harvey layer, a grid of ultra-high-resolution CHIRP seismic lines will be collected throughout the study area. Based off of a combination of the interpretations of the Hurricane Harvey flood deposit delineated by the TWDB as well as the CHIRP results, a series of cores will be collected to both ground truth and validate the seismic data. The interpreted results of these data will be used to develop a Hurricane Harvey Flood Deposit Isopach Map (map showing thickness of deposit). This map will provide the basis for a more robust quantification of the total volume of the Hurricane Harvey deposit within the delineated study site.

#### Scope of Work:

- 1) Collect a grid of at least 10 miles of CHIRP seismic data, with a grid sufficient to provide complete coverage of Hurricane Harvey flood deposit.
- 2) Collect at least 25 cores to ground truth and validate the CHIRP data. Note, these cores will likely be a combination of push cores and vibra cores, depending on the thickness of the deposit and the resistance of the sediment.
- 3) Analyses of sediment cores, including splitting, digitally photographing, describing and subsampling as needed. As required, we will also x-radiography specific cores for more detailed analyses. Where required, sediment grain size distributions and water content analyses will be conducted to help in interpretations of stratigraphic signature of the flood deposit and pre-flood deposits.
- 4) Once the flood deposit horizons are selected from the core data, these horizons will be traced throughout each seismic line. These tracings will be digitally extracted and imported into GIS and other mapping programs available to the lab to make final interpretations of the flood deposit volume.
- 5) The final report will be due 120 days after the execution of the contract. Note, preliminary results will likely be available much earlier.

#### Deliverables:

- 1) A final report describing the methods used in the project as well as the project finding.
- 2) An archive of all Core and CHIRP data
- 3) GIS layers of the flood deposit and any other layers requested by the client.

#### Archiving of Data

- 1) All core materials, including sediment samples will be archived in the TAMUG Coastal Geology Cold Storage Room for at least 1 year after the completion of the project
- 2) All digital data will be archived on the TAMUG Coastal Geology computers and servers. Additional digital backups will also be archived for at least 3 years following the completion of the project.