**Field Data Collection**

* Data were collected from 01 November 2019 through 05 March 2021
  + 54 survey days
* Sidescan and Multibeam Bathymetry = Edgetech 6205s
  + Sidescan
    - 230 and 550 kHz
    - Horizontal beamwidth = 0.54 / 0.36
    - Range resolution = 30 mm / 10 mm
  + Multibeam bathymetry
    - 550 kHz
    - Beam width for 500 kHz = 1 x 0.5
    - Motion Correction from iXSea Octans
      * \*\* iXSea Octans broke after scanning Lavaca Bay north of the HWY 35 bridge (‘Lavaca North’); Depth data from the EdgeTech was incorporated into the dataset for Lavaca North; In the remaining scanned areas (i.e. ‘Lavaca South’ and ‘Tres Palacios’), bathymetry data from the EdgeTech could not be corrected for motion and thus are not provided for this survey
  + Range of 30 - 50 meters; varied with water depth as appropriate
  + 15% Overlap between transect
  + Transect spacing of 50 – 85 m
  + Data collected in WGS 84
  + Projected to UTM 14N using WGS 84 Datum
  + Location Data: Ashtec dGPS receiver with Communication System International MBX-3 Differential
  + Data acquisition = HYPACK
* Singlebeam Bathymetry = Biosonics DTX
  + 120 kHz frequency
  + Collected in Visual Acquisition
  + Pulse rate = 8
  + Pulse duration = 0.1
  + Power Reduction = -9.2
  + Transducer depth = 0.61 m
  + Location Data = Garmin GA 29 GPS

**Data Post Processing**

* Sidescan
  + Chesapeake SonarWiz V7
  + Bottom track
  + Empirical Gain Normalization
  + Mosaic and output as 8-bit GeoTiff with 0.2 m-resolution
  + WGS84 UTM 14N
* Multibeam bathymetry (depth only)
  + Used only for Lavaca North scan area, due to malfunctioning iXSea Octans Motion Reference Unit during the remainder of the survey
  + Processed in HYPACK
    - Multibeam soundings immediately along the nadir were isolated using a spatial join in ArcMap 10.7 to trackline location data from the DTX-associated Garmin GA 29 GPS (where available) or the EdgeTech-associated Ashtec dGPS receiver
    - Isolated nadir soundings were averaged in 5 m intervals along tracklines
  + Depth corrected to MLLW in 1-hour intervals from nearest NOAA tide station = Port Lavaca 8773259
* Singlebeam bathymetry (depth and seafloor characteristics)
  + Depth data used for Lavaca South and Tres Palacios scan areas
  + Seafloor characteristics (e.g. hardness, roughness, etc) included where available for all scanned areas
  + Processed in EchoView
  + Bottom Line Selection
    - Min SV for pick = -30
    - Backstep @ -40 discrimination level
    - Peak threshold = -20
  + Bottom Classification (to pull features)
    - Distance between intervals = 5 m
    - Background noise = -999
    - Bottom echo threshold @ 1 m = ranges from -60 to -40
  + Location data assignment in the event of Garmin GA 29 GPS failure
    - Data from the Ashtec dGPS receiver, corrected for the small spatial offset between the two sonars on the vessel, were joined with the singlebeam bathymetry data based on time stamp
      * Column “GPS\_Source” indicates soundings that used the alternate GPS method
  + Depth corrected to MLLW in 1-hour intervals from nearest NOAA tide station = Port Lavaca 8773259

**DEM Creation (can be re-created from point data using different interpolation techniques)**

* Empirical Bayesian kriging
  + Output cell size 50
  + Logempirical transformation
  + Exponential semivariogram
  + 500 points in each local model
  + Local model overlap 3
  + 50 simulated semivariograms
  + Standard circular search pattern
    - Radius of 100 m
    - Maximum neighbors = 500
    - Minimum neighbors = 100
    - Angle 45
    - Sector Type - 4

**Thematic Mapping**

* Manual interpretation based on sidescan imagery and depth, hardness, and roughness bottom features from singlebeam echosounder
* Accuracy assessment using petite ponar (17 cm x 15 cm)
  + 168 samples
  + Overall map accuracy was 86.3%
  + Accuracy for Oyster habitats 75%
  + Kappa was 73%
* “Oyster habitat” was defined as: Any sample in which the combination of “shell hash” and “Rubble” accounted for ≥40% of the sample collected by gear type (petite ponar, patent tongs, or dredge).
  + “Shell hash” was defined as: Substrate layers dominated by loose shell accumulations with median particle size of <25mm.
  + “Rubble” was defined as: Substrate layers dominated by living or non-living shell ≥25mm. These particles may be loose, individual shells, cemented, conglomerated, or otherwise attached to form boulders of consolidated shell material.

**Data Dictionary for Soundings CSV**

* Area: Geographic sub-section of project scan area (Lavaca North, Lavaca South, Tres Palacios)
* Bathy\_Source: Sonar from which bathymetry data originates (DTX or EdgeTech)
* GPS\_Source: GPS unit from which location data originates (DTX or EdgeTech)
* Date: Local date on which data was collected
* Time: Local time at which data was collected
* Latitude: Latitude coordinate using WGS 1984 datum
* Longitude: Longitude coordinate using WGS 1984 datum
* Depth: Raw depth measurement (corrected for transducer depth); Not tide-corrected
* Bottom\_Roughness: Proprietary seafloor characteristic value; See Echoview documentation
* Bottom\_Hardness: Proprietary seafloor characteristic value; See Echoview documentation
* First\_Bottom: Proprietary seafloor characteristic value; See Echoview documentation
* Second\_Bottom: Proprietary seafloor characteristic value; See Echoview documentation
* Bottom\_Rise: Proprietary seafloor characteristic value; See Echoview documentation
* Max\_SV: Proprietary seafloor characteristic value; See Echoview documentation
* Kurtosis: Proprietary seafloor characteristic value; See Echoview documentation
* Skewness: Proprietary seafloor characteristic value; See Echoview documentation
* Tide: Hourly tide observation, relative to MLLW, from nearest NOAA tide station
* Corrected\_Depth: Depth at MLLW, corrected using hourly measurements from nearest NOAA tide station