Objectives

- Characterize the monthly and seasonal water surface elevation, salinity, temperature, oxygen and nutrients
- Characterize the high frequency variability in the vertical and horizontal salinity gradients during spring-summer seasons when marsh growth is at maximum
- Develop empirical relationships between river discharge, water level, wind, and hydrologic variables at marsh spits.
- Determine the transports and residence times of salinity, nutrients, organic matter, oxygen, and suspended sediments in the system
- Assess the magnitude and frequency of boat wakes that impinge upon the marsh edge
Hydrography

• Completed sampling in Jan, Feb, Mar, Apr; scheduled monthly through 2018

• 18 hydrographic stations
  o CTD (S, T, O₂)
  o 6 sites in Region 1, 6 in Region 2, and 6 in Region 3

• 8 discrete sampling stations
  o TSS, nutrients, organic matter (bulk carbon and nitrogen and isotopes), Chla
  o 2 sites in Region 1, 4 in Region 2, and 2 in Region 3
  o Surface and bottom samples
Marsh porewater continuous measurements (begun April 20)

- Installed wells in spits 1, 4, and 9
  - Spit 1: Forested
  - Spit 4: Forested/Marsh
  - Spit 9: Marsh
  - Three wells per spit installed across elevation gradient
  - Surveyed with RTK GPS

- Deployed continuous loggers in each well
  - water surface elevation
  - temperature
  - salinity
  - oxygen
Water column continuous measurements (begun May 1)

- **Mouth**
  - Water column - velocity
  - Bottom - temperature, salinity, pressure, dissolved oxygen

- **Bellingrath Gardens**
  - Water column - velocity,
  - Surface and Bottom - temperature, salinity, pressure, dissolved oxygen

- **Spit site**
  - Bottom – velocity, temperature, salinity, pressure, dissolved oxygen

- **Upriver bridge**
  - Bottom – velocity, temperature, salinity, pressure, dissolved oxygen
Wave gauges on spit edges (to be installed by Memorial Day)

- Installed near wells on spits 1, 4, and 9
- 3 additional spit sites
- Maintained through Labor Day
Modeling

- Engineering and Design phase will require modeling to
  - Facilitate design of the restoration, e.g. raising the elevation of the marshes or arming the shoreline
  - Evaluate unintended consequences, e.g. creating erosional hotspots downstream of armored shorelines; or altering physics, chemistry, and biology
  - Predict the expected ”life” of the restoration project in the face of other environmental change, e.g. sea level rise; changing watershed land-use; altered hydrology/hydrography

- Modeling provides a predictive capability for NEP to
  - Holistically evaluate impacts of other proposed restoration and conservation projects as outlined in the Fowl River WMP
  - Predict system changes that may occur due to other outside influences
    - SLR, SST, altered hydrology in MB watershed, potential changes in salinity due to dredging, etc.
    - Manage, mitigate, adapt locally to global change
  - Transferrable to other sub-estuaries in the Bay and their WMPs
1. Watershed Hydrology
2. Hydrodynamic
3. Ecosystem
4. Sediment Transport
5. Marsh and River Biotic Community

- SAC is already collecting many of the data types needed for model forcing and validation
Wx Station Data

GSSHA

Discharge and Stage

Loads derived from rating curves

Previous studies

NOAA tide gauges

Fowl River Marsh Study

MyMobileBay

Meteorological and Ocean Forcing

Observed River Discharge

EFDC

Currents

Sea Surface Elevation, Stratification

Fowl River Sediment Model

Sediment Transport Model

Fowl River Biota Model

Marsh and Biota Model

Fowl River Ecosystem Model

CGEM

O₂, pH, K_d, Chla, TSS, CDOM, POC, DOC, N, P

Sediment Transport Model

Fowl River Watershed Model

Wx Station Data

Stream Gauges

GSSHA

Discharge and Stage

MBNEP Scenarios

Engineering and Design

Observational Data for Model Validation and Forcing

Fowl River Marsh Study

NOAA tide gauges

Previous studies

MyMobileBay

Meteorological and Ocean Forcing

Observed River Discharge

Fowl River Watershed Model

1

2

3

4

5