Mobile Bay National Estuary Program
Science Advisory Committee Meeting

10 am – 12:00 pm May 10, 2019
Killian Room, International Trade Center
250 N. Water Street Mobile, AL 36602

Agenda

Welcome - review and approval of minutes from previous meeting
Dr. John Lehrter, Dauphin Island Sea lab

Updates and Presentations

Alabama Submerged Aquatic Vegetation Restoration and Monitoring Program
Dottie Byron, Dauphin Island Sea Lab

Fowl River Marsh Health and Recovery Study
Fowl River Marsh Study Team

Other Business

MBNEP Management Conference Updates

Announcements

Adjourn

Mobile Bay National Estuary Program
Science Advisory Committee Meeting
Killian Room, International Trade Center, Mobile AL
May 10, 2019

The Mobile Bay National Estuary Program Science Advisory Committee was established to bring area experts together to provide advice, guidance, and recommendations to ensure that MBNEP activities will be conducted in a scientifically relevant and rigorous manner.

In attendance:
Steve Ashby, Alex Beebe, Wade Burcham, Dottie Byron, Kevin Calci, Marlon Cook, John Curry, Brian Dzwonkowski, Meg Goecker, Patric Harper, Elizabeth Hieb, Amy Hunter, Julien Lartigue, John Lehrter, John Mareska, Missy Partyka, Evan Reid, Stephanie Smallegan, Kari Servold, Tim Thibaut, Caitlin Turnbull, Bret Webb, Byron Webb

Phone-in: none

MBENP Staff: Jason Kudulis, Roberta Swann, Tom Herder, Christian Miller, and Bethany Dickey

Takeaways

- DISL will be mapping and monitoring SAV in 2019 and 2022 using the same methodology as previous surveys for image acquisition and polygon development. Updating ground-truthing to include data for status and trends. Will also attempt to restore SAV beds using nursery stock.
- Marsh Study investigators were unable to discount any hypothesized mechanisms, or "smoking guns" underlying marsh degradation.
- Fowl River spits and marshes are being affected by multiple stressors: lack of sediment to replenish marshes and stay ahead of sea level rise and subsidence; more frequent flooding and salt intrusion on the marshes; increased erosion from high-frequency, low-amplitude boat wakes; and elevated nutrient concentrations.
- Next SAC Meeting will be September 13, 2019.

Dr. Lehrter called the meeting to order at 10:02 CDT. Minutes from the March meeting were not drafted. Discussion at the March SAC Meeting focused on the CCMP Update. Comments from the meeting will be cataloged into the CCMP Update Public Comments document.

First on the agenda, Dottie Byron with the Dauphin Island Sea Lab presented: Alabama Submerged Aquatic Vegetation Restoration and Monitoring Program. Prior SAV mapping was performed every six years to create distribution and acreage maps. With funding from RESTORE Bucket 2, this project will conduct surveys every three years (2019 and 2022). This project will use similar methodology to previous efforts. Will employ a two-tier method

Tier 1: landscape analysis, following NOAA's Guidance for Benthic Habitat Mapping. Imagery collected between June 15 and August 30. RFQ for this activity was open at the time of the May meeting. Ground-

truthing will be done by DISL.
Tier 2: status and trends will use random point in 400m-900m tessellated hexagons. Will use smaller hexagons in areas with higher species diversity. Random points will be generated in potential SAV habitat.

DISL previously conducted Tier 2 monitoring between 2011-2016 for the National Park Service in Gulf Islands National Seashore. Dottie reviewed this work and presented a case study using the tessellated hexagons SAV monitoring in Big Lagoon. This program will also include SAV restoration grown from nursery stock focusing on freshwater species and *halodule wrightii.* The team will use a bio-optical model for habitat suitability to aid site selection. Additionally, navigation aids, boating guides, and educational signage will be installed to support restoration and program goals.

Next, representatives from the year-long Fowl River Marsh Health and Recovery Study shared results with attendees. Planning for this SAC pilot project started in 2017, with implementation of research in 2018. The Fowl River Marsh Study examined vegetation, sediment, and hydrology characteristics from the mouth of Fowl River upstream to the bridge on Fowl River Rd., with a focus on marshes and spits in the transitional zone of Fowl River (Region 2). A strength of this study is that each component (vegetation, sediment, hydrology) is integrated, meaning investigation of each component will benefit from information collected for the other two.

Funding to undertake this comprehensive assessment of marsh health, including the four priority spits identified in the WMP, was awarded to the MBNEP by the National Fish and Wildlife Foundation (NFWF) Gulf Environmental Benefit Fund. Before funding restoration measures, NFWF expressed the importance of first understanding the factors underlying loss of habitat in Region 2 marshes before proceeding with engineering and design or habitat restoration projects.

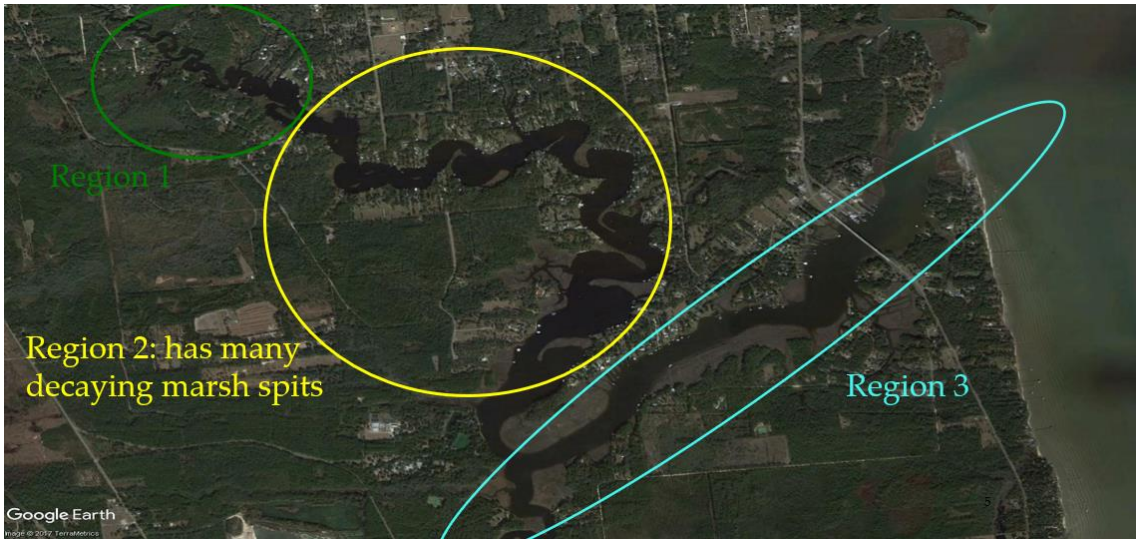


TABLE 8.2: PRIORITY COASTAL PROJECTS					
Priority (Zone)	**Location Name**	**Length (ft)/ Area (acres)**	**Est. Cost**	**Brief Description**	**Location Diagram**
1 (I)	Lightcap	1800 / 1.7	$2.1M	Proposed salt marsh enhancement and protection would include structural stabilization, fill, and appropriate vegetation.	
2 (I)	Tapia	2800 / 4.2	$3.2M	Proposed salt marsh enhancement and protection would include structural stabilization, fill, and appropriate vegetation.	
3 (I)	Strout	1300 / 0.8	$1.5M	Proposed spit and salt marsh enhancement and protection would include structural stabilization, fill, and appropriate vegetation.	
4 (I)	Closing Hole	1700 / 3.2	$2.0M	Proposed spit and salt marsh enhancement and protection would include structural stabilization, fill, and appropriate vegetation.	

Representatives from the Marsh Study Team:
Dr. Alex Beebe, USA; Dr. Ruth Carmichael, DISL; Dr. Just Cebrian, DISL; Mr. Marlon Cook, Cook Hydrogeology LLC; Dr. Brian Dzwonkowski, DISL; Mr. Joshua Goff, DISL; Dr. John Lehrter, DISL; Dr. Stephanie Smallegan, USA; Mr. Tim Thibaut, Barry Vittor and Associates; Dr. Bret Webb, USA.

To begin, Mr. Tim Thibaut provided specific examples of failing or lost marsh habitat in Fowl River. Analysis of comparative aerial photographs from 1938, 1974, and 2013 in the WMP and 1940, 2002, and 2017 provided by Barry Vittor and Associates demonstrate shoreline loss in Fowl River. The Marsh Study Team hypothesized three mechanisms (acting separately or in conjunction) that could be responsible for the observed decline.

Three hypothesized mechanisms:

- Sea level rise: Increased inundation and salinity
- Sediment starvation
- Boat wakes and wave energy

To investigate these mechanisms, the study selected three integrated components for investigation:

- Vegetation: Composition, health, and extent
- Sediments: Insufficient sediment loads to sustain marsh habitat
- Hydrology: salt intrusion, flooding, nutrient concentration, and wave energy

Mr. Thibaut then presented the Vegetation component, describing ***vegetative composition, porewater salinity, and elevation characteristics of tidal marshes along Fowl River, Alabama.***

<u>Vegetation component questions:</u>

1) What is the general marsh health status across the three study Regions?
2) What are the factors that influence the health of marshes in the transitional zone where fresh and brackish waters mix?

Vegetation component activities - vegetation surveys were performed at 10 sites across the three Regions.

- Plant species diversity, distribution, and % cover

- Marsh elevation
- Marsh porewater salinity
- Hydrogeomorphic modeling
- Floristic Quality Index

<u>Conclusions:</u> Elevation transects revealed the spits are relatively flat. With continued sea level rise, they will be permanently inundated with water. Boat wakes and erosion are likely exacerbating the inundation stress. The diversity, distribution, and coverage of plants species has changed. When the spits were surveyed decades ago, they were forested with more woody, more upland vegetation; surveys conducted during this study reveal those habitats are now mostly covered with emergent marsh species.

Next, Dr. Alex Beebe presented ***Fowl River and Marsh Sediment Dynamics.*** While Mobile Bay is characterized as a drowned river valley, Fowl River represents a *drowning* river valley. This is common in riverine systems where meanders in the upper reaches transition to a broad open basin downstream, before transitioning again near the mouth to a tidal inlet. Examples of similar river systems are common globally where sea level rise increases, forcing water up river. In the case of Fowl River, geologically, the future of the spits comes down to delivery of sediments to offset and sea level rise – like balancing a checking account. Marsh elevation is controlled by two things: accretion (paycheck/revenue) and increases in sea level (expenditures). If your paycheck/revenue does not exceed your expenses over time, your account (relative elevation of spits) will decrease as represented in the following equation:

$$\Delta Marsh\ Elevation\ = Net\ Accretion - \Delta Sea\ Level$$

Sediment component activities:

- Sediment loading and transport assessment
- Channel profiles and channel bed sediment characterization
- Sediment cores collected from spits and river channel
    - Calculated accretion/erosion rate
    - Organic carbon concentration
    - Stable isotope analysis to determine increased human activity
    - Depositional profiles

<u>Sediment team questions and conclusions:</u>

1) What is the current sediment supply, fate, and transport in Fowl River?
    - *Very little river sediment is available to accrete on the Region 2 spits.*

2) How do the current sediment conditions compare to the past?
    - *Same sediment type but composition of stable isotopes reflects increased human activity in the 20th Century.*

3) What is the accretion/erosion rates for the marsh?
    - *Accretion (paycheck/revenue) is not keeping pace with sea level rise (expenditures).*

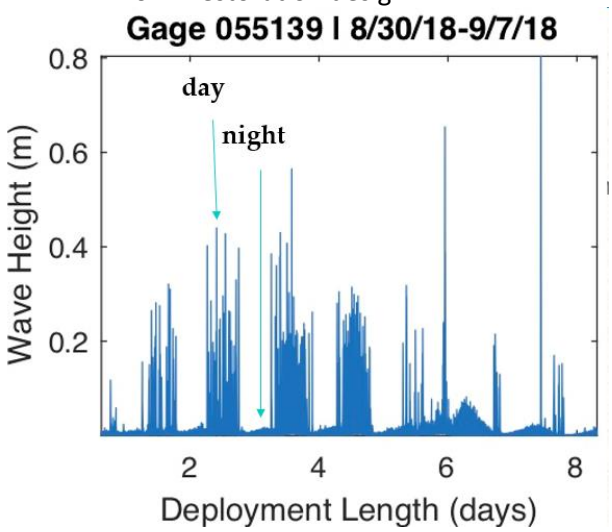
Dr. Bret Webb shared analysis of ***Boat Wakes in Fowl River. (Hydrology)***

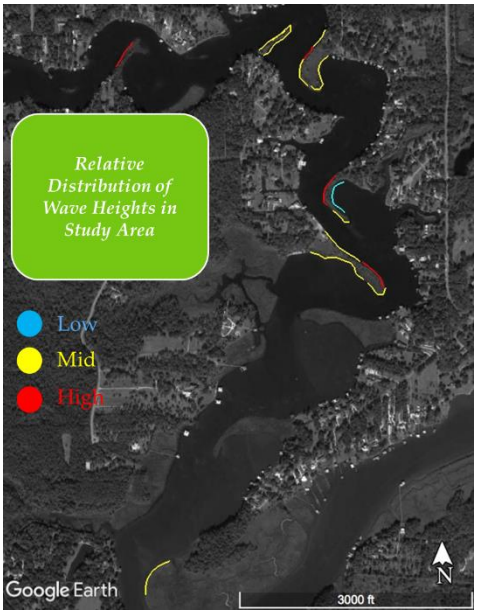
Boat wake component activities:

- 10 high frequency wave gauges were deployed between May 24 and October 3, 2018
    - Some gauges were deployed permanently at representative stations while others were rotated at strategic spit locations.

Boat wake study objectives:

- Measure tides and waves
- Evaluate wave conditions
- Describe wave frequency
- Inform restoration design





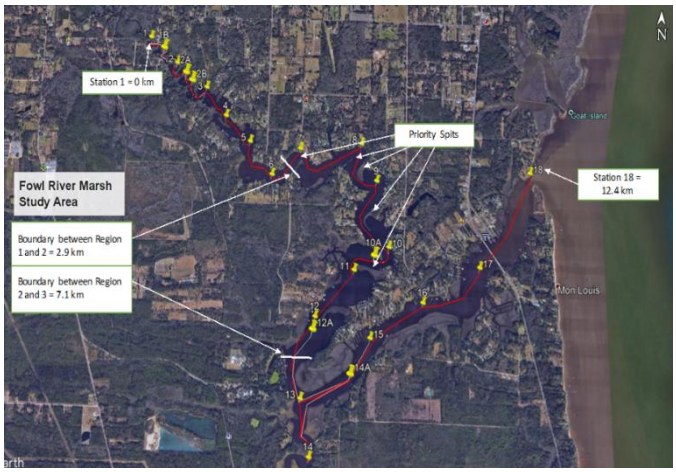
<u>Conclusions:</u> Data from the boat wake study suggests all significant wave energy is generated by boats (rather than winds). Data clearly showed all wave energy is during daylight hours with little to no wind chop. Wave frequency, rather than wave height, is the primary stressor. Persistent wave frequency exceeded marsh grass (*Spartina alterniflora*) tolerance limits most of the time. All sites exceeded frequency tolerance thresholds by at least 20%, while some sites exceeded tolerance 80% of the time. Wakes are likely contributing to additional marsh inundation and erosion to the edges. Regardless of other contributing stressor impacts, reducing the energy of boat wakes will be a critical component of any restoration design.

Dr. John Lehrter, also addressing the Hydrology component, shared **Sea *Level, Salinity, Suspended Sediments, and Nutrients.***

<u>Hydrology team questions:</u>

1) How are changing marsh spits related to sea level rise, salinity, and nutrients?

2) Can we diagnose causes for loss of spit shoreline?
3) How best to plan for restoration considering environmental change?



Hydrology component activities:

- Continuous water quality sampling and measurements from April to October 2018
- Porewater well (depth and salinity)
- Monthly water quality surveys at 18 stations from January to October 2018.
    - Developed vertical profiles (salinity, temperature, depth, and dissolved oxygen)
    - Eight discrete water sampling stations to collect suspended sediments, nutrients, organic matter, and Chlorophyll a (surface and bottom)

Conclusions: The hydrology team concluded that marsh flooding is a persistent issue, with marshes submerged throughout the study period. Salinity in the marshes is related to increasing salinity trends observed in the river. Suspended sediment data indicated low inputs come from the watershed but instead are mainly from Mobile Bay. Persistently-low oxygen (hypoxic) conditions were frequently found on the bottom of the river. Low oxygen conditions, while naturally occurring, can be intensified by excessive nutrients entering the system. Analysis of nutrient data suggests Fowl River is a eutrophic (nutrient-rich) system. However, additional investigation would be needed to determine the significance of the relationship to marsh degradation in Fowl River.

At 11:58 am Dr. Lehrter made the motion to adjourn and Mr. Tim Thibaut seconded it.