

Seabird Nesting Habitat Restoration in Charleston Harbor

Geosyntec
consultants
Geosyntec Consultants of NC, P.C.

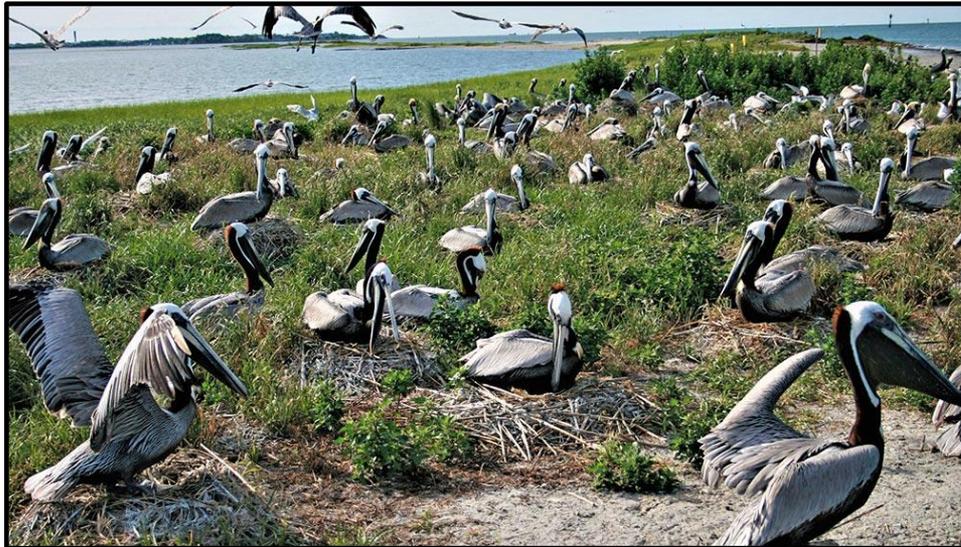
ATM
ATM of NC

Fran Way, PE, CFM | 11.05.2021



Post-45 Beneficial Use of Dredged Material

- Crab Bank was once a flourishing nesting site for seabirds (including many highly threatened species).
- Less than ~one acre of land above high tide prior to restoration.



- Several footprints were considered by USACE to meet a nesting habitat and cost/benefit criteria.
- None considered material fate and/or impacts to surrounding areas.

Post-45 Beneficial Use of Dredged Material

- Incremental cost to create the bank was covered by SCDNR as a non-federal sponsor of the project.
- DNR collected public funds with a campaign organized through the SC Bird Conservation Program.
- Ultimately 65% federal money and 35% non-federal.
- Key partners: Audubon South Carolina, SC Coastal Conservation League, Coastal Expeditions and individuals.
- This made negotiating a new location rather challenging. Don't upset the public interest and federal bureaucracy.



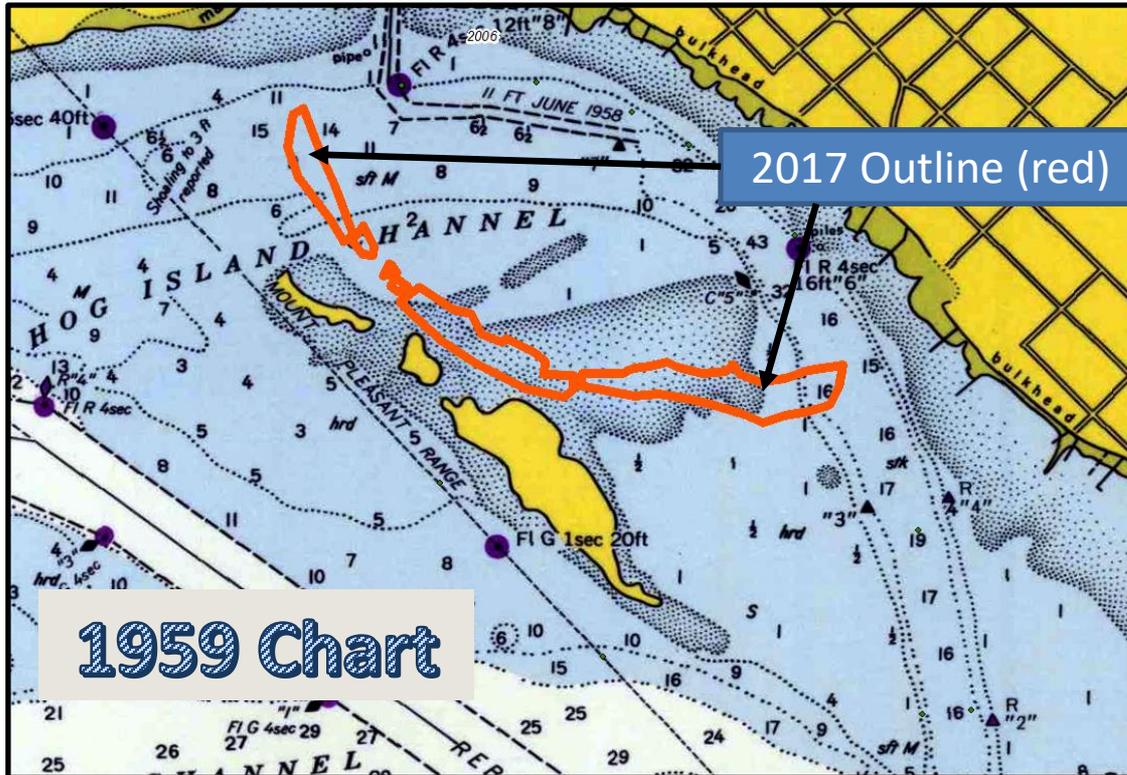
- A vital asset to the Town of Mount Pleasant
 - A shrimping and commercial fishing hub
 - Restaurant, hospitality, and retail row
 - Tourist destination
- Already experiences siltation issues causing the shallowing of the creek.
- Hog Island channel, berth, slip maintenance dredging is on the Town's dollar.



*The total economic losses to the Town of Mount Pleasant that would arise from reducing the depth of Shem Creek would total between **\$82.9 million and \$126.1 million annually.***

- November 2020 Economic Impact Study

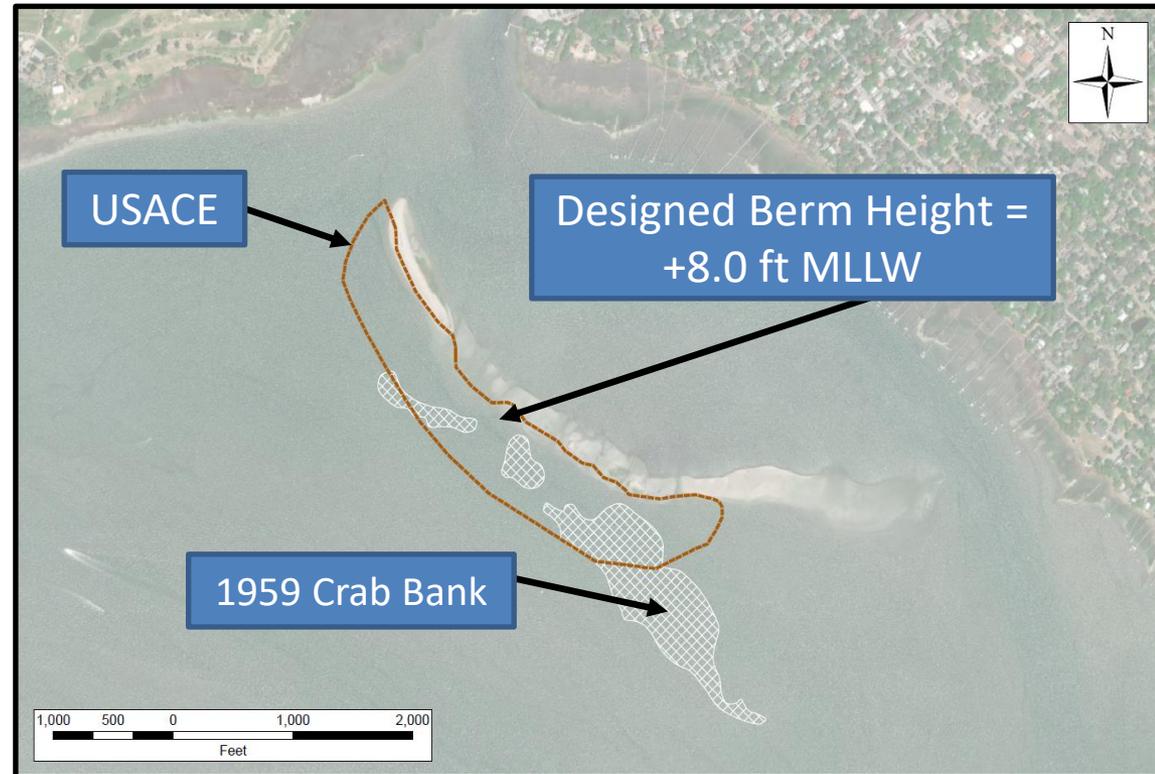
1950's Placement & Long-Term Migration



- Hog Island Channel has narrowed significantly (by ~25 ft per year) as Crab Bank migrates north (over ¼ mile since creation).

- Crab Bank is a spoil island created in ~1958.
- Located in Charleston Harbor between the tip of Sullivan's Island and Patriots Point and at the mouth of Shem Creek.
- Has been spreading, thinning, and migrating north since original placement.
- Migration has accelerated in recent decades (~500 ft northward movement since 1994).

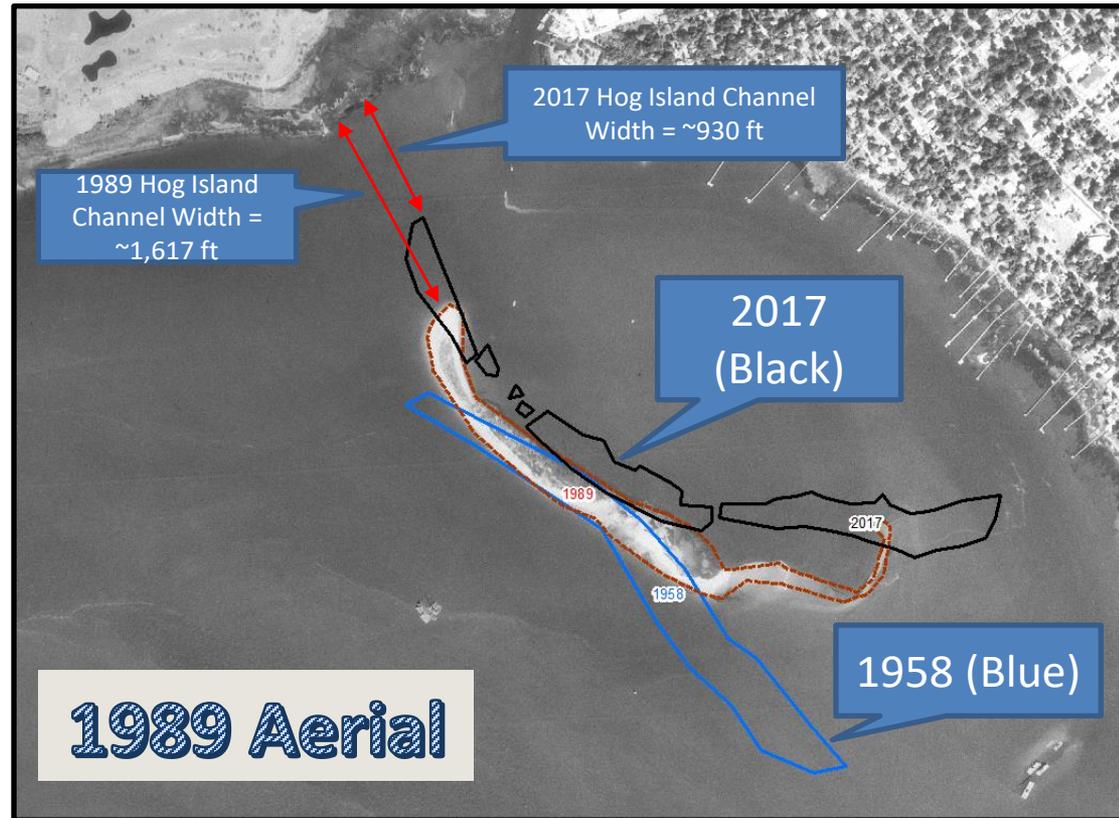
- USACE selected “Medium A” for the project in March 2018.
- Large Scale Project
 - 825,000 cy total placement
- 660,000 cy of sandy material ultimately to enhance Crab Bank upland for nesting habitat (~30 acres).
- No consideration of material fate.



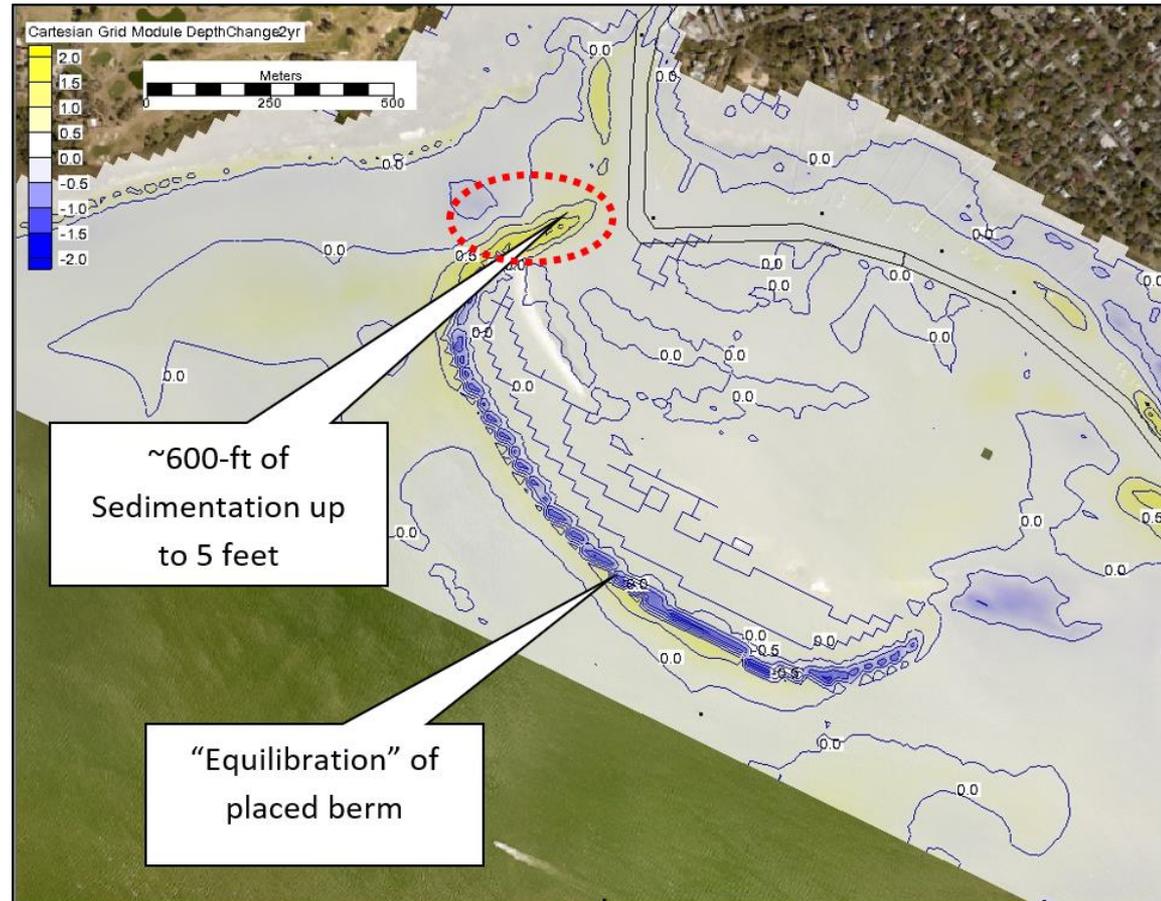
- Original USACE footprint located primarily on the existing NW half of Crab Bank remnant (closer to Shem Creek mouth).

Town Concerns with Long-Term Migration

- Any added material will erode and migrate over time (as the 1950s placement did).
- No study or consideration of sedimentation effects.
- The proposed USACE design did not account for Crab Bank's northward migration.
- Town engaged ATM in August 2018 to model and assess the impacts of the USACE project.

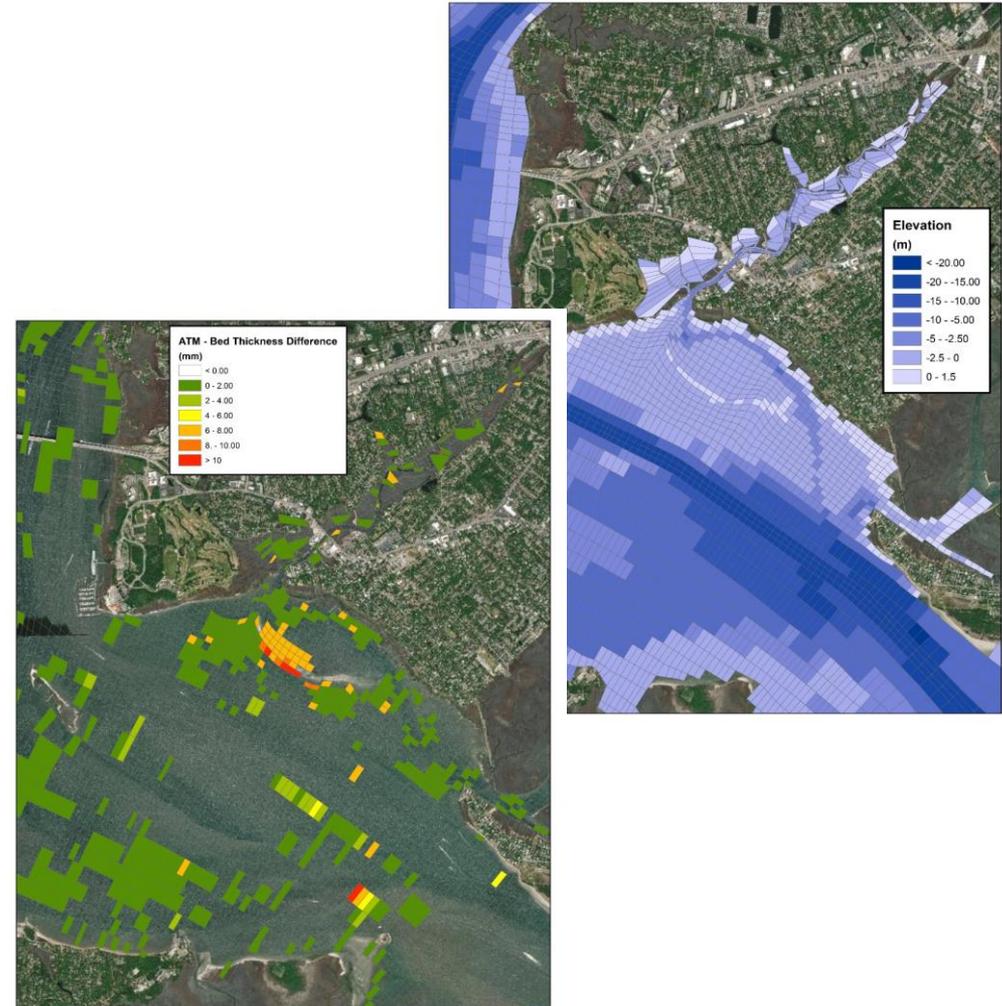


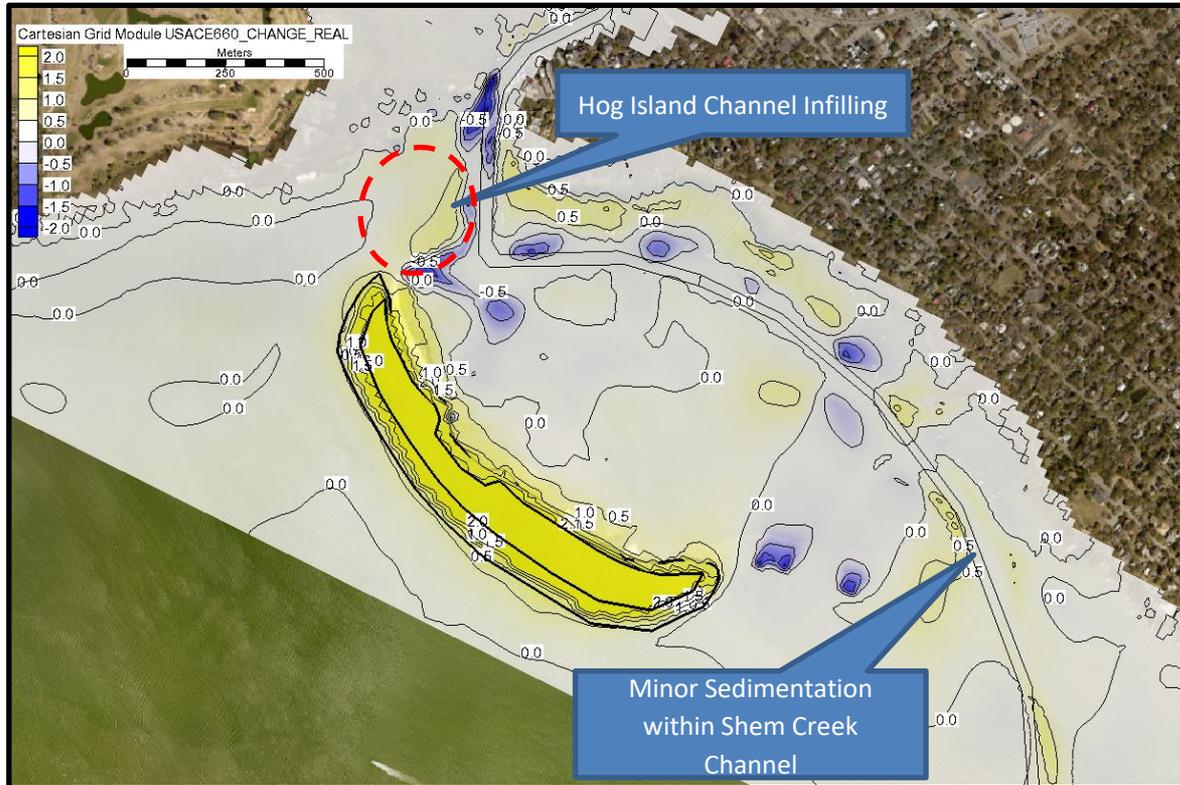
- CMS model to assess long-term movement of sandy material.
- 2-year simulations of existing morphology changes, USACE plan, and Alts (some 5-yr and 10-yr runs).
- USACE Plan shows significant sedimentation near mouth of Shem Creek and in Hog Channel.



ATM Analysis: Short-Term Sedimentation Impacts

- EFDC Hydrodynamic and Sediment Model utilized to assess potential for short-term fine sediment impacts.
- Utilized existing harbor wide model to accurately simulate currents and transport.
- Found insignificant changes in overall fines sedimentation.





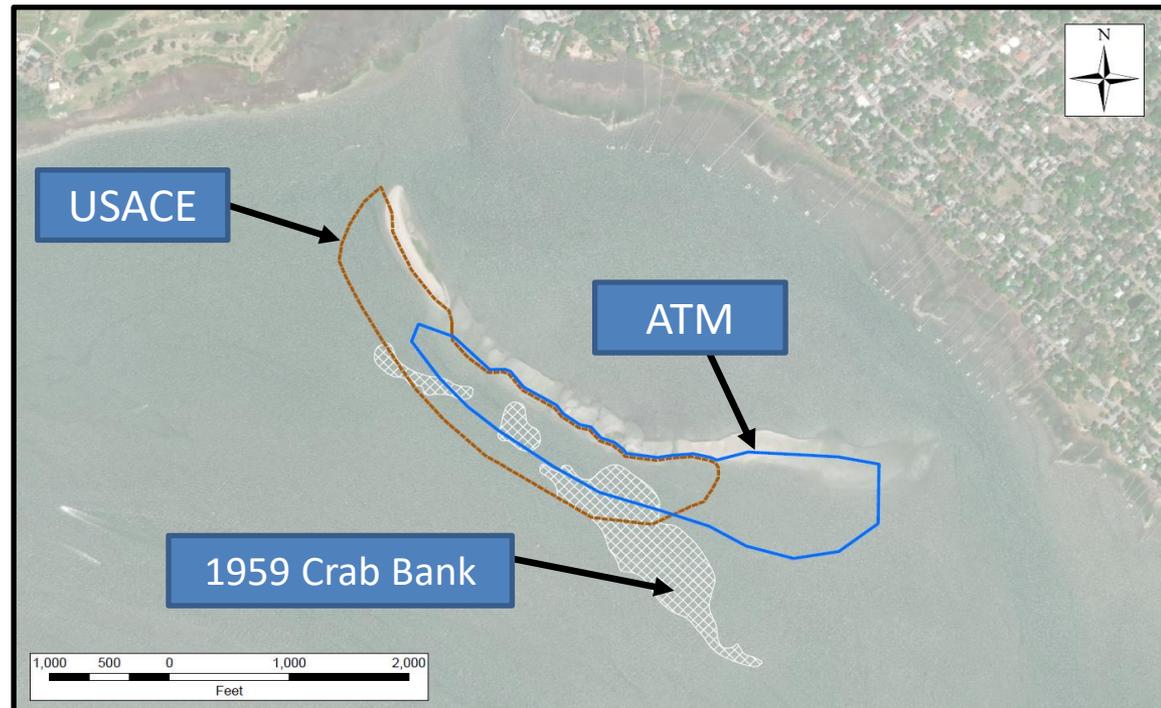
Blue=Deeper (eroding)

Yellow=Shallower (accreting)

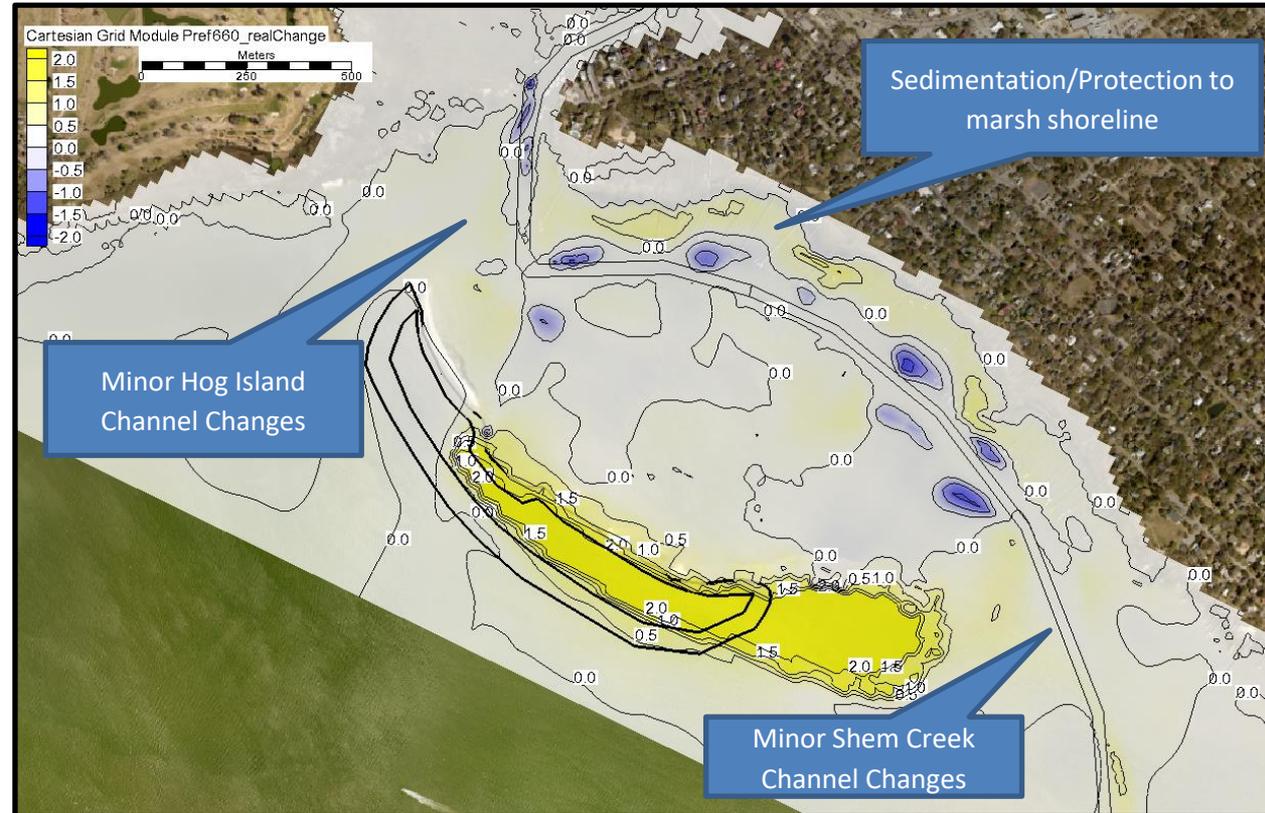
Loss of navigability of Hog Island Channel and accelerated potential for mainland attachment.

- Relatively low berm (can be overtopped during storm and king tide events; more frequently with SLR).
- Increased rate of northerly sediment migration.
- Original USACE plan shows significant increased sedimentation near mouth of Shem Creek (0.53 ft/yr increase).

- Matches the USACE Medium A volume and acreage (~60 acres total).
- Takes advantage of existing shallow areas to the ESE.
- Shifts bulk of placement to the south and ESE.
- 660,000 cy of sandy material found to meet and potentially extend beyond 50-yr project lifespan.

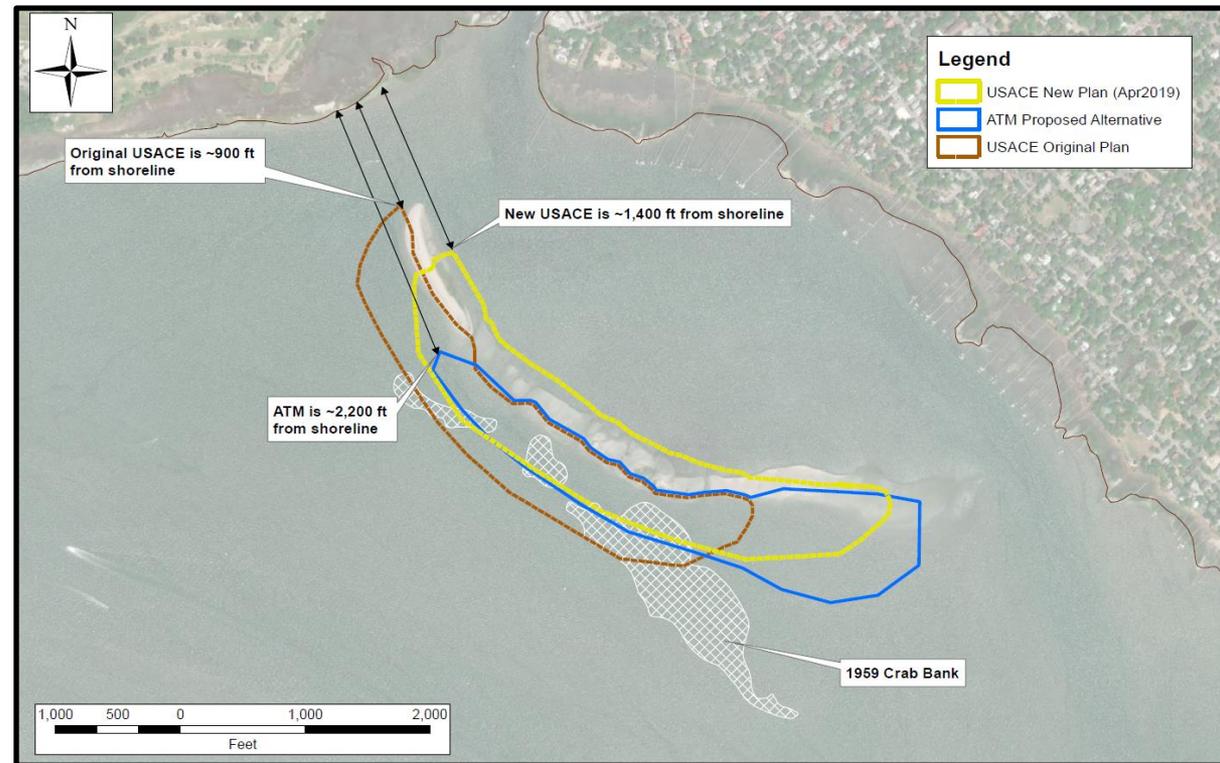


- Compared to original USACE plan
 - Significantly less sedimentation in areas of concern (~0.15 ft/yr increase)
 - Reduction in impacts to Hog Island Channel by ~71%
- Observed benefits to Mount Pleasant shoreline.
- Less risk of attachment to mainland.



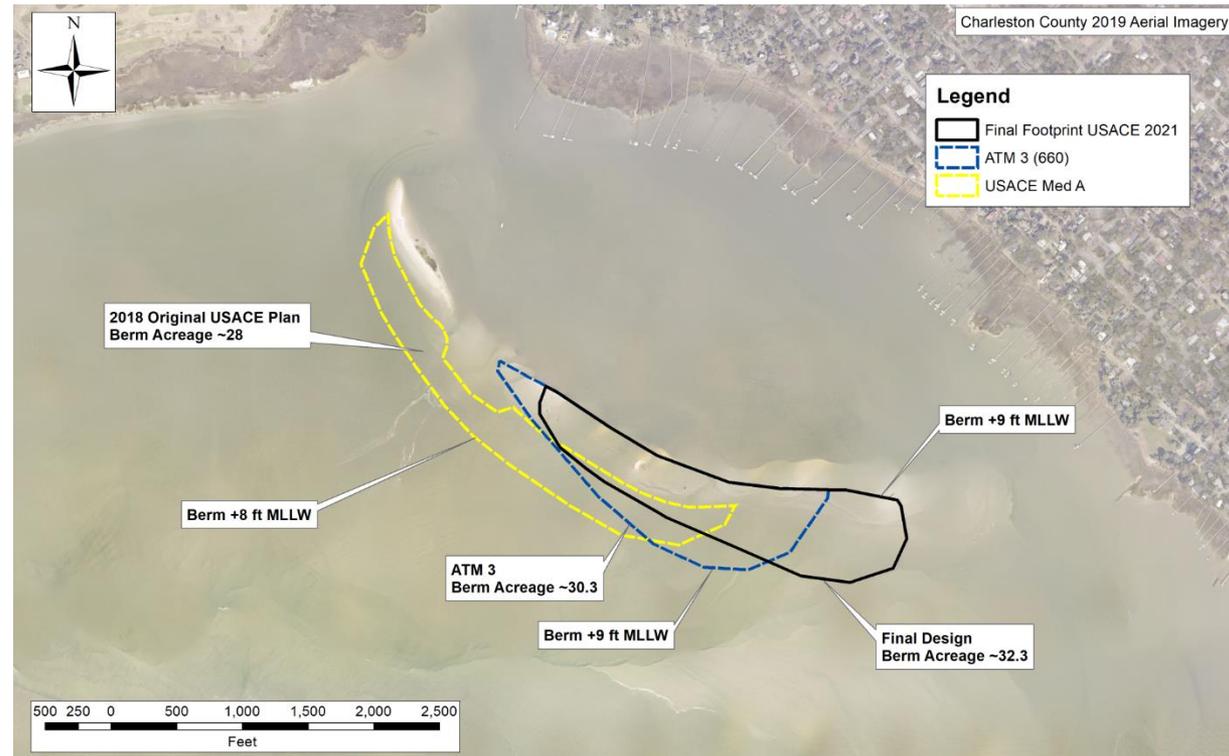
Blue=Deeper (eroding)
Yellow=Shallower (accreting)

- ATM, Town, USACE, and other stakeholders met to discuss the modeling results and the Town's concerns in early 2019.
- USACE agreed to consider alternative placement farther away from mouth of Shem Creek. Also concurred an increased berm height is needed.
- USACE obtained new depth/elevation data and then provided a "compromise" design in April 2019.



- USACE 2019 plan moved south 400-500 feet from original Medium A plan and increased berm heights.
- Town held public hearings; concerned the April 2019 plan was still too close to the mouth of Shem Creek.

- In Fall 2019, ATM used the updated survey data and modeled the long-term morphology changes of the April 2019 plan and alternative footprints to minimize impacts to Shem Creek and Hog Channel.
- Town selected “ATM 3” as their preferred location which they presented to USACE.
- Meeting with USACE, Norfolk Dredging, Town, and ATM in April 2021 regarding final placement.



- The preferred construction design provided by Norfolk (based on the latest 2021 survey data) resulted in a very favorable location for the Town and a win-win for stakeholders as it gives more nesting acreage.

Construction Underway



- Norfolk Dredging began construction on September 14, 2021. Completion anticipated in November.
- ATM is performing weekly monitoring of the construction for the Town.

