APPENDIX E: PUBLIC AND AGENCY COORDINATION

- **Agency Kick-Off Meeting - January 22, 2020**
- **Agency Coordination Meeting - June 22, 2020**
- **Agency Coordination Meeting - September 24, 2020**
- **Agency Coordination Meeting - February 23, 2021**
- **Joint Evaluation Committee Meeting - March 31, 2021**
- **MDOT MPA Spotlight Series Presentation**
- **Water Quality Certificate and Tidal Wetlands License Public Notice - October 22, 2021**

Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Kick-off Meeting

22 January 2020; 10:00 - 12:00 p.m.

1. Project background
2. Purpose of Design Phase and approach for two islands
3. Initial schedule
4. Current activities
    a. Scope development
    b. NEPA/Agency coordination
5. Review of Feasibility Phase biological surveys
6. Discussion of agency perspectives
    a. Identify Design Phase surveys and data needs
7. Path Forward and Action Items

MID-CHESAPEAKE BAY ISLANDS ECOSYSTEM RESTORATION PROJECT

DESIGN PHASE
AGENCY COORDINATION KICK-OFF

Angie Sowers

USACE - Planning

22 January 2020

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AGENDA

- Project background
- Purpose of Design Phase and approach for two islands
- Initial schedule
- Current activities
  - Scope development
  - NEPA/Agency coordination
- Review of Feasibility Phase biological surveys
- Discussion of agency perspectives
  - Identify Design Phase surveys and data needs
- Path Forward and Action Items

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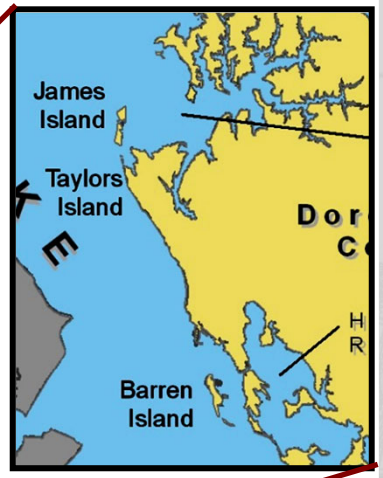
Mid-Chesapeake Bay Island Ecosystem Restoration Project Location



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PROJECT BACKGROUND

- Feasibility study conducted from 2002 to 2009
- ROD signed 2019 concluding the Feasibility Phase
- Planning, Engineering, and Design Phase started late 2019

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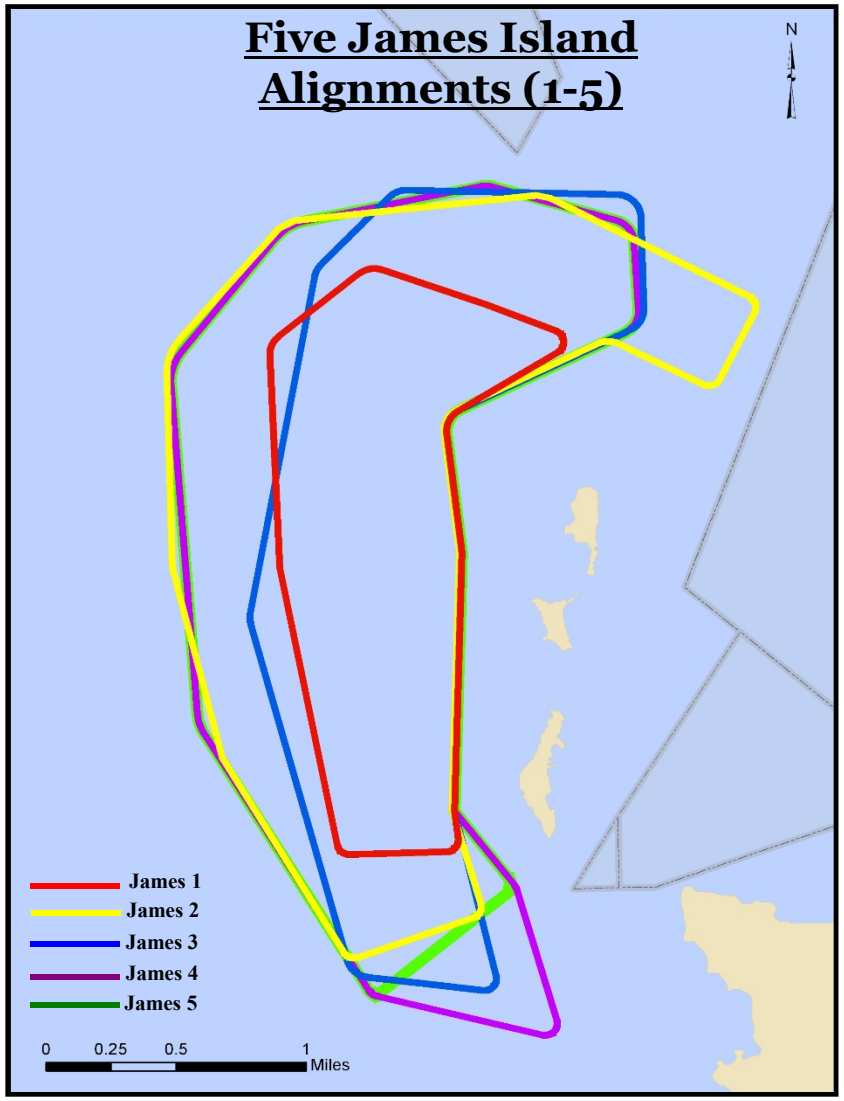
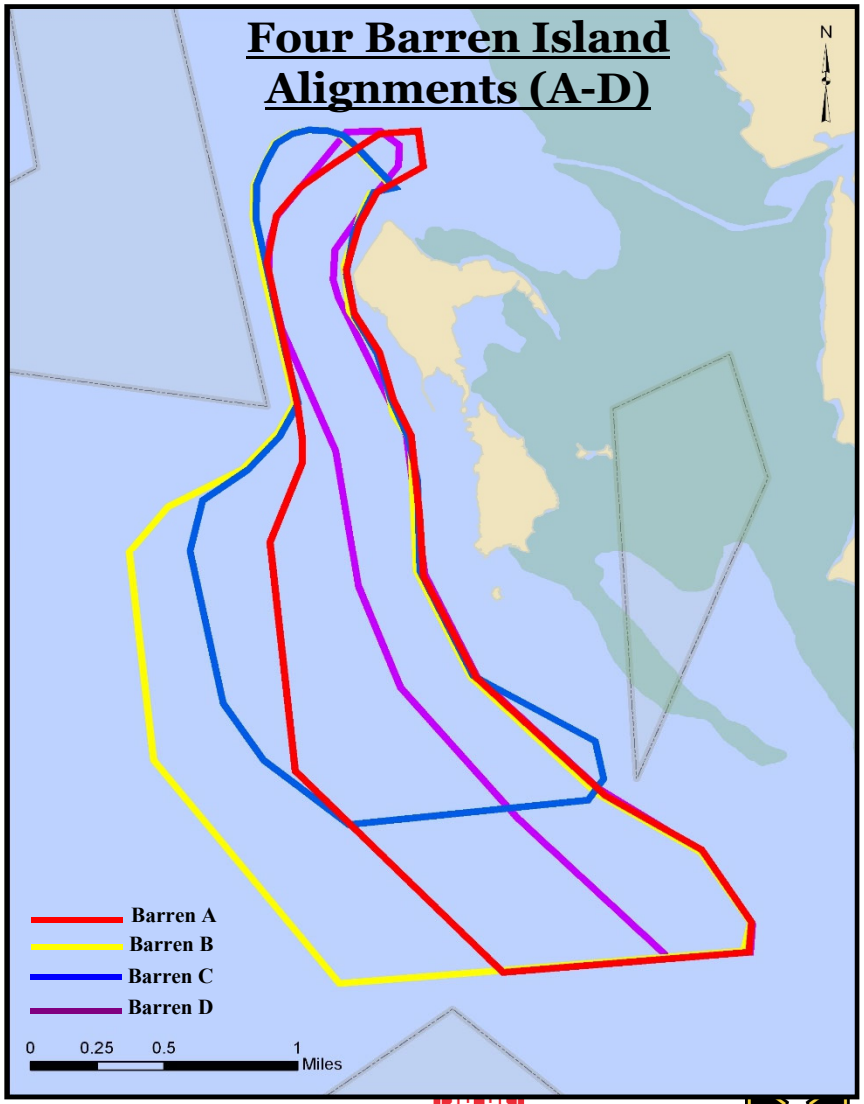
Alignments Evaluated





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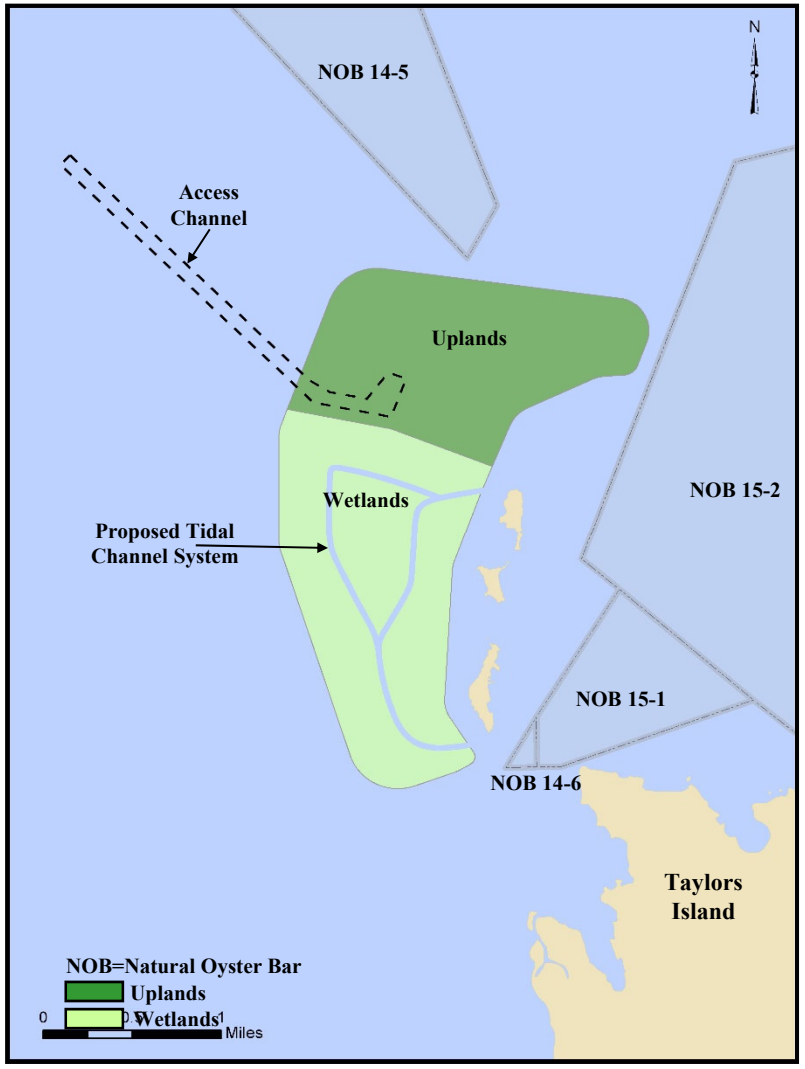
Recommended Plan

James Island

- 2,072 acres
- 55% wetland, 45% upland
- Upland dike height: 20 ft
- Access Channel Dredging
- Capacity: 90-95 mcy
- Placement Duration: 28-30
- Design Features
  - Tidal channels through wetlands
  - Freshwater ponds
  - Intertidal/unvegetated mudflats
  - Bird nesting structures



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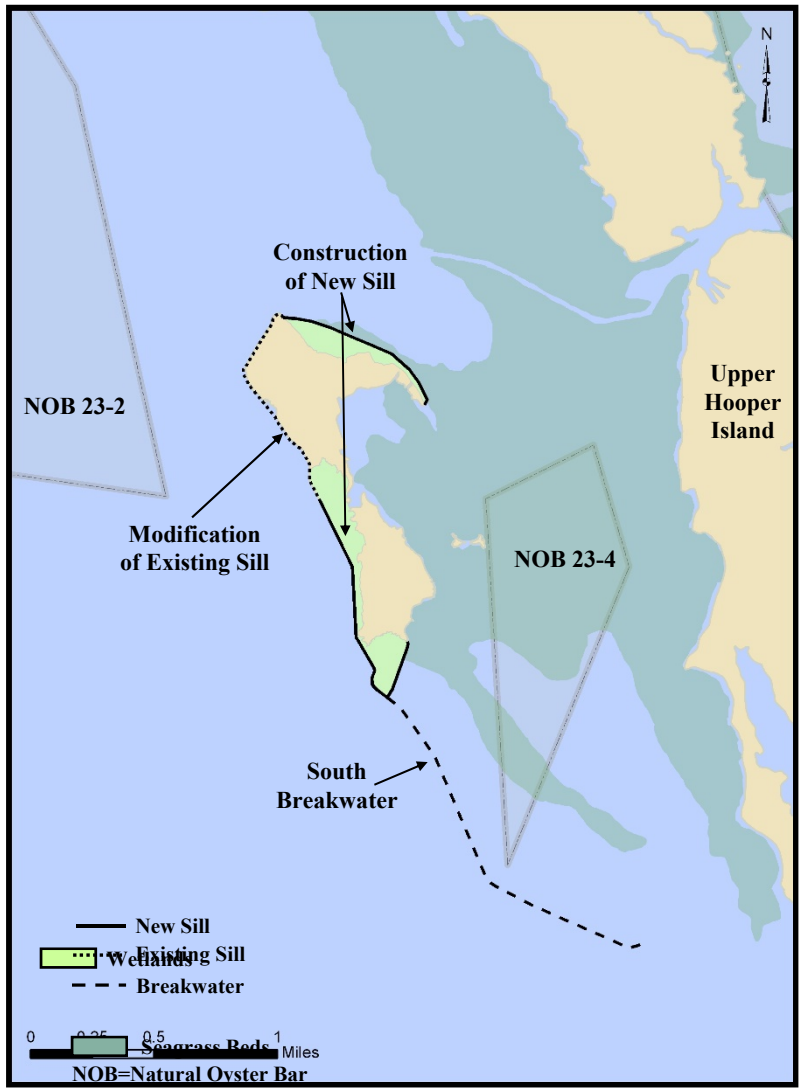
Recommended Plan

Barren Island

- 72 acres of wetland restoration, plus protection of existing island remnants and seagrass beds
- Sill height: 4 ft
- Southern Breakwater height: 6 ft
- Capacity: 0.38 mcy
- Placement Duration: ~7 years
- Design Features:
  - Existing sill modifications (4,900 ft)
  - Northern sill construction (9,760-ft)
  - Southern breakwater construction (8,200-ft)



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Environmental Compliance

- Draft Feasibility Study/EIS was released in August 2006; ROD signed 2019
- Received highest rating (lack of objections) from US Environmental Protection Agency

- No major objections or comments were received
- During process of updating NEPA in 2017 to enable ROD to be signed, it was decided with relevant agencies to complete update during design phase
    - Essential Fish Habitat
    - Endangered Species Act
    - Fish and Wildlife Coordination Act
    - Clean Water Act – Section 401 and 404
    - Critical Area Commission
    - Cultural

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PURPOSE OF DESIGN PHASE AND APPROACH

Primary goal - provide full design, reporting, plans and specifications for procurement of construction services for James and Barren Island.

Barren Island

- Design as a complete standalone project
- Bid all work out under one complete construction contract
- Initiate NEPA as a supplemental EIS, but anticipate a FONSI will be final product (per 40 CFR 1502.9)

James Island

- Similar approach to Poplar Island
- Design for phased construction
  - Initial design efforts - perimeter dikes, access channel, and permanent facilities for construction management
  - Future design work - wetland cell, tidal gut, and upland design features
- Initiate NEPA as a sEIS minus public scoping
  - may become EA if no significant impacts are determined

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SCHEDULE

Barren

- Development of survey and sampling scopes: winter 2019 – 2020
- Award AE contract: spring 2020
- ERDC modeling: spring/summer 2020
- NEPA update completed by March 2021
- Design Document Report (DDR): spring 2021
- Request CG appropriations for FY22
- Construction begins: summer 2022

James

- Development of survey and sampling scopes: winter 2019 – 2020
- ERDC modeling and in-house design: spring 2020 thru winter 2024
- NEPA: spring 2021 to summer 2022
- Draft Design Document Report (DDR) – winter 2022
- Request CG appropriations for FY24
- Construction begins - summer 2024

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CURRENT RELEVANT ACTIVITIES

- Scope development
  - Hydrographic surveys
  - Soil sampling
  - Aerial photography and mapping

- NEPA
  - Initiate agency coordination
  - Identify existing data
    - Waterfowl area survey (1991 – 2019)
    - Colonial waterbird survey (1985 – 2017)
    - VIMS SAV surveys (1978 – 2018)
  - Determine survey needs

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FEASIBILITY PHASE BIOLOGICAL SURVEYS

- Previous surveys for James and Barren undertaken in summer 2002, fall 2002, winter 2003, and spring 2003
  - Water quality
  - Sediment characterization
  - Plankton – phytoplankton and zooplankton
  - Benthic species – clams, oysters, blue crab, horseshoe crab, macroinvertebrates/benthic community
  - Fish
    - Seasonal sampling
  - Bottom trawling, beach seine, gillnetting, pop net
    - Commercial harvests
  - Avian - Shorebirds and Wading Birds, Waterfowl, Song birds, raptors
  - Terrestrial - Vegetative communities, Invertebrates, Insects (butterflies), Amphibians, Reptiles, Mammals
  - Wetland surveys
  - SAV - spring and summer surveys

AGENCY PERSPECTIVES AND INPUT

1. Fish and Wildlife Service
2. NOAA/National Marine Fisheries Service
3. Maryland Department of Natural Resources
4. Maryland Department of the Environment

DESIGN PHASE BIOLOGICAL SURVEYS AND DATA NEEDS

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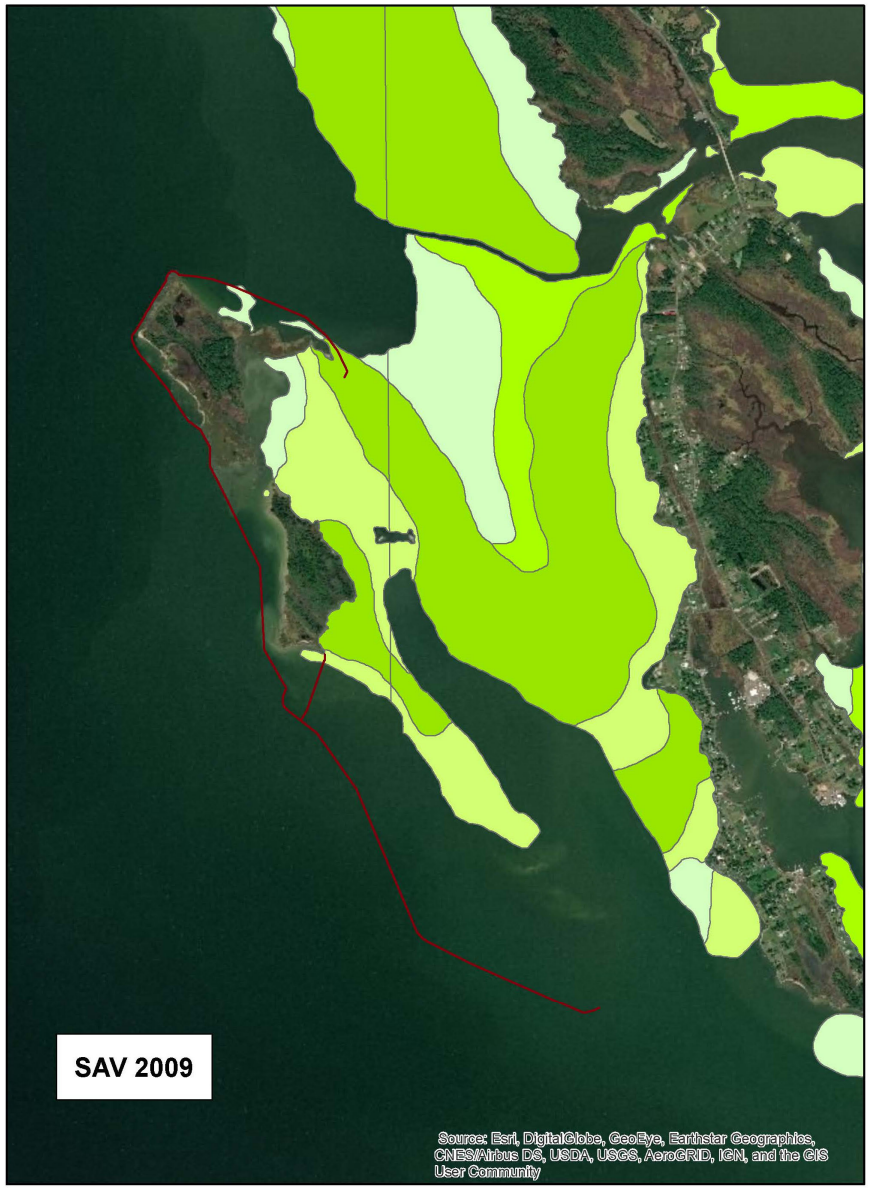

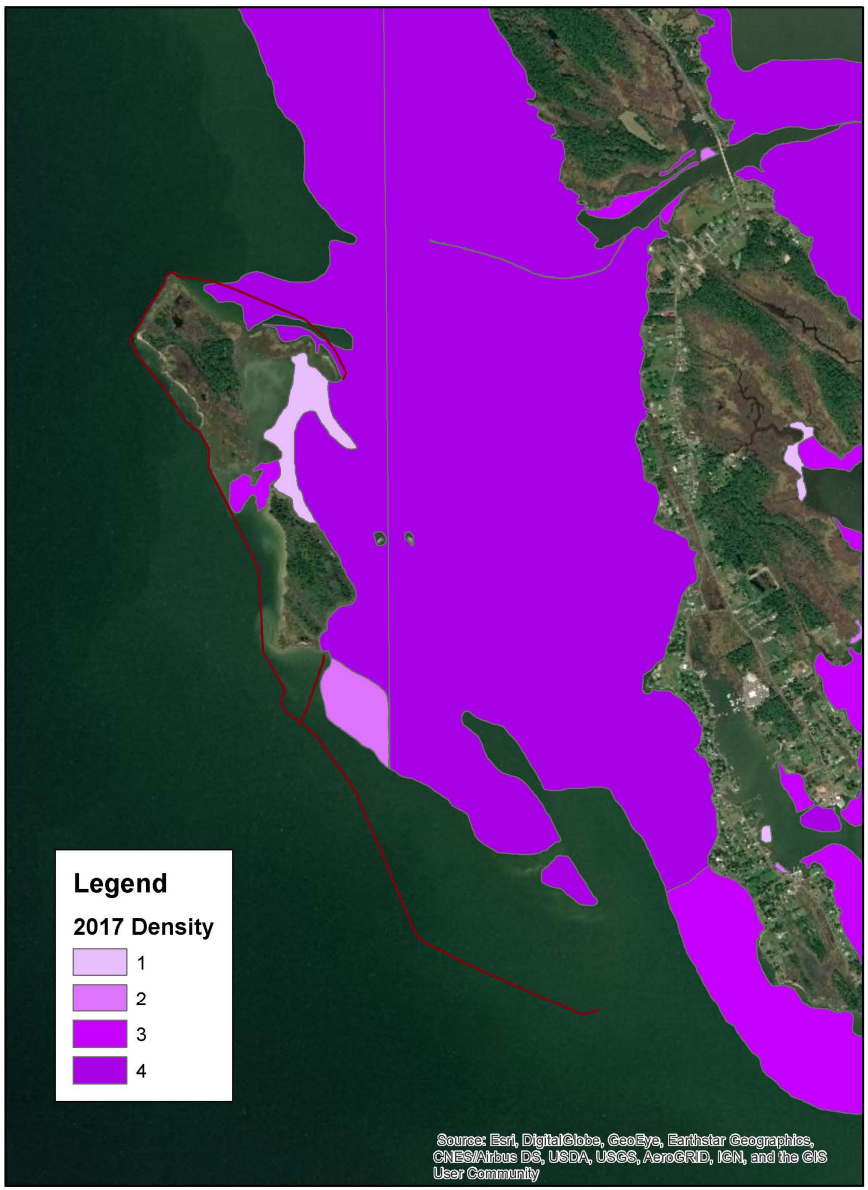

SAV

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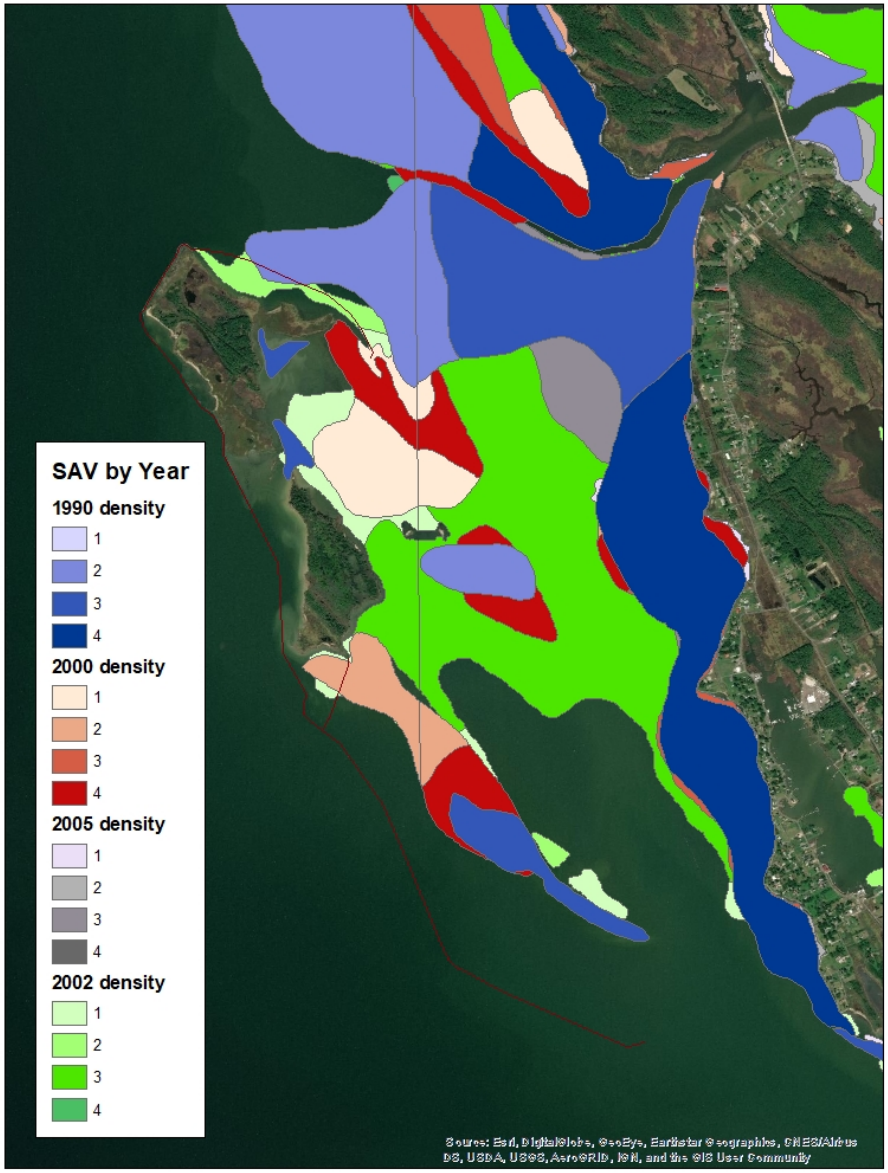

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PATH FORWARD AND ACTION ITEMS

- Develop scopes for surveys
- Provide input to Barren Island H&H modeling
- Develop habitat map for Barren Island

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MONITORING (primarily for future discussion)

- Monitoring activities occurring at Poplar
  - Exterior Sediment Monitoring – MGS
  - Wetland Vegetation – FWS
  - Wetland Soil & Vegetation (in newly constructed wetland cells) – UMCES
  - Exterior Water Quality (separate from discharge monitoring) – MES
  - Turbidity monitoring – only during construction phases
  - Benthics, tissue, and community – EA Eng.
  - Fisheries Use of Proximal Waters – NOAA
  - Wetlands Use by Fish – NOAA
  - Wetlands Use by Wildlife – USGS, FWS
  - Bird Utilization Counts (26 per year) – MES
  - SAV – FWS
  - Shellfish Bed Sedimentation – MGS
  - Interior algae monitoring – MES
  - Terrapins – Ohio University

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Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Kick-off Meeting

Meeting Minutes

22 January 2020; 10:00 - 12:00 p.m.

Participants:
USACE – Charles Leasure, Angie Sowers, Ray Tracy
MPA – Dave Bibo, Amanda Penefiel
MES – Cassandra Carr, Maura Morris
MDE – Heather Nelson, Mary Phipps-Dickerson
DNR – Dave Brinker, Roland Limpert
FWS – Robbie Callahan, Chris Guy, Matt Whitbeck
NMFS staff on phone – Kristy Beard, Karen Greene, Brian Hopper, Dave O'Brien

USACE (Sowers) provided a summary of the project, purpose of the design phase, two island approach, initial schedule, and status of current activities.

Current activities are focused on developing scope of works for various aspects of the project, and initiating NEPA and agency coordination.

Objectives of this meeting were to re-introduce the project to resource agencies, initiate agency coordination, receive initial input and direction from resource agencies as to tasks on which to focus NEPA update, and discuss survey and data needs. USACE (Sowers) provided a summary of Feasibility Phase biological surveys. Ensuing discussion is summarized below:

NMFS

1. Conditions have changed - have seen water temperature increases, possible change in species
2. Can check in with NCBO about current data that could characterize current conditions - contact Bruce Vogt
3. With respect to seasonality of future surveys - all four seasons are normally documented
4. SAV is more important to NMFS than island habitat
5. Focus SAV surveys where design will overlap SAV presence. Density will determine if it can be impacted (K. Beard).

FWS

1. Benthic invertebrates are a prime concern - very dynamic - will change seasonally - do all 4 seasons
2. It will be important to develop a success metric to lead data collection and future monitoring efforts
    a. For all data to be collected, think through how the data will be used and how the data will affect design.
    b. Metrics could be established to either 1) provide the conditions for habitat use or 2) to document use of a habitat by certain species

i. For species present, the goal would be to sustain or improve populations. In these cases, need to know baseline conditions. e.g., stabilize or Improve heron habitat (shoreline restoration should do this). Perform a spring quantitative survey.
ii. For species that do not currently inhabit the islands, the objective would be to set stage for use by providing sustainable habitat. In these cases, there is no baseline to document. e.g., provide nesting habitat for terns, etc. Habitat not used MAY NOT be a failure.

3. Survey for predatory mammals, but not others
4. Insects not necessary – don't expect to be a metric
5. Look at possibility of including intertidal/mudflat habitat within wetland design at breakwater – consider including as a success metric
    a. Design considerations
        i. Size: >1 ac, but the larger the better
        ii. Shape: better volume to edge ratio than long, narrow (Brinker)
    b. FWS (Callahan): At Poplar, don't design for mudflat, but do track presence because no one has the responsibility to maintain it as a mudflat
    c. USACE (Leasure): design idea - double breakwater with material confined between - would need to be maintained with SLR, and receive periodic replenishment of confined material; would need to be in lower dynamic environment
    d. FWS(Whitbeck): we should be cautious to develop design based on needing periodic material because Fishing Creek channel is not regularly maintained
6. Shorebirds - monitor only summer
7. Eastern narrow mouth toad – State listed as Endangered. Not observed at Barren recently

DNR

1. Don't see a need to do anything additional for waterfowl
2. Will be TOY and restrictions for working around colonial nesting waterbird rookery on southern end of island
3. Desire to see southern breakwater with backfilling on east side to provide benefits to nesting birds
    a. Common tern and royal tern nesting (state endangered species due to habitat loss) occurred on sandspit of southern end of Barren in 1980s
    b. Suggest creating a few (3) small islands (2-3 acres) amongst segmented breakwaters. Could add visibility and safety to breakwaters
    c. Mudflats/intertidal zone on east side of breakwaters could be valuable habitat for shorebird migrations
4. Opossum Island is gone, but could restore it fairly easily - it is in a low energy environment

MDE

1. Borings has generated public interest
2. Important to document existing water quality and track this overtime - this will promote/be needed for SAV
3. CWA - through State - authorization process and public hearing (needs to be advertised for at least 45 days) for construction plans; plan for timeline for WQC

4. MPA - will be leading public outreach - first meeting planned for spring
5. Wetland delineation - demarcate high vs low wetlands and identify impact to any existing habitat by type
6. Will want to see that design USACE presents has the least impacts and the work has been done to avoid and minimize impacts; provide input on modeling done and why certain decisions for design were made

SAV

1. FWS - avoid, minimize, and mitigate will apply; must demonstrate the impact we have is unavoidable
    a. There will be a regulatory mitigation process for loss of SAV changed to wetlands
    b. Priority would be island over SAV
    c. Need island to maintain SAV habitat
    d. SAV came in between island remnants after breakwater was built in 2009/2010
    e. Clammers have had negative impact on SAV in Poplar Harbor
2. NFMS - EFH perspective - SAV is priority/HAPC, but not saying it is against reclaiming some of Barren Island
    a. LOOK AT AVOIDANCE
    b. Can we adjust the design to avoid filling gap? Is the gap sustainable over the long-term?
3. Survey discussion
    a. FWS- qualitative surveys in spring and summer - a limited number of points to document species
    b. NMFS – may want to focus surveys in area where design overlaps with where SAV has moved in enable quantification of potential impacts. For most projects they are fine with using a 5 year composite density of VIMS data.
    c. MDE - recognize that we really only have one year of survey and how that could be factored in considering we have 5 year composite; also think about wanting to know the extent in non-impact area to document increase
    d. USACE - consider focusing on quiescent areas which could be identified by ERDC modeling
    e. Always realize that conditions are going to change from what we have considered during plans

High vs Low marsh

1. NMFS – wetlands valuable to resources of concern need to be within potential fish habitat range
2. FWS – target an elevation range at the highest of the local tide range to maximize sustainability with SLR of tidal marsh
3. High/Low Marsh ratios will be revisited but unclear of extent they can be changed

SUMMARY OF SURVEYS IDENTIFIED TO BE UNDERTAKEN:

1. Water quality – T, salinity, pH, etc. (as before)
2. Benthic species – clams, oysters, blue crab, horseshoe crab, macroinvertebrates/benthic community
3. Sediment characterization (covered by soils surveyed being scoped)

4. Plankton – phytoplankton and zooplankton
5. Fish – sample all four seasons - bottom trawling, beach seine, gillnetting, pop net
6. Avian
    a. Shorebirds (only summer); wading birds – spring quantitative survey
    b. Not needed - Waterfowl as current survey data available; song birds or raptors)
7. Terrestrial – predatory mammals
    a. Vegetative communities (will develop habitat map from aerial data and FWS transects),
    b. Not needed - invertebrates, insects (butterflies), amphibians, reptiles, non-predatory mammals
8. Wetlands – wetland delineations
9. SAV
    a. spring and summer to ID species; use 5 years of VIMS survey data to characterize extent
    b. Areas to consider for focus of surveys
        i. areas of potential habitat conversion (shallow water to wetland) along/between island remnants
        ii. areas bordering existing SAV beds to demonstrate positive impact/expansion of beds, and/or
        iii. areas identify as quiescent by ERDC modeling

ACTION ITEMS:

1. USACE – reach out to NCBO to identify whether there is current fish and benthics data available
2. Coordination letters to agencies from USACE
3. USFWS needs a letter addressed to the refuge
4. USACE - draft a scope for FWS for Fish and Wildlife Coordination Act activities
5. USACE - coordinate with NMFS to identify relevant EFH species
6. USACE PL/Env - discuss designs for modeling with ERDC
7. Define NEPA schedule
8. Define agency coordination check-points
9. Input for modelers
10. MES – review feasibility phase records for scopes of aquatic surveys

FUTURE DISCUSSION ITEMS:

1. Low/marsh ratio
2. Identify reference marshes

Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Update

22 June 2020; 1:00 - 2:00 p.m.

1. Introductions
2. Schedule Update
3. Activities Completed since Kick-off Meeting
    a. Surveys
    b. NEPA and Agency coordination
    c. Biological Surveys
4. Next Steps
5. Wrap-up and Action Items

MID-CHESAPEAKE BAY ISLANDS ECOSYSTEM RESTORATION PROJECT

DESIGN PHASE AGENCY COORDINATION UPDATE

Angie Sowers

USACE - Planning

22 June 2020

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AGENDA

- Schedule
- Activities Completed Since Kick-off Meeting
  - Surveys
  - NEPA and Agency Coordination
  - Biological Surveys
- Next Steps
- Action Items

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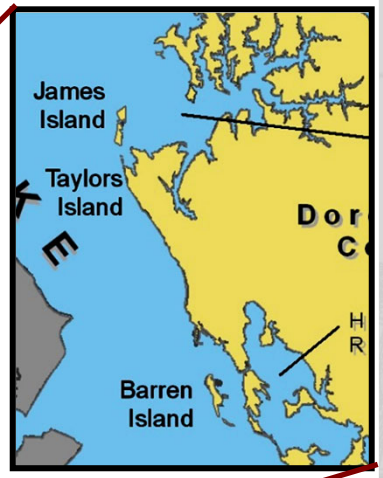
Mid-Chesapeake Bay Island Ecosystem Restoration Project Location



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SCHEDULE

Barren

- Development of survey and sampling scopes – winter 2019/2020
- Award AE contract – summer 2020
- ERDC modeling – summer 2020
- 35% Design provided by AE – October 2020
- 65% Design provided by AE – March 2021
- Design Document Report (DDR) – summer 2021
- NEPA: EA Public Review – July 2021
- Signed FONSI – November 2021
- Request CG appropriations for FY22
- Construction begins – summer 2022

James

- Development of survey and sampling scopes – winter 2019/2020
- ERDC modeling and in-house design – spring 2020 through winter 2023
- NEPA – spring 2021 to summer 2022
- Draft Design Document Report (DDR) – winter 2022
- Request CG appropriations for FY24
- Construction begins – summer 2024

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EFFORTS SINCE KICK-OFF MEETING

- Survey work
  - Barren and James Hydrographic survey – complete
    - Bathymetry acquired
    - Establish monuments
  - Barren Geotech surveys – results due July
    - sediment geotechnical characterization and sediment quality analyses
  - Aerial photography and mapping – complete
    - terrain type and habitat characterization
    - Lidar and aerial photogrammetry acquired

- NEPA
  - Development of scope and award of contract to Anchor QEA for biological surveys
  - Development of Fish and Wildlife Coordination Act scope of work with FWS for Planning Aid Report and surveys
  - Public Notice and Agency Coordination Letters

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BIOLOGICAL SURVEYS

	James Island				*Barren Island*			
Survey Type	Spring 2020	Summer 2020	Fall 2020	Winter 2020 - 2021	Spring 2020	Summer 2020	Fall 2020	Winter 2020 - 2021
Water Quality/Nutrient								
Benthic Invertebrate								
Plankton	removed upon further consultation with NFMS							
SAV	2021				2021			
Fisheries								
Bottom Trawl								
Beach Seine*								
Gillnet								
Pop Net			Sept				Sept	
Soft-shell and Razor Clam								
Pound Net Telephone Survey***								
Commercial Harvest Data Collection								
Crab Pot Survey^		delayed				delayed		
Avian								
~~Shorebirds~~	transitioned to SHARP surveys and point counts				transitioned to SHARP surveys and point counts			
~~Wading Birds~~								
Avian surveys - point counts								
Avian surveys - wetlands - SHARP	2021	2021			2021	2021		
Mammals								
Predatory mammals								

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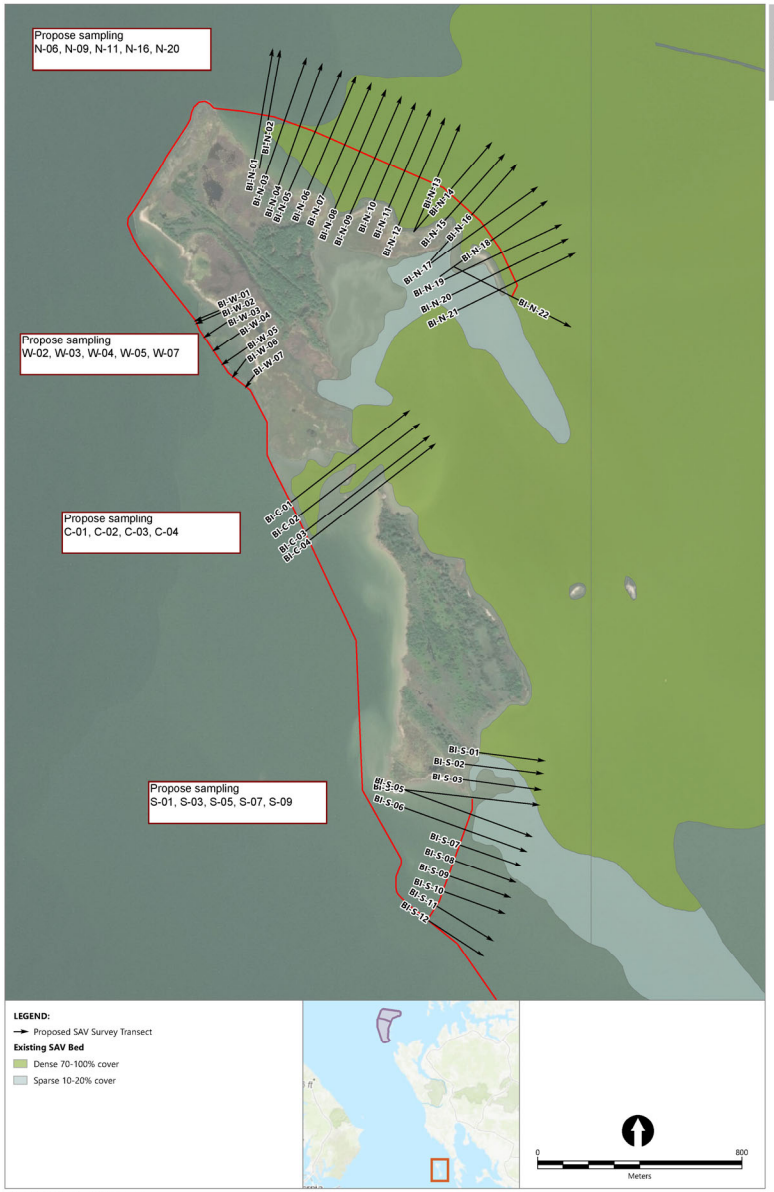

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ANCHOR QEA

Figure #
Barren Island Proposed Transects
Mid Bay SAV Survey

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ANCHOR QEA

Figure #
James Island Proposed Transects
Mid Bay SAV Survey

NEXT STEPS

- Initiate biological surveys
- Publish/distribute Public Notice and Agency Coordination Letters
- Identify Agency check-points
- Identify reference marshes
- Develop success metrics for project
- Develop Table of Contents and background information for EA

- ERDC modeling of proposed plan and considerations for southern breakwater

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AGENCY CHECK-POINTS – BARREN ISLAND COMPONENT

1. Summer 2020 – Initial ERDC modeling for Barren Design Meeting
2. November 2020 – Barren 35% Design Review Meeting
3. December 2020 – Draft PAR provided by FWS
4. March 2021 – Barren 65% Design Review Meeting
5. Spring 2021 – Complete draft EFH assessment, ESA assessment, 404(b)(1) Analysis, and Critical Areas Commission response; provide to appropriate agencies
6. July 2021 – Public Review of EA

Mid-Chesapeake Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Update Meeting
Minutes
22 June 2020; 1:00 - 2:00 p.m.

Participants:
USACE –Angie Sowers, Ray Tracy
MPA – Dave Bibo, Amanda Peñafiel, Holly Miller
MES – Cassandra Carr, Maura Morris
MDE – Heather Hepburn
DNR – Becky Golden, Roland Limpert, John Moulis
FWS – Chris Guy, Matt Whitbeck
NMFS – Brian Hopper, Jonathon Watson
Anchor – Karin Olsen

Agenda:

1. Introductions
2. Schedule Update
3. Activities Completed since Kick-off Meeting
    a. Surveys
    b. NEPA and Agency coordination
    c. Biological Surveys
4. Next Steps
5. Wrap-up and Action Items

USACE (Sowers) provided a project update including schedule, activities completed since January 22 meeting, and next steps. See slides for content.

MES (Morris) provided an update on the access channel for James Island and the overlap with a historic oyster bar. A meeting was held last week with DNR-Shellfish to discuss a possible path forward that would not result in relocating the access channel. The next step is for DNR to speak to the watermen that have harvested oysters on that bar. Depending on the watermen's input, the team will discuss next steps and if any surveys are needed. If there is an impact to the oyster bar, shell could be captured and relocated to another oyster bar.

FWS (Whitbeck) asked if winter hunting that occurs in December and January on set days at Barren Island would interfere with any of the biological surveys. He will provide the dates to MES to coordinate efforts. It is expected that the surveys can be conducted without interfering with hunting days.

Action Items:

1. Resource agencies – Provide feedback about Barren Spring 2021 surveys – Are all desired given that the information will likely not be available for inclusion in the EA? The information can be used to understand baseline conditions. Provide any additional agency check-points to track.
2. Sowers will be in touch to set a meeting date once initial H&H modeling is completed by ERDC.

Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Update

24 September 2020; 10:00 - 11:30 a.m.

Call-in information: https://usace.webex.com/meet/angela.sowers
Meeting number: 960 786 356
Call-in number: 1-877-336-1828
Access code: 4495502
Security code (if asked): 4321

1. Introductions
2. Project status/schedule update - USACE
3. Summer field surveys update and Fall sampling preview - MES/Anchor
4. Discussion of Barren Island design formulation - USACE
    a. preview H&H modeling results and discuss how to evaluate for SAV habitat
5. Barren Island wetland design framework - USACE
6. Reference marsh identification - USACE
    a. Please be prepared to discuss suggestions for sites to use as reference marshes
7. Next Steps
8. Wrap-up and Action Items

MID-CHESAPEAKE BAY ISLANDS ECOSYSTEM RESTORATION PROJECT

DESIGN PHASE AGENCY COORDINATION UPDATE

Angie Sowers

USACE - Planning

24 September 2020

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   - preview H&H modeling results and discuss how to evaluate for SAV habitat
5. Barren Island wetland design framework - USACE
6. Reference marsh identification - USACE
7. Next Steps

"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."

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SCHEDULE

Barren

- Development of survey and sampling scopes – winter 2019/2020 - COMPLETE
- Award AE contract – summer 2020 – MOVED in-house
- ERDC modeling – summer 2020 – IN PROGRESS
- 35% Design provided by AE – ~~October 2020~~ April 2021
- 65% Design provided by AE – ~~March 2021~~ October 2021
- NEPA: EA Public Review – ~~July 2021~~ December 2021
- Signed FONSI – ~~November 2021~~ April 2022
- Request CG appropriations for FY22
- Construction begins – summer 2022

James

- Development of survey and sampling scopes – winter 2019/2020 - COMPLETE
- ERDC modeling and in-house design – 2020 through winter 2023
- NEPA – spring 2021 to summer 2022
- Draft Design Document Report (DDR) – winter 2022
- Request CG appropriations for FY24
- Construction begins – summer 2024

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PROGRESS SINCE JUNE MEETING

- Engineering
  - ERDC H&H modeling of 5 potential southern breakwater alignments
  - Updating/aligning schedule
  - Soil sampling and analysis

- NEPA
  - Development of updated sampling plan
  - Summer biological surveys
  - Issued Public Notice for EA and agency coordination letters
  - Wetland delineation at Barren

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BIOLOGICAL SURVEYS – MES/ANCHOR UPDATE

	James Island					*Barren Island*			
Survey Type	Spring 2020	Summer 2020	Fall 2020	Winter 2020 - 2021		Spring 2020	Summer 2020	Fall 2020	Winter 2020 - 2021
Water Quality/Nutrient									
Benthic Invertebrate									
Plankton	removed upon further consultation with NFMS								
SAV	2021					2021			
Fisheries									
Bottom Trawl									
Beach Seine*									
Gillnet									
Pop Net			Sept					Sept	
Soft-shell and Razor Clam									
Pound Net Telephone Survey***									
Commercial Harvest Data Collection									
Crab Pot Survey^		delayed					delayed		
Avian									
~~Shorebirds~~	transitioned to SHARP surveys and point counts					transitioned to SHARP surveys and point counts			
~~Wading Birds~~									
Avian surveys - point counts									
Avian surveys - wetlands - SHARP	2021	2021				2021	2021		
Mammals									
Predatory mammals									

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ERDC H&H MODELING FOR BARREN ISLAND DESIGN

- CSTORM Preliminary Results Water Levels and Wave Heights
  - ADCIRC and STWAVE
  - Incorporate current bathymetry
  - Finer resolution –15 to 20 meter around structures (ADCIRC), and 70 m throughout Bay and 17.5 m around islands (STWAVE)
- Summary of Modeling Performed To-Date
  - Storms - Selected 100 Synthetic Tropical Cyclones from the 1060 NACCS storm suite
  - Subsample those 100 down to 25 storms for Barren Island Screening of Alternatives
  - Modeling completed without tides; forced by winds and river flow
- Created 5 with project configurations using the newly updated mesh/grids
  - Ran 100 storms on the updated “Base” configuration
  - Ran 25 storms on each of the 5 “with-project” configurations

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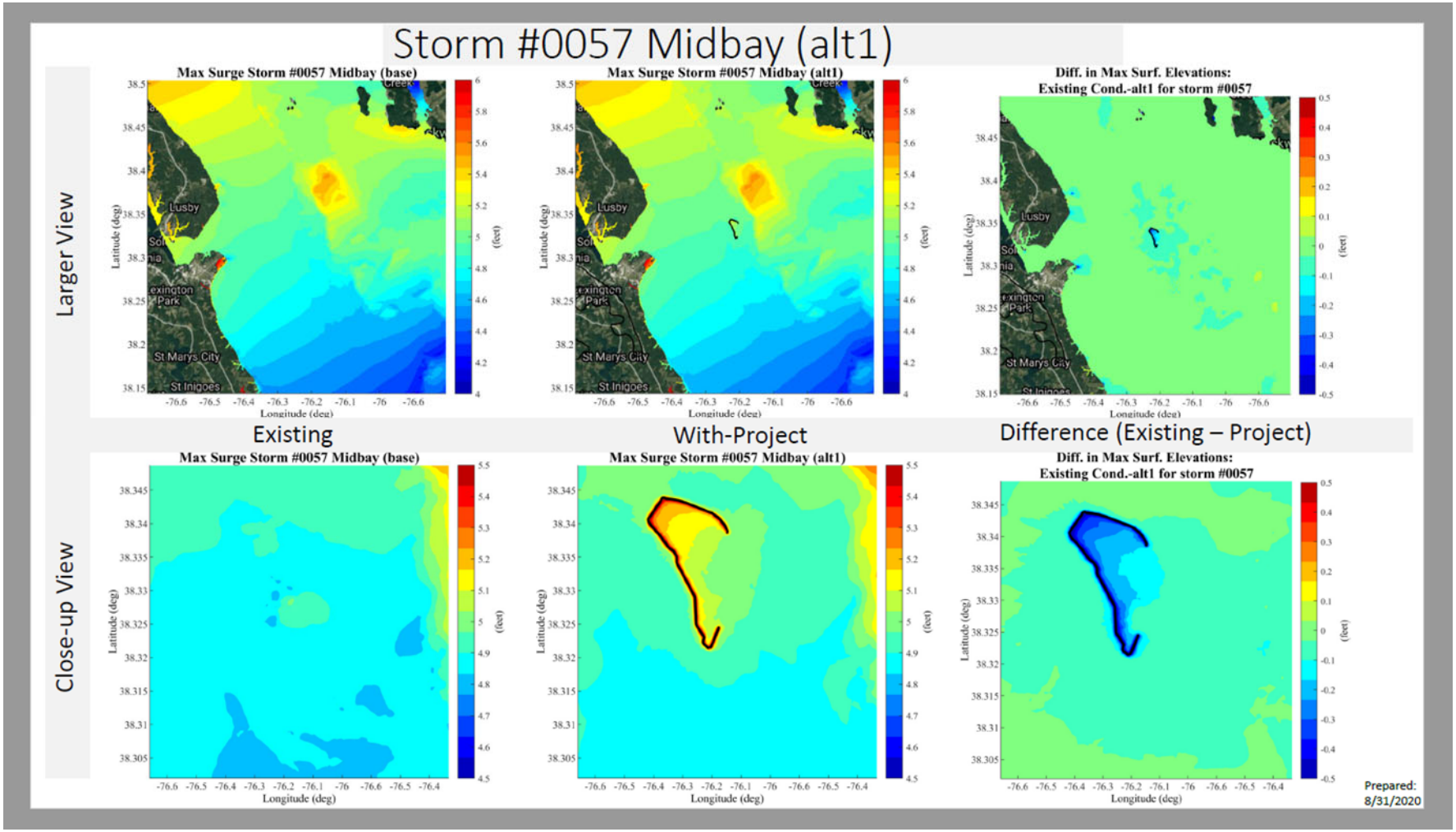
MAXIMUM WATER SURFACE ELEVATION – ALT 1



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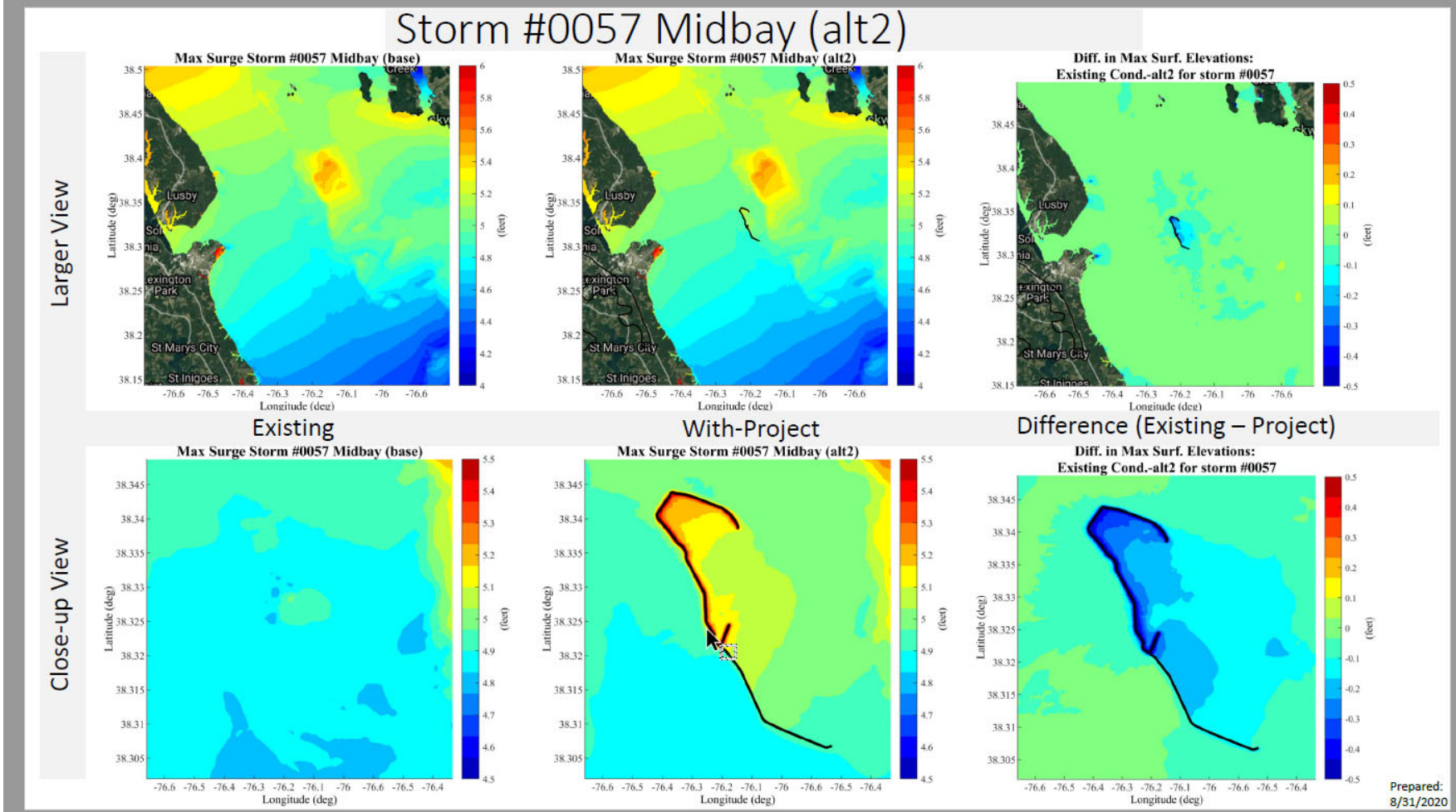
MAXIMUM WATER SURFACE ELEVATION – ALT 2



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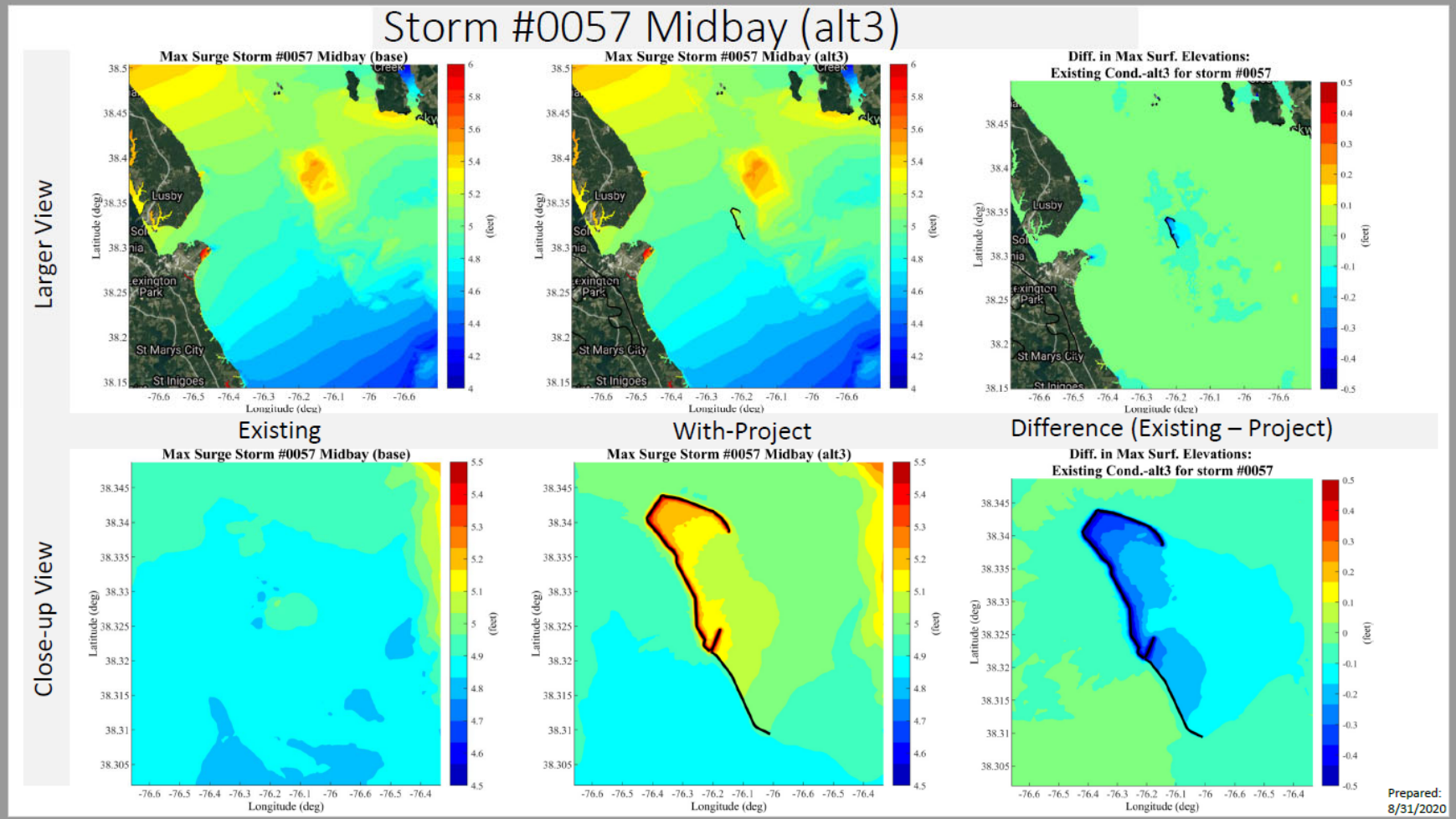
MAXIMUM WATER SURFACE ELEVATION – ALT 3



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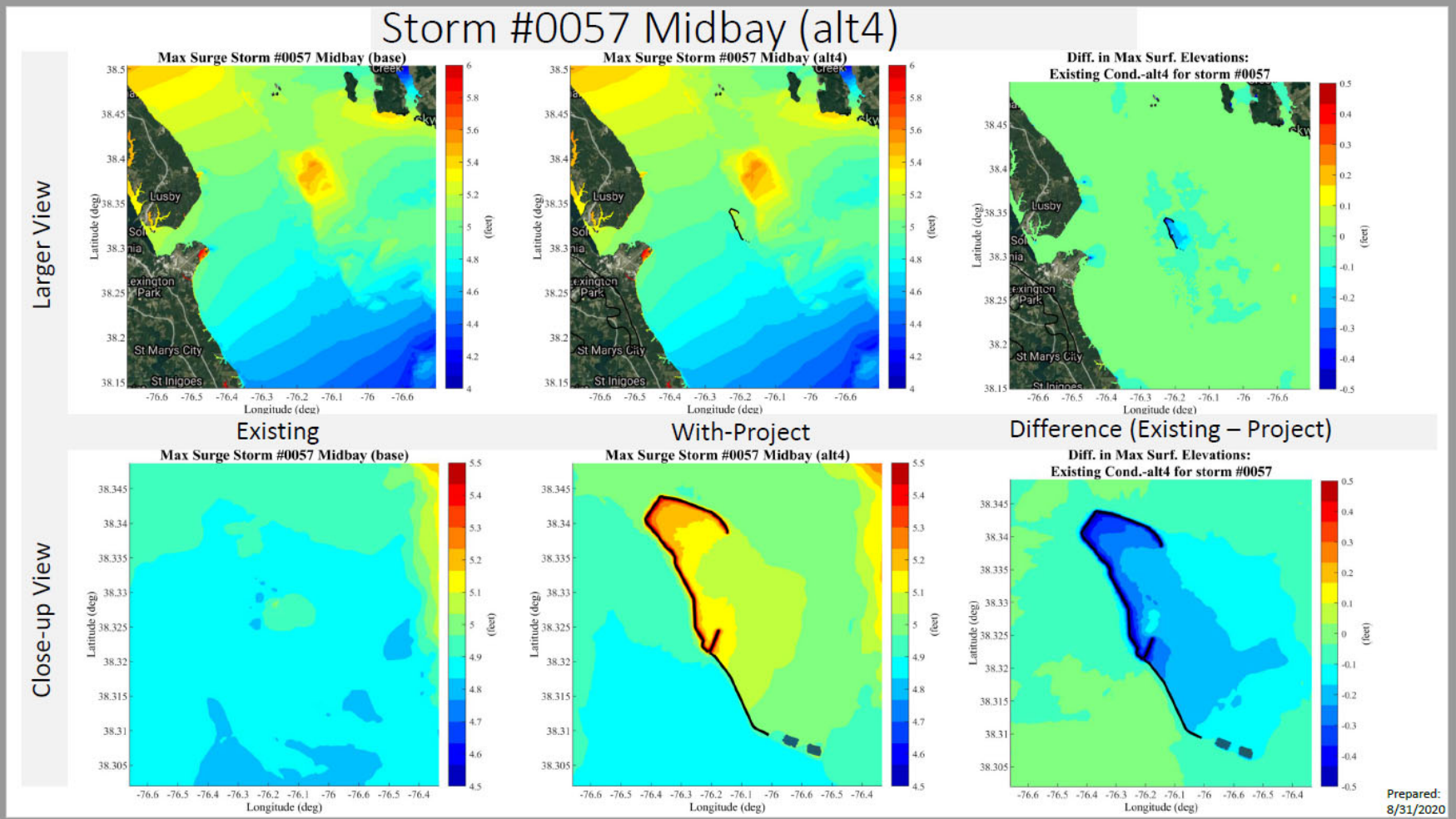
MAXIMUM WATER SURFACE ELEVATION – ALT 4



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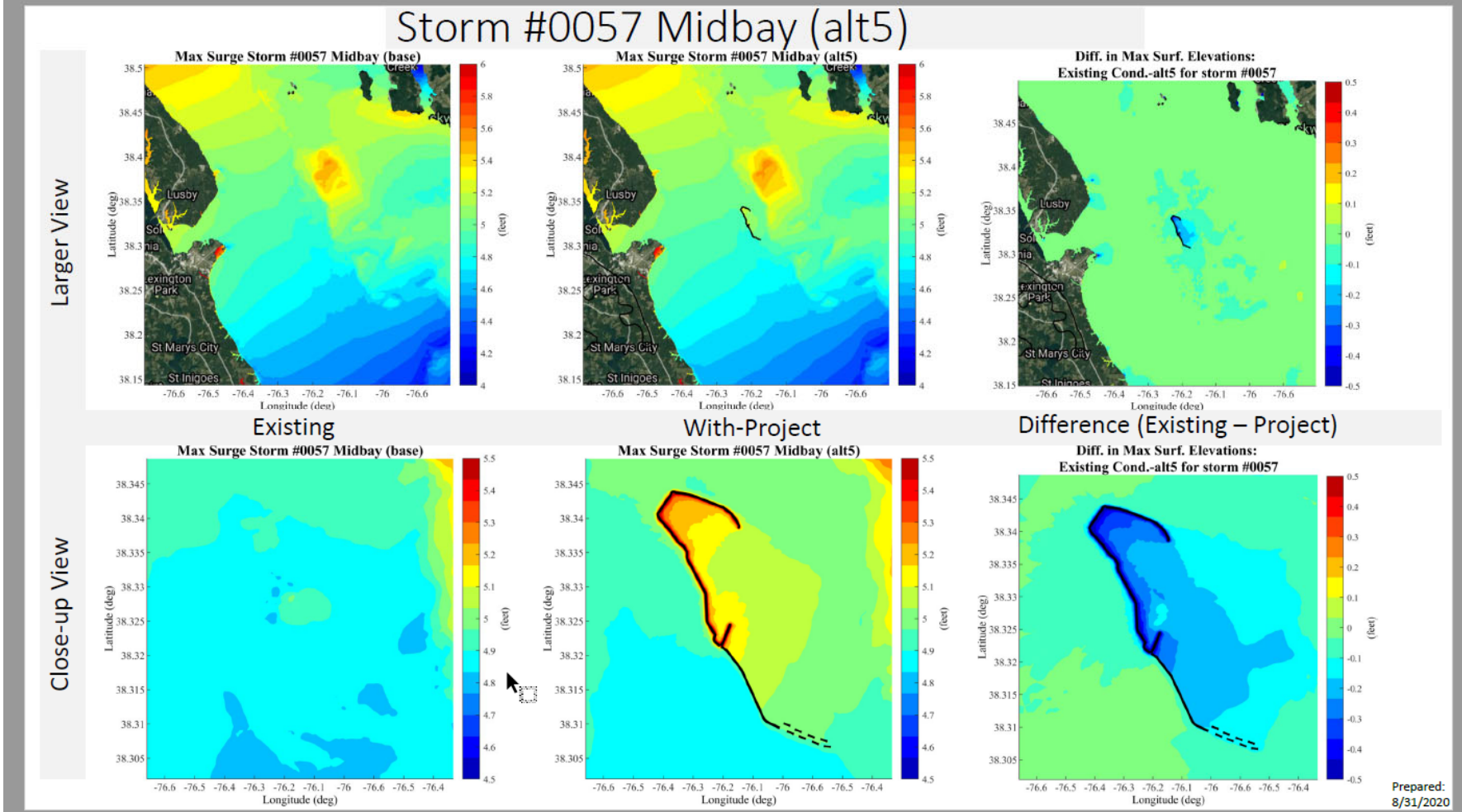
MAXIMUM WATER SURFACE ELEVATION – ALT 5



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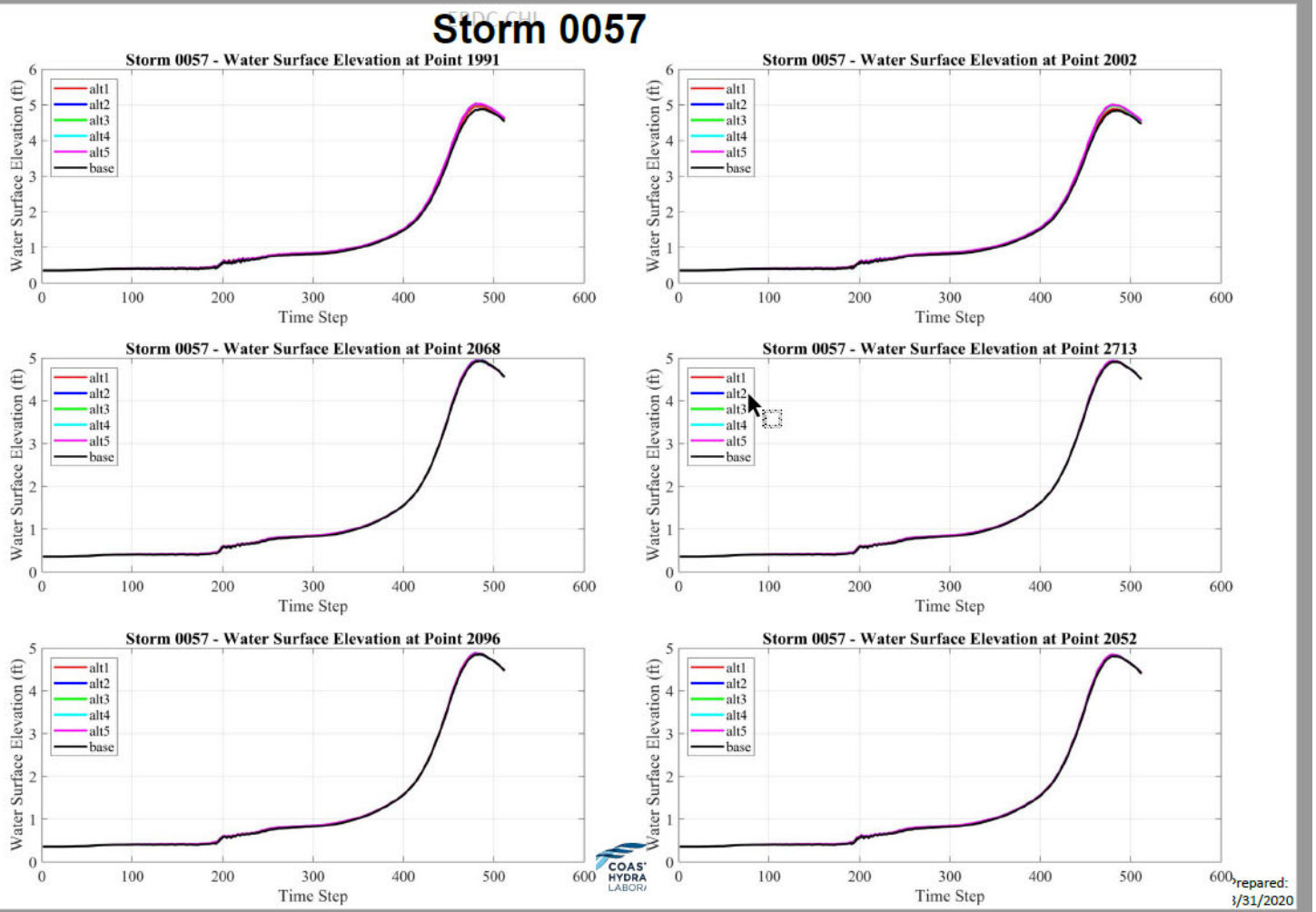
WATER SURFACE ELEVATION TIME SERIES



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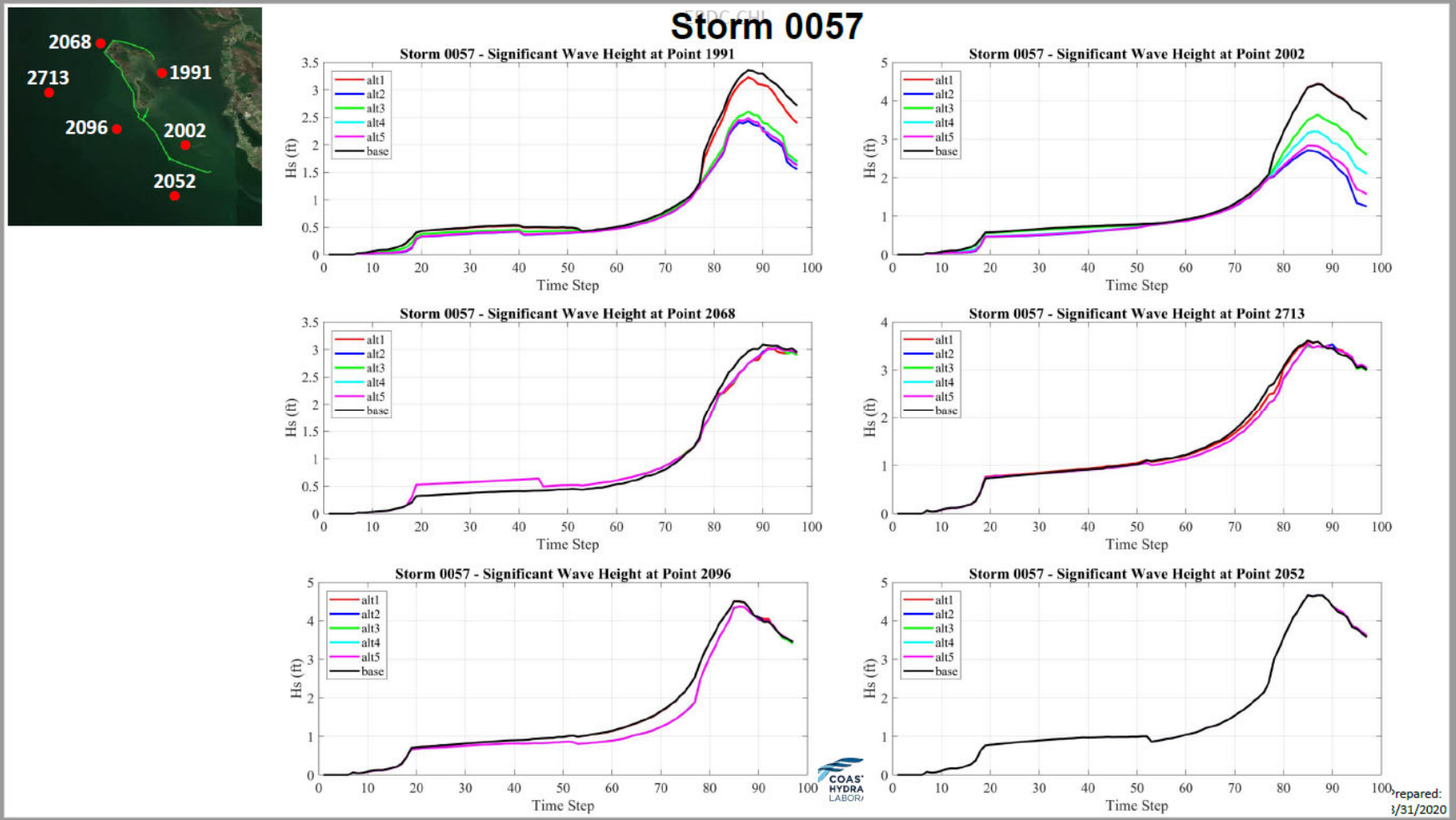
MAXIMUM SIGNIFICANT WAVE HEIGHT



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PRELIMINARY ALTERNATIVES EVALUATION

- Next step is to evaluate model results for current velocities
  - Model velocities in project area under non-storm conditions for with and without project conditions
  - Identify maximum and mean velocity during storms with and without project (5 alternatives)
  - Compare – targeting alternatives which replicate the current conditions that promote SAV habitat (based on relatively consistence presence of SAV east of Barren prior to wet years of 2019 and 2020)
    - There is some information available on suitable conditions for *Ruppia maritime* and *Zostera marina* in literature
- Initial results suggest that full southern breakwater extent may not be warranted
  - Due to poor foundation, material would need to be removed and fill used from a new borrow area to construct lower half of southern breakwater
  - Footprint of full southern breakwater does not mimic historic shoreline
  - Full evaluation needs to be completed, but initial review of H&H results suggest full breakwater is not necessary

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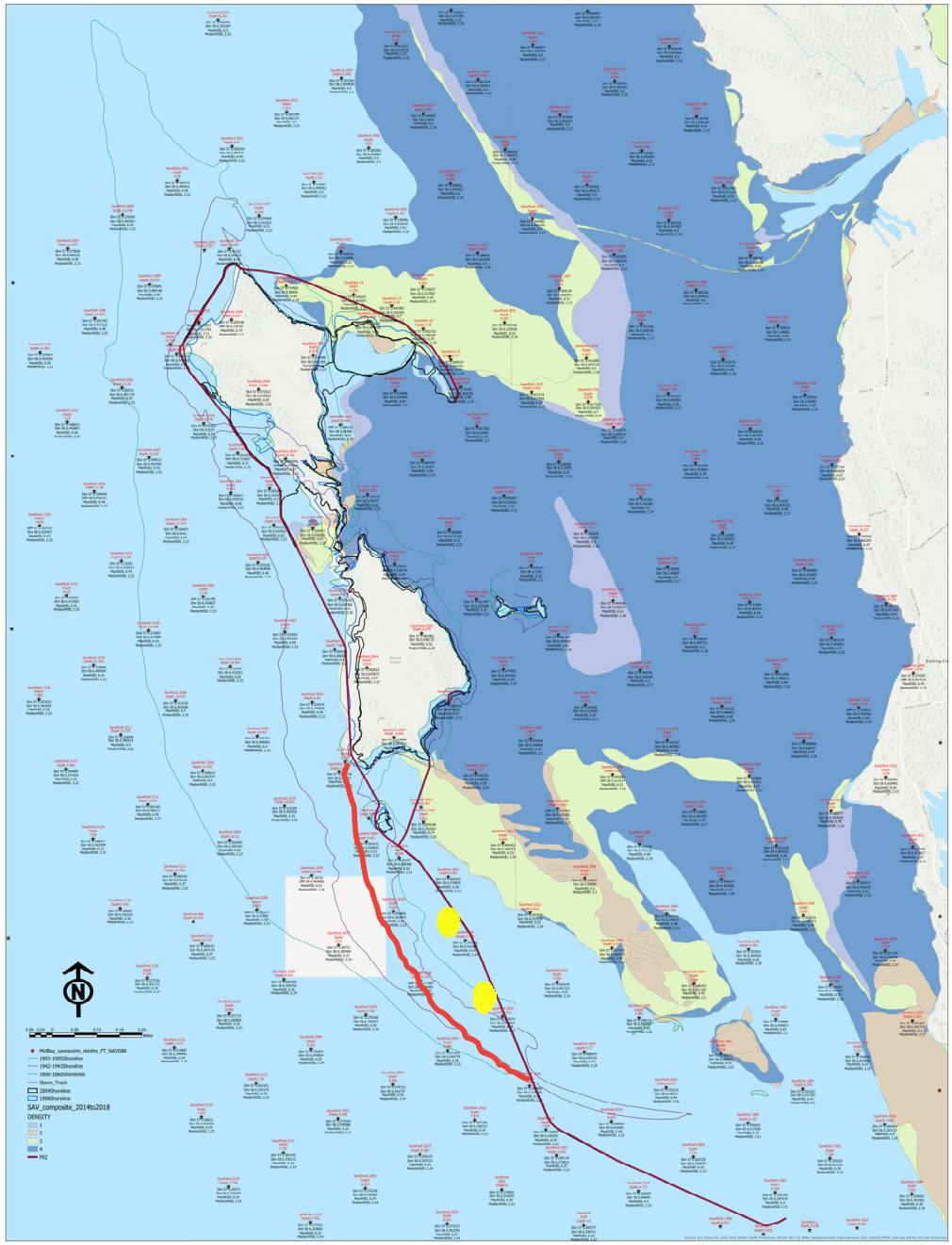
WSEL for Alternative Plan 02



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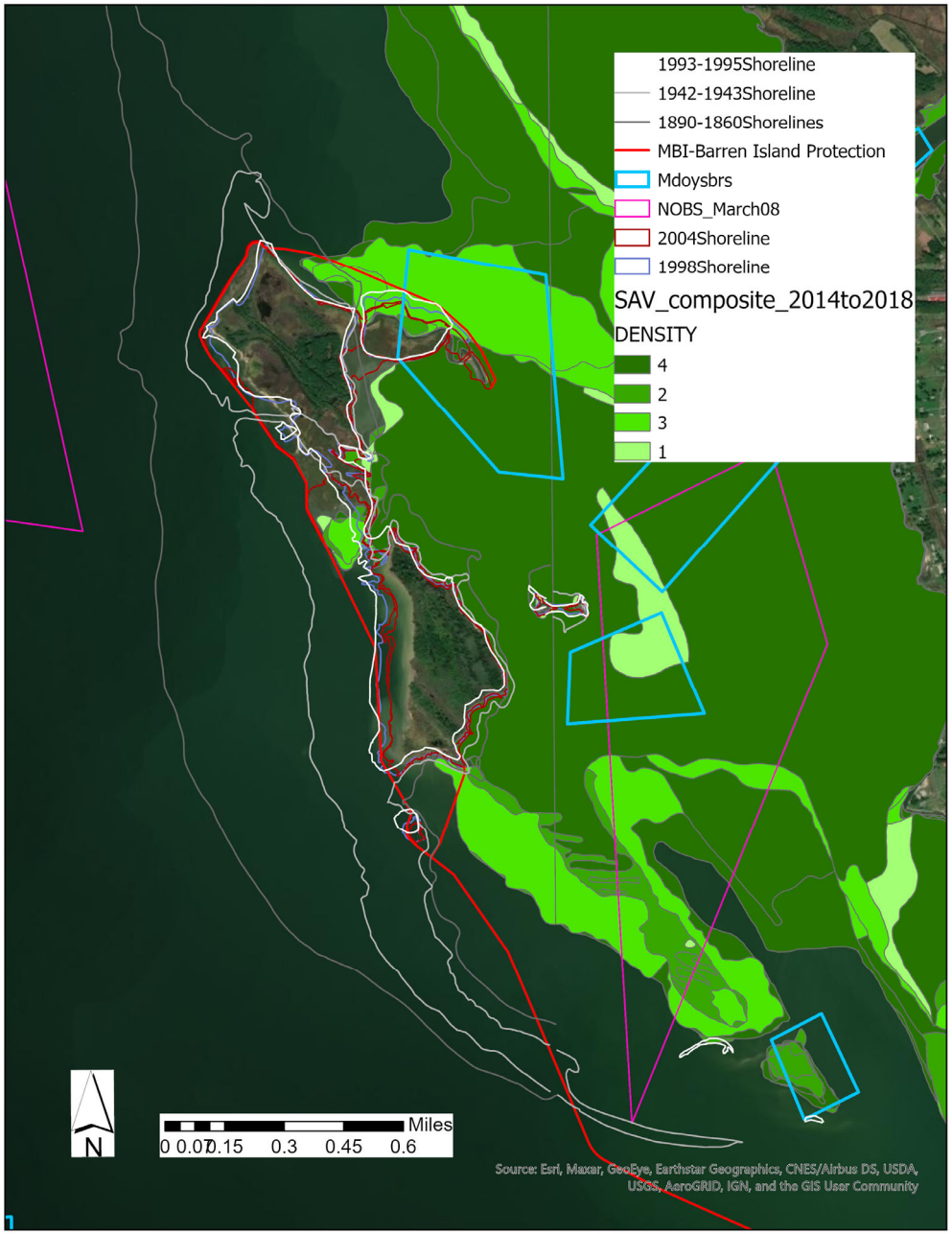
ADDITIONAL NEPA CONSIDERATIONS

SAMCUC(1

Oysters:

Great Bay (bar #4):
10 bushels
(November 2019)



Slide 16

SAMCUC(1 Sowers, Angela M CIV USARMY CENAB (USA), 9/24/2020

WETLAND DESIGN FRAMEWORK

Step 1: Identify reference marsh(es) and determine the following conditions to help guide design:

1. tidal range (MLLW, MLW, MHHW)
2. distribution of high to low marsh (including high marsh:low marsh line and high marsh:upland line)
3. low marsh to aquatic breakline
4. vegetative cover

Step 2: Using reference marsh conditions (Step #1) and lessons learned from Poplar, identify:

1. project goals/success metrics as a target and an acceptable range,
2. assumptions and conditions needed to reach these goals,
3. risks to achieve metrics
4. factors affecting success and risks

Step 3: PL sketch out design with ENG, review with agencies.

Step 4: Determine dredged material inflow plan

Step 5: Develop design plan

Step 6: Develop grading plan

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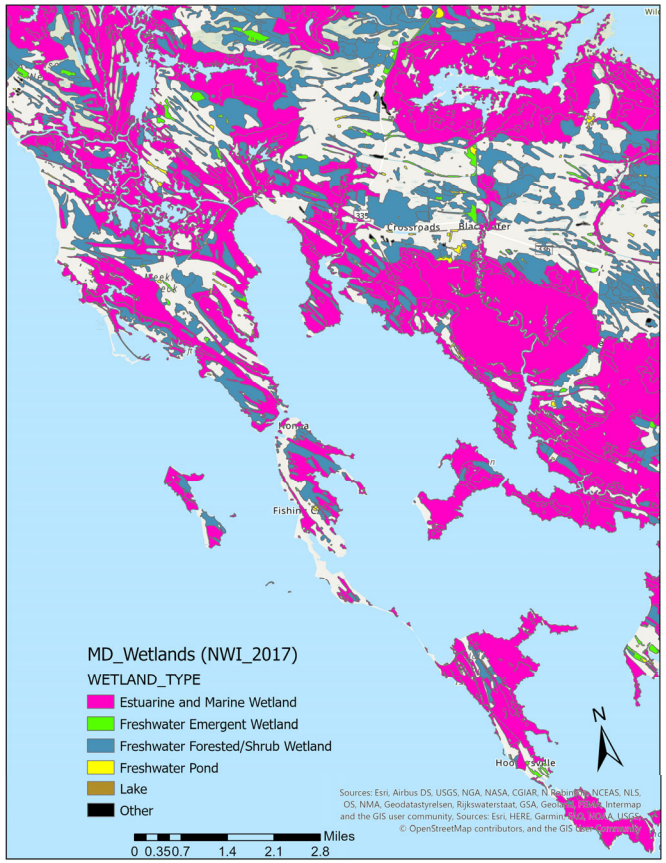
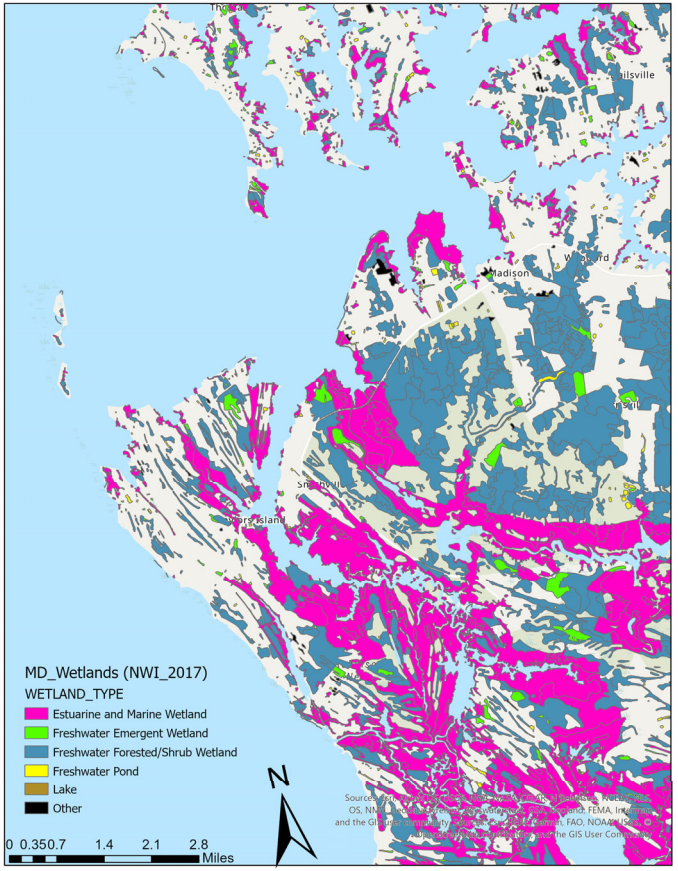
REFERENCE MARSH IDENTIFICATION

- Discussing site locations with FWS
- We are open to suggestions or others being involved





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NEXT STEPS

- Further evaluate H&H modeling results
- Consider SAV habitat requirements with modeling results
- Refine southern breakwater design
- Identify reference marshes and collect relevant data (Step 1 of Wetland Design Framework)
- Develop success metrics (Step 2)
- Begin to draft EA

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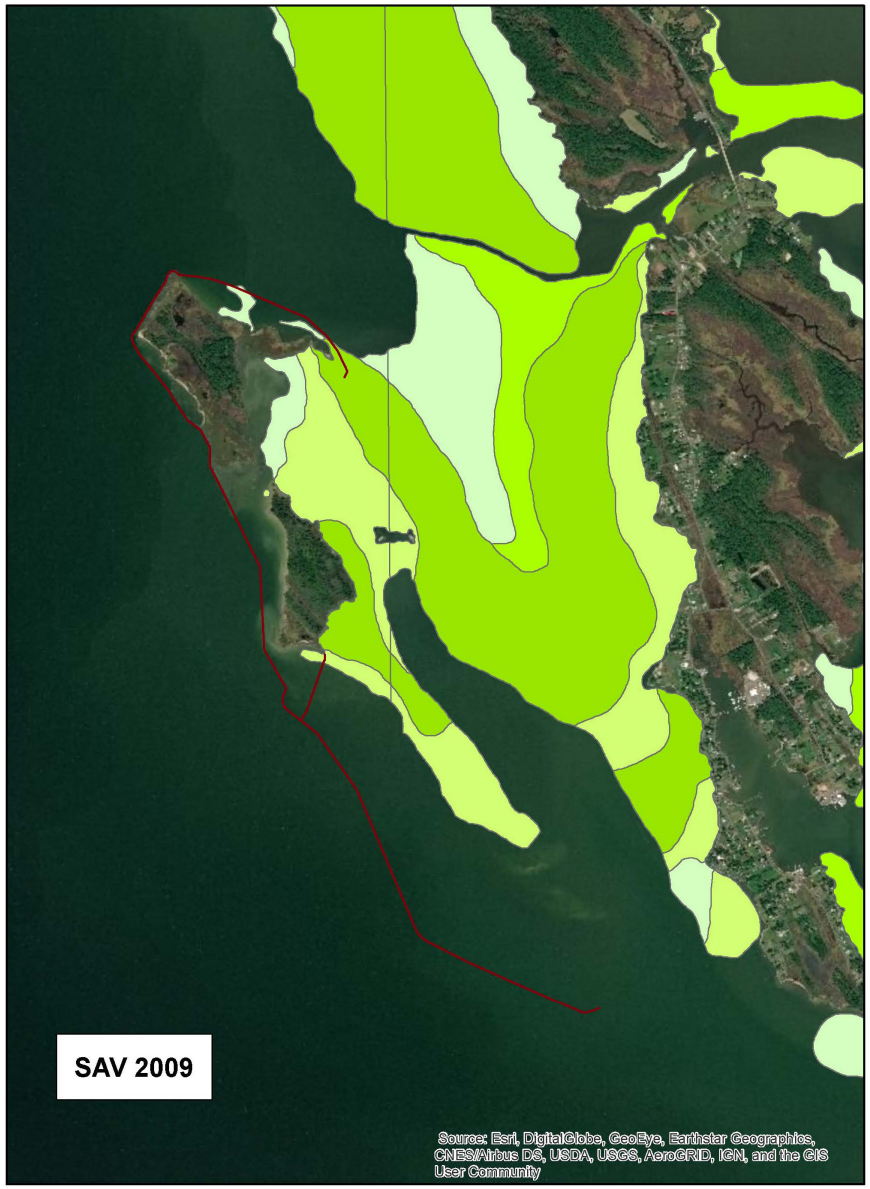
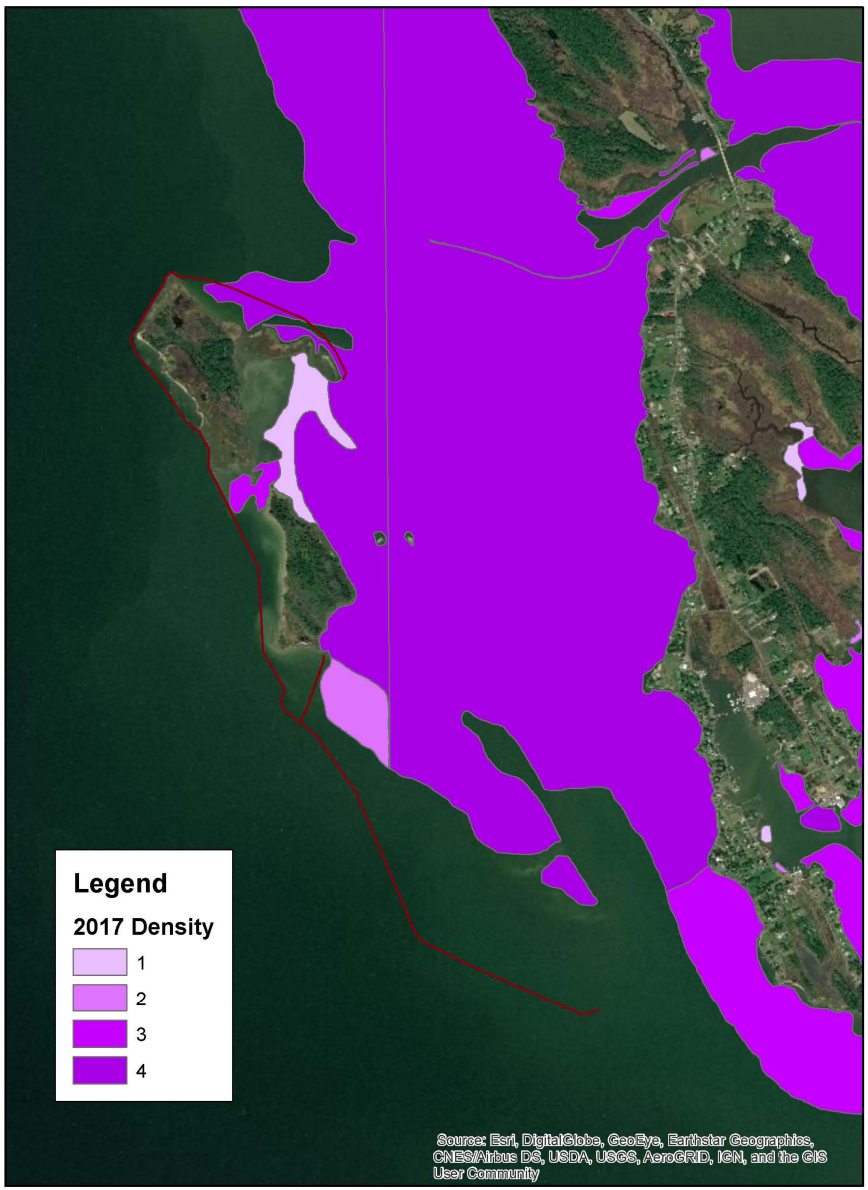
AGENCY CHECK-POINTS – BARREN ISLAND COMPONENT

1. Summer 2020 – Initial ERDC modeling for Barren Design Meeting
2. December 2020 – Draft PAR provided by FWS
3. April 2021 – Barren 35% Design Review Meeting
4. October 2021 – Barren 65% Design Review Meeting
5. Summer 2021 – Complete draft EFH assessment, ESA assessment, 404(b)(1) Analysis, and Critical Areas Commission response; provide to appropriate agencies
6. December 2021 – Public Review of EA





SAV

File Name

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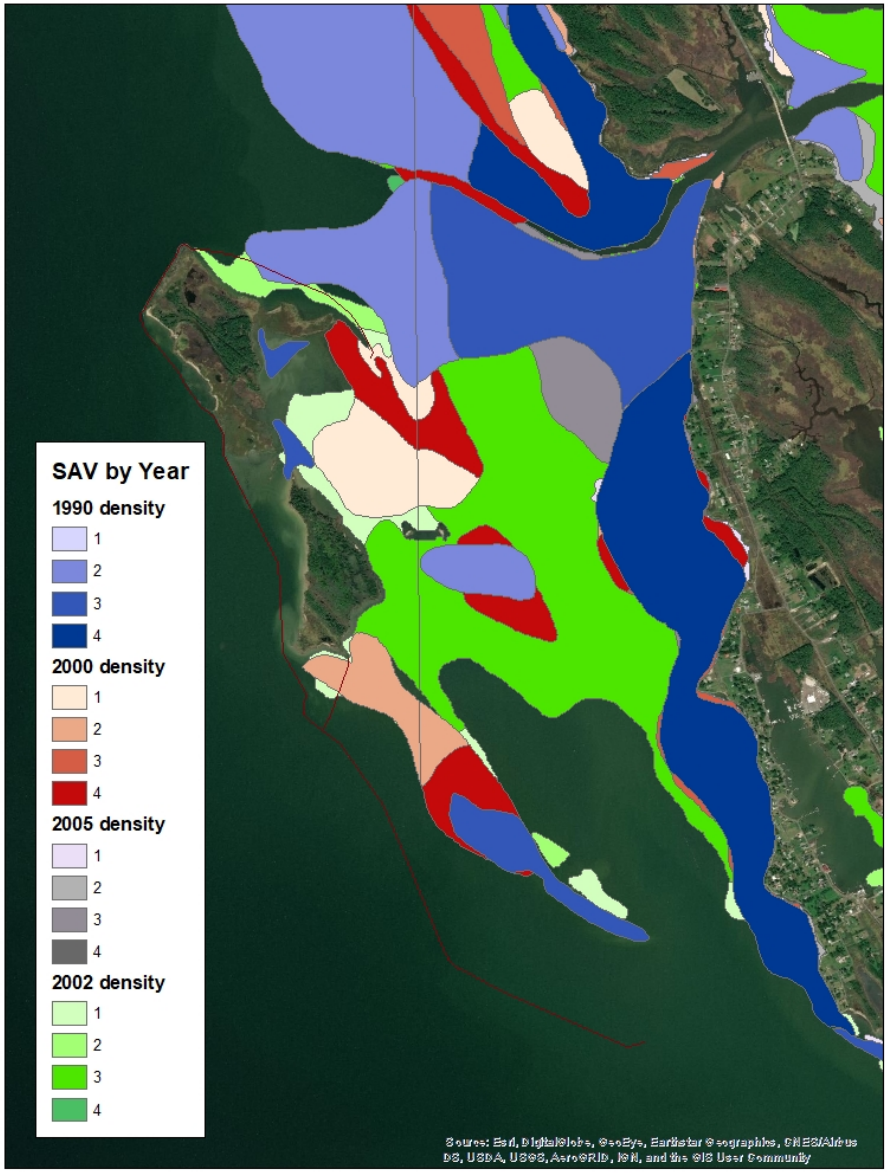

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Mid-Bay Environmental Surveys – Summer 2020 Summary

Karin Olsen, PG
September 24, 2020

Summer 2020 Sampling Elements

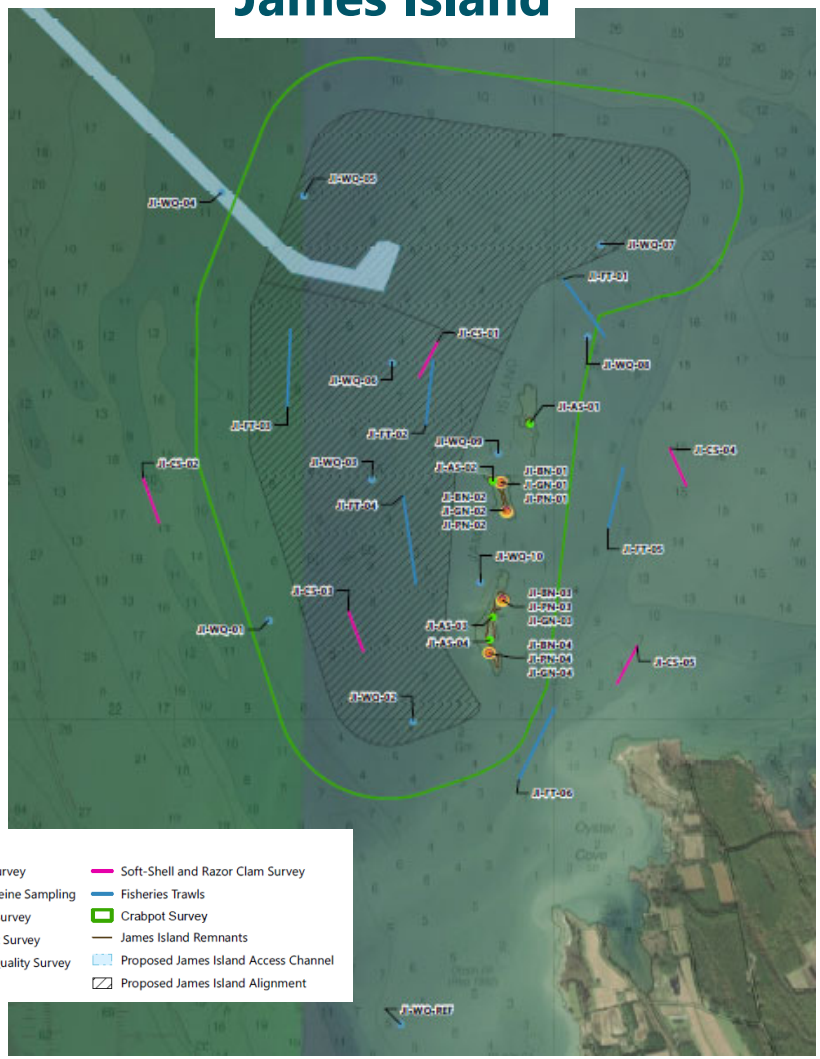
- Benthic and Water Quality
  - Total of 11 locations; 10 monitoring and 1 reference
  - 1 location in the access channel
  - For benthics, sediment sampling conducted
- Avian
  - Identify 4 habitat types: forest, wetland, beach, SAV
  - Asked the crew to assess habitats based on existing conditions
- Crab Pots
- Fisheries
  - Co-located the seine, pop net, and gill nets
  - 4 locations at James and 5 locations at Barren

Target Locations – General Approach

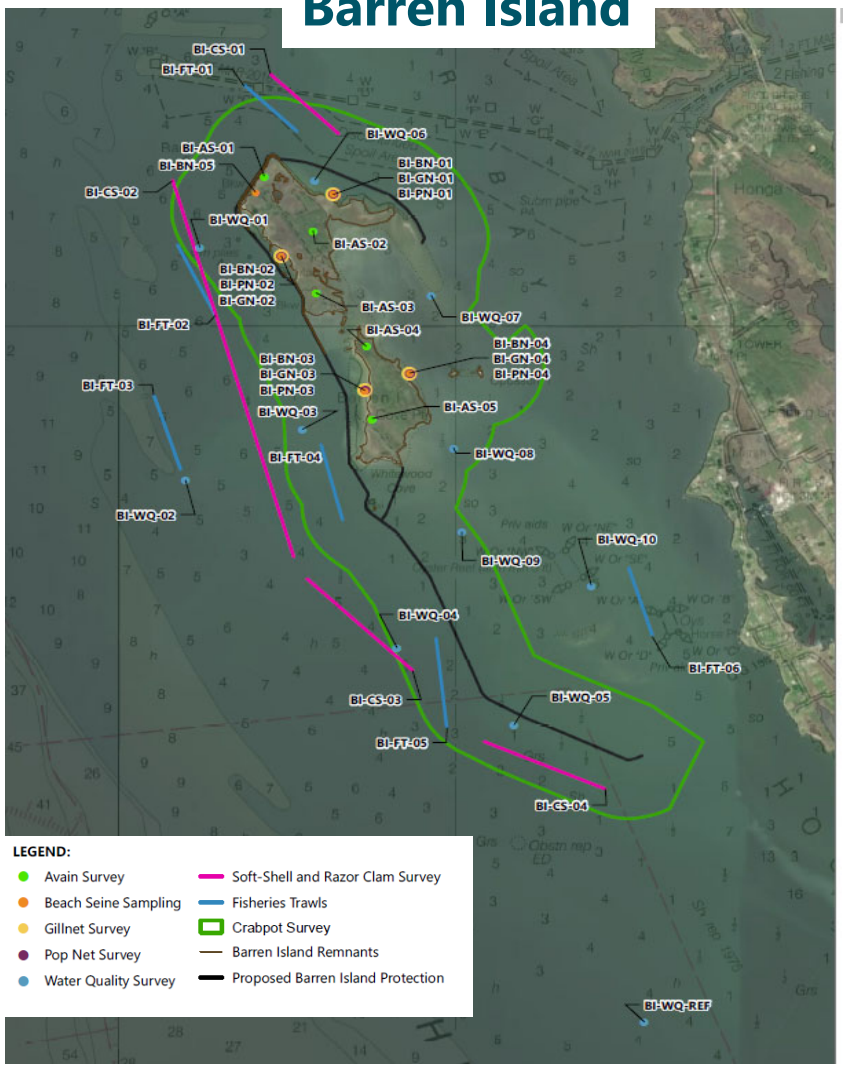
- Program consistent with previous efforts
  - Some locations were moved based on existing conditions, notably the decreased island remnants at James
- All field teams were instructed to assess conditions and revise sampling coordinates if needed
  - Prioritize locations resulting in valid data
  - Viability as monitoring locations
- Successfully sampled the majority of the target locations

Target Locations

James Island



Barren Island



Benthic Community and Water Quality

- All target locations successfully sampled; no access or sampling challenges
- Sediment data for habitat classification collected and submitted for analysis
- Water quality samples submitted to CBL for nutrient analysis
- Still waiting on analytical results
- Upcoming Sampling
  - Fall sampling: mid-October
  - No winter sampling
  - Spring sampling in 2021

Avian Surveys – James Island

- No terrestrial habitat left – survey included shoreline, mudflat, salt marsh, and open water
- Target (previous) locations no longer exist
  - Locations were selected to minimize the amount of viewscape overlap
- Because of lack of habitat diversity, the species list was mostly water birds and shorebirds.
  - Six species of sandpiper/plover - sanderling, spotted sandpiper, semipalmated sandpiper, least sandpiper, semipalmated plover, and ruddy turnstone
  - Gulls, terns, pelicans, and cormorants
  - Fish-eating raptors (osprey and eagle)

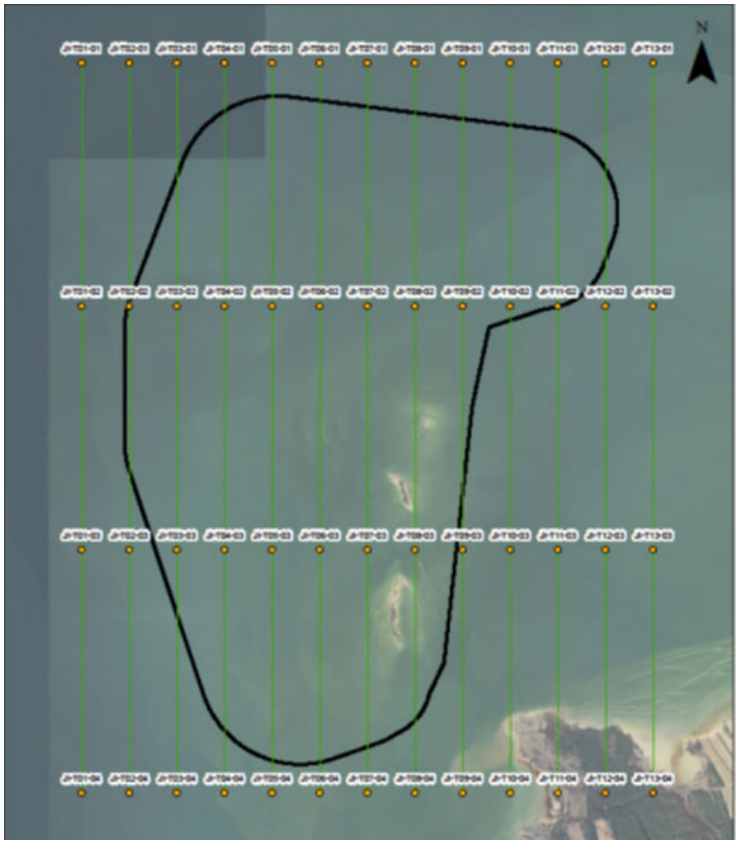
Avian Surveys – Barren Island

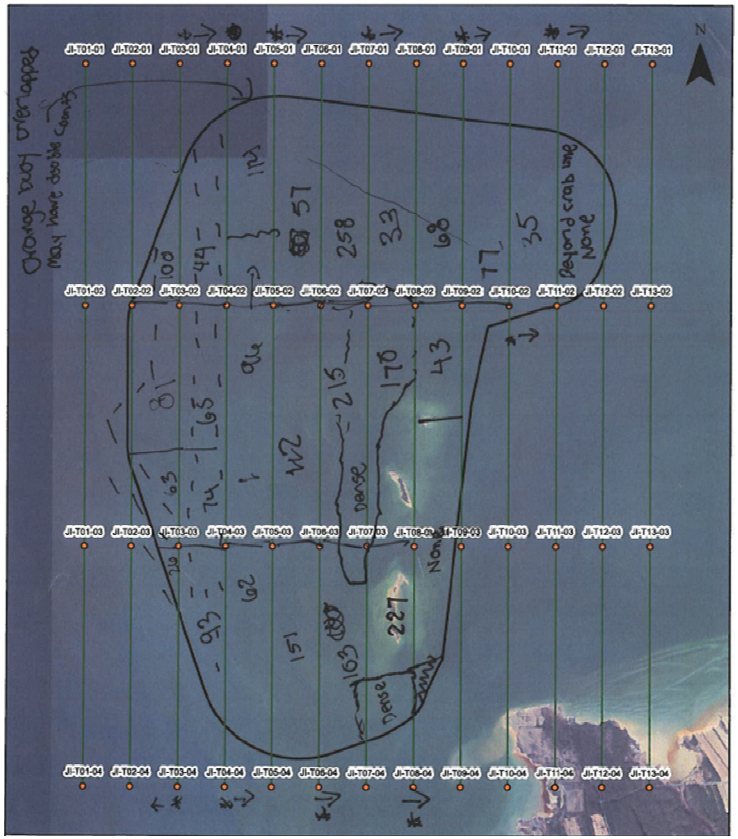
- Habitats were more diverse – survey included shoreline, mudflat, salt marsh, and open water plus forest and scrub shrub

- Marsh habitat was also much larger
  - Hundreds of brown pelicans and double-crested cormorants
  - Shorebirds - sanderling, spotted sandpiper, and semipalmated plover
  - Terns, gulls, and raptors, plus some clapper rails and wading birds in the marshes
  - Terrestrial birds included migrant warblers, flycatchers, hummingbirds, resident brown-headed nuthatches, Carolina wrens, pine warblers, and cardinals

Crab Pot Surveys

- Developed an area of observation and transects for consistency and navigation





Crab Pot Surveys

- Next step is GIS analysis:
  - total crabpots per acre
  - estimates within James Island footprint
- Next sampling event:
  - Sept – next week
  - May, June, July 2021

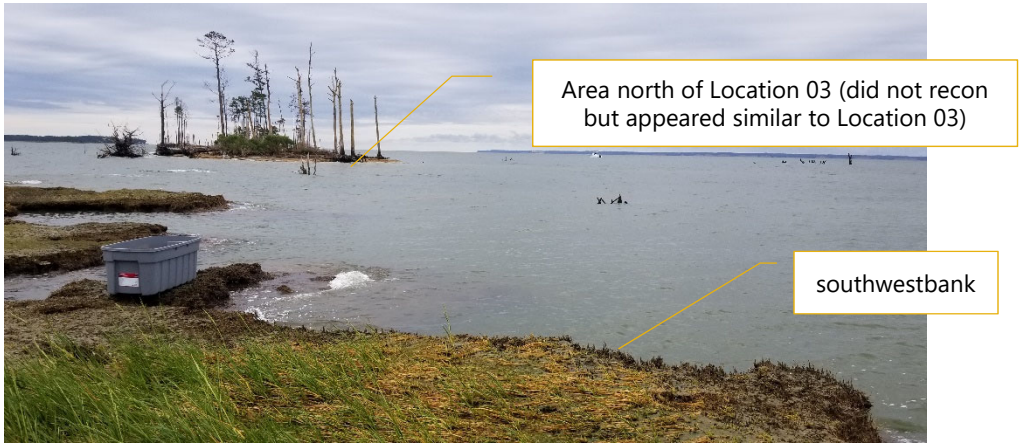
Fisheries – James Island

- Trawls: all locations sampled
- 4 locations at James
  - Location 1:
    - Successful pop net, gillnet and seine
    - Seine was shorter than target – approx. 20 ft in horseshoe

James Island, cont

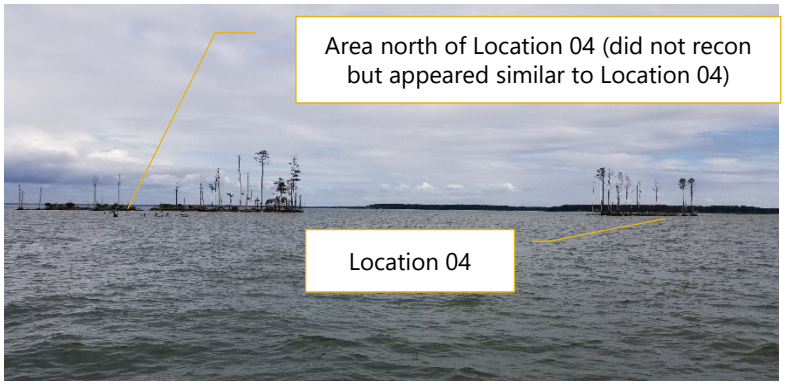
- Location 2
  - Successful pop net, gillnet and seine

- Location 3
  - Successful gillnet and seine; abandoned pop nets



James Island, cont

- Location 4
  - Successful pop net, gillnet recovery
  - Beach seine abandoned



Fisheries – Barren Island

- Trawls: all locations sampled
- 5 locations at Barren
  - Location 1
    - Successful pop net, gillnet and seine

Barren Island, cont

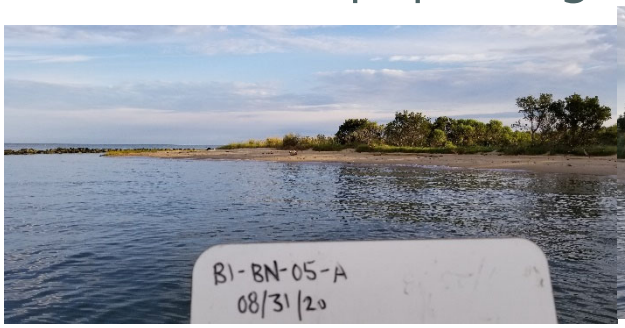
- Location 2
  - Successful pop net, gillnet and seine

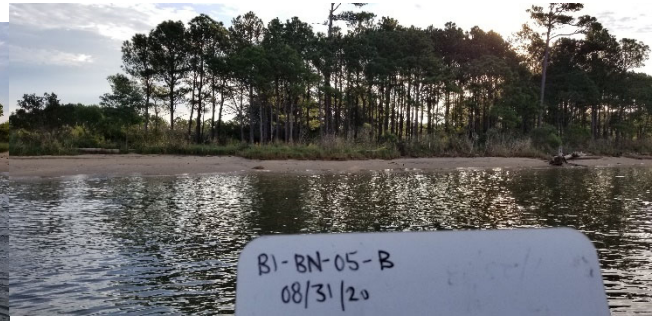
- Location 3
  - Successful pop net, gillnet and seine

Barren Island, cont

- Location 4
  - Successful pop net, gillnet and seine

- Location 5
  - Successful pop net, gillnet and seine





Fisheries Summary

- Gill Nets
  - Successful overall
- Trawls
  - Successful overall; lots of crab pots at James hindered the gear's ability to fish effectively. Some locations were modified to avoid crab pots but maximize recovery
- Beach Seine
  - Limited "beach" area left for seining; James especially limited
  - Many of the seine locations did not extend full 100 linear ft
  - Abandoned one location (James 4) because no viable area and no 'replacement' area available
- Pop nets
  - Generally successful, but difficult to deploy
  - Abandoned one location (James 3) because no nearshore area

Upcoming Sampling Schedule

- Fall sampling – tentative
  - Water and benthic community: week of Oct 19th
  - Fisheries: weeks of Oct 26th and Nov 2 (gill net, seine and trawl only)
  - Commercial clam survey: November
- Winter sampling
  - Water and fisheries: late January
- Spring 2021
  - April / May 2021
  - Crab Pots in May, June, July
  - Includes pop nets for fisheries

Questions/Discussion

Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Update

23 February 2021; 10:30 - 12:00 a.m.

Webinar information: https://usace1.webex.com/meet/angela.sowers
Join by phone
+1-844-800-2712 US Toll Free
+1-669-234-1177 US Toll
Access code: 199 872 1676

1. Introductions
2. Project status/schedule update
3. Biological surveys
4. Barren Island – Habitat Delineation
5. Barren Island – 35% Design
    a. Engineering considerations - H&H Modeling, foundation material
    b. Natural resources considerations - SAV and Oyster Resources
6. Next Steps
7. Wrap-up and Action Items

MID-CHESAPEAKE BAY ISLANDS ECOSYSTEM RESTORATION PROJECT

DESIGN PHASE AGENCY COORDINATION UPDATE

Angie Sowers

USACE - Planning

23 February 2021

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AGENDA

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3. Biological surveys
4. Barren Island – habitat delineation
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   b) Natural resources considerations – SAV and oysters
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- Request CG appropriations for FY24
- Construction begins – summer 2024

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PROGRESS SINCE SEPTEMBER MEETING

- Engineering
  - ERDC H&H modeling of velocities for 5 potential southern breakwater alignments; and additional run of revised alignment with increased Manning's coefficient to represent roughness provided by SAV
  - Updating/aligning schedule
  - Soil sampling and analysis of southern and northeast breakwater
  - Development of 35% Design documents (draft)

- NEPA
  - Completion of summer and fall biological surveys
  - Start of predatory mammal surveys
  - In field wetland delineation
  - Habitat delineation
  - Evaluation of potential impacts to oyster bars
  - Reference marsh – initial meetings, discussion

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BIOLOGICAL SURVEYS - STATUS

		James and Barren Island				
Survey Type	Spring 2021	Summer 2020	Fall 2020	Winter 2020 - 2021	Spring 2021	Summer 2021
Water Quality/Nutrient		√	√	Feb	April	
Benthic Invertebrate		√	√		April	
SAV	√				2021	
Fisheries						
Bottom Trawl		√	√	Feb	April	
Beach Seine*		√	√	Feb	April	
Gillnet		√	√	Feb	April	
Pop Net			√		April	
Soft-shell and Razor Clam			√			
Pound Net Telephone Survey***			√			
Commercial Harvest Data Collection				in progress		
Crab Pot Survey^		√		May, June, July		
Avian						
Avian surveys - point counts		√			April/May	
Avian surveys - wetlands - SHARP					May, June	July
Avian surveys - passive listening counts/flushing survey				Jan, Feb, March		Aug, Sept
Predatory mammals				Jan, Feb, March		Aug, Sept

To be conducted by Anchor QEA

To be completed through FWCA - FWS or subcontractor (Audubon or APHIS)

To be completed by DNR

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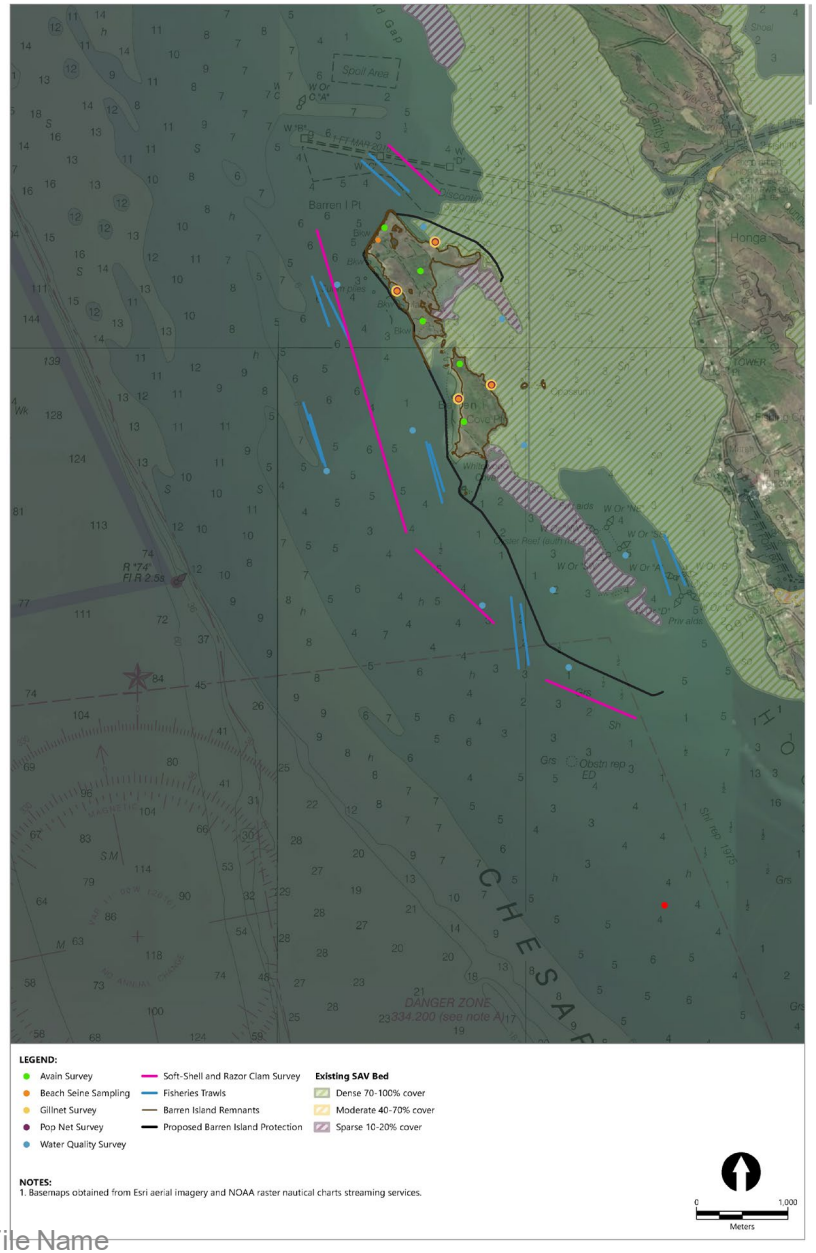
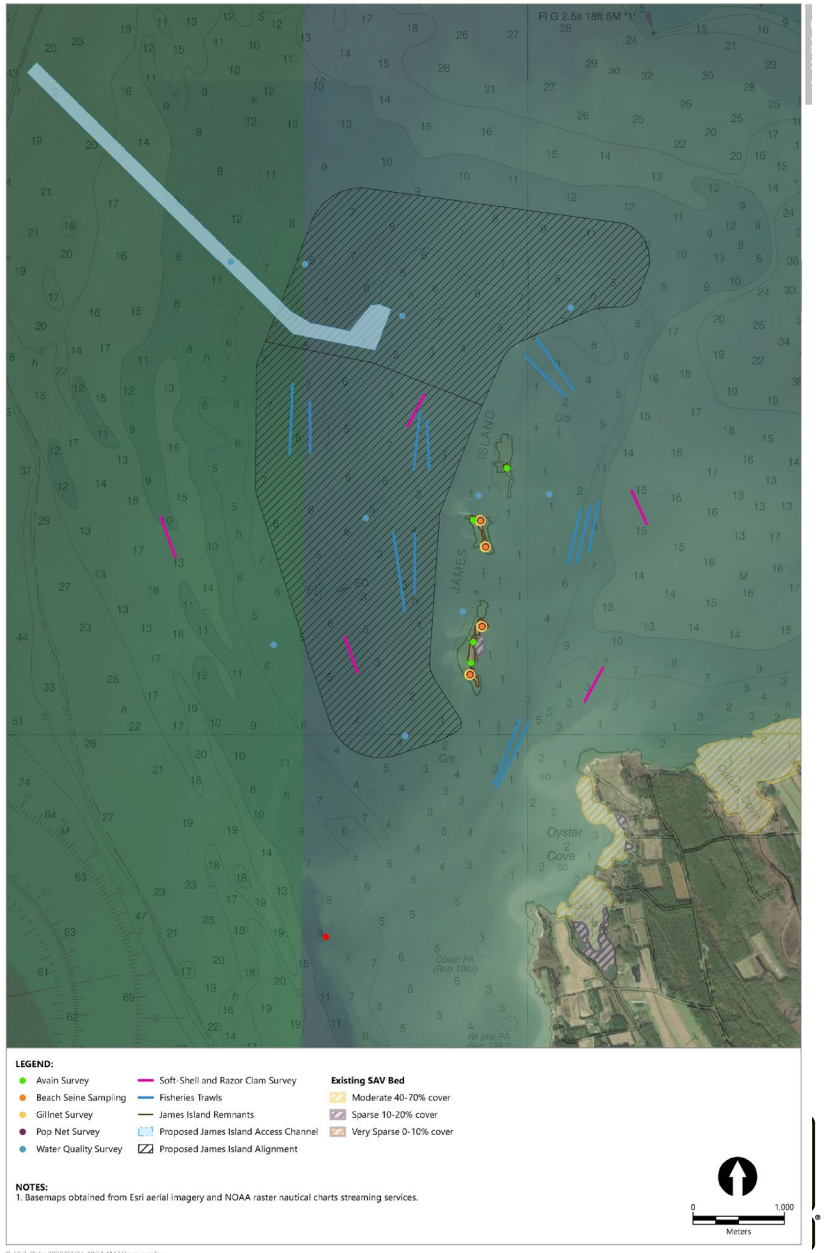
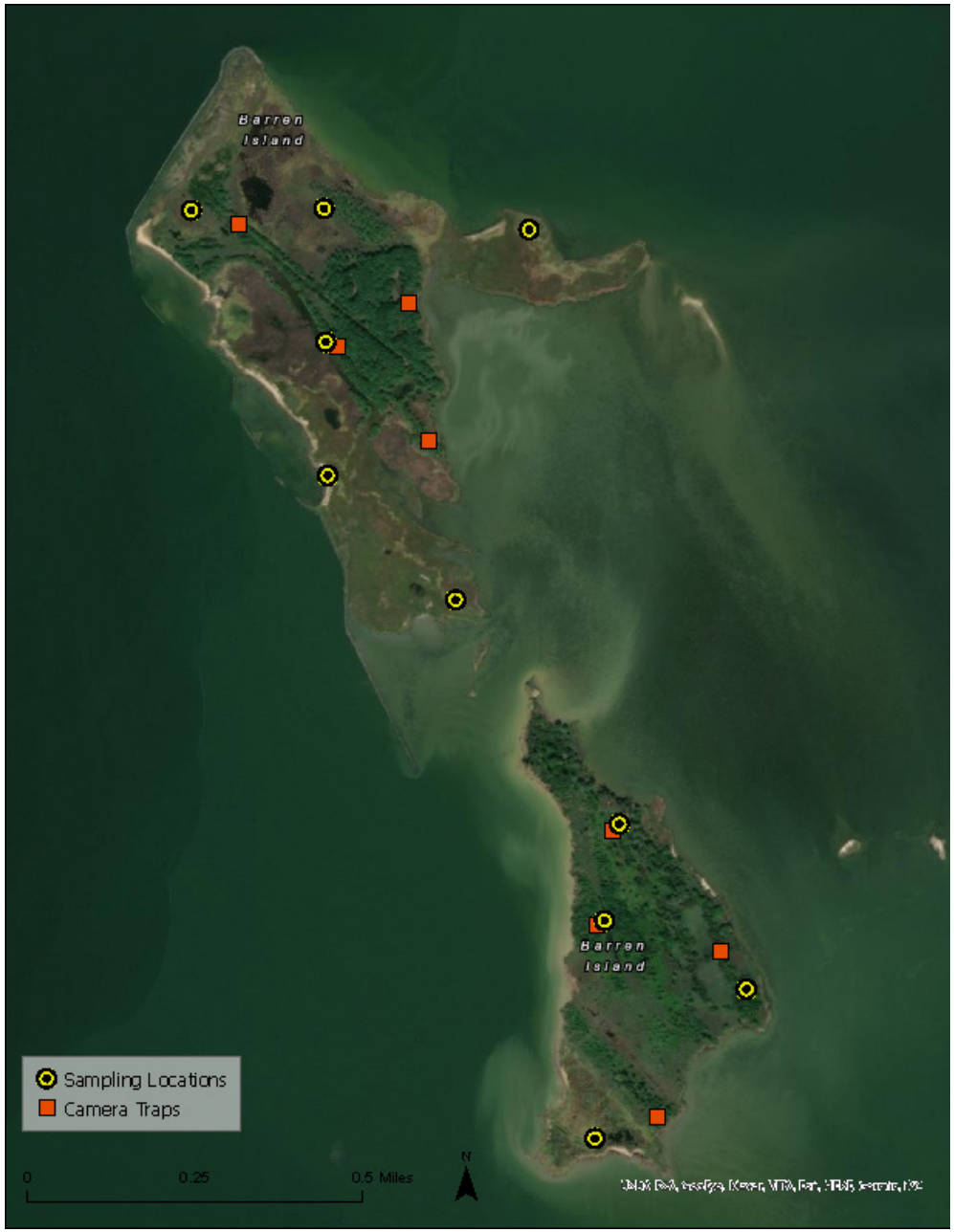
JAMES AND BARREN SAMPLING POINTS (ANCHOR QEA)







AVIAN AND PREDATORY MAMMALS SURVEYS - APHIS

Mammals observed Jan 7, 2022

- Red Fox (visual and sign)
- Raccoon (sign)
- River Otter (sign)
- White tailed deer (visual and sign)
- Muskrat (sign)
- Also noted – remains of 1 box turtle and 2 diamond back terrapins

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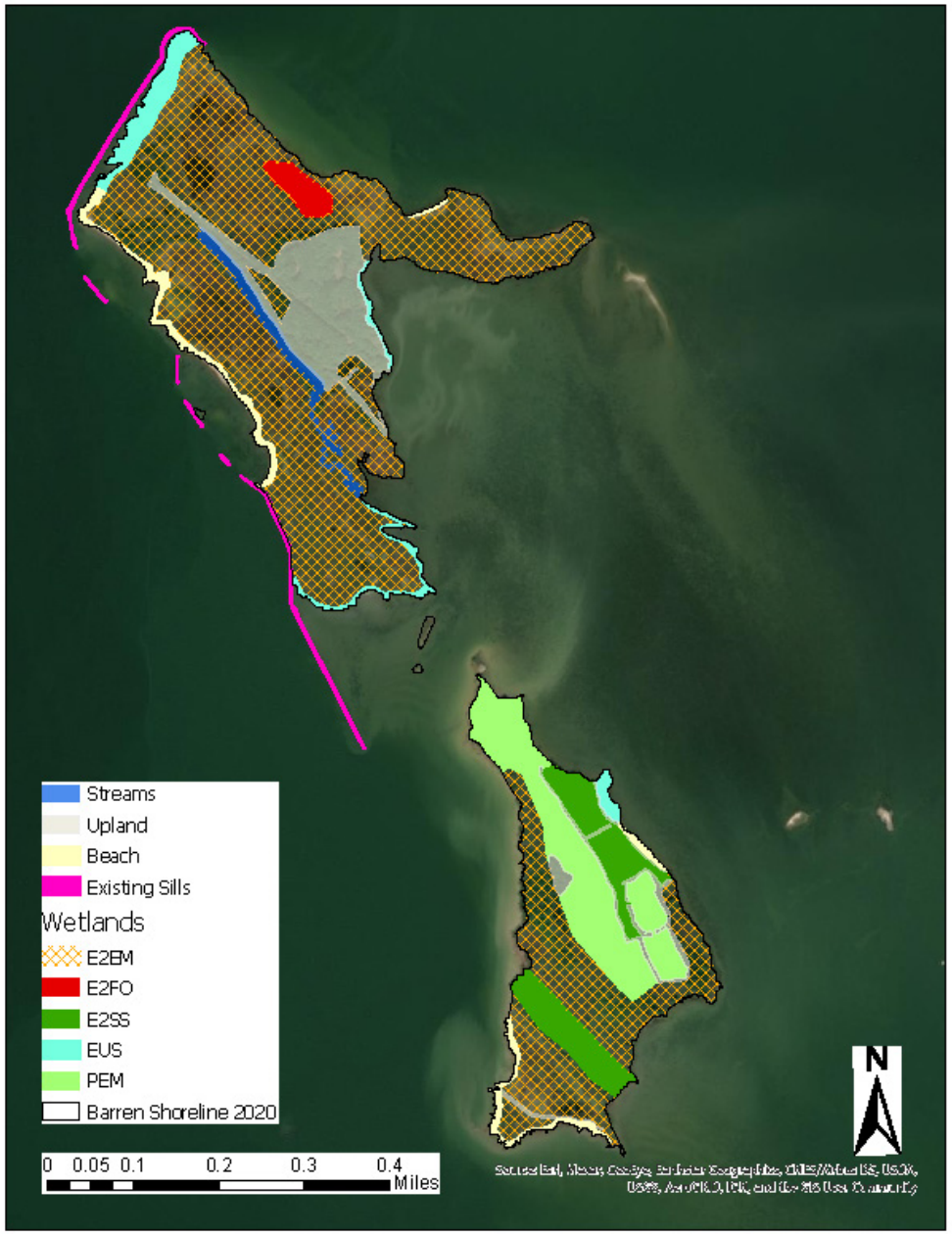
HABITAT DELINEATIONS: BARREN

Barren Island Habitat Coverage (Acreage)		
Wetlands		**117.91**
PEM	13.92	
E2FO	1.70	
E2SS	8.73	
E2EM	88.74	
EUS	4.78	
Stream		**1.88**
Beach		**3.44**
Upland		**14.51**
TOTAL		**137.75**

E2FO - Estuarine, Intertidal, Forested
E2SS - Estuarine, Intertidal, Scrub-Shrub
E2EM - Estuarine, Interdial, Emergent
EUS - Estaurine, Unconsolidated Shore
PEM - Palustrine, Emergent



HABITAT DELINEATIONS JAMES

James Island Habitat	
	Acres
Upland	***3.35***

ALTERNATIVES EVALUATION

- Alternatives evaluated:
  - Alt 1 - island protection (NE sill, improve existing sills along western shoreline, SE sill), no breakwater
  - Alt 2 - full breakwater
  - Alt 3 - short breakwater
  - Alt 4 - 2 bird islands extended from short breakwater
  - Alt 5 - segmented breakwaters extended from short breakwater
  - Alt 6 – island protection with 150 m breakwater, 100 m gap, and 3 bird islands
- Compare – targeting alternatives which replicate or improve (reduced velocity) the current conditions that promote SAV habitat (based on relatively consistence presence of SAV east of Barren prior to wet years of 2019 and 2020)
- Results suggest that full southern breakwater extent is not warranted
  - Footprint of full southern breakwater does not mimic historic shoreline
  - Due to poor foundation, material would need to be removed and fill used from a new borrow area to construct lower half of southern breakwater
  - Modeling results show that shorter breakwater can provide for existing or reduced velocities throughout the SAV habitat
    - Velocity reduction benefits higher in the southern portion of the habitat where island erosion has left habitat exposed
    - Continuing to investigate Tar Bay area velocities
  - Modeling results suggest that additional cost for longer breakwater are not necessary

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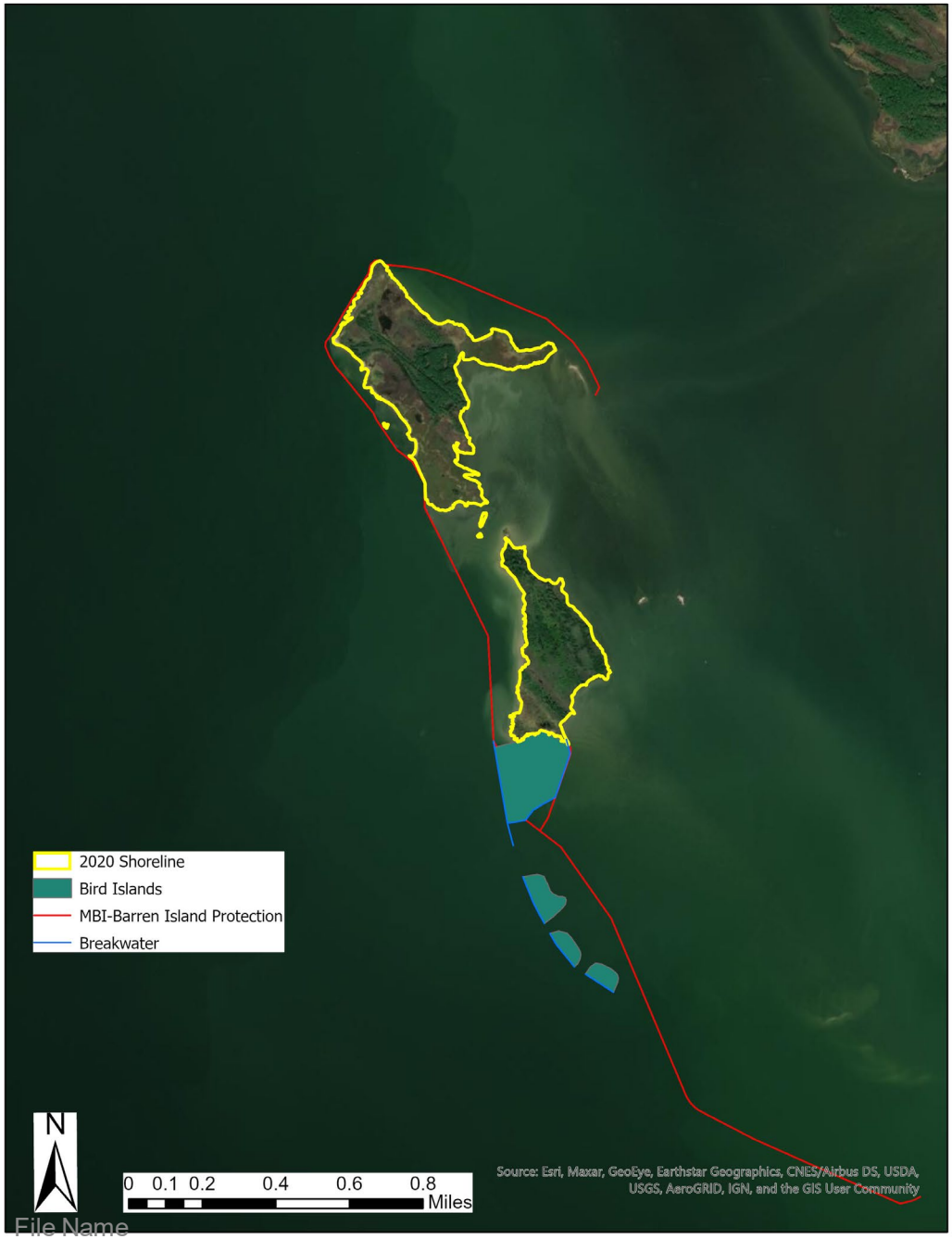
PROPOSED 35% DESIGN



Proposed Sill Crest Elevation (NE, SE, existing) = 3.52’

Proposed Breakwater Crest Elevation = 5.52’

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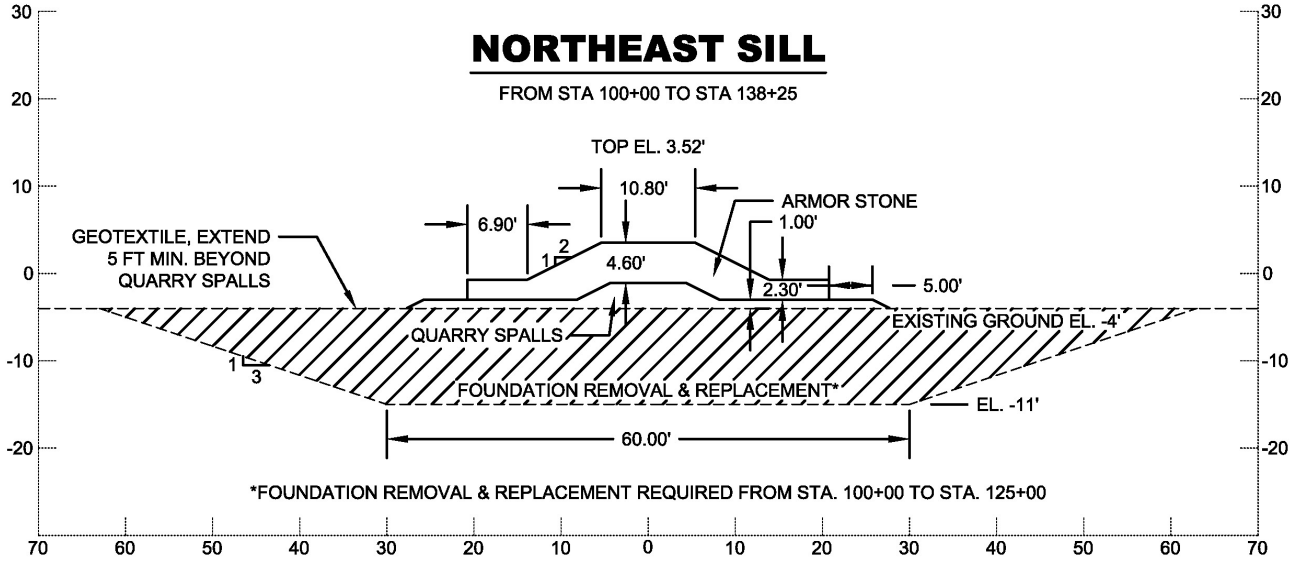
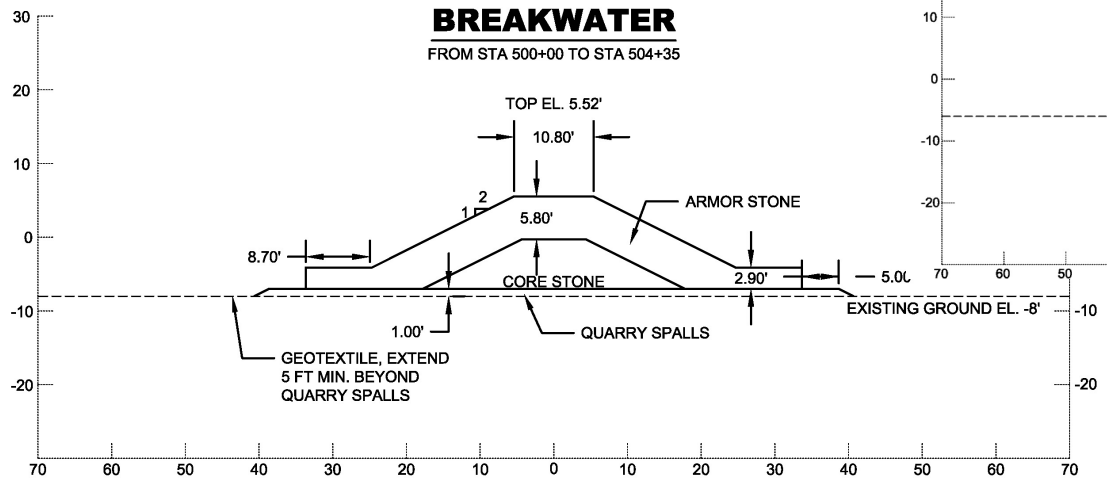
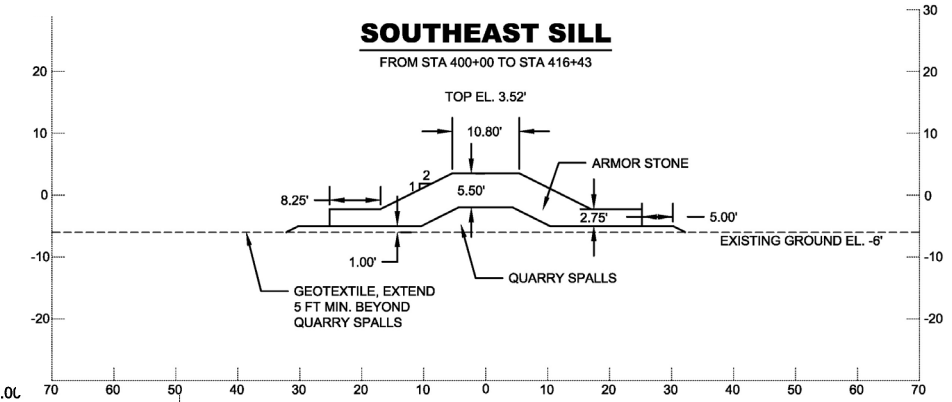
BARREN – SILLS AND BREAKWATERS 35% DESIGN







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ERDC H&H MODELING FOR BARREN ISLAND DESIGN

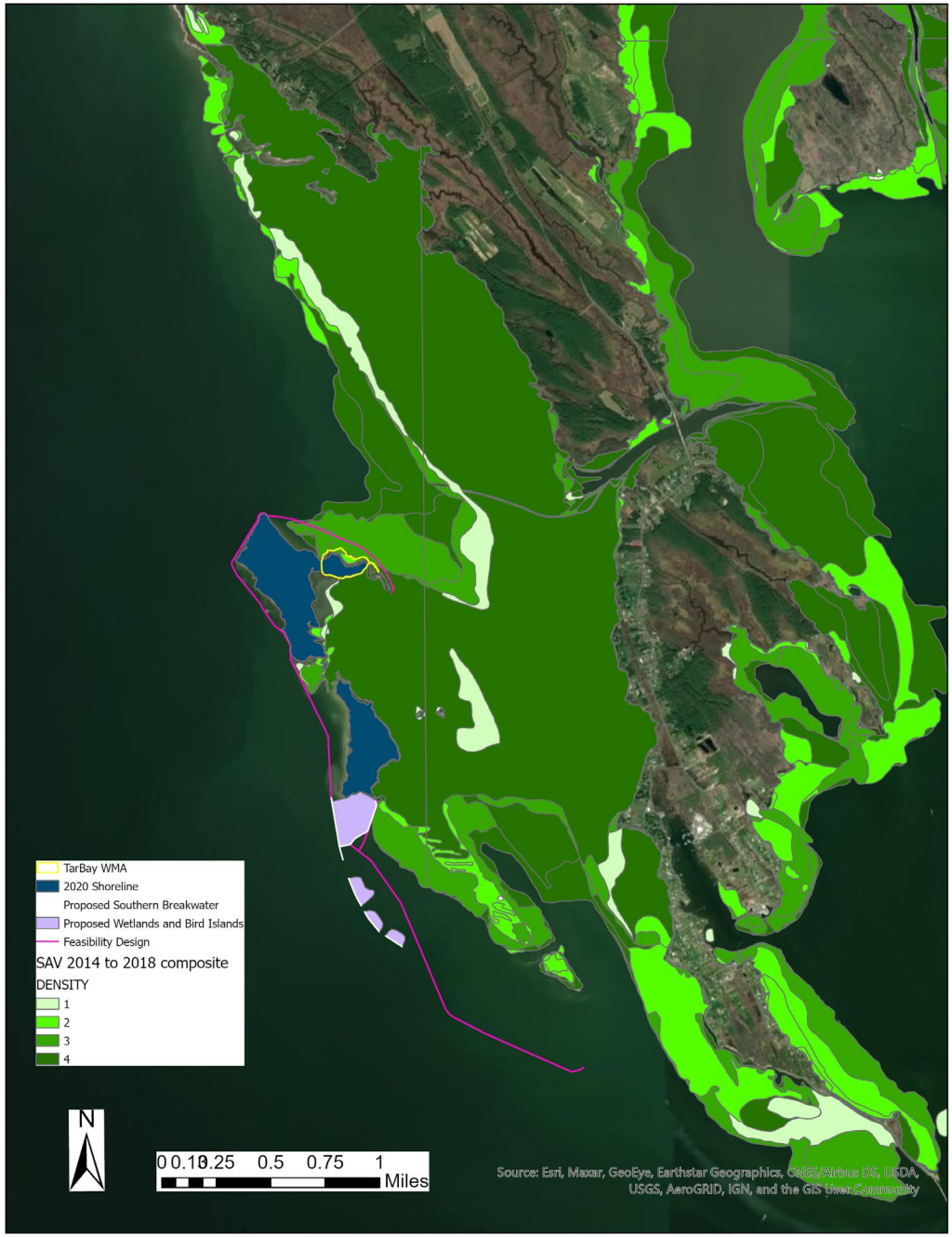
- Previously modeled water levels and wave heights
- Utilized CSTORM (for 25 storms) to evaluate velocities:
  - maximum water velocities,
  - 24 hour and 48 hour mean peak velocities,
  - velocities at spring high and summer low tide conditions,
  - affect of adjusting Manning's n coefficient to represent bottom roughness provided by SAV beds

SAV CONSIDERATIONS FOR DESIGN

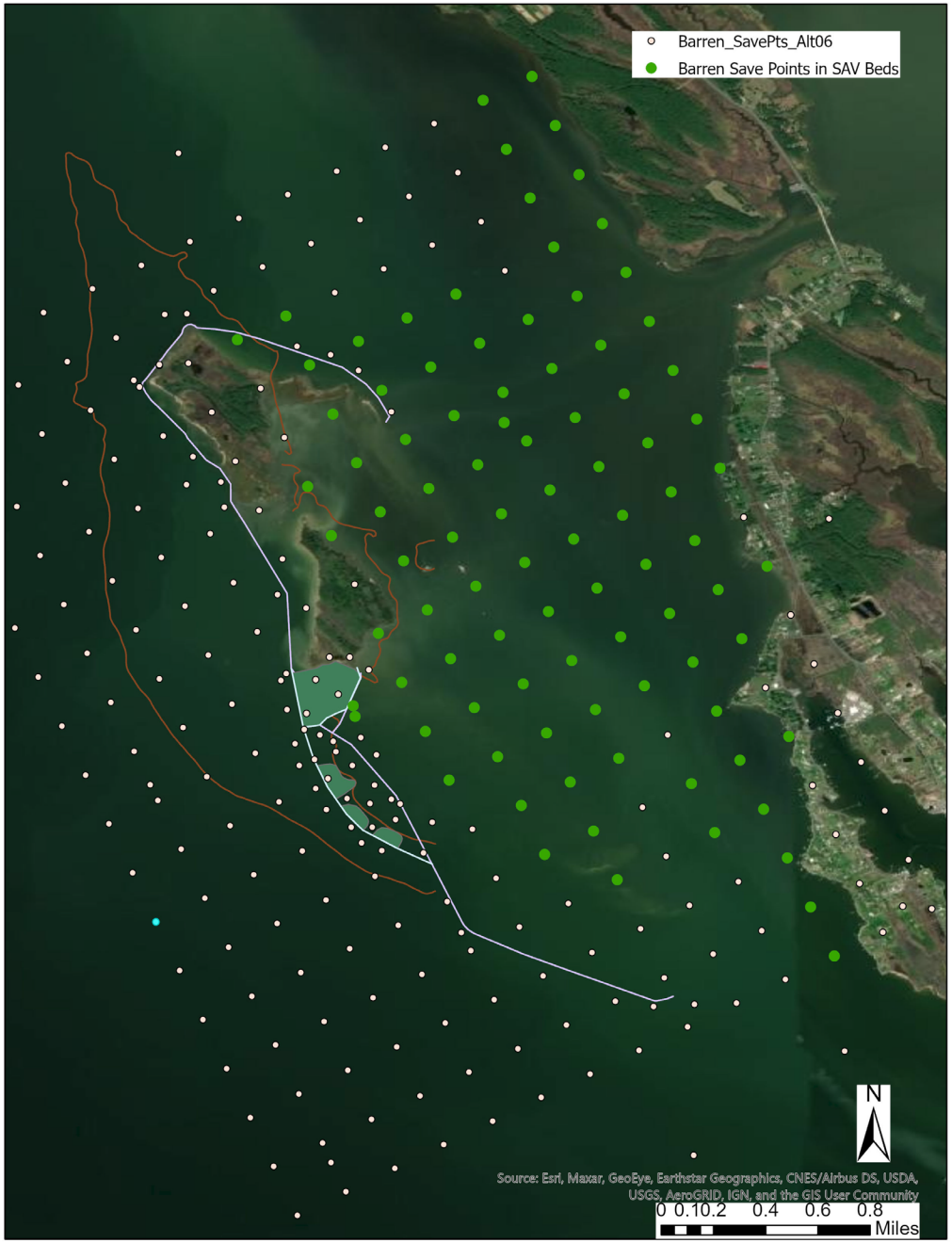
- SAV species present at Barren and James:
  - Horned pondweed (*Zannichellia palustris*) (Barren and James) – spring
    - Canopy formers – wave limited
  - Eelgrass (*Zostera marina*) (Barren) – spring
    - Meadow formers
  - Widgeon grass (*Ruppia*) (Barren and James) – summer
    - canopy formers – wave sensitive/impose less drag on waves
  - Macroalgae sea lettuce (*Ulva lactucna)* (previously Barren and James)

- Velocity profile requirements (Koch 2001 and CBP 2000)
  - Preferred current regime: *Z. marina* > 3 – 180 cm/s; *Z. palustris* < 50 cm/s
  - Intermediate currents are needed to support growth and distribution = 5 to 100 cm/s
  - minimum velocities = 3 – 16 cm/s, max = 50 – 180 cm/s
  - Wave tolerance – 0-1 m limited growth for canopy formers (*Ruppia*)
  - waves > 2m tolerant growth for meadow formers

SAV HABITAT COMPOSITE 2014 TO 2018



MODELING SAVE POINTS



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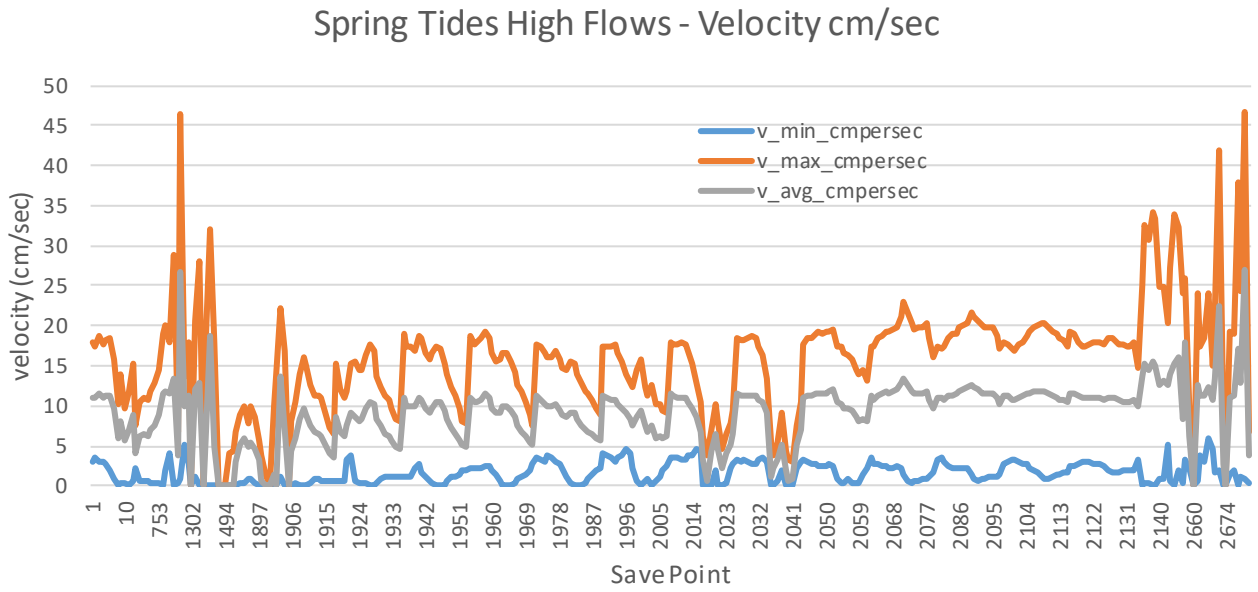
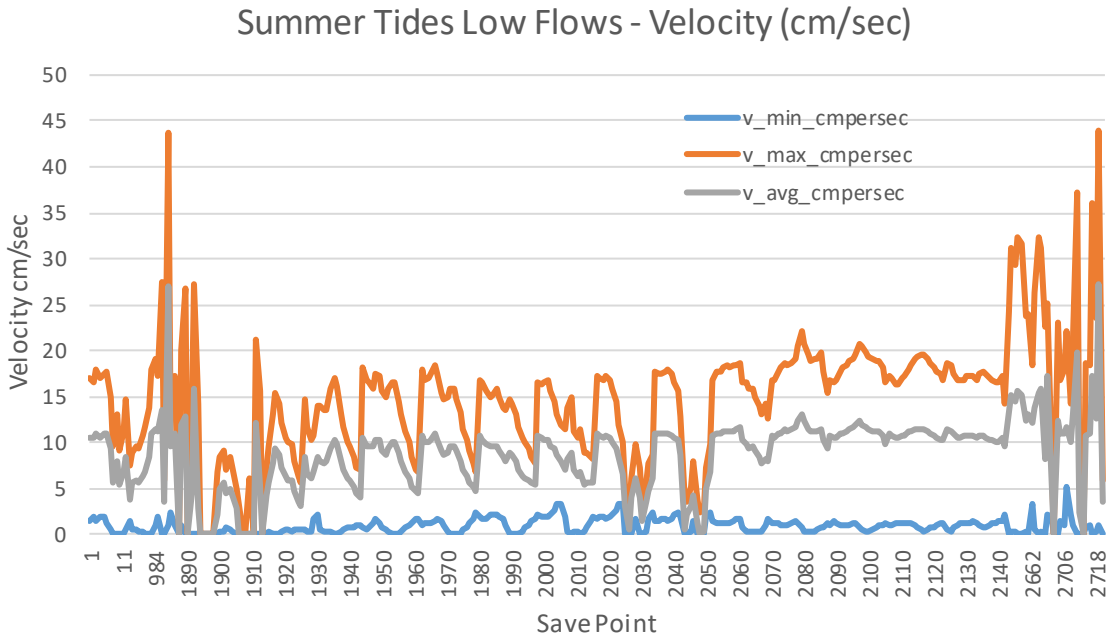
EXISTING CONDITIONS





- Spring High Tides - maximum ranges from 0 – 46.8 cm/s; avg ranges from 0 - 26.9 cm/s
- Summer Low Tides - maximum ranges from 0-44 cm/s; avg ranges from 0 – 27.2 cm/s

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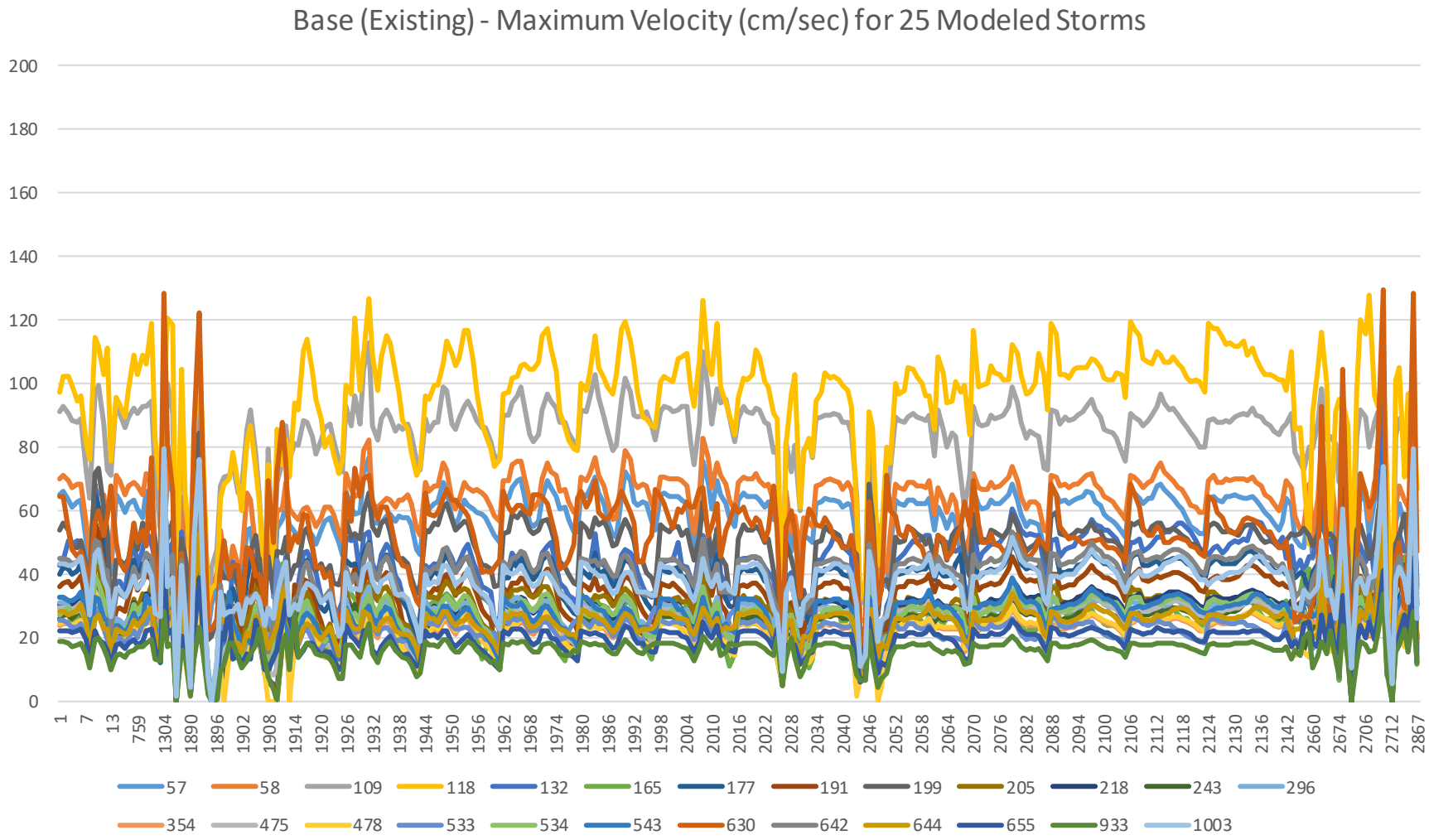

Maximum ranges from 33.6 – 129.3 cm/s; avg ranges from 16 – 95 cm/s

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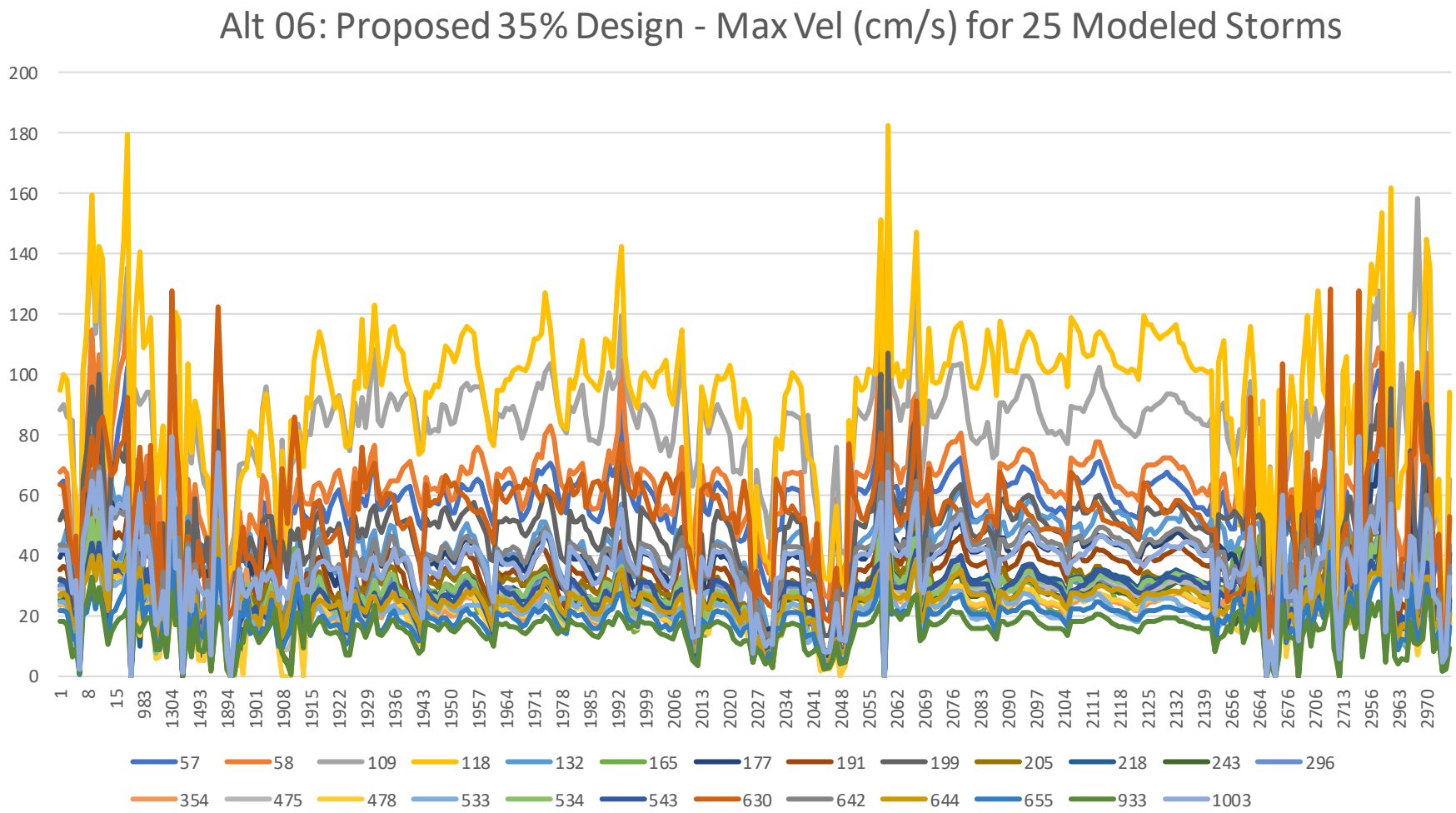

Maximum ranges from 34.1 – 182.6 cm/s; avg ranges from 16 – 93 cm/s

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MAXIMUM STORM VELOCITIES – SUMMARY COMPARISON

	Base (Existing Conditions) - all Save Points			*Alt 06 - all Save Points*			*Base (Existing Conditions) - Save Points in SAV*			*Alt 06 - Save Points in SAV*		
Storm	min	max	avg	min	max	avg	min	max	avg	min	max	avg
57	14.9	83.7	57.2	0	109.0	55.8	18.5	75.7	57.3	16.4	89.7	55.2
58	17.0	90.1	62.9	9.3	121.5	62.6	21.4	83.0	63.2	19.8	105.0	61.4
109	19.9	112.8	83.6	11.3	158.1	83.1	33.8	110.0	86.0	32.5	119.6	84.2
118	15.7	128.0	95.1	0	182.6	93.0	35.3	126.2	97.2	29.3	142.3	94.6
132	0	93.2	42.7	0	90.9	41.4	17.4	54.5	41.2	4.3	56.9	39.3
165	0	72.3	26.5	0	72.2	26.0	12.5	39.6	25.9	7.3	38.8	24.3
177	0	66.1	38.1	0	86.1	36.8	20.3	49.8	37.8	7.6	53.7	35.8
191	0	56.4	32.4	0	73.1	31.2	7.6	44.3	32.3	3.8	44.7	30.5
199	10.5	84.7	49.0	0	106.9	47.9	30.4	62.9	49.0	13.5	70.7	46.1
205	0	54.6	29.3	0	61.9	28.6	16.7	39.0	29.8	7.4	38.8	28.4
218	0	52.0	27.4	0	54.2	26.3	13.2	35.6	26.3	5.2	36.3	25.0
243	0	39.5	23.2	0	49.9	22.3	8.6	32.2	23.2	2.9	31.7	21.8
296	0	50.7	27.3	0	52.0	26.3	13.1	34.2	26.9	6.5	41.2	25.6
354	0	37.3	22.2	0	45.7	21.3	11.6	32.7	21.9	4.5	34.9	20.5
475	0	37.4	24.9	0	47.5	23.8	12.1	32.4	23.8	5.3	34.5	22.4
478	0	34.6	21.0	0	45.1	20.0	8.7	30.4	21.2	3.0	30.0	19.9
533	0	70.5	23.0	0	70.4	22.2	13.7	32.7	22.4	8.3	32.1	21.3
534	0	54.4	26.9	0	54.9	25.9	14.6	36.2	26.8	5.7	36.7	25.6
543	0	49.8	26.6	0	50.8	25.6	13.1	34.1	24.9	5.9	34.6	23.5
630	13.5	129.3	53.0	0	128.6	53.4	25.1	75.0	53.5	22.6	77.3	54.3
642	0	72.2	39.1	0	73.5	37.6	20.0	51.1	38.0	9.1	53.3	36.5
644	0	62.7	24.8	0	62.7	24.0	14.4	36.8	23.9	7.6	35.3	22.9
655	0	45.0	19.2	0	45.0	18.5	9.7	31.3	18.6	4.9	30.3	17.5
933	0	33.6	15.9	0	34.1	15.1	7.3	28.5	16.2	2.7	27.1	14.9
1003	0	79.7	37.1	0	79.4	36.1	20.6	45.0	35.5	10.7	55.3	34.0

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NaN	57	58	109	118	132	165	177	191	199	205	218	243	296	354	475	478	533	534	543	630	642	644	655	933	1003
759	62.89142	71.64121	95.27257	115.9166	46.51294	26.67856	43.74815	38.79725	56.65811	33.13741	31.72706	28.4406	30.0688	25.61328	28.87036	26.32222	23.45714	31.27692	29.12496	54.79658	44.82489	27.69421	20.47919	17.56093	41.6519
1897	46.43538	54.724	70.19179	63.92654	17.36837	24.36739	28.92671	7.505279	41.0323	31.68845	13.43079	9.045577	32.79805	28.72456	17.66699	8.398361	27.06972	19.19702	17.61176	39.77445	35.93834	29.87732	20.79125	10.6572	35.19248
1899	37.25477	42.38943	70.70193	68.89944	26.89169	21.73206	26.7476	24.64248	39.67867	35.11918	30.672	25.75076	24.08526	34.93389	21.18274	14.66574	26.50899	30.64537	28.65842	38.76026	26.74637	26.19457	26.5649	18.18702	26.3771
1900	42.98258	53.48446	76.15543	81.03954	46.83114	23.78974	37.39822	31.24715	45.87425	27.02919	22.69095	19.70738	22.00589	19.59245	19.15825	18.17118	18.81856	24.17118	20.6336	40.17292	28.98558	19.17842	13.77687	16.77835	29.45586
1901	39.79762	49.52294	71.67998	79.40159	39.44072	21.00187	31.65363	27.53255	41.38124	24.34679	21.14123	19.08937	20.0013	17.55169	19.98061	16.54603	16.24499	21.86313	22.57588	36.29861	32.72655	19.88268	15.62478	14.08578	32.54
1902	39.84532	46.80988	68.1511	66.2766	29.27919	18.58144	25.23841	21.83059	35.33059	19.27281	16.15121	14.13579	15.48395	14.05874	15.0809	13.00641	14.50691	17.25516	17.43709	29.56302	26.71618	16.52793	12.47992	10.84915	25.99742
1903	57.35225	66.58704	88.7676	87.19964	45.26579	24.89941	40.70865	26.76004	51.02316	27.11723	19.54374	15.96309	23.38744	17.22634	18.33299	15.1939	21.98704	22.32721	21.60681	50.12658	34.53141	22.78423	15.8313	13.04349	34.19437
1904	57.02736	63.98561	96.06378	93.61285	48.58842	30.31812	45.60094	33.35229	53.0998	29.1232	22.85992	17.68298	24.37758	21.73007	19.54694	17.81658	22.97043	23.97245	19.54345	48.44329	33.38003	21.2044	14.3736	14.4727	31.94997
1905	38.51449	48.08163	77.70403	77.95	46.16933	37.4145	42.75853	38.01792	53.14444	36.13438	27.46301	21.87718	29.16215	23.99778	21.71754	22.45856	30.14436	30.05176	22.55211	41.88052	34.75076	27.38883	25.39225	17.738	34.46723
1906	26.12927	33.2445	63.58514	64.43786	43.85749	38.82944	44.78538	32.55798	43.05629	31.6503	27.1422	19.34633	30.19248	28.71881	23.64447	19.88435	31.07942	30.63287	23.77447	37.09049	32.00575	24.36005	18.05706	22.18077	31.39593
1907	16.44245	19.796	32.49297	34.65716	20.5095	20.30163	20.67711	12.66519	30.12292	24.64854	14.05771	9.299892	20.7649	15.39465	13.82257	8.930777	23.23964	16.33373	13.79501	29.664	21.58981	23.24988	9.69957	13.55833	25.33014
1912	59.85071	65.27405	83.26009	81.34121	45.4269	34.88467	36.67879	24.87867	48.51488	34.78261	26.1342	21.99613	31.32079	21.43868	24.43211	21.92172	32.10045	27.15531	27.60349	73.80501	37.67251	30.92088	30.30881	21.12684	41.88584
1914	52.035	57.1794	80.9753	92.66754	35.04688	16.81318	32.97018	34.1815	39.26363	25.14164	25.50676	27.96891	24.81684	23.6745	26.55403	18.17827	22.60653	24.24129	23.68276	51.54822	31.6432	19.64173	17.32915	27.08877	28.47624
1915	50.76953	56.87454	80.24537	89.06518	35.44555	21.6532	31.73322	27.57344	40.11278	24.9405	21.48668	20.26388	21.57026	18.16579	18.87302	18.01251	17.308	22.93128	19.92431	48.86423	32.80741	17.9773	13.51717	13.81714	27.56125
1916	55.39829	62.90243	90.32569	104.527	46.36367	28.15836	42.13777	38.41623	50.85224	32.16081	28.54537	26.76265	27.67036	22.54129	24.88456	23.04392	21.60202	30.13019	26.23751	57.31277	41.8485	23.22408	16.35521	16.45851	34.47809
1917	57.52579	64.0578	92.57934	114.1408	48.49458	29.71492	45.32873	39.3277	54.9477	34.87092	32.53197	29.29756	30.59168	25.36709	28.39893	26.5095	22.80673	32.75992	28.49113	58.44717	45.60807	24.93988	19.52798	18.75258	37.86411
1918	55.2941	62.014	88.11376	109.1973	44.6661	24.81433	39.8138	37.07959	48.43902	31.20288	29.6664	26.46759	27.75355	23.32396	26.28578	24.46384	20.44722	29.26297	27.53649	48.0988	41.48114	24.8646	19.76513	17.36517	38.41104
1919	51.05602	57.73225	82.68403	103.2303	42.3565	22.56397	35.84879	32.50752	46.44382	27.38451	26.2391	23.553	24.64716	21.27717	23.5521	21.67973	18.24334	25.69353	25.84287	43.98951	38.52586	23.33986	18.28277	14.73326	37.6408
1920	55.90488	61.25407	85.5817	97.42197	35.36198	22.26466	33.81914	28.44497	48.6471	26.30989	23.4311	20.0122	23.69274	19.09326	21.88665	19.03049	18.97638	23.66616	22.4742	44.7636	36.13873	22.63612	16.24935	13.86487	35.15059
1921	60.17425	66.92857	91.14274	88.95733	33.90465	18.14226	30.16596	24.14944	47.74434	25.06546	21.0107	17.66769	22.26152	18.51993	19.92324	16.5539	20.16628	20.81059	23.10171	46.97016	35.33933	23.55744	16.90539	14.3447	35.80261
1922	61.71711	67.96783	93.01356	92.67192	34.97955	23.67227	33.62733	24.97056	50.39572	27.70406	20.47828	17.47366	23.39264	17.72621	19.48011	15.98194	24.46409	22.1841	23.1287	48.88836	36.83585	24.83362	17.16175	13.77982	35.65056
1923	56.81787	62.80693	87.7768	84.19539	28.43407	18.53777	26.88165	19.19398	43.49674	22.97009	16.81097	13.1862	18.33692	14.94438	15.55847	12.52789	20.57837	18.15278	18.78261	39.92472	30.75067	20.85869	14.23533	11.63394	29.41024
1924	51.17508	56.84688	80.15782	75.81631	29.62244	21.4217	26.3015	18.83789	40.21666	21.96358	14.78843	11.48918	16.39393	12.14706	12.85901	11.24086	16.98369	17.33613	14.36751	31.63346	22.67837	15.04676	10.67426	7.210805	22.14066
1925	47.22862	53.60947	74.70642	76.25367	32.3812	25.76924	28.96365	21.19078	41.59415	24.9255	16.81725	12.88028	18.69102	14.25621	14.92062	13.36726	19.14578	19.43852	13.71587	28.36057	21.72987	15.02427	11.46241	7.158914	22.96856
1926	64.27867	69.10606	90.74361	97.88293	47.68184	31.18179	40.53379	35.59003	52.81627	33.73187	28.82644	26.30216	31.5371	22.45366	25.85395	23.53313	26.57668	26.00602	28.72402	64.34359	40.8864	28.07815	23.30251	17.12241	38.97474
1927	58.41733	63.70994	82.79381	95.25584	44.8558	28.83685	37.79947	33.28317	45.91358	28.14621	25.92239	22.84945	25.84133	21.65122	22.73512	21.69167	22.47979	23.66032	25.48293	55.33958	35.84928	22.81707	19.43285	17.1527	33.43706
1928	58.84087	61.08235	92.52365	118.3113	45.74073	26.0939	37.82812	38.83863	48.91453	29.08365	24.47573	25.89987	25.39143	20.16519	21.96491	23.05261	20.67515	26.44838	23.10594	75.5978	38.51047	22.05101	18.41633	15.64865	33.20442
1929	56.15025	61.0808	82.6042	95.65138	35.59796	25.32514	32.39361	26.57923	46.24134	27.3465	21.46366	19.12216	24.63208	17.10547	19.16393	18.62249	21.132	22.90837	20.11643	62.44014	32.8606	21.33449	15.92585	12.94992	32.13364
1930	67.01777	72.82858	98.94651	105.8039	45.70037	30.52868	40.80191	33.65972	54.49502	32.38118	27.58127	23.40662	30.17285	22.50557	25.11874	22.98481	26.18064	27.63272	25.38179	67.73766	40.93769	26.43693	20.50069	17.73706	38.82203
1931	72.49765	76.67942	108.0227	123.0549	48.34567	30.36958	44.75905	38.21521	56.69558	35.39968	30.46322	27.11798	34.11834	28.19394	27.77297	24.45142	26.81241	31.47421	27.6521	70.45	45.44626	26.11131	21.22281	23.604	39.25257
1932	55.01941	58.58042	84.49583	106.6608	40.57392	27.49677	37.40555	32.07999	50.20852	31.95013	26.22549	22.90624	26.82011	20.04277	22.8478	21.22881	22.16695	27.82524	23.94887	62.20813	38.80051	22.58222	15.27569	14.28713	34.23221
1933	54.97463	59.52137	83.07372	96.65718	38.34205	26.22908	36.28029	31.30884	47.45533	30.22479	25.38862	22.35488	26.013	19.37896	21.96324	20.48751	20.6509	26.77622	23.15303	56.71941	36.77549	21.82897	14.38846	13.60648	32.4804
1934	57.12969	62.60564	89.81946	106.645	45.58793	29.28349	42.40867	38.09148	53.01075	34.35794	30.35029	27.76671	30.03615	23.21346	26.17568	24.98529	21.92762	31.51592	27.03661	60.62051	43.01144	24.55208	17.33381	15.89097	36.77298
1935	59.43844	64.92893	93.61025	114.5174	50.12009	30.70254	46.13957	41.58188	55.68091	36.34829	33.36818	30.82498	31.98308	26.17386	29.13889	27.99699	22.92127	33.97526	29.58334	60.56174	46.13098	25.77921	20.515	17.94901	38.45647
1936	59.943	64.47138	91.71045	115.8957	49.28781	29.35302	45.55832	41.35709	56.30975	35.56499	33.31218	30.73718	31.72579	26.31498	29.57742	27.80292	23.56755	33.50529	30.32882	58.43032	45.9276	27.53258	21.84205	18.62562	42.42787
1937	58.24198	64.50281	88.50776	109.395	42.36939	23.78371	40.18018	35.88468	50.7756	30.38261	28.98681	26.54441	27.56082	23.61202	26.39022	24.29794	21.21216	28.81359	25.94771	51.7366	40.90997	24.37055	18.66292	16.09256	37.33067
1938	61.38844	69.04533	92.41674	107.2769	41.32976	21.5169	39.12179	34.18786	51.20618	28.78063	27.83747	24.51288	27.24868	22.79209	25.77217	22.76958	21.08511	27.59056	25.41614	48.62543	39.501	25.28751	17.75721	15.65843	38.73373
1939	62.18985	70.24326	93.35556	97.91488	37.60484	23.40749	36.2991	28.83997	51.99465	28.21037	24.1712	20.10213	25.29536	19.72514	23.1426	19.2771	21.78396	25.09909	23.57853	50.08023	37.49488	24.86323	16.80387	14.38315	39.43089
1947	57.31385	61.12219	80.99625	95.88746	37.54471	25.97399	35.57454	31.55342	49.51741	29.06151	25.9493	22.45561	25.59657	18.87253	22.60623	20.467	20.885	25.45345	23.47035	58.48514	38.28587	22.37672	17.40686	15.28698	33.12276
1948	62.3598	65.94598	89.77637	102.1387	42.55152	28.83576	39.71279	34.6619	54.7716	32.76	28.90586	24.63735	28.37522	21.25244	25.30146	22.70477	24.03742	28.27488	26.15434	60.72841	42.77315	25.14825	19.4575	17.19612	37.54633
1949	60.89351	63.97524	89.42749	109.2051	43.99633	30.39983	41.14827	36.10806	55.67765	34.84316	29.64046	25.79874	29.84823	21.95067	25.65133	23.5256	24.33229	30.31428	26.69752	66.17195	43.72286	24.45545	19.34418	17.27099	38.15167
1950	54.01986	58.33144	83.29531	106.981	41.11039	29.90054	38.60812	32.62163	51.02899	32.97843	27.15693	23.24825	27.96391	20.10155	23.17986	21.5276	22.45934	28.91876	24.62222	62.65857	39.87957	23.26162	16.72089	15.15227	35.06329
1951	53.98225	58.61373	83.99197	103.9912	39.84973	28.23661	37.41223	32.74968	48.99501	31.75037	26.60776	23.19297	27.69161	19.92173	22.8279	21.32063	21.76318	28.31969	24.42221	64.2686	38.72756	23.06097	16.36852	14.50565	34.11949
1952	58.11981	64.32472	89.70037	107.4972	43.30147	28.53487	40.64279	36.08738	50.91964	33.35291	29.21115	26.24826	29.41186	22.32824	25.19137	23.8577	21.80286	30.79633	26.42473	61.00313	41.53263	24.0357	18.4281	15.75772	35.77017
1953	63.69683	69.40481	95.30132	113.0801	47.54898	29.58492	43.87057	40.16866	53.51633	35.1332	32.23475	29.89454	31.11318	25.27289	28.01025	26.74241	22.13596	33.13804	29.07915	60.4872	44.99136	26.04206	20.93803	17.74224	40.00215
1954	61.52413	67.29802	96.89085	116.0712	50.54697	30.09515	45.55663	41.7479	55.18124	35.53588	33.61291	31.00103	31.46964	26.54986	29.48121	28.00903	23.21544	33.66303	30.85986	58.98219	46.36423	28.31057	22.23786	19.00215	43.29952
1955	61.85772	67.755	94.54698	115.0571	46.9218	26.86716	44.08522	39.09113	56.30359	33.55112	32.01023	28.75447	30.23928	25.56959	28.77172	26.39036	23.17983	31.92571	29.02776	55.63109	44.65868	26.87652	20.61939	17.8648	40.28866
1956	63.97101	74.27229	95.8386	113.7771	46.665	26.06195	44.17877	38.83886	57.53874	32.7548	31.46809	28.38611	29.95662	26.23193	29.25075	26.38878	23.69276	31.10714	28.73452	54.45296	44.68767	28.50763	20.22406	17.17906	43.13189
1957	65.4575	75.96364	96.14744	103.001	42.07898	21.11153	39.8266	34.38279	53.25206	29.06447	28.27295	24.78113	27.2986	23.62837	26.67693	23.37532	23.71559	27.67208	26.9835	54.05079	40.68499	27.57678	19.01191	15.53086	41.70118
1958	63.91735	74.38185	95.72347	97.46295	39.88846	22.45881	37.04009	30.92998	50.94355	27.4409	25.78973	22.02538	25.27379	21.3999	24.75752	20.88416	23.54815	25.01625	25.05273	55.10021	37.44523	26.05249	17.79063	14.1779	39.36894
1967	57.16279	60.595	84.42239	102.3602	40.21395	27.10018	38.34208	33.62366	50.94782	32.11388	28.30009	23.78155	28.34211	20.71608	24.81294	21.8594	21.06581	28.28603	25.45727	62.83449	41.67046	22.5909	18.29441	15.923	35.02251
1968	51.89737	55.27443	78.55035	101.7776	37.22779	26.55201	35.09386	30.07096	47.33895	30.35299	25.35668	21.37588	26.4533	18.28584	21.74171	19.72301	20.38444	26.60577	23.03076	62.13876	37.97293	21.59171	16.23286	14.33695	32.56756
1969	53.59228	57.60962	81.7967	101.2109	36.93466	25.94321	34.88568	30.29783	46.55992	30.14305	25.27319	21.74702	26.58473	18.45393	21.55575	20.04584	20.92753	27.20027	23.25157	65.21628	37.57262	22.31819	16.92826	14.11897	32.68779
1970	55.6526	61.489	86.2466	104.0785	40.50062	26.72756	37.97286	34.25083	48.42908	31.84649	27.89812	24.88091	28.54147	21.12508	24.12289	22.72918	21.78272	29.66572	25.47739	63.3216	40.55723	23.71433	19.08556	15.41275	34.7923
1971	64.35226	70.45509	92.92495	111.7614	47.1796	27.9765	42.60001	38.5439	52.01501	34.06597	31.30071	28.39957	30.69331	24.19453	27.2101	25.76041	23.84931	32.34411	28.68121	63.4482	44.10367	25.98629	22.08234	17.62796	39.48668
1972	68.48072	73.81403	97.21792	112.1154	47.73651	28.3592	44.12019	40.55382	52.75509	34.23786	32.65994	30.12552	30.70308	26.01517	28.73965	27.28086	22.74419	32.9506	29.08875	60.20191	45.22036	26.91282	21.28788	18.04018	40.64001
1973	67.15839	72.34378	95.23208	113.6852	51.01182	30.24781	46.89685	42.29816	56.87355	35.3196	33.64494	31.6902	31.54778	27.82547	30.7394	28.69761	24.47821	33.32012	30.0613	58.11826	46.42432	27.88761	21.79068	18.3114	41.53709
1974	68.85416	79.85548	100.3912	127.0765	51.14714	30.00562	48.40245	41.81409	62.70918	36.57169	34.47031	30.45267	32.95645	28.20258	31.76559	28.3657	26.71995	33.84918	32.41542	62.3233	49.60773	31.53833	23.55317	19.90241	47.61578
1975	70.38548	83.06753	103.7578	115.4682	46.44222	24.82026	43.9084	37.38614	58.87367	32.54325	30.90854	26.85775	31.79881	25.78546	29.15106	25.34997	25.90185	30.32996	29.92904	61.39335	45.04033	30.30867	21.96322	18.34048	45.71583
1976	68.29414	79.06639	97.69581	101.6322	41.79387	20.57727	38.46421	32.47297	52.7469	28.13296	26.53611	23.21111	27.80291	22.41282	25.4108	21.84063	24.24753	25.79543	27.35853	59.806	38.75739	27.44626	19.23188	15.99698	40.77874
1983	67.0172	70.84915	96.27273	111.2706	44.44026	30.14391	39.83	33.88113	53.00741	31.44377	28.15476	24.16963	28.67977	22.41132	25.96433	22.50815	25.72538	27.55327	27.29874	66.94174	41.61062	25.79129	20.30284	17.01031	37.87191
1984	59.49227	62.36954	85.96696	100.1984	39.19488	25.54249	36.52218	31.60853	48.85284	29.34804	26.57745	22.5218	25.7456	20.61651	24.31371	20.86574	21.98504	25.88576	25.52978	55.79858	39.13247	23.26966	18.6334	15.70042	35.4335
1985	53.64903	56.42311	78.36848	98.48635	37.79816	24.98433	35.81071	31.47088	47.49952	29.63666	26.42151	22.2162	26.22659	19.90294	23.50991	20.43113	20.51334	26.43857	24.03951	60.1783	39.18388	21.58331	16.75597	14.87961	33.05089
1986	52.43251	55.24201	78.01278	97.09127	34.57413	24.51307	33.08318	28.78654	44.24682	28.12628	24.66646	20.45837	25.20488	18.11174	21.41538	18.8674	19.31458	25.3724	22.03332	64.3633	36.71692	20.38282	15.95643	13.59778	30.69124
1987	50.99628	55.60554	76.88808	94.67892	35.18094	21.06697	31.4874	27.24975	41.87729	27.23218	23.85629	19.64598	24.91412	16.91124	20.93067	18.07241	18.9466	25.07978	22.31489	64.98056	35.50054	20.67826	15.95342	12.94806	31.0836
1988	54.83073	61.40004	82.92423	99.90263	39.69786	21.4695	33.75123	30.07771	43.41958	28.88938	25.67476	21.74299	26.59345	18.85236	22.76217	20.08111	20.02512	27.09929	24.52232	61.96906	38.53105	22.10248	17.54112	14.44669	33.97468
1989	62.87522	68.3041	93.66261	111.72	46.92964	24.63523	39.62044	35.67506	48.48893	32.39052	29.56607	25.96054	29.55594	22.7074	26.16718	23.90274	21.59389	30.84002	28.15883	64.03639	42.43942	25.79932	20.37023	17.37508	39.41002
1990	70.12163	74.83575	100.3718	110.9387	44.82053	25.42229	40.32465	36.36117	48.14252	31.80303	29.61651	26.62166	28.83261	23.26813	26.52765	24.22682	23.19041	30.50708	27.04827	59.81475	42.3534	25.1064	21.6642	18.06739	38.11234
1991	66.49951	70.77441	95.39446	102.6818	43.60208	24.91743	38.98595	35.50189	46.17076	29.04626	28.44529	26.54188	28.9809	23.18696	25.59079	23.74575	22.86442	28.28659	25.74756	49.97034	39.50529	24.23483	22.08773	16.91876	35.48881
1992	70.65965	81.04268	99.04005	131.4566	52.84332	32.91182	49.25697	42.4619	63.99095	37.05086	35.35629	30.81432	37.40234	28.89307	32.44189	28.67833	30.80619	34.62988	33.70035	71.8187	51.39487	32.56306	27.20723	21.16696	49.67399
1993	89.73977	104.9774	119.5661	142.3184	56.92381	31.8855	53.66468	44.73183	70.74878	38.82873	36.26678	31.7378	41.22431	30.88539	34.53836	29.97128	31.36609	36.66821	34.63605	77.34121	53.27332	35.27449	27.53393	19.84741	55.31404
1994	71.61232	83.27677	102.2896	106.5412	43.05911	22.36814	40.4972	34.22067	55.38439	28.84278	27.92826	24.86105	31.13418	24.1407	27.3518	23.3751	25.62542	27.48705	29.00948	65.26131	41.06114	29.23805	21.6502	17.88456	43.36705
2002	56.8412	60.49803	79.68814	100.7638	39.49554	25.82701	36.90373	32.19699	48.46047	29.69624	27.08283	22.87922	26.4789	20.85164	24.26867	21.03175	21.95976	26.93774	24.92692	56.68363	39.68142	23.0087	17.92625	15.3498	34.43518
2003	51.58759	53.74177	74.86036	101.1518	36.43379	23.17448	33.98279	29.77945	45.00846	27.47026	24.94694	21.16646	24.30827	19.18723	22.48595	19.4301	19.71702	24.61349	23.75759	62.97398	36.68887	21.40595	16.05132	13.96569	32.62655
2004	53.39135	56.3335	78.82778	104.9784	35.93924	25.64193	32.71407	28.48228	43.38741	27.1567	23.60724	20.42187	23.96558	18.14025	21.01224	18.59714	20.96025	24.60294	21.4304	67.15151	35.35946	21.37248	16.70254	13.5036	30.1104
2005	49.03366	53.93397	72.94885	93.74124	34.44346	21.37547	29.99209	26.03274	39.78664	27.11415	22.40197	18.85217	23.74166	16.73923	19.6845	17.28863	19.81116	24.01391	20.61001	65.35685	33.81404	21.31733	15.36607	12.69124	29.37706
2006	47.31623	53.53594	77.68343	89.95406	37.45763	16.46699	32.25146	26.43888	38.723	25.67349	24.05505	18.82463	24.57677	16.75271	21.1	17.31761	18.70003	24.84382	22.4898	60.46513	36.10452	21.08524	15.92324	12.26515	32.12004
2007	56.28925	61.15142	88.6553	101.0659	48.21704	18.97365	38.78898	33.87841	44.99633	30.14495	28.41603	24.47226	28.54612	21.41138	25.27334	22.289	21.61113	29.52025	27.54853	65.07792	41.25964	24.77209	19.47877	15.66103	39.46548
2008	71.94456	75.8703	105.8024	114.7332	48.36134	23.88913	43.76338	39.02785	49.51882	33.03975	31.7808	27.62916	30.65778	24.28052	28.15612	25.27527	23.1221	32.63395	28.47941	66.99342	45.57076	27.21512	21.16882	18.42345	41.93087
2009	62.11311	64.71128	89.3735	82.31935	35.97584	18.09579	31.0119	29.15504	34.17602	22.6571	22.47715	20.13482	20.82436	17.10339	19.38743	18.37269	16.75179	23.03188	19.40871	43.79953	31.63466	18.96029	15.86317	13.58514	28.81787
2010	47.0865	50.41447	72.80878	58.36158	26.00956	12.50714	21.53662	20.17271	26.72903	15.53652	15.37899	14.49572	16.91751	13.54318	14.04746	12.82697	15.24889	14.62056	15.08444	42.10416	21.83848	14.09229	12.72496	9.801887	21.06036
2011	37.01287	40.9256	62.97489	29.25547	13.34643	8.24918	10.73957	6.801265	13.54914	8.746413	5.812949	5.87759	9.627897	8.874543	6.169411	5.402982	10.26801	7.614418	7.115557	35.91958	11.11641	8.222092	5.845277	5.312432	12.68151
2012	46.75937	60.72975	71.15753	40.25438	12.33753	11.16624	11.35671	7.988544	16.20698	7.55537	6.080868	4.519616	6.497813	5.109175	5.986524	4.767896	9.089133	6.656114	7.340195	27.55595	11.55615	8.562492	5.104621	3.127754	13.61954
2013	61.98914	69.72796	91.67315	95.7054	39.04012	23.2733	35.244	30.16603	46.84439	24.51851	24.18105	22.71922	24.17281	22.06467	24.26771	20.88368	24.09697	22.73104	25.86665	61.93532	34.60757	26.37148	18.75678	14.67226	39.55551
2022	45.68226	46.08322	68.4753	86.00874	36.06747	18.7195	30.88736	26.52292	39.53842	24.34926	22.67093	18.44284	21.73953	16.25206	20.65058	16.6744	15.38882	22.29188	22.70361	47.43804	34.85268	20.18658	15.39033	11.24084	31.67941
2023	44.48038	48.57923	67.10506	82.26113	29.57682	18.17541	27.16604	24.1412	35.72046	21.96464	19.75544	16.77387	20.28647	15.16324	17.69435	15.44275	16.83363	20.39159	18.1238	57.39775	30.13017	17.53201	13.37835	10.73222	25.40145
2024	45.47829	50.92271	75.72202	92.01926	37.34444	18.77722	32.25459	24.08983	36.01776	23.76825	22.25155	17.72636	22.9827	16.63677	19.02154	15.48056	19.07623	22.56573	20.81533	64.73015	32.74269	21.65669	15.84843	11.67249	30.45784
2025	50.28032	54.96318	79.28606	86.51077	32.03766	11.05799	27.54802	20.44927	31.54752	20.22252	17.58617	15.09896	22.6056	13.79461	15.79111	13.10194	16.81224	17.82489	17.84117	51.63225	27.00452	16.92032	17.1949	11.78911	27.34341
2027	46.85438	47.65436	68.19218	62.9019	26.85466	15.14648	24.05315	21.16331	24.99022	16.51965	16.69375	13.82039	14.60002	13.2791	14.31526	13.40055	11.58424	17.29666	14.63437	34.43266	24.36534	13.34437	8.710561	9.258324	20.66771
2028	36.6237	41.44147	60.03357	48.78173	26.39665	14.32486	18.76421	19.85364	19.46963	12.3573	12.91259	15.22603	10.31573	10.37612	10.99285	11.85761	10.58491	12.45281	10.87792	27.25313	18.70898	11.24058	7.971432	7.800129	15.0778
2031	35.45544	55.63132	57.77804	31.76916	4.265032	7.274947	7.581753	3.764753	14.68411	7.353557	5.164772	2.882323	8.234493	4.541559	5.341564	2.973713	8.255698	5.686876	5.932656	22.56814	9.096107	7.609809	4.889713	2.728697	10.7188
2041	40.62551	45.00761	62.41577	69.82415	37.17924	13.87973	28.71192	24.43549	33.25727	19.41121	19.56101	16.71183	17.20581	13.59824	18.4333	14.06291	12.73428	18.55305	21.42162	34.79409	31.21431	18.63381	13.87529	8.312906	30.54993
2042	29.58667	44.34549	54.33547	59.30683	29.15694	26.87418	26.83466	18.16398	30.74951	19.65226	16.36958	13.25376	17.22412	15.99766	12.33758	10.03563	17.30319	15.71331	13.78392	50.81205	24.91052	14.28385	8.768967	9.559788	23.17141
2142	26.27688	33.22907	41.12843	42.46023	26.7935	25.50717	19.58562	14.25309	30.6708	19.77642	12.23008	10.19946	13.94356	15.40126	9.953243	7.851471	17.46409	13.34423	11.07343	49.06889	21.86032	15.01438	8.799915	8.205658	20.52958

Alternative 6 - Data table of max velocities (cm/s) at each save point (row) in SAV habitat for each storm (column)

- Yellow = velocity >50
- Orange = velocity > 80
- Red = velocity > 100

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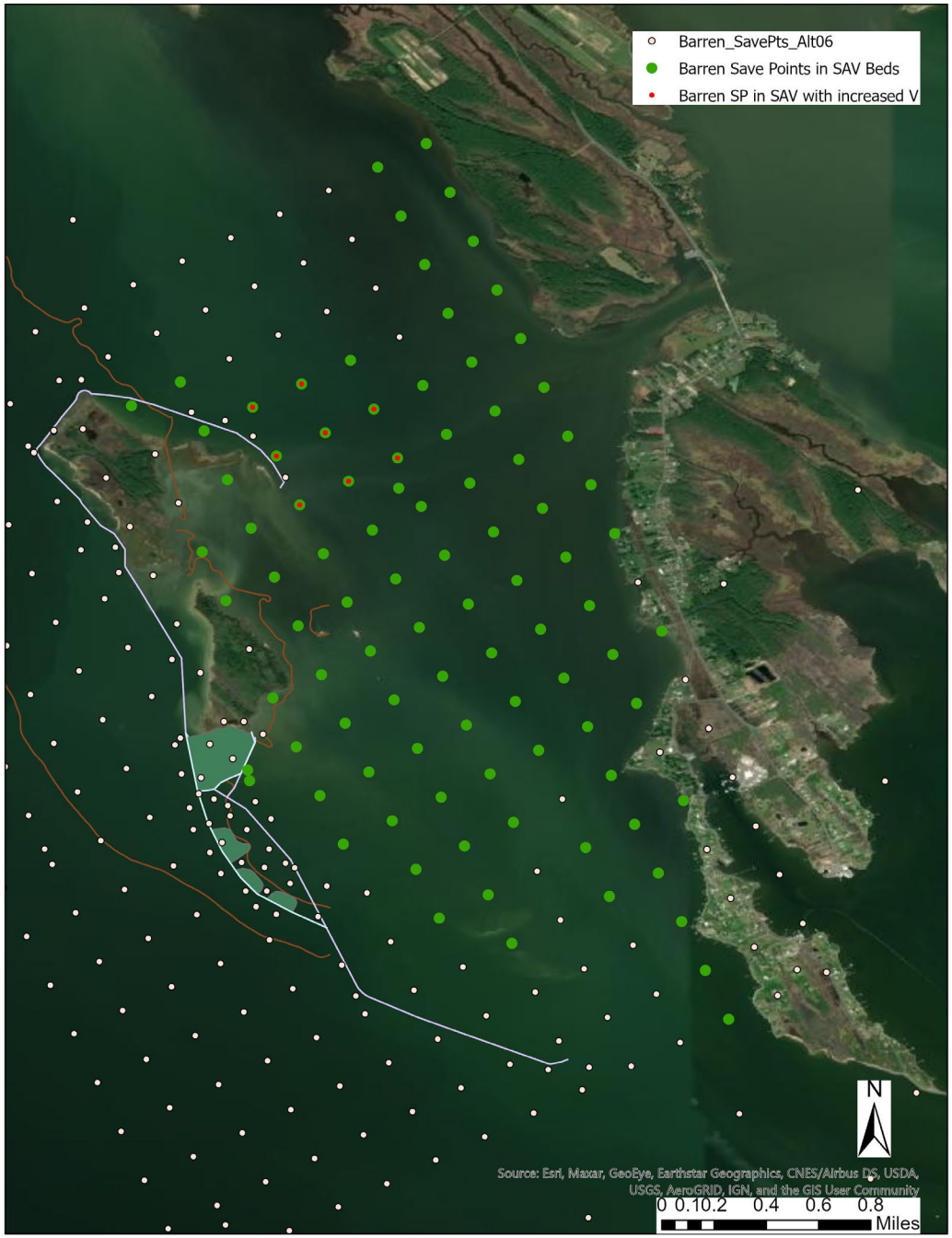
NaN	57	58	109	118	132	165	177	191	199	205	218	243	296	354	475	478	533	534	543	630	642	644	655	933	1003
759	2.254635	4.024145	4.803944	13.22209	4.469353	4.683246	4.737683	4.104555	8.753629	4.353054	3.752924	3.084619	2.86467	3.532542	3.961928	3.409187	3.344755	3.257779	4.160858	4.677307	6.012242	3.763853	2.795857	0.500049	6.092871
1897	1.577905	0.808456	2.706945	0.241317	-0.07495	-1.71742	3.230831	-0.11331	-0.61347	0.159455	0.274393	-0.01518	0.036265	0.25336	3.610057	-1.37647	-0.53208	0.148992	0.333306	-1.98174	-0.43843	-1.45967	-0.84529	0.685033	0.874495
1899	-0.89847	1.203778	-0.41846	-1.0285	0.407755	-0.08058	-0.0526	-0.08362	0.923269	1.518734	0.35909	-0.28154	-1.35202	3.1162	-4.61542	0.344678	-1.29184	2.050632	-5.45153	-0.14796	-1.15577	-1.76674	-3.58915	-0.05503	-1.61966
1900	2.274072	4.583508	1.594348	2.969095	3.039906	1.109287	1.719158	1.080421	3.055092	1.552915	1.1208	1.086047	1.36754	-1.16947	0.289473	0.771807	0.714958	-1.06737	-3.59903	-2.47602	1.302313	0.453274	0.463291	-1.47586	1.319728
1901	3.920043	6.632403	6.25753	11.02205	2.486079	2.928927	1.921839	2.268986	5.100182	2.54264	1.177017	1.083753	2.575322	0.331481	1.22497	0.934665	1.871851	2.603217	1.457853	-6.26501	2.231471	1.566371	1.355661	0.243324	2.248503
1902	2.85167	3.205446	0.724585	6.139277	2.197812	2.384716	2.472991	1.641441	4.214379	2.594831	1.044401	1.27893	2.405298	0.35102	1.044536	1.489436	0.827815	2.649222	1.40778	1.104069	1.745765	1.325198	1.111547	0.22696	1.848981
1903	3.369892	1.20459	3.238179	5.437314	2.387752	1.391932	2.380975	1.474787	2.855932	1.237808	0.986537	0.874229	1.56341	0.855492	1.174597	1.303602	2.463053	1.989075	1.407218	2.098893	1.911373	1.473985	1.105977	0.414852	2.053724
1904	2.647867	0.709903	4.166008	7.055407	1.788253	0.957486	1.941628	-0.6099	6.021071	1.542141	1.268597	0.826759	1.687209	1.715462	1.702196	0.889903	1.820661	1.570948	1.25595	1.230186	0.686474	0.949237	1.026813	-0.27543	1.041135
1905	-1.1223	0.346103	0.157126	5.100376	1.129506	0.040519	0.964488	-6.27246	1.160605	0.416862	0.308469	0.274064	0.837877	-1.13207	0.776953	0.221229	1.048401	0.341605	1.132117	2.739828	0.810651	0.651162	0.134753	-0.09277	0.589103
1906	-3.04833	-1.10909	-1.04496	2.138621	0.614716	-0.72334	-0.387	1.498387	0.265696	-0.51613	0.140759	0.276311	0.483167	-3.9473	-1.39112	0.165626	0.566397	0.114592	0.297697	-3.05125	0.909428	-1.28943	-2.87643	-0.49627	0.013829
1907	-2.09521	-1.56594	-1.31678	-0.59559	1.878823	1.248769	0.41539	0.582363	-0.25507	0.715564	0.365442	0.731548	0.201622	-0.35768	0.587649	0.230057	0.874011	0.70234	0.675456	-0.93131	1.572578	0.917476	-0.04746	0.178272	1.788465
1912	-2.40875	-3.59619	-3.54709	-0.90538	-0.30331	-0.35328	-1.30171	-1.55493	-3.01395	-1.18287	-0.67079	-2.55892	0.097399	-2.70854	-1.79494	-8.49554	-0.57262	-1.32392	-1.56263	-1.15107	-3.34183	-5.91393	-1.03061	0.005727	-1.7602
1914	-1.21994	-1.06568	-0.35667	-1.25103	1.056174	1.565751	-0.90599	-2.51303	-3.50999	-0.58468	0.1052	-4.21464	-0.08896	-1.91218	-0.34265	0.273943	-1.11561	-1.09068	-1.5998	-0.82883	-0.75622	-0.26091	-1.82853	-1.43171	-1.86339
1915	-0.25807	-0.30233	-0.51896	-2.35019	-0.96906	0.030016	-1.09549	-0.77801	-2.38057	-0.41635	0.037667	-0.40002	-0.20095	-0.09516	-0.01299	-0.22531	-0.46776	-0.25164	-0.38547	-1.06237	-0.44867	-0.21918	-0.4954	0.025094	-1.06058
1916	2.36232	2.402654	1.977567	-5.89962	-0.34763	-0.39958	-0.18434	0.203094	-1.69827	-0.23925	0.096543	0.215546	-0.07669	0.074445	0.108968	-0.06946	-0.57491	-0.16035	-0.12725	-1.39277	0.133106	-0.08098	0.164766	0.061031	-0.64442
1917	3.272114	2.903661	4.56462	0.378401	1.099694	-0.32946	1.168497	1.371253	0.540528	0.62774	1.343746	1.191802	1.385291	1.249681	1.395499	1.168064	0.269222	0.984069	1.062936	0.236113	1.619795	0.377909	1.263831	0.520977	0.983967
1918	3.294475	4.554452	5.021229	5.082769	2.151104	1.361388	3.041224	2.985704	0.203739	1.529841	2.478018	2.375748	2.054183	1.477854	2.769429	2.375246	1.256549	2.034065	1.686342	-0.94411	3.843351	1.738942	1.474156	0.318729	2.445944
1919	1.756333	2.62531	4.707193	8.38748	1.844599	2.984797	2.351849	3.400697	5.28254	2.974953	2.896476	2.449806	2.418841	2.420168	2.239322	2.455824	2.117413	2.267764	1.957613	1.782926	2.933584	2.063434	1.783864	0.030396	2.811822
1920	2.091642	3.632922	3.439638	8.489611	2.667685	4.018421	4.218582	3.54425	5.348291	2.97286	3.109736	2.673968	2.543434	1.126097	3.100855	2.718716	2.356145	2.752105	2.344559	2.448349	4.148409	3.242195	1.760237	-0.37633	4.218793
1921	3.759676	5.612841	5.296825	9.208895	1.87906	4.265258	1.665791	3.410869	7.390616	3.925008	2.096918	2.49697	2.817027	0.050713	2.230978	2.8849	2.185384	2.087005	2.277101	8.369144	2.809514	2.269894	1.669953	0.010467	3.736945
1922	4.060185	6.985075	5.588162	9.606433	3.861594	3.267414	2.557759	3.890982	7.407244	3.19684	0.871608	2.331505	2.957791	0.405128	1.738152	2.139085	1.773423	1.58197	2.103457	8.386111	2.100539	1.465688	1.537954	0.341823	1.609896
1923	2.593341	3.909734	5.481327	6.590576	3.09804	2.84653	1.423125	1.989215	6.125339	2.830269	0.629771	0.884868	1.179686	0.256711	1.052892	1.330709	1.072662	0.896088	1.574978	9.649496	1.549715	0.866802	1.145571	0.106843	1.039963
1924	1.313832	3.656921	4.411405	3.927705	1.593764	1.068533	1.884413	0.120197	3.528925	1.447253	1.024714	0.596695	1.066156	0.542679	0.713674	0.542354	1.417711	1.192539	0.867805	6.498363	1.284086	0.686246	0.744474	-0.09726	1.581875
1925	1.024134	3.113221	2.539842	0.713558	0.99659	0.334795	0.690678	0.695148	1.353009	1.048605	0.189263	0.216681	0.708642	0.323256	0.185406	0.202158	0.936466	0.481784	-0.38583	0.804658	0.542634	0.221479	0.419189	-0.2352	0.475546
1926	-1.69588	-2.2763	-2.22104	-1.45874	-3.98288	-3.22844	-3.89046	-3.47132	-4.38358	-0.56262	-3.57	-3.84806	-0.81513	-2.88925	-2.38482	-2.71226	-0.792	-2.41393	-0.85139	-1.20991	-1.39725	-0.85475	-0.72205	-0.50351	-1.63557
1927	-2.4571	-3.10527	-3.68256	-1.44991	-5.71314	-5.23536	-4.96431	-4.56553	-5.83076	-1.40906	-2.66695	-3.7006	-0.72201	-2.54058	-2.72197	-3.49659	-0.61513	-2.33777	-0.81158	-1.1591	-1.53249	-0.85019	-0.79546	-0.58298	-1.58927
1928	-0.21254	-3.34539	-3.50305	-2.37075	-6.45338	-5.90083	-5.36742	-2.63013	-3.75552	-0.56425	-1.79038	-4.64388	-1.42777	-1.34903	-1.38825	-2.61651	-1.0243	-1.27022	-0.92783	2.264675	-1.66633	-0.91422	-1.09419	-0.61564	-2.26476
1929	-3.43809	-4.36521	-4.83918	-1.89866	-3.53073	-2.79105	-3.27679	-2.33217	-4.65894	-1.37471	-2.56732	-1.71033	-1.69311	-1.89478	-2.42777	-1.59092	-0.76334	-1.9687	-2.59865	-1.73784	-3.43042	-1.14182	-1.00514	-0.85753	-2.6135
1930	-4.64293	-6.256	-5.28848	-3.1961	-6.48529	-4.65645	-5.9784	-3.32387	-5.07471	-2.46658	-2.09163	-1.82276	-2.58309	-1.52252	-1.99113	-1.53604	-1.16199	-2.0611	-2.3797	-2.46365	-3.04502	-1.82062	-1.59954	-0.91509	-2.71053
1931	-4.13778	-5.56133	-4.73724	-3.61367	-5.17732	-5.30905	-5.047	-2.71151	-8.99997	-1.97268	-2.7903	-2.98608	-2.04106	-0.54473	-1.56347	-2.79131	-1.81909	-2.02505	-2.16135	-0.38186	-3.68436	-1.02847	-1.49571	-0.59655	-3.90726
1932	-1.15516	-3.22653	-2.25856	-2.30926	-2.78614	-2.6842	-3.55794	-2.0501	-4.93088	-1.98639	-1.80116	-1.12562	-1.363	-1.67892	-2.24179	-1.34624	-1.13856	-1.4999	-1.83486	-1.25848	-2.70297	-0.95095	-0.72054	-0.7956	-3.43281
1933	-1.21956	-1.69187	0.826274	-1.31946	-1.8585	-1.53844	-2.00012	-0.64814	-4.45084	-1.29447	-0.89698	-0.48004	-0.61458	-0.70998	-1.19069	-0.41923	-0.47188	-0.74603	-0.89203	-0.61998	-1.74454	-0.57853	0.004331	1.248501	-1.76927
1934	1.133347	0.298535	1.17591	-1.69863	-0.61038	-0.97394	-1.01545	-0.08175	-3.23569	-0.74711	-0.33975	0.323115	-0.5494	-0.34822	-0.45425	0.011911	-0.59013	-0.24547	-0.52625	-0.23475	-0.4904	-0.54325	0.250825	0.69625	-1.00202
1935	1.349768	1.244236	1.954519	-0.44773	0.938511	0.351826	0.078925	0.956197	-1.33842	0.061379	0.817667	1.154087	0.500575	0.616344	0.671652	0.870908	-0.47172	0.643104	0.375047	-0.28643	0.863883	-0.10085	1.10975	0.169089	-0.40491
1936	1.329948	1.17838	2.173305	2.966389	1.729191	1.24211	2.295353	2.23648	2.926626	1.709808	1.889419	1.753301	2.008132	1.780039	2.038493	1.701234	1.335739	1.812903	1.698231	1.268682	2.61007	1.662689	1.481393	-0.07368	2.367323
1937	1.819531	3.327288	3.517392	5.929513	2.923226	3.014107	3.002981	2.429449	5.055532	2.824766	2.398152	1.894084	2.264712	2.243974	2.401936	2.019156	2.224667	2.160564	2.325864	2.958232	3.641499	2.307532	1.781999	0.297226	3.434867
1938	3.315638	5.74907	5.893427	10.07724	3.871159	4.897336	4.440575	3.754027	6.757418	3.1682	3.416767	2.687711	2.386187	3.233716	3.393302	2.849452	1.871124	2.89543	3.428696	3.891054	4.963829	3.877935	2.27961	0.680536	5.411061
1939	4.69125	7.149035	7.745897	9.45767	4.615615	4.441142	4.609375	3.839007	6.982482	3.997916	3.44362	2.82018	2.472911	2.227317	3.504281	2.906591	2.79772	2.914291	3.274306	7.420401	4.895263	3.914927	2.224355	0.623758	5.450739
1947	-5.16219	-6.8122	-7.00307	-3.72945	-4.99705	-4.38175	-4.11269	-3.30523	-5.81045	-2.97915	-2.85586	-2.81252	-3.20783	-2.5632	-2.93285	-2.35817	-2.78157	-2.38105	-2.69736	-0.85098	-3.4958	-2.81986	-2.36741	-1.76539	-4.13563
1948	-6.25539	-8.77139	-8.82612	-4.05573	-3.95649	-3.90243	-4.92534	-4.20584	-6.30808	-3.36957	-3.41277	-3.11316	-3.78622	-3.6336	-3.88895	-3.28774	-2.74464	-3.17181	-3.94467	-3.13381	-4.71581	-3.31352	-2.86244	-2.03022	-5.08528
1949	-5.46856	-8.74955	-8.31843	-4.28168	-4.31919	-3.65058	-4.74089	-4.05804	-6.56271	-2.94036	-3.43658	-3.22187	-2.75515	-3.57587	-3.78093	-3.18728	-2.96057	-2.88689	-3.38258	-0.47286	-4.54138	-3.60195	-2.87261	-2.1133	-4.82607
1950	-3.44251	-4.90243	-4.17893	-2.42327	-4.07949	-2.19933	-4.21283	-3.13884	-5.95988	-2.43437	-2.82606	-2.52145	-1.97945	-2.7735	-3.20237	-2.31271	-1.2604	-1.96023	-2.41691	-0.56002	-3.45972	-1.44682	-1.72949	-1.46466	-4.134
1951	-1.29693	-2.16986	-1.69543	-1.75724	-1.64611	-1.82851	-2.82481	-0.65717	-4.96759	-1.82401	-1.37409	-0.6097	-0.90604	-1.11058	-1.55249	-0.71733	-0.79822	-1.0554	-1.14035	0.997817	-2.0361	-0.75331	-0.63602	-0.75385	-2.56898
1952	0.453505	0.894637	1.05499	-0.21413	-0.70567	-1.44996	-1.42409	-0.18364	-4.21221	-1.29831	-0.72038	0.068643	-0.53934	-0.6526	-0.89295	-0.06071	-0.7482	-0.40409	-0.67341	-0.37552	-0.97244	-0.73138	0.300523	0.120694	-1.83049
1953	0.66892	0.758707	2.618693	-3.31588	-0.33424	-0.60004	-0.84573	0.107507	-3.00417	-0.50543	-0.01581	0.431465	0.243205	-0.36251	-0.03852	0.005651	-1.04942	0.131708	0.486135	0.450267	0.094429	0.439061	0.839964	0.210645	0.963783
1954	-0.27105	0.172388	2.730344	-0.37067	1.346493	0.76762	0.703801	0.922781	-0.6243	0.475721	0.903974	0.87041	0.427962	0.703331	0.785682	0.733056	-0.26182	0.680569	1.353118	0.485438	1.108011	1.186526	1.224511	-0.0005	1.710034
1955	1.528176	1.488894	3.442797	7.754778	3.083874	1.945824	3.357716	2.653737	6.260018	2.728078	2.704033	2.089023	2.089845	2.403198	2.702271	2.241753	2.131103	2.208646	2.870085	2.92636	4.095281	2.356907	2.044394	0.12678	3.628569
1956	4.535585	7.844371	7.410516	16.36476	5.70944	5.89948	6.37042	5.057	10.31106	5.237719	4.64684	3.703639	3.683622	4.236595	4.706294	3.957048	3.09369	4.128178	4.63773	6.991931	7.197938	5.291107	3.258773	0.965875	7.757394
1957	6.520244	10.41815	10.03631	15.81949	6.233486	7.81318	6.879107	5.561638	10.69618	4.724907	4.843284	3.950566	3.854937	4.658632	4.964612	4.118365	2.65071	4.2083	4.654644	13.45386	7.440063	5.505365	3.233666	1.023134	7.914532
1958	6.116298	9.807201	9.749169	13.46144	4.652782	6.299039	5.020277	4.015241	8.278252	4.090322	3.608028	3.018921	2.628767	3.322096	3.76903	2.953758	3.919297	2.657793	3.868329	13.78337	5.437681	4.522589	2.675852	0.129556	6.299579
1967	-7.09827	-9.80073	-8.36212	-3.64929	-5.07129	-4.42988	-5.31033	-4.51782	-7.53723	-3.27273	-3.60427	-3.55868	-2.94468	-3.67232	-3.80227	-3.54074	-4.39187	-3.26173	-4.0401	3.000165	-5.01942	-4.3752	-3.56196	-2.63298	-5.71647
1968	-4.33982	-7.94787	-5.43466	-2.63929	-4.3713	-3.06931	-4.79982	-3.73976	-6.63576	-2.84275	-3.20879	-3.04734	-2.46868	-3.45369	-3.35118	-2.94864	-1.62032	-2.60684	-2.8544	3.305879	-4.31189	-1.72055	-2.56077	-2.06918	-4.49122
1969	-1.35015	-3.03167	0.313738	-3.09924	-3.42181	-2.30104	-3.58812	-2.41193	-6.05492	-2.39284	-2.25226	-1.79659	-1.54533	-2.57666	-2.48921	-1.90316	-0.99275	-1.41327	-1.82526	0.326062	-2.67504	-0.95813	-0.90403	-1.1741	-3.14311
1970	-0.99429	-1.39654	2.175697	-2.70663	-1.82576	-2.12828	-2.6295	-1.12019	-5.47814	-2.08787	-1.52086	-0.84538	-1.18065	-1.63568	-1.40935	-1.10591	-0.94622	-0.64869	-1.24986	-1.3986	-1.75462	-0.87391	0.022207	-0.24053	-2.21537
1971	0.239328	0.338889	1.024145	-3.36276	0.407547	-2.3971	-1.82685	-0.99412	-4.75391	-1.97338	-1.05259	-0.69124	-1.11672	-1.37194	-1.3071	-0.9584	-1.02223	-0.68278	-0.43838	-1.06272	-1.67981	-0.30422	-0.0449	-0.11027	-0.38828
1972	-0.75141	-1.33449	0.815468	-5.23878	-1.30501	-2.3155	-1.89929	-0.93648	-4.27534	-1.59522	-0.7291	-0.61325	-1.07593	-1.00205	-1.28331	-0.77607	-1.94254	-0.73347	-0.60196	-2.02114	-1.45738	0.364612	-0.61589	-0.48246	0.394814
1973	-0.06634	0.43103	0.627512	2.390765	1.317	0.793507	1.825435	1.129643	2.64733	1.684024	1.443582	1.14908	1.74467	1.457645	1.68949	1.355533	1.045103	1.144135	1.802207	0.603793	3.213216	2.200434	1.704664	-0.08874	2.757504
1974	4.303451	9.057213	8.265719	23.19042	8.396592	7.858401	9.168558	6.941957	14.26134	7.527447	7.183855	5.496136	5.390279	6.270058	7.036687	5.757568	5.431208	6.191516	6.996334	11.25237	11.16797	7.540139	4.457666	3.051384	11.35218
1975	10.07841	16.9905	16.12845	24.15017	9.535994	10.01836	10.39549	8.202696	15.23074	7.447071	7.218391	6.187547	6.614795	6.450751	7.610542	6.23966	6.536418	6.444744	6.463284	19.65073	10.69983	7.884261	4.400832	3.423567	11.76773
1976	7.464533	12.51161	9.712804	15.49649	6.491628	8.066915	6.710878	5.183747	10.79279	5.645253	4.284525	3.72479	4.817405	3.695715	4.274811	3.393298	4.566752	3.620197	4.831288	17.03935	6.302608	5.51673	3.393408	1.5831	7.794276
1983	-3.47187	-5.58271	-6.55333	-3.92416	-8.46921	-2.95189	-6.78203	-5.20565	-4.86305	-1.65463	-2.12627	-2.38238	-1.33466	-1.57975	-1.74172	-1.53507	-0.44962	-1.51357	-2.09726	-2.50497	-2.85533	-1.2294	-1.306	-1.18546	-2.78111
1984	-5.78758	-8.52884	-9.34561	-4.99262	-4.44061	-4.70456	-3.47058	-3.12223	-6.75578	-3.09836	-2.48903	-2.18196	-3.08565	-2.12134	-2.3842	-2.05378	-2.31546	-2.40498	-3.11992	-3.71697	-3.69291	-2.56171	-2.67569	-1.92058	-3.87744
1985	-8.38169	-11.3814	-10.8094	-3.37569	-5.18791	-5.01806	-5.38383	-4.48536	-8.89902	-3.87186	-3.69394	-3.50849	-3.13156	-3.37561	-3.81453	-3.36953	-3.70713	-3.42252	-4.10934	2.691547	-5.16278	-3.97754	-3.67941	-2.7033	-6.06316
1986	-4.88136	-8.14068	-6.95075	-1.96726	-6.78774	-4.58473	-6.58595	-5.05705	-10.1703	-4.58402	-3.93352	-3.78124	-3.38863	-3.68704	-4.12353	-3.73031	-3.92682	-3.61311	-4.2173	7.459312	-5.501	-3.65222	-3.06835	-2.65944	-6.07813
1987	-0.90995	-1.7284	-1.95205	-2.20409	-1.43628	-4.0627	-4.57973	-3.53886	-7.14028	-2.94395	-2.15039	-2.40191	-2.19624	-2.96818	-2.04624	-2.57586	-1.29454	-1.92778	-1.65978	5.209692	-3.60395	-1.13113	-0.86222	-1.89221	-2.932
1988	3.465956	3.619558	2.279541	-2.9039	0.802424	-3.10053	-3.20552	-1.39424	-5.99954	-2.02112	-0.79324	-1.01177	-1.08654	-1.44682	-0.45682	-1.10462	-0.86656	-1.00273	0.001303	0.343037	-1.02728	-0.62074	0.441666	-0.51009	-0.51201
1989	-1.48567	-2.14903	-1.46507	-5.37979	0.64473	-2.97328	-2.52769	-1.26375	-5.96681	-2.22797	-1.0695	-0.91204	-1.29685	-1.3555	-0.91919	-1.16542	-2.70192	-1.13578	-0.03617	-1.79077	-2.36638	-0.1597	-1.18114	-0.20164	0.41017
1990	-2.07046	-3.90399	-1.54095	-8.3883	-2.78062	-5.39056	-4.63759	-3.03761	-9.2983	-3.82688	-2.70782	-2.18797	-3.49095	-2.81168	-2.71046	-2.5244	-2.83186	-2.48979	-2.21251	-3.52524	-3.87239	-2.35654	-1.93157	-1.02908	-2.53729
1991	-2.67621	-5.06711	-1.5412	-10.6973	-2.82585	-6.05683	-4.44639	-2.73642	-7.83275	-4.82646	-2.63734	-1.55394	-2.07467	-2.45263	-3.02365	-2.30983	-2.23787	-3.07026	-2.51598	-9.61599	-4.50023	-2.27984	-0.64884	-0.9651	-4.82226
1992	7.841017	12.20631	8.793684	25.28248	8.111075	4.761254	8.52207	6.257809	13.21338	6.088963	7.234507	4.385807	9.963438	5.414583	6.351183	4.73384	8.492088	5.435266	8.232106	15.60656	10.81658	8.353709	7.208823	4.783563	12.61106
1993	27.91395	37.60321	30.39429	44.90909	16.22619	9.343083	17.95176	13.08204	26.14845	13.14018	11.89447	9.011512	15.47482	10.4518	11.48465	9.456424	11.68543	12.57607	11.51287	33.31578	18.50161	13.55693	9.293796	4.469799	20.71362
1994	9.11186	14.87757	12.50902	16.94127	7.093429	5.232066	7.38484	5.864244	11.40503	4.998148	5.036822	4.666077	6.004629	4.675051	5.409078	4.331394	6.754412	4.704956	5.78526	21.22962	7.268863	6.663524	3.626009	3.054897	8.832284
2002	-7.62265	-9.46206	-11.8688	-6.76723	-10.6223	-5.48051	-5.20186	-3.3967	-6.54758	-2.9439	-3.14505	-3.2929	-3.52248	-2.79344	-3.21919	-2.81121	-2.88331	-2.05783	-3.98833	-3.93026	-4.36109	-3.1894	-3.3868	-2.54416	-4.70861
2003	-11.9344	-15.663	-17.9579	-7.1837	-6.31085	-4.4914	-5.20182	-4.36459	-7.24773	-3.40004	-3.82154	-3.62461	-4.21023	-3.59017	-4.12125	-3.42351	-4.4431	-2.94712	-5.09232	3.735896	-5.41363	-4.4475	-4.69225	-3.22699	-6.48352
2004	-8.97886	-11.6806	-13.9397	-4.22487	-6.46447	-4.66477	-5.87874	-4.4217	-10.2158	-4.51859	-3.85254	-3.34218	-4.91388	-3.64617	-3.96926	-3.52107	-4.06839	-3.15837	-4.55476	4.251795	-5.54475	-4.28029	-3.39559	-2.86794	-6.32605
2005	-4.90032	-5.35886	-8.76457	-4.93075	-4.18711	-4.84372	-5.25604	-4.25795	-9.20352	-3.352	-2.82232	-2.96286	-2.87275	-3.03735	-3.04405	-2.95265	-1.68343	-2.22604	-2.89206	4.382513	-4.27751	-0.851	-2.56919	-2.07441	-3.87239
2006	1.443402	1.026874	3.243913	-3.07478	1.568275	-3.42748	0.671552	-0.90108	-5.80697	-2.0457	0.807622	-0.89756	-0.58999	-0.95566	0.536975	-1.01176	-0.66267	-0.19002	0.693571	-0.33279	-0.08788	0.011954	0.641872	-0.56276	0.517756
2007	-1.73939	-3.00408	1.225865	-6.18591	0.669349	-2.50872	-1.21106	-1.64514	-6.85935	-2.74345	-0.87065	-1.50314	-1.26644	-1.44797	-0.97651	-1.57431	-1.49615	-1.25755	0.398883	-1.56733	-2.38407	-0.44371	0.42763	-1.00807	1.502904
2008	-3.70726	-7.13724	-4.16817	-11.4682	-3.65132	-9.13775	-6.0167	-3.96338	-13.3389	-5.96962	-3.84371	-3.87137	-3.51954	-4.58924	-4.2608	-3.95655	-4.61341	-3.60213	-3.99433	-0.37145	-5.5654	-1.91593	-3.66748	-2.12091	-3.07928
2009	-6.97549	-11.653	-8.41268	-24.0144	-10.7666	-14.7318	-11.6799	-7.83148	-19.1523	-9.70097	-7.28239	-7.25375	-8.61152	-7.97253	-8.1575	-7.04787	-8.70724	-6.36613	-7.29779	-8.4857	-9.61701	-7.90253	-5.15827	-4.46179	-9.53933
2010	-13.5969	-16.6668	-14.5855	-44.6553	-15.5701	-15.3711	-16.5606	-13.3434	-18.8451	-12.5683	-11.0205	-9.87137	-10.1986	-8.39648	-9.99521	-9.54013	-5.639	-12.7847	-9.2716	-12.9778	-15.8292	-9.53415	-7.38303	-6.81085	-15.2604
2011	-32.593	-34.2232	-35.5956	-89.6031	-41.1386	-22.7747	-35.0566	-34.8331	-40.3726	-23.5649	-24.5743	-24.5194	-23.1472	-16.8126	-21.8632	-20.9668	-14.2762	-23.5433	-20.3159	-26.3262	-32.1145	-17.5919	-18.2275	-13.8577	-27.2506
2012	-18.3853	-10.3437	-22.8138	-58.5319	-27.6616	-10.3098	-23.8775	-22.3369	-29.5249	-17.342	-17.1614	-16.9445	-20.4572	-14.8835	-16.3511	-14.8953	-11.4765	-16.8522	-15.0894	-18.1764	-22.7065	-13.4148	-13.3909	-11.4601	-21.6182
2013	-0.25589	1.446702	-3.4727	2.088752	2.467842	7.653805	2.857257	2.177896	3.970876	3.384942	2.466928	2.630375	0.261977	0.895426	2.649628	2.438643	2.574677	1.976785	1.558671	8.270092	-0.0424	2.921014	2.016552	-0.96156	2.427882
2022	-15.5562	-21.4215	-19.2554	-14.6043	-6.13894	-7.35974	-6.81559	-7.53986	-10.3433	-5.26	-5.58084	-6.08382	-5.82495	-6.09615	-5.83047	-5.98286	-7.91297	-4.51789	-6.21912	-3.09265	-6.88967	-6.03741	-4.81428	-5.30982	-8.28873
2023	-18.0514	-19.9843	-19.8183	-16.797	-11.1415	-10.9426	-9.94235	-7.30311	-15.2979	-7.79977	-6.04922	-6.18935	-7.12255	-5.63354	-6.25792	-5.52841	-6.45894	-5.43818	-7.56173	3.51934	-7.75234	-6.59962	-5.81329	-4.63298	-9.4968
2024	-11.7893	-11.7513	-2.7136	1.479877	-0.75024	-8.49462	1.657703	-2.57961	-5.05255	-1.32666	2.016773	-0.42509	-0.92032	0.234546	0.273384	-0.68337	-1.31118	1.065258	1.451346	-3.10289	0.676892	0.490334	-0.46955	-2.66075	1.619559
2025	-8.03325	-8.84992	-0.77398	-2.53196	0.762452	-1.99872	-0.2521	0.41297	-3.69953	-5.3415	-5.14991	0.329528	-6.81715	-10.2687	-4.2708	-0.87779	-4.89184	-5.51037	-5.05265	-1.89838	-1.92628	-4.2901	-5.72781	-8.06315	0.362484
2027	-12.5508	-18.3509	-13.5581	-17.5447	-11.6604	-16.8332	-13.3013	-7.14045	-24.9143	-14.0411	-9.02292	-6.13213	-11.5777	-8.35448	-10.213	-5.52131	-14.0772	-9.1094	-7.88374	-20.285	-10.6529	-10.1719	-8.91103	-4.04744	-13.4237
2028	-10.7639	-11.7182	-12.1224	-47.8892	-14.0004	-10.2515	-18.6877	-11.2762	-25.4598	-16.0999	-12.1974	-7.08614	-15.8109	-13.5476	-11.6402	-8.07924	-16.3188	-14.8699	-13.0051	-32.4529	-18.8999	-14.4056	-8.99861	-12.1393	-24.0007
2031	-16.8669	-2.3291	-21.0136	-46.4939	-28.5028	-10.9514	-21.6335	-21.2781	-20.3047	-11.8145	-14.6447	-15.139	-10.9042	-12.867	-13.9097	-13.7267	-10.1657	-13.0477	-13.274	-27.7017	-18.9427	-12.6352	-7.92417	-7.01063	-20.2027
2042	-32.2317	-22.5164	-30.0486	-33.2285	-16.7284	-5.93749	-11.8693	-16.0478	-17.7509	-9.71093	-10.3627	-12.7553	-11.8033	-6.50002	-14.1573	-12.9471	-6.76382	-10.2005	-15.6268	-1.11469	-13.1896	-12.0842	-12.1482	-6.88063	-16.5668
2142	-37.7495	-36.3095	-46.1889	-55.3172	-18.4031	-5.95781	-20.0743	-21.7528	-19.7739	-10.2629	-16.5118	-16.8779	-16.0731	-8.34351	-17.9563	-16.2154	-7.10851	-13.9161	-19.4588	-1.59158	-18.6048	-12.3484	-12.947	-8.85146	-20.6116

Alternative 6 - Data table of the change in max velocities (cm/s) at each save point (row) in SAV habitat for each storm (column) compared to the base condition

- Green: $\Delta < 0$ (a reduction)
- Yellow: $0 < \Delta < 5$
- Orange: $5 < \Delta > 15$
- Red: $15 < \Delta > 25$
- Dark Red: $\Delta > 25$



Save Points in SAV Beds with increased velocities for select storms

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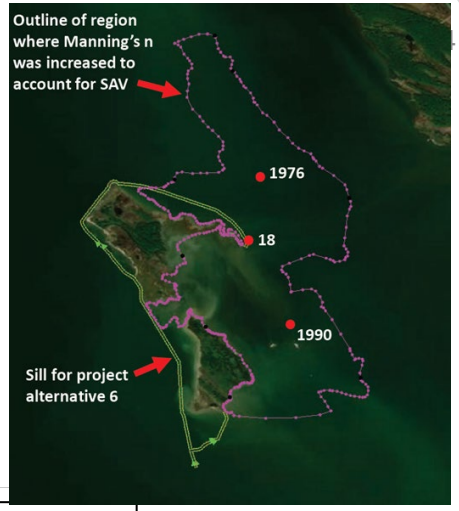
BED ROUGHNESS FROM SAV – INCREASE MANNING'S N COEFFICIENT

- The model setup was adjusted to have higher Manning's values in the Tar Bay area to more accurately account for SAV in the area.
- When Manning's n was increased, the peak velocities under with-project values decreased by approximately 20-30%.



Storm	Water Level ARI (Yrs)	Point ID #	Existing Condition	Existing w/ Increased Manning's n	Alt P06	Alt P06 w/ Increased Manning's n	Existing Condition	Existing w/ Increased Manning's n	Alt P06	Alt P06 w/ Increased Manning's n
			(Peak Storm Velocity (cm/s))				(Mean Storm Velocity (cm/s))			
57	38.7	1976	60.6	-	68.2	-	10.4	-	12.8	-
		18	63.3	-	102.0	-	12.0	-	20.1	-
		1990	72.1	-	70.1	-	14.5	-	13.5	-
58	123.3	1976	66.4	53.0	78.8	62.1	11.9	9.6	14.3	11.4
		18	68.7	52.3	119.5	86.3	15.0	11.3	21.4	16.0
		1990	78.7	54.3	74.4	52.2	15.8	11.1	14.0	9.8
109	81.9	1976	87.9	-	97.4	-	16.0	-	19.4	-
		18	91.9	-	133.6	-	17.7	-	26.7	-
		1990	101.9	-	100.3	-	20.4	-	19.7	-
188	9.6	1976	85.4	66.2	101.4	78.9	11.5	8.9	13.6	10.5
		18	108.2	78.6	178.9	130.2	14.2	10.2	22.7	16.9
		1990	118.9	81.3	110.4	76.1	15.8	10.7	14.5	9.7
199	9.3	1976	40.7	-	52.0	-	7.5	-	10.0	-
		18	52.6	-	78.8	-	10.8	-	16.9	-
		1990	57.0	-	48.1	-	12.9	-	11.4	-
630	6.3	1976	40.5	-	58.7	-	7.3	-	8.2	-
		18	54.9	-	89.1	-	9.2	-	13.2	-
		1990	61.5	-	58.4	-	10.8	-	9.5	-

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SUMMARY OF H&H MODELING AND EFFECTS ON SAV

- Proposed design provides for existing conditions or reduced maximum velocities in all areas but Tar Bay
- Affect on maximum velocities increased from north to south
- At locations with increased velocities, velocities still within SAV habitat requirements
- Modeled velocities as presented are likely to be higher than expected (conservative) in SAV beds during the growing season because bed roughness was not factored into the full modeling effort
- Additional work needs to be done to understand the velocities in the Tar Bay area

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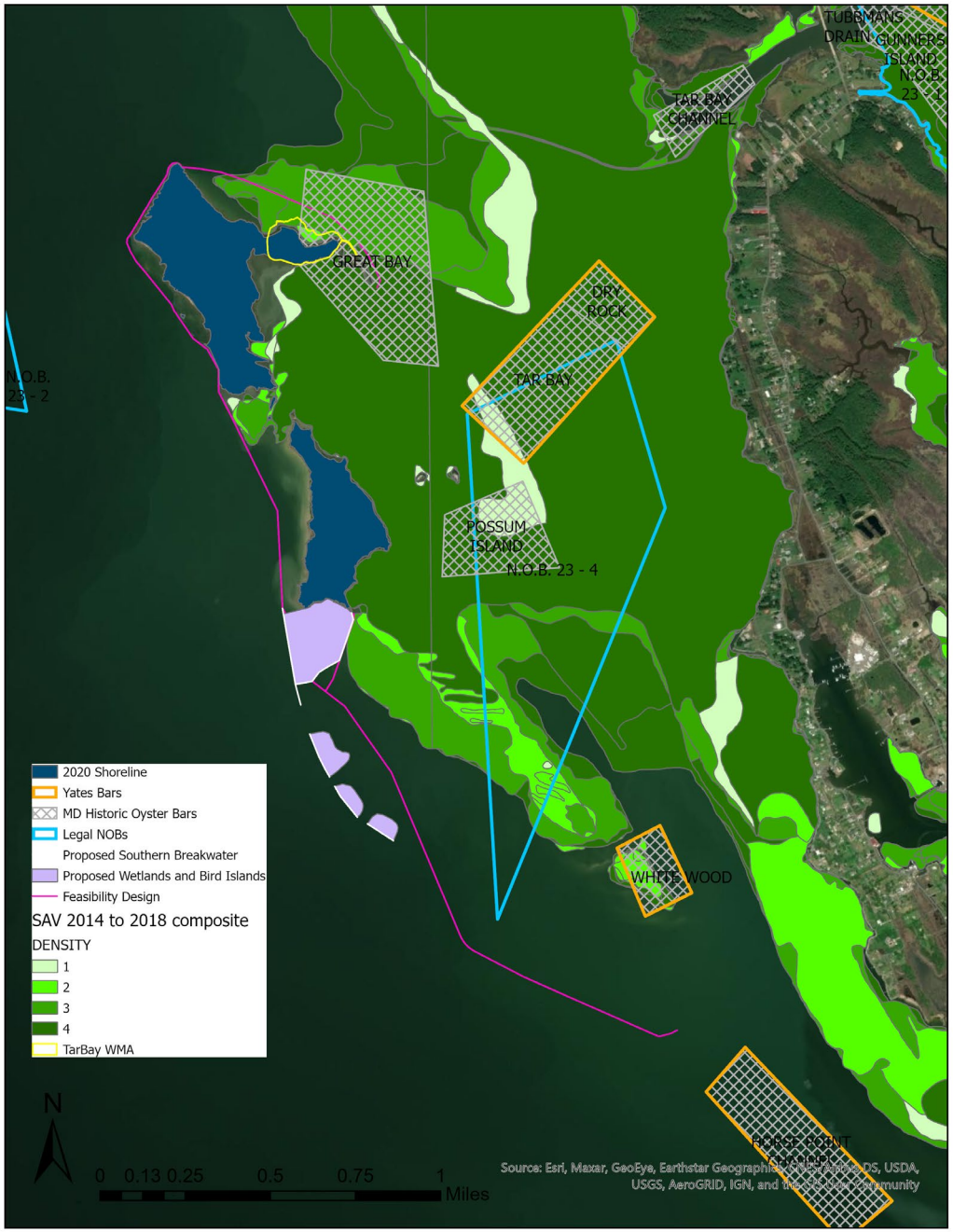
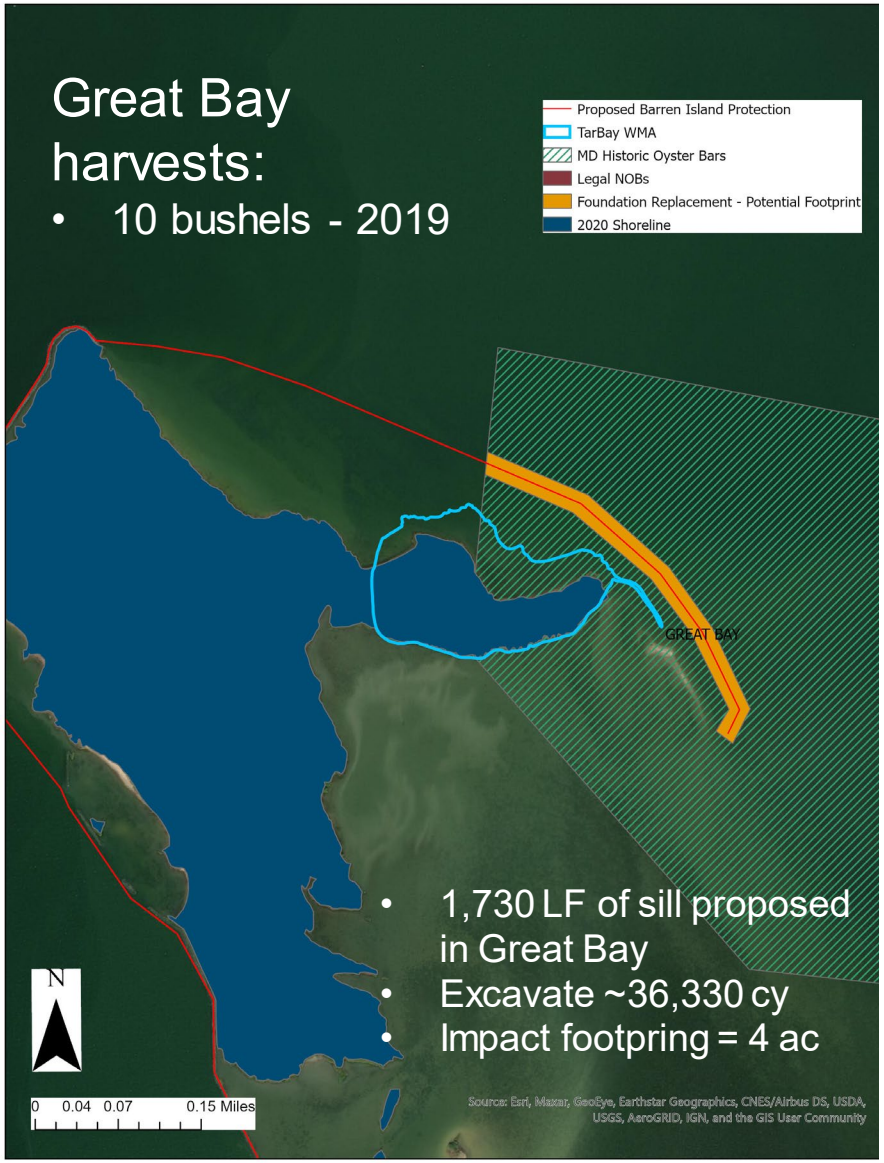
ADDITIONAL NEPA CONSIDERATIONS



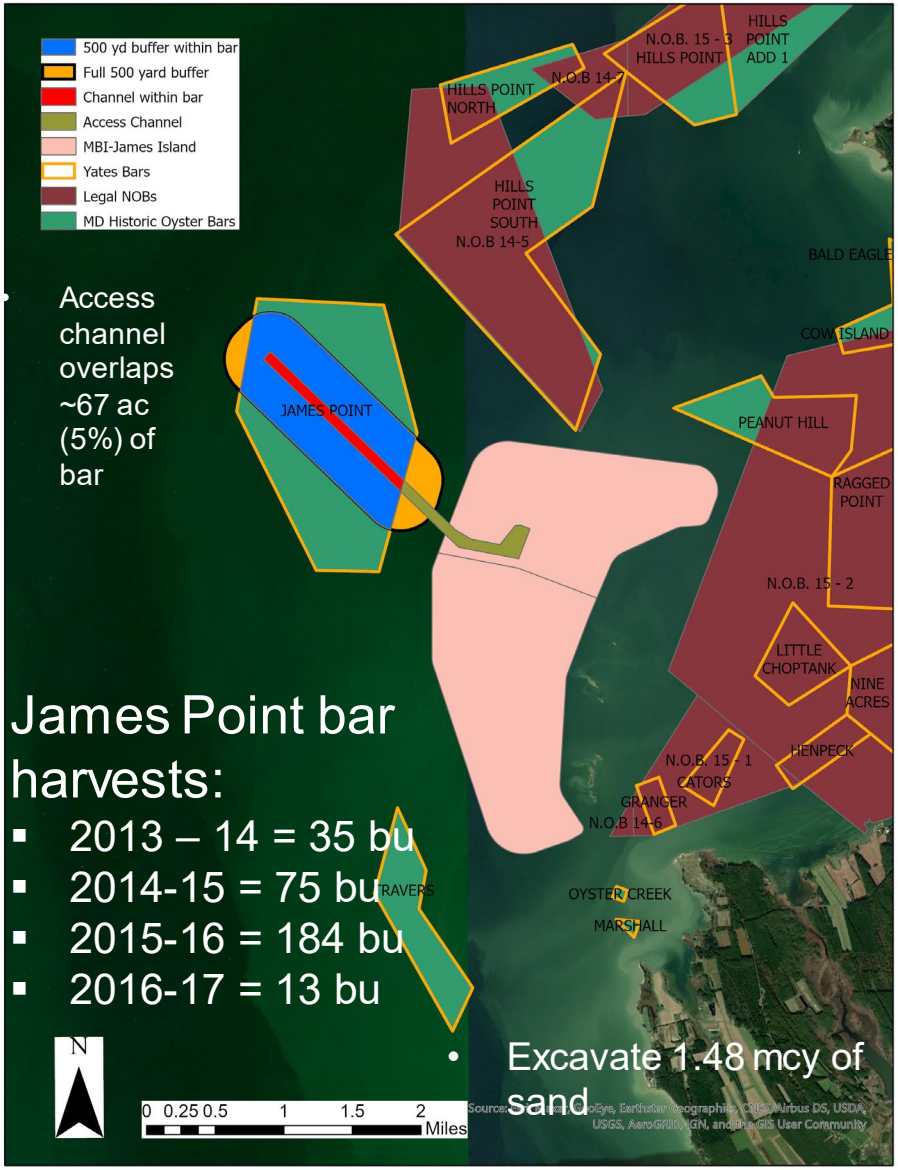
POTENTIAL OYSTER IMPACTS

Great Bay harvests:

- 10 bushels - 2019



- 1,730 LF of sill proposed in Great Bay
- Excavate ~36,330 cy
- Impact footpring = 4 ac



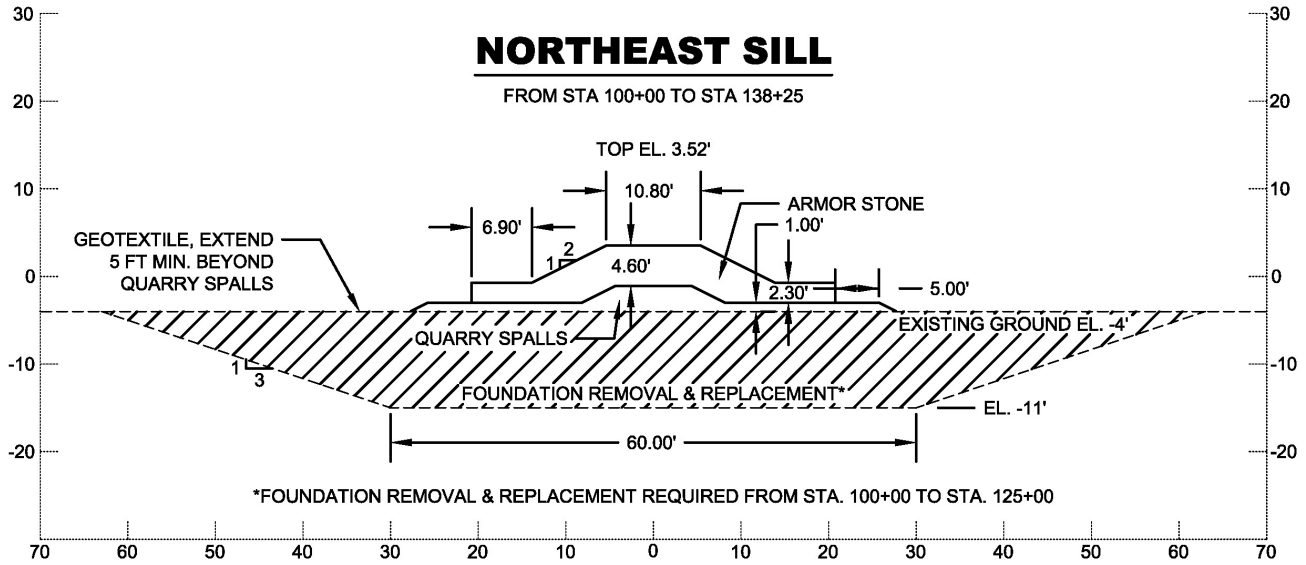
- Access channel overlaps ~67 ac (5%) of bar

James Point bar harvests:

- 2013 – 14 = 35 bu
- 2014-15 = 75 bu
- 2015-16 = 184 bu
- 2016-17 = 13 bu

- Excavate 1.48 mcy of sand

BARREN – IDEA – INCORPORATE OYSTERS INTO NE SILL



0.33'	MEAN HIGHER HIGH WATER (MHHW)
0.16'	MEAN HIGH WATER (MHW)
0.00'	NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)
−0.45'	MEAN TIDE LEVEL (MTL)
−1.06'	MEAN LOW WATER (MLW)
−1.22'	MEAN LOWER LOW WATER (MLLW)

TIDAL DATUMS AT BARREN ISLAND, MD FOR THE 1983–2001 TIDAL EPOCH*

NOT TO SCALE

DATUM NOTES

1. ALL COORDINATES ARE IN FEET AND REFERENCE THE MARYLAND STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ALL ELEVATIONS ARE IN FEET. UNLESS OTHERWISE NOTED, ALL ELEVATIONS REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)..
3. TIDAL DATUMS ARE BASED ON A TWO YEAR SERIES (JAN 2001–MAR 2003) USING NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION TIDE STATION 8571579 AS THE CONTROL TIDE STATION.

US Army Corps of Engineers

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NEXT STEPS

- Further evaluate H&H modeling results in Tar Bay Area
- Complete 35% Design – ***request agencies provide any input by March 5***
- Winter and spring biological surveys
- Continue to work on identifying reference marshes and wetland design criteria
- Coordinate with FWS to confirm they have necessary information for draft PAR
- Begin to draft EA
- Support MES for permitting pre-application process
- Develop wetland restoration sequencing plan
- Discuss expected maintenance needs for bird islands

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AGENCY CHECK-POINTS – BARREN ISLAND COMPONENT

1. Summer 2020 – Initial ERDC modeling for Barren Design Meeting √
2. February 2021 – Barren 35% Design Review Meeting √
3. March 2021 – Draft PAR provided by FWS
4. Now through July 2021 – Conduct relevant coordination to enable completion of draft EFH assessment, ESA biological assessment, 404(b)(1) Analysis, and Critical Areas Commission response
5. August 2021 – Barren 65% Design Review Meeting
6. December 2021 – Public Review of Barren EA

US Army Corps of Engineers

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Mid-Bay Island Ecosystem Restoration Project
Design Phase
Agency Coordination Update

23 February 2021; 10:30 - 12:00 a.m.

Webinar information: https://usace1.webex.com/meet/angela.sowers
Join by phone
+1-844-800-2712 US Toll Free
+1-669-234-1177 US Toll
Access code: 199 872 1676

MEETING MINUTES

Participants
USACE: Angie Sowers, Charles Leasure, Chris Johnson, Ray Tracy, Dale Duncan, Ben Fedor, AJ De Rosset
MPA: Dave Bibo, Amanda Penefiel, Holly Miller
MES: Maura Morris, Cassandra Carr, Mindy Strevig
MDNR: Dave Brinker, Roland Limpert, John Moulis, Becky Golden, Laura Sanford, Chris Judy, Erik Zolokowitz
USFWS: Chris Guy, Robbie Callahan, Matt Whitbeck, Amy O'Donnell
MDE: Mary Phipps-Dickerson
NOAA/NMFS: Jonathan Watson, Brian Hopper, Mary Andrews
Audobon: Dave Curson

Angie Sowers presented the project update, reviewed the habitat delineations, alternatives analysis, H&H modeling, considerations for SAV and oysters, next steps, and agency checkpoints (see slide deck and recording).

Discussion:
Angie Sowers asked for input about potential maintenance requirements for the bird islands.

- Dave Brinker commented that more details of the design are needed to scope out maintenance needs.
- Dave Brinker stated that based on the survey data he previously provided for the historic islands to the south of Barren, those islands that were the furthest from Barren supported higher numbers of birds. He suggested increasing the distance of the islands from Barren.
    - Angie Sowers replied that we can further consider that. The current 100 m distance in the design was based on prior feedback from the resource agencies. The objective is also to use the islands in place of a breakwater to support SAV habitat conditions so both the bird habitat and benefit to SAV are objectives to balance.
- Chris Guy – long-term control of vegetation will likely require periodic use of herbicide at a time when application is not detrimental to bird communities. We will likely need to

identify success metrics for the bird islands as we would for the wetlands. One metric could be a trigger for herbicide application, i.e. when a certain percent cover of vegetation is reached.

- The group discussed suitable substrates for the bird islands:
    - Oyster shell is a great substrate to support nesting. Pro: substrate used historically by nesting communities. Con: availability and its degradation releases free calcium which supports vegetation growth
    - Angie Sowers mentioned the mixed shell available from NJ Atlantic coastal fisheries. Chris Guy had also been thinking of this material.
    - Dave Corson added that Audubon and DNR are developing floating bird islands in the Coastal Bay with a clam shell surface.
    - Dave Brinker stated that based on its chemical composition, clam shell would likely be more suitable than oyster shell because when clam shell degrades it releases less free calcium (by which it would not be as beneficial to vegetation growth).
    - Chris Guy will provide size range of material from Fire Island project.
    - Pea gravel was shown to not be a good source due to heat capture.
- Group discussed design depth of substrate
    - It was decided 12 inches is preferred
    - AJ – costs could be a concern
    - Chris Guy stated that if costs becomes a concern USACE should ask the agencies to research the suitable depth further to refine the design recommendation.
    - Angie shared that she has costs from the use of the mixed shell through the oyster program to build 12" reefs.
- Jonathan Watson – requested a characterization of the sediments in the Honga River channel and for the NE sill. Angie will follow-up with our geotechnical team members. Jonathan also asked if training dikes would be utilized.
- Angie requested any further input relevant to the 35 % design to be provided by March 5.

Mid-Chesapeake Bay Island Ecosystem Restoration Project

Barren Island Construction

Joint Evaluation Committee Meeting
March 31, 2021

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

US Army Corps of Engineers ®
Baltimore District

Agenda

1. Mid-Bay Project History

- Location
- EIS Review
- Recommended Plans
- Project Purpose

2. Project Schedule

- Mid-Bay Project Phases
- Barren Island Timeline

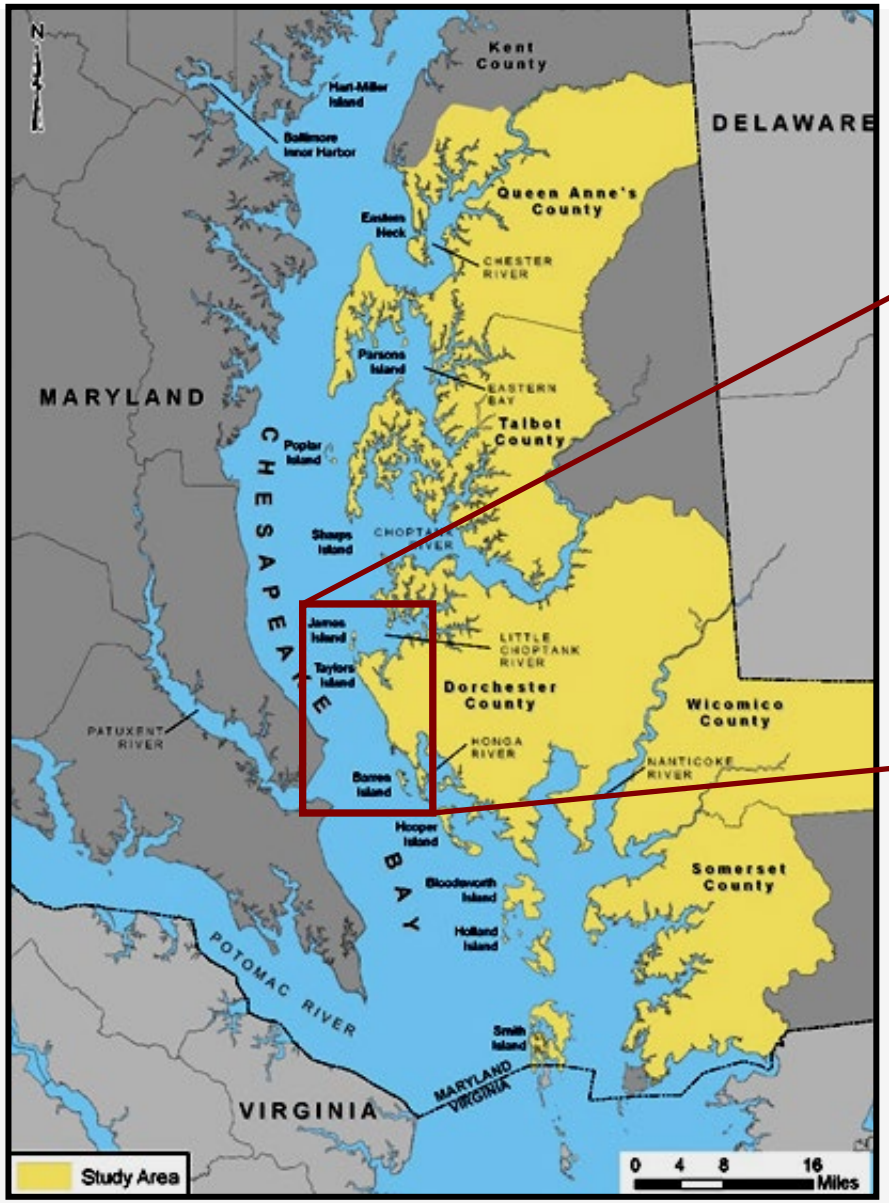
3. Barren Island Project review

- Current Conditions
- Restoration Plan
- Construction
- Wetland Restoration

4. Questions

Project History

Project Location



Mid-Bay Integrated Feasibility Report and Environmental Impact Statement (2008)

- Mid-Bay Integrated Feasibility Report and Environmental Impact Statement

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- 105 Potential Island Location → 2 Islands

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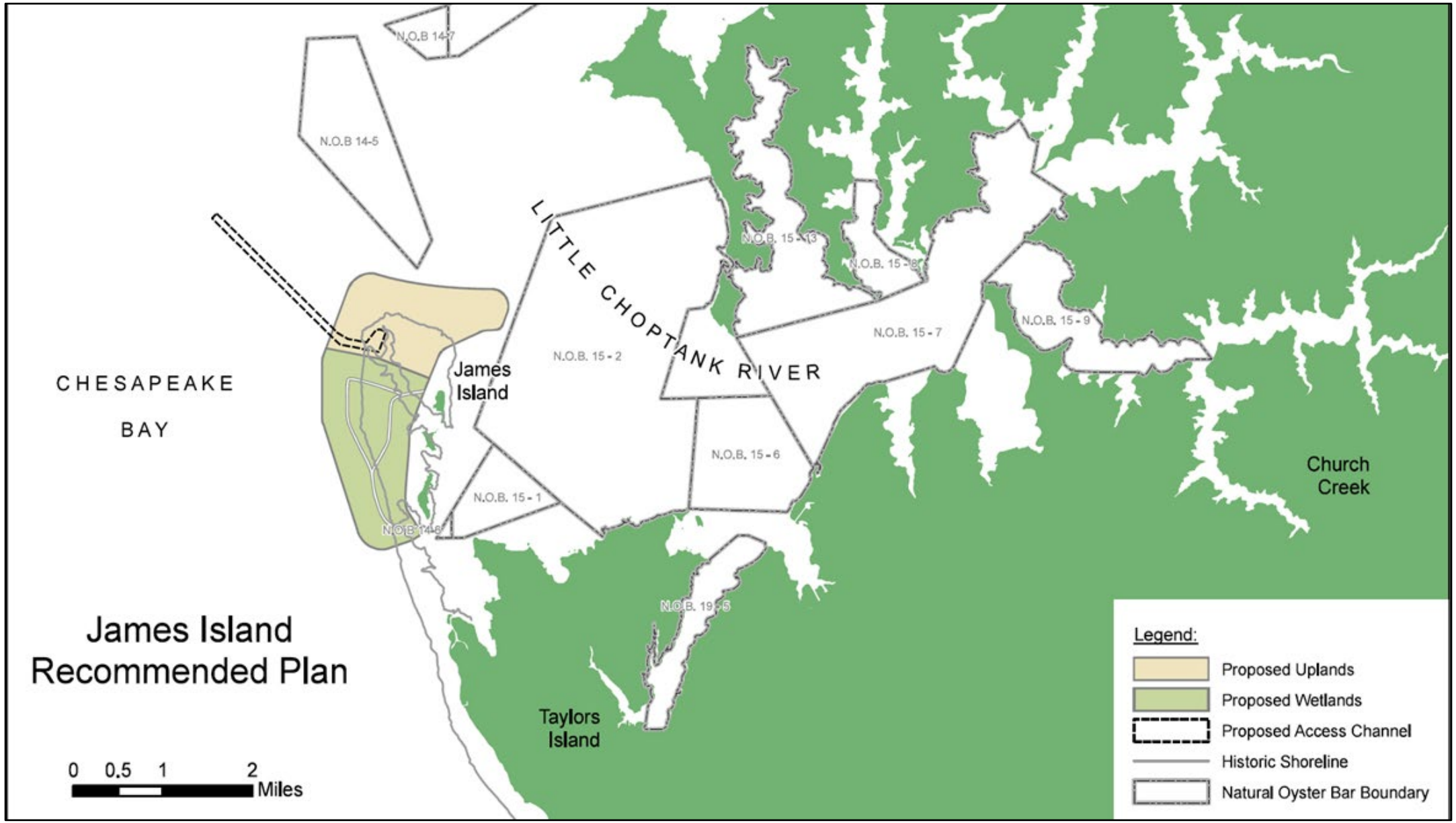
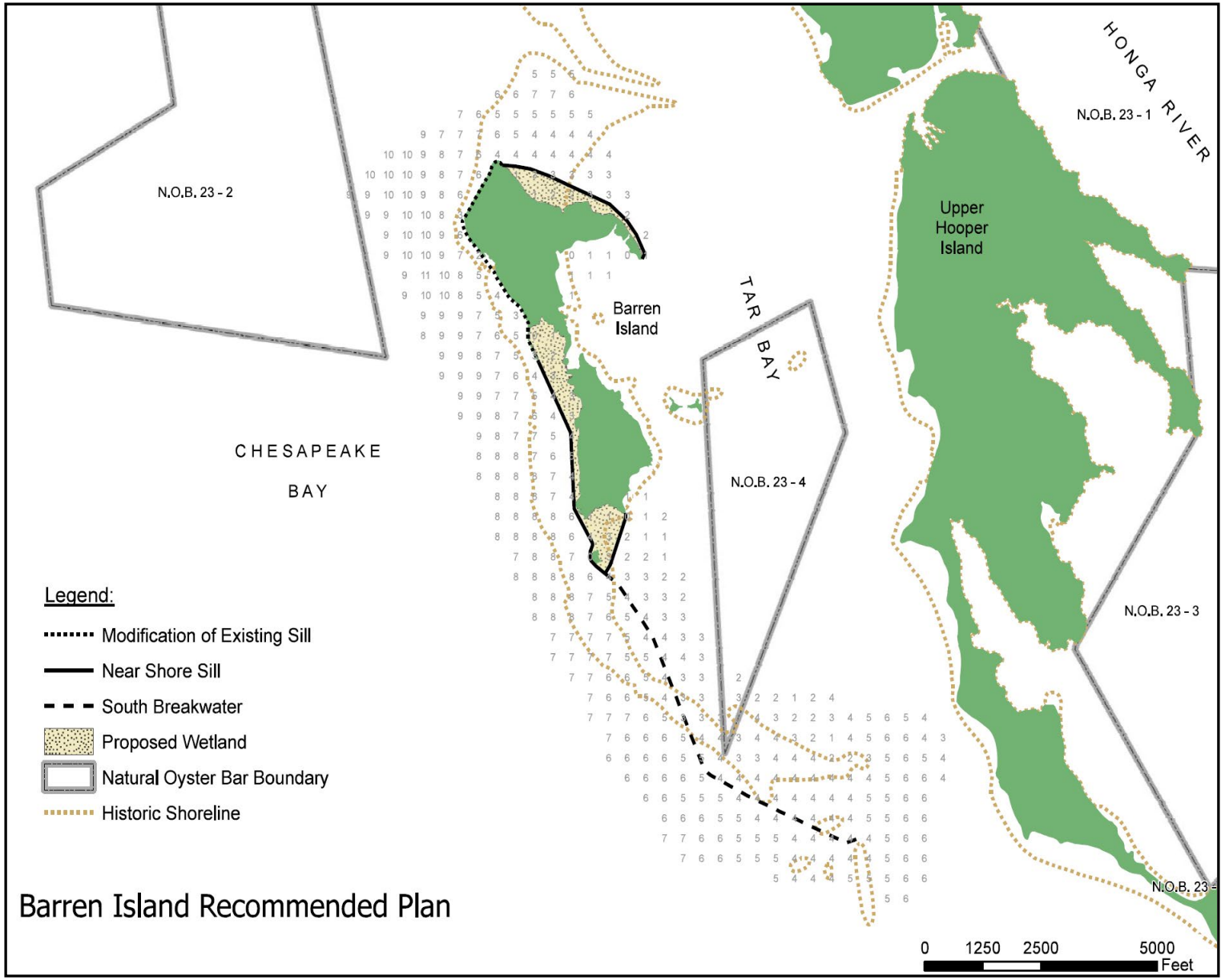
- 2 Islands → 29 Alignments

James Island – Recommended Plan



Barren Island – Recommended Plan



Project Purpose

- Restore and protect wetland, aquatic, and terrestrial island habitat for fish, reptiles, amphibians, birds, and mammals;
- Protect existing island ecosystems to prevent further loss of island and aquatic habitat;
- Provide dredged material placement capacity for Federal navigation channels;
- Increase wetlands acreage in the Chesapeake Bay watershed
- Decrease local erosion and turbidity;
- Promote conditions to establish and enhance submerged aquatic vegetation; and
- Promote conditions that support oyster recolonization.

Project Schedule

Mid-Bay Project Phases

- Reconnaissance and Feasibility Studies – Identified Recommended Plans – Completed 2008

- Pre-Construction Engineering and Design – 2020-2024

- Sill and Breakwater/Exterior Dike Construction Following PED Phase & Funding Availability – ~2022-2028

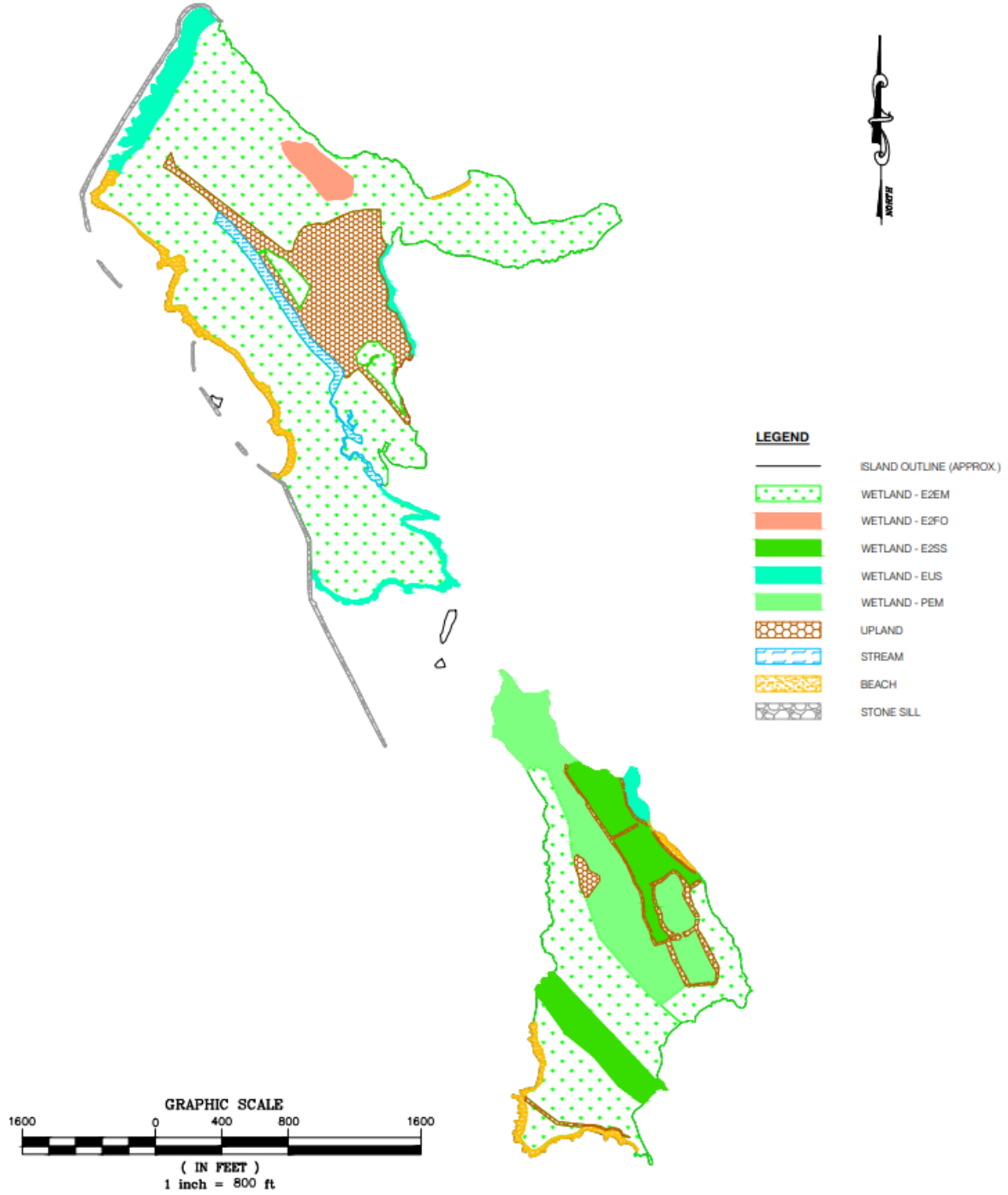
- Continued Construction (including habitat development) and Operations and Maintenance Activities - ~2024-2065

Barren Island Schedule

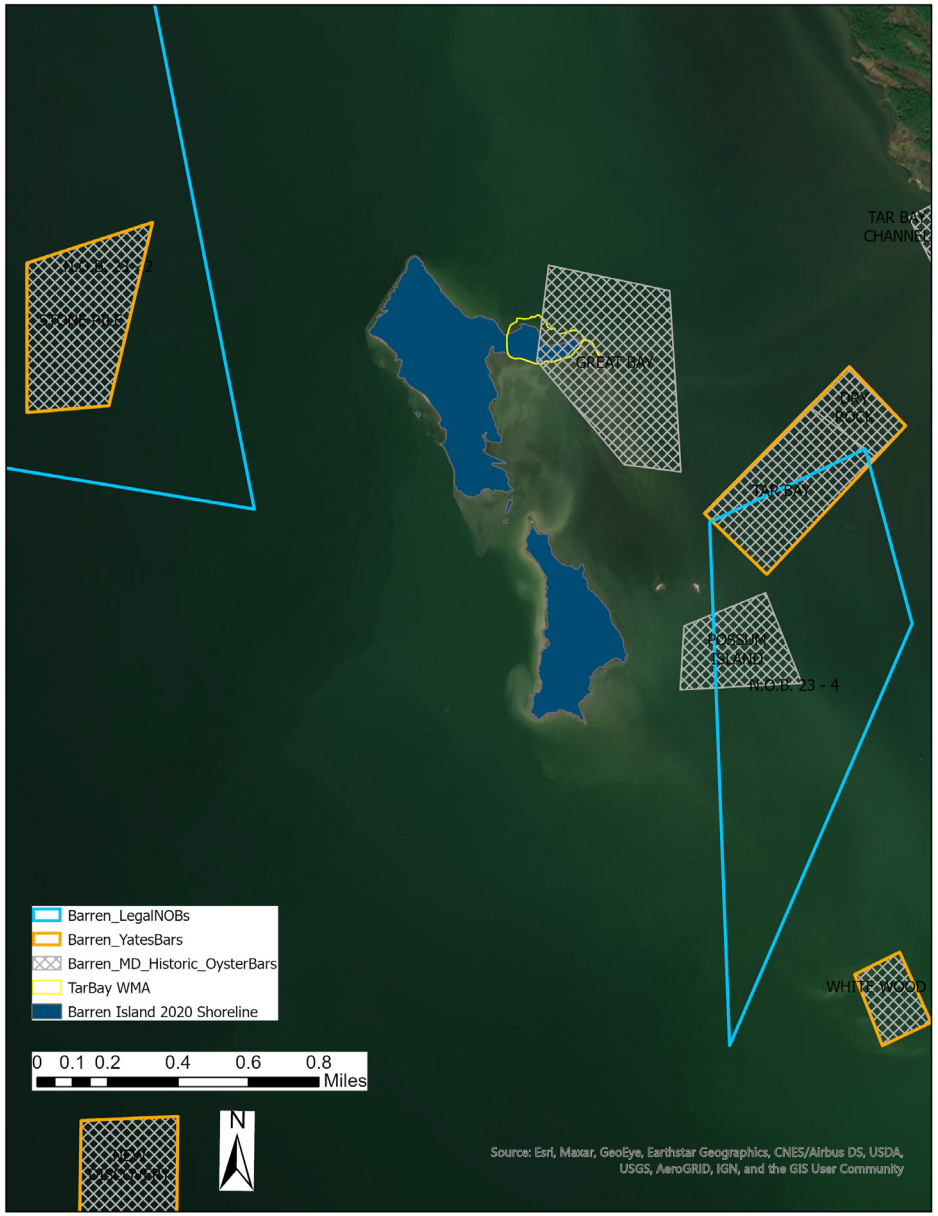
- Environmental Surveys – Summer 2020 – Spring 2021
- ERDC modeling – Summer 2020 – Current
- Permitting – April 2021 – April 2022
- 35% Design Complete – April/May 2021
- 65% Design Complete – October 2021
- NEPA: EA Public Review – December 2021
- Signed FONSI – March 2022
- Construction Begins – Summer 2022

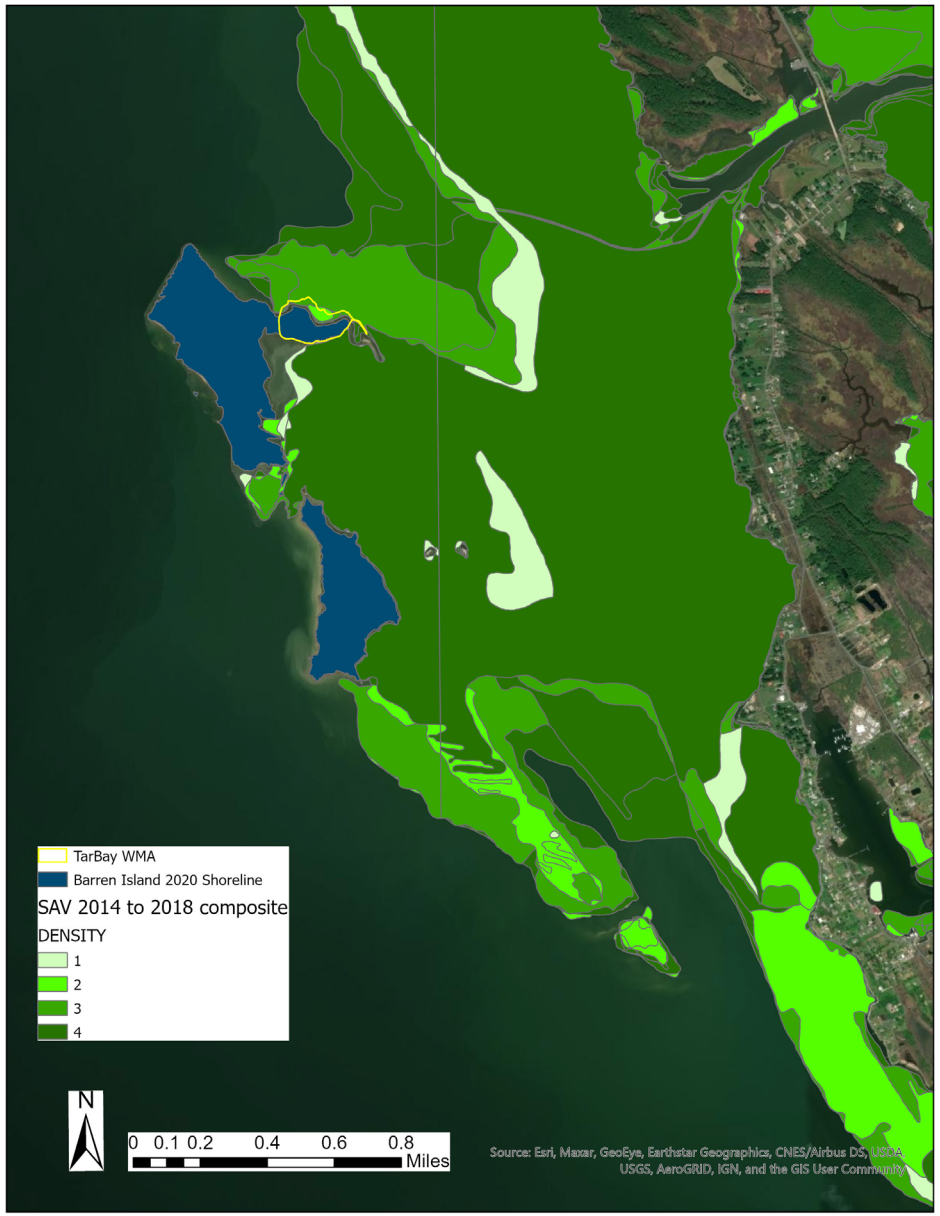
Project Overview

Current Conditions



Current Conditions

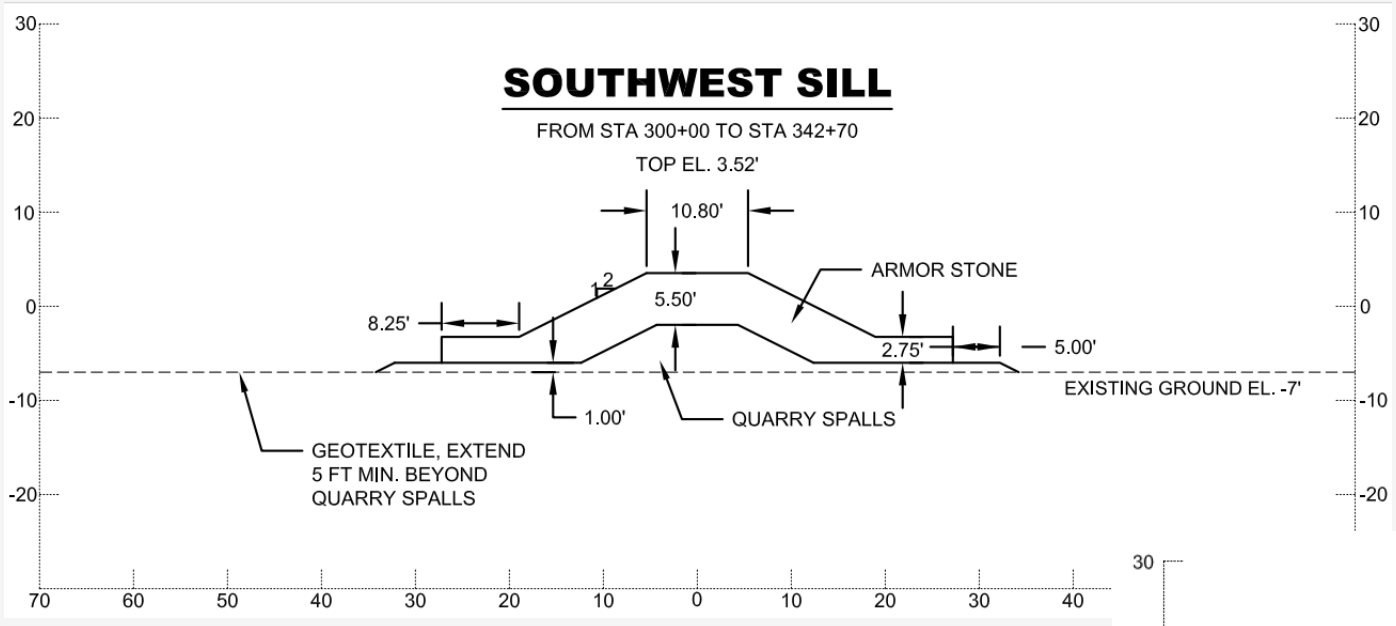


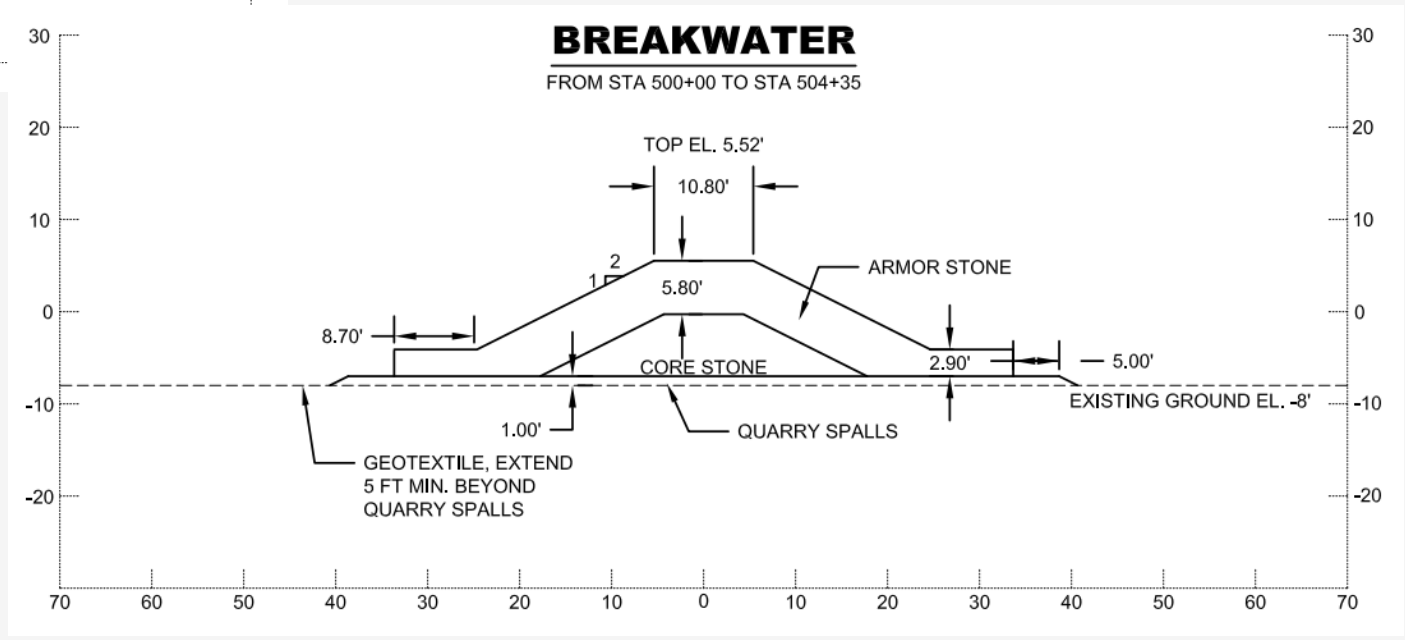


Barren Island Restoration Plan

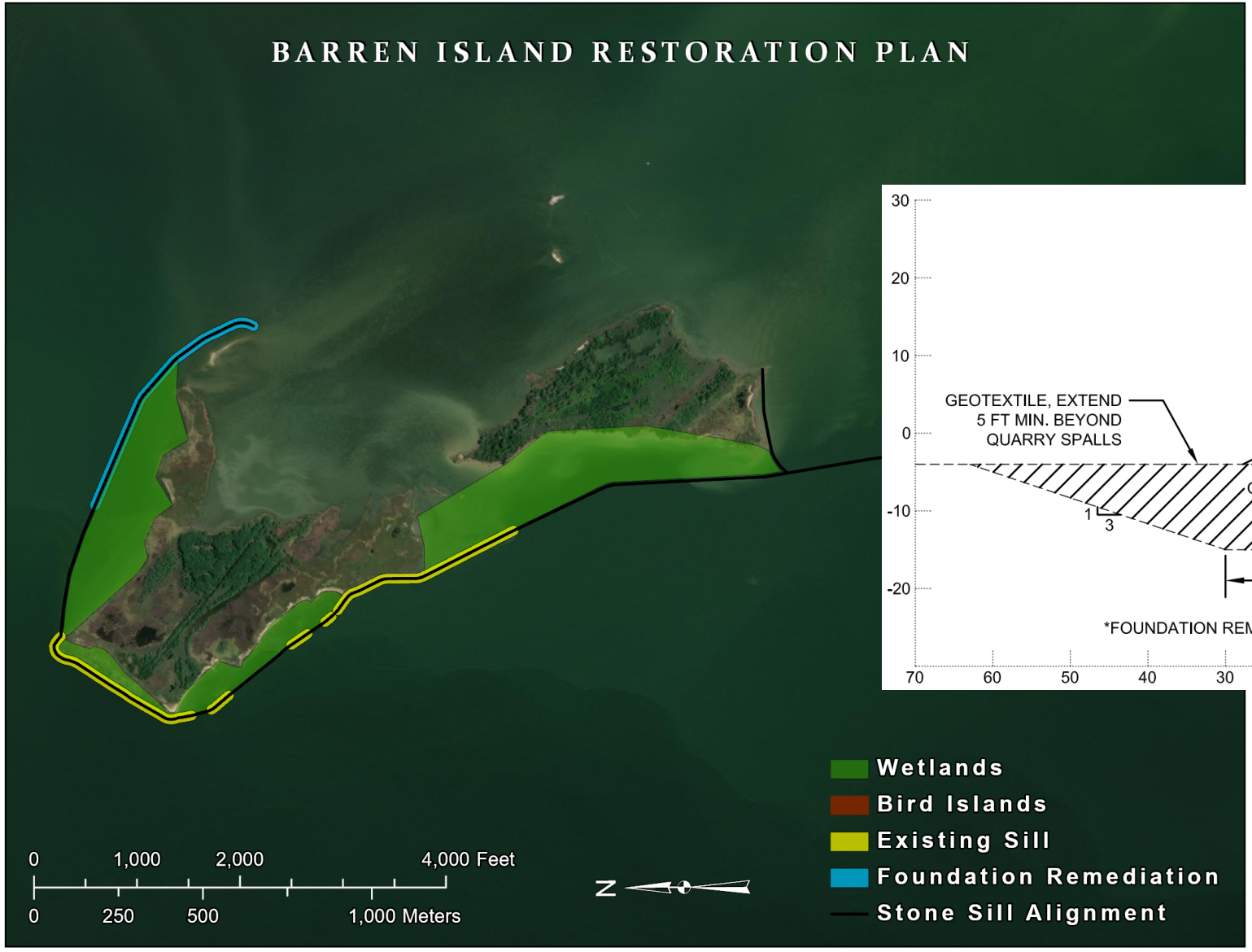
- 13,023 linear feet of sill
- 2,506 linear feet of breakwater
- 2 bird island (8.5 acres total)
- Minimum of 65 acres of wetland and intertidal mudflats

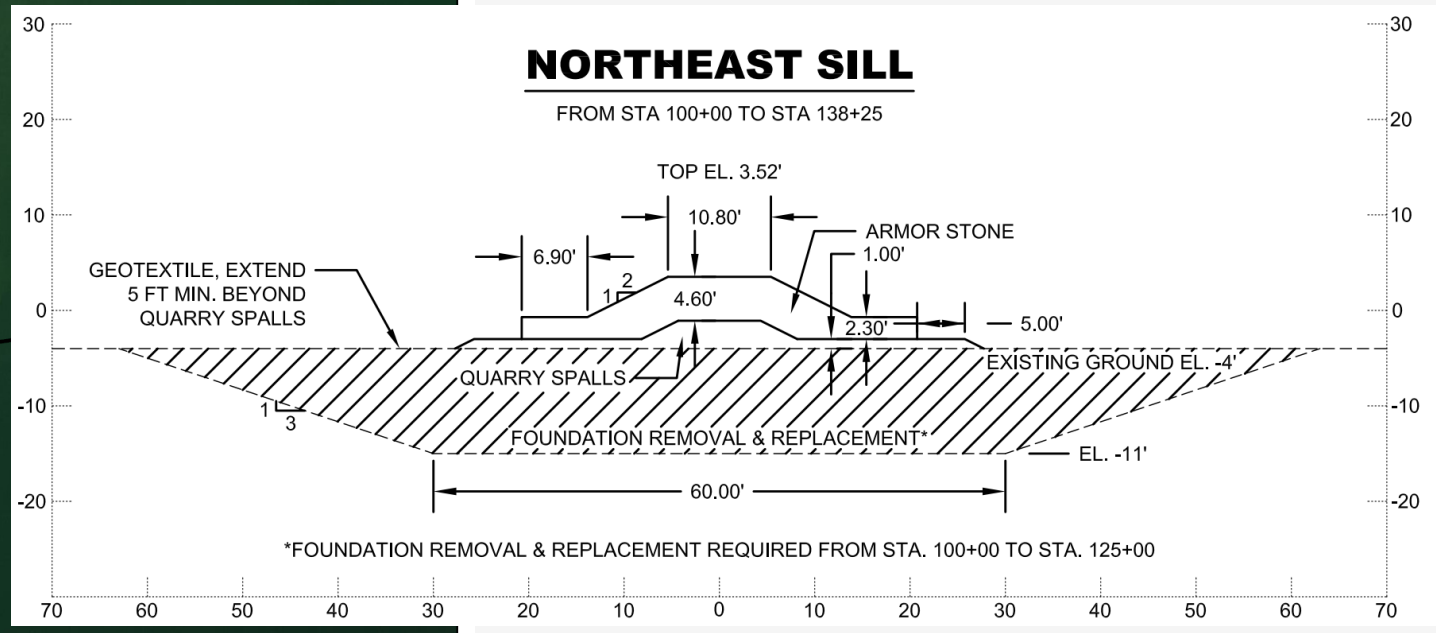
Sill and Breakwater Construction Cross Sections



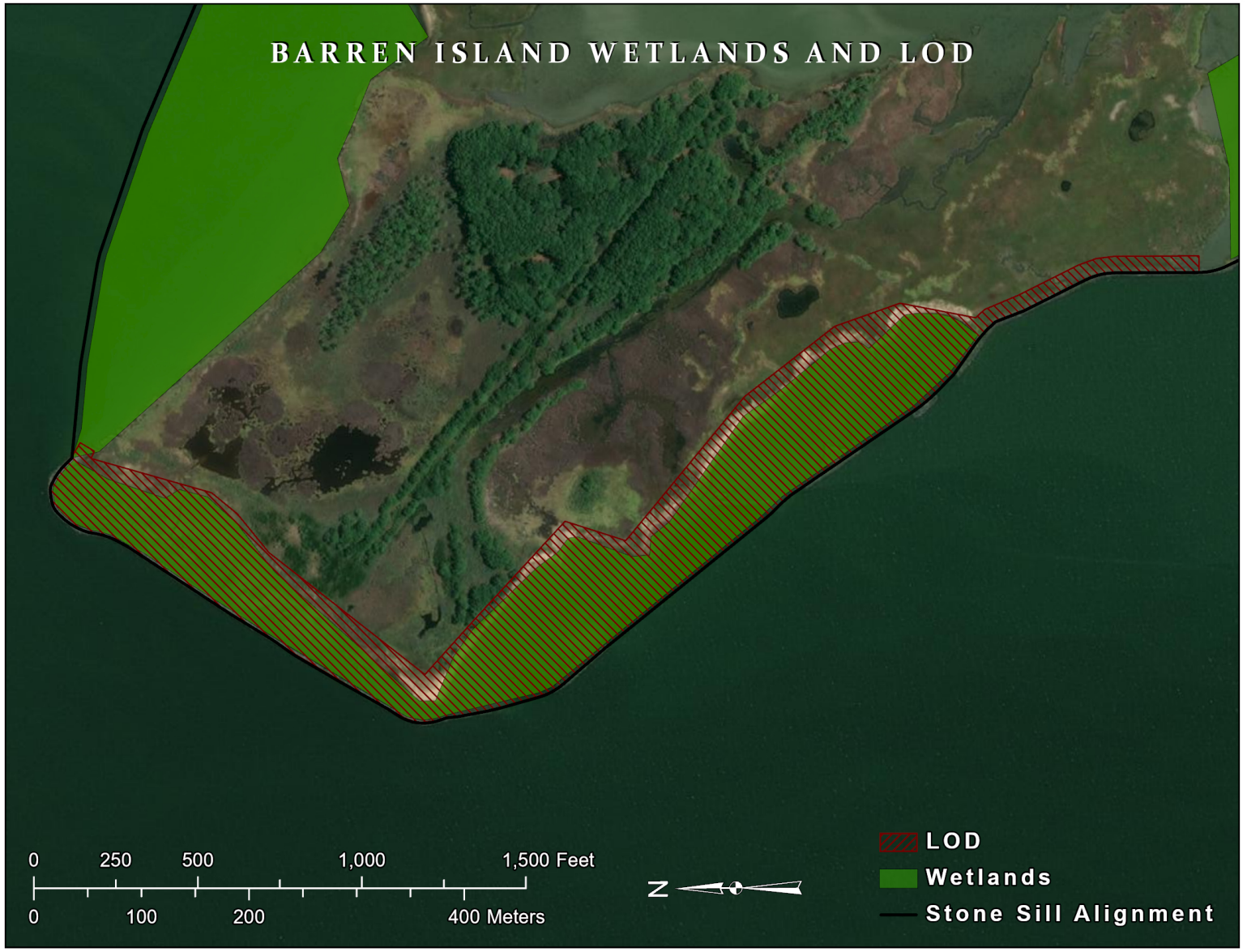


Foundation Replacement

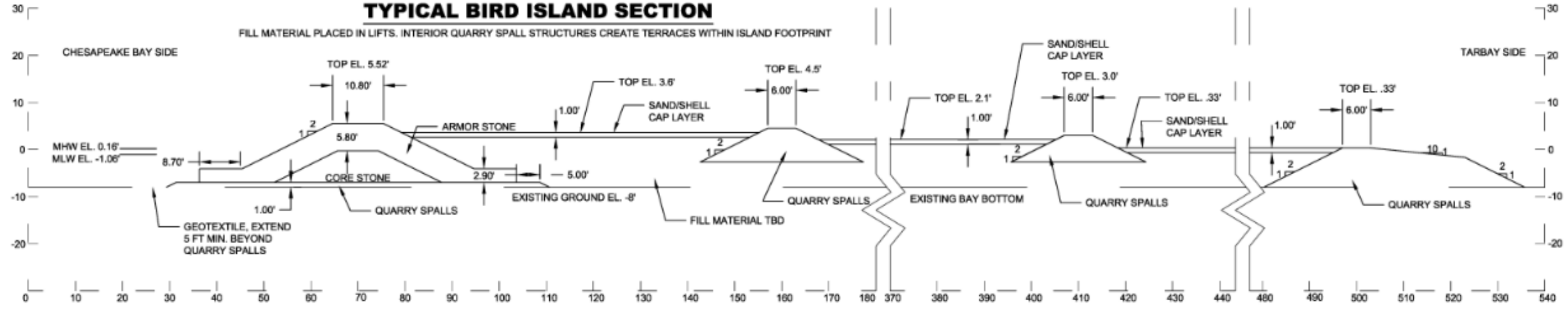




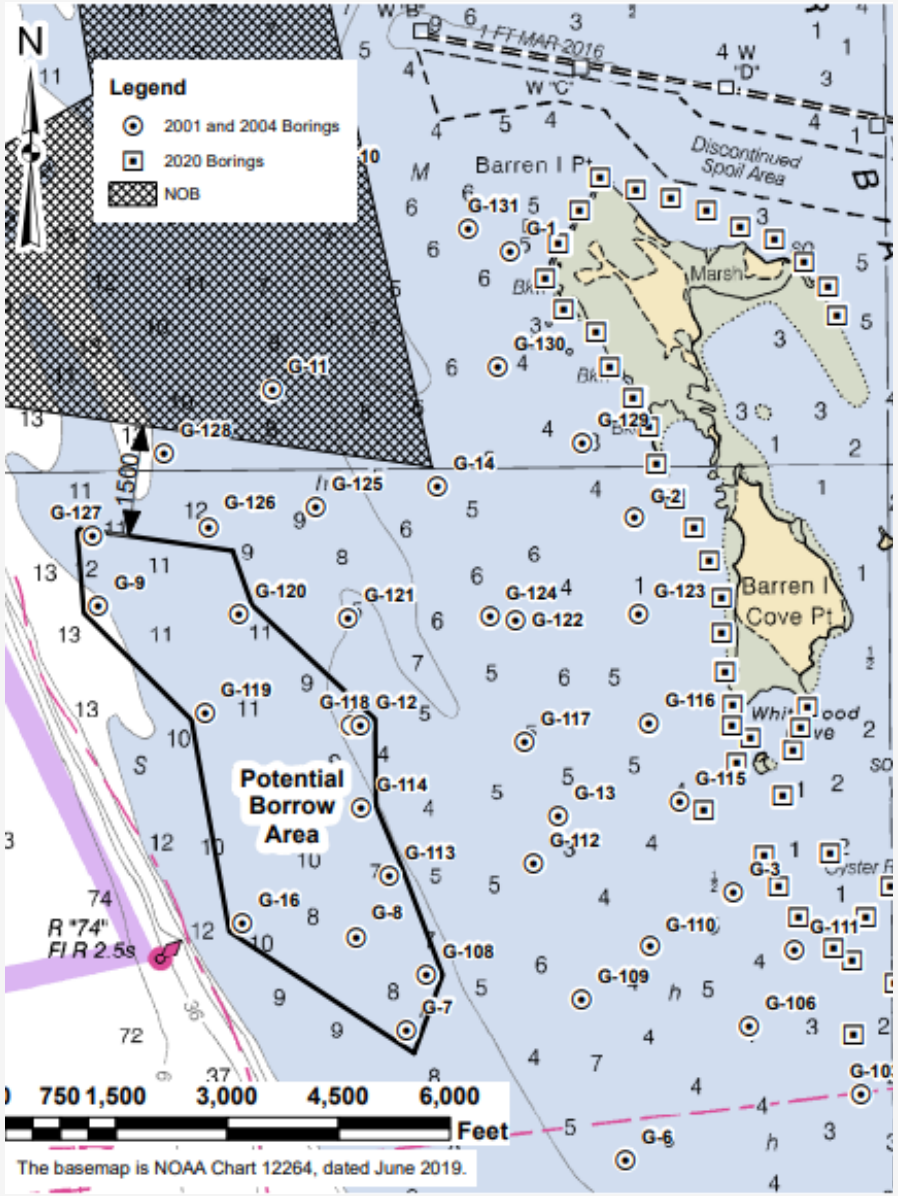
Foundation Material Placement



Bird Islands



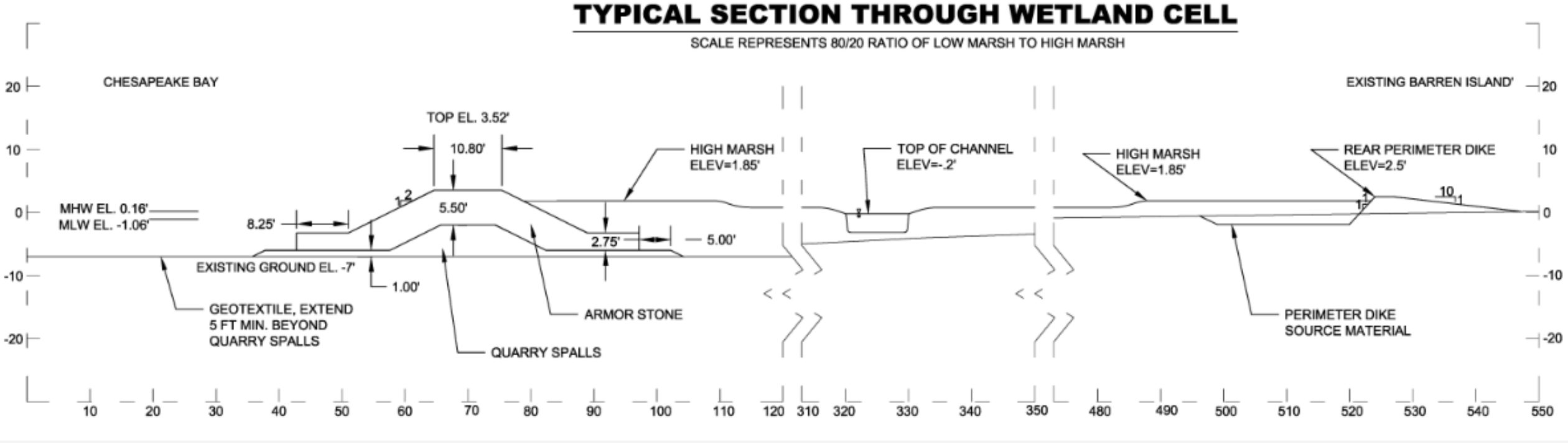
Borrow Area


N
Legend
2001 and 2004 Borings
2020 Borings
NOB
Potential Borrow Area
Barren I P
Discontinued Spoil Area
Marsh
Barren I
Cove Pt
R "74"
Fl R 2.5s
1500
750 1,500 3,000 4,500 6,000
Feet
The basemap is NOAA Chart 12264, dated June 2019.

Alternatives Analysis

Wetland Restoration

Wetland Restoration Cross Section



Questions or concerns?

2021 MDOT MPA SPOTLIGHT SERIES

MARYLAND DEPARTMENT OF TRANSPORTATION
MARYLAND PORT ADMINISTRATION

Wednesday, May 19, 2021
5:30pm EST

Mid-Chesapeake Bay Island Ecosystem Restoration Project

This year marks the 20th anniversary of Maryland's Dredged Material Management Act, a tremendous effort which has guided how we manage dredged material successfully in ways that are good for our economy, our communities, and our environment. Join us for an informative discussion that will spotlight the Mid-Bay Ecosystem Restoration Project, a future dredged material placement site that will restore and expand beneficial island habitat in the Chesapeake. This will be hosted virtually, and is free and open to the public.

For more information click link below or go to **www.maryland-dmmp.com**

REGISTER HERE

FEATURED SPEAKERS

Holly Miller: MDOT MPA

Trevor Cyran: US Army Corps of Engineers

Angie Sowers: US Army Corps of Engineers

Chris Guy: US Fish and Wildlife Service

Moderated by Kristen Keene: MDOT MPA

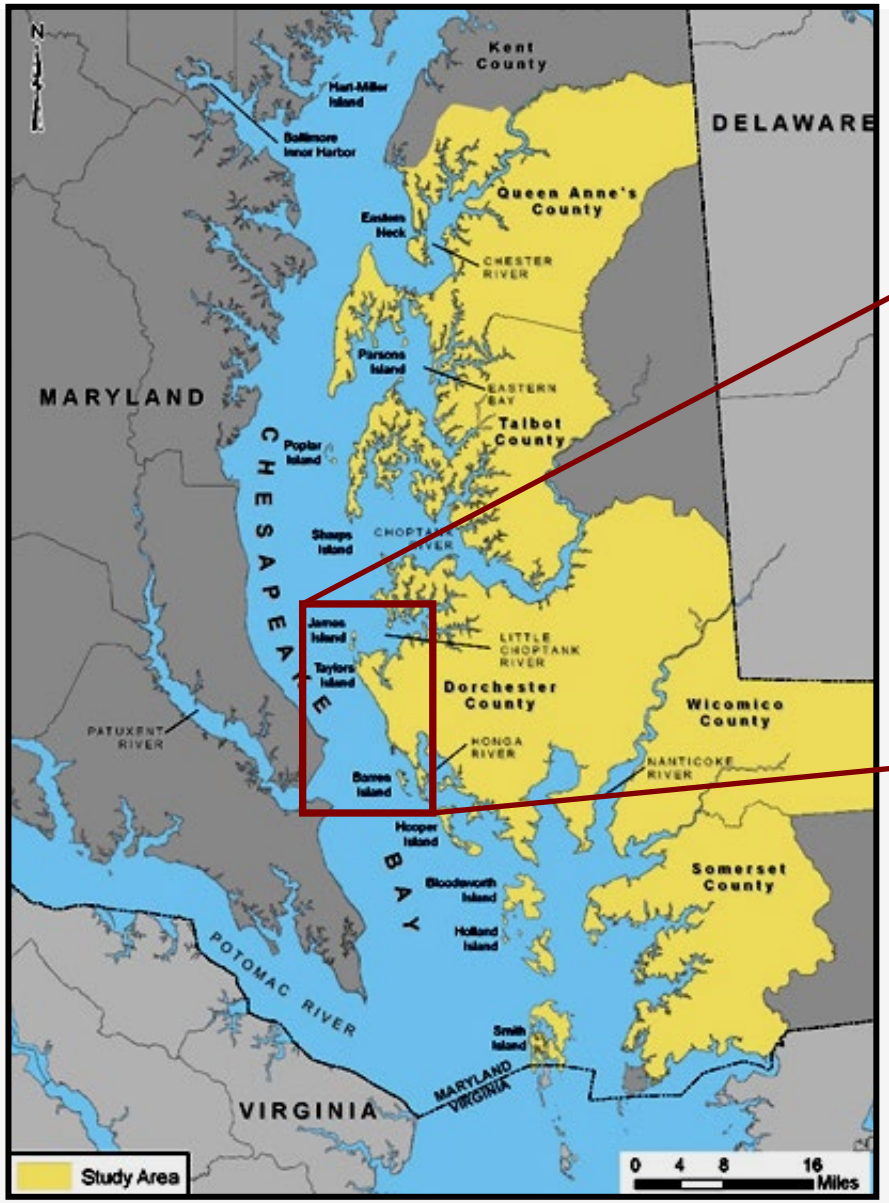
PORT OF BALTIMORE 1706 Helen Delich Bentley

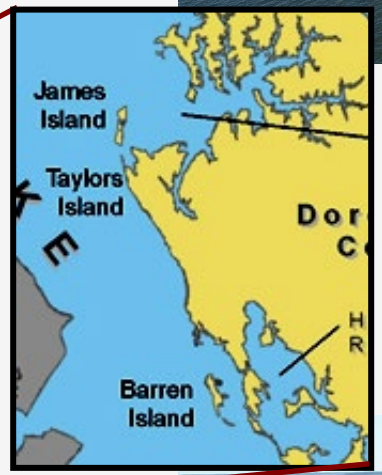
Dredged Material Management Act
Commemorating 20 Years
2001-2021

Maryland-DMMP.com

Project History

Project Location



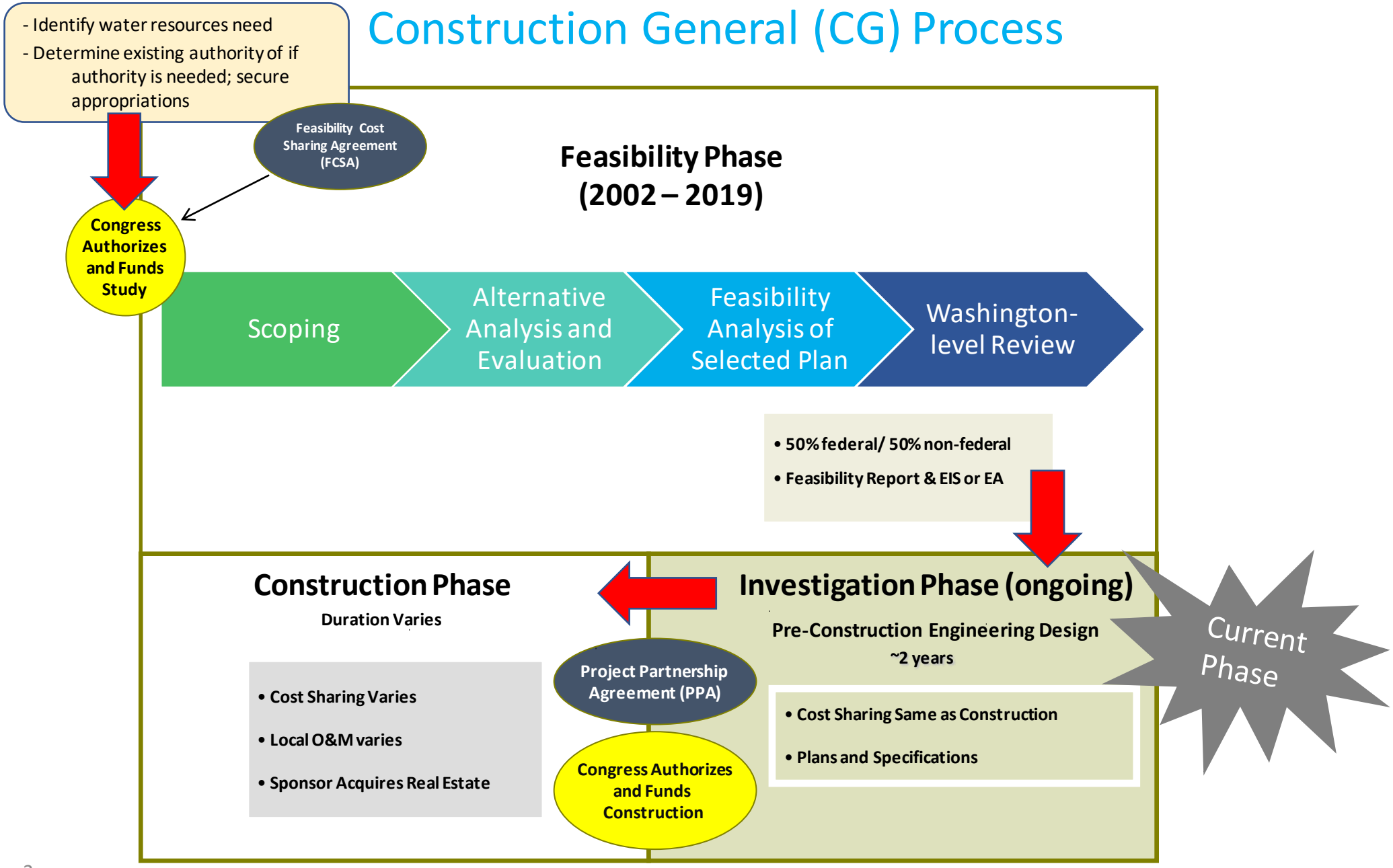


Barren Island is located directly to the west of Upper Hoopers Island in Dorchester County, Maryland

Project Purpose

- Restore and protect wetland, aquatic, and terrestrial remote island habitat for fish, reptiles, amphibians, birds, and mammals;
- Protect existing remote island ecosystems to prevent further loss of island and aquatic habitat;
- Provide dredged material placement capacity for Federal navigation channels;
- Increase wetlands acreage in the Chesapeake Bay watershed;
- Decrease local erosion and turbidity;
- Promote conditions to establish and enhance submerged aquatic vegetation; and
- Promote conditions that support oyster recolonization.

Civil Works General Investigation (GI)/ Construction General (CG) Process



Mid-Bay Integrated Feasibility Report and Environmental Impact Statement (2008)

- Mid-Bay Integrated Feasibility Report and Environmental Impact Statement

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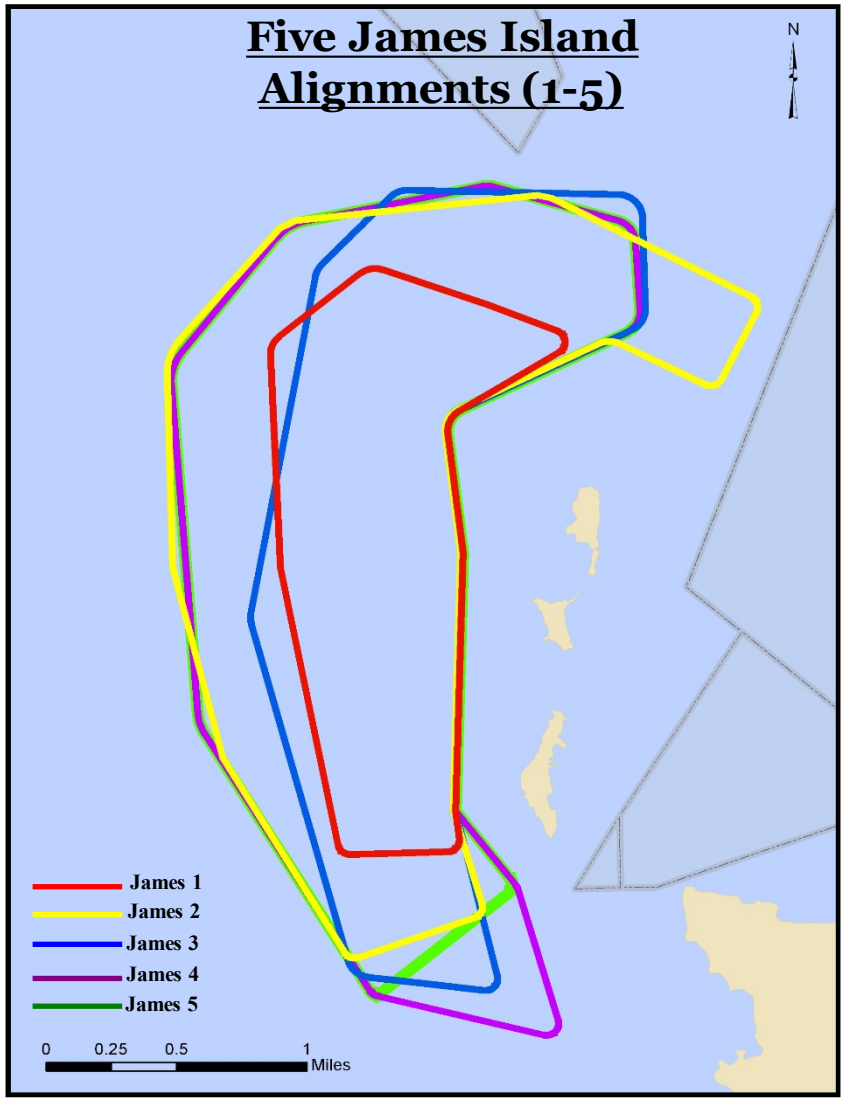
- 105 Potential Island Location → 2 Islands

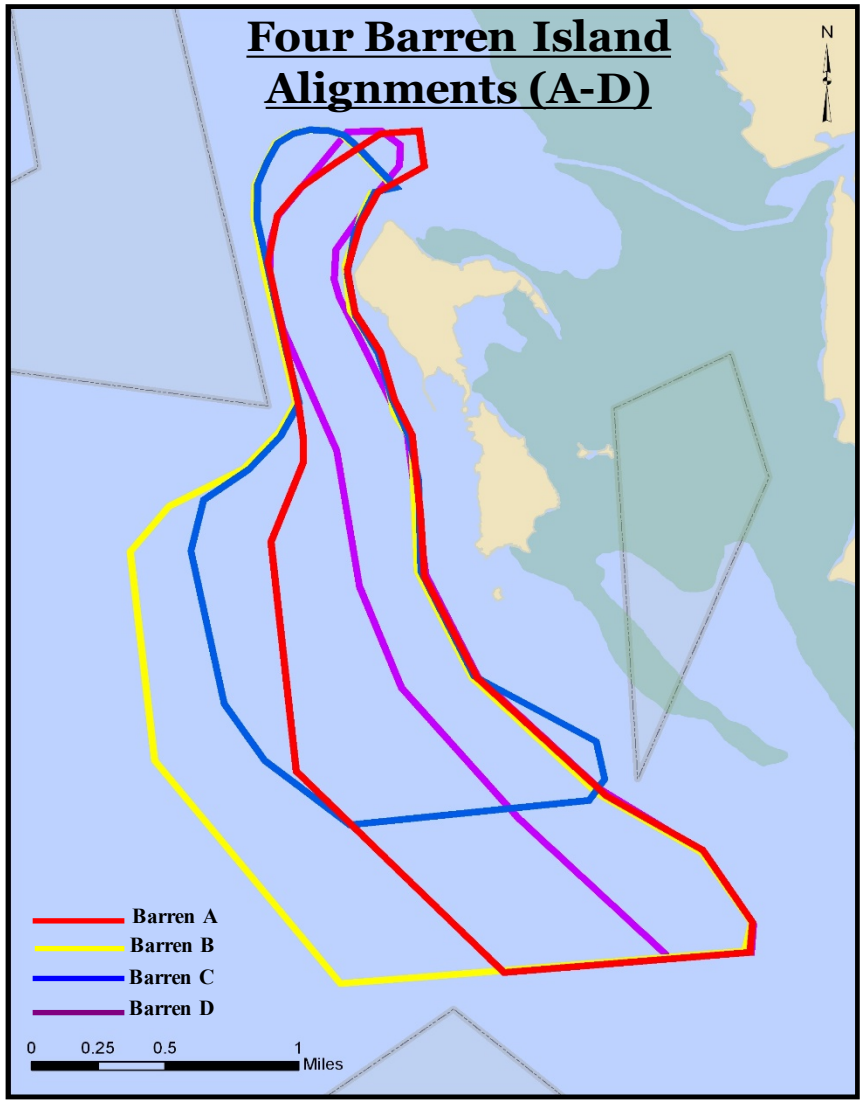
↓

- 2 Islands → 29 Alignments

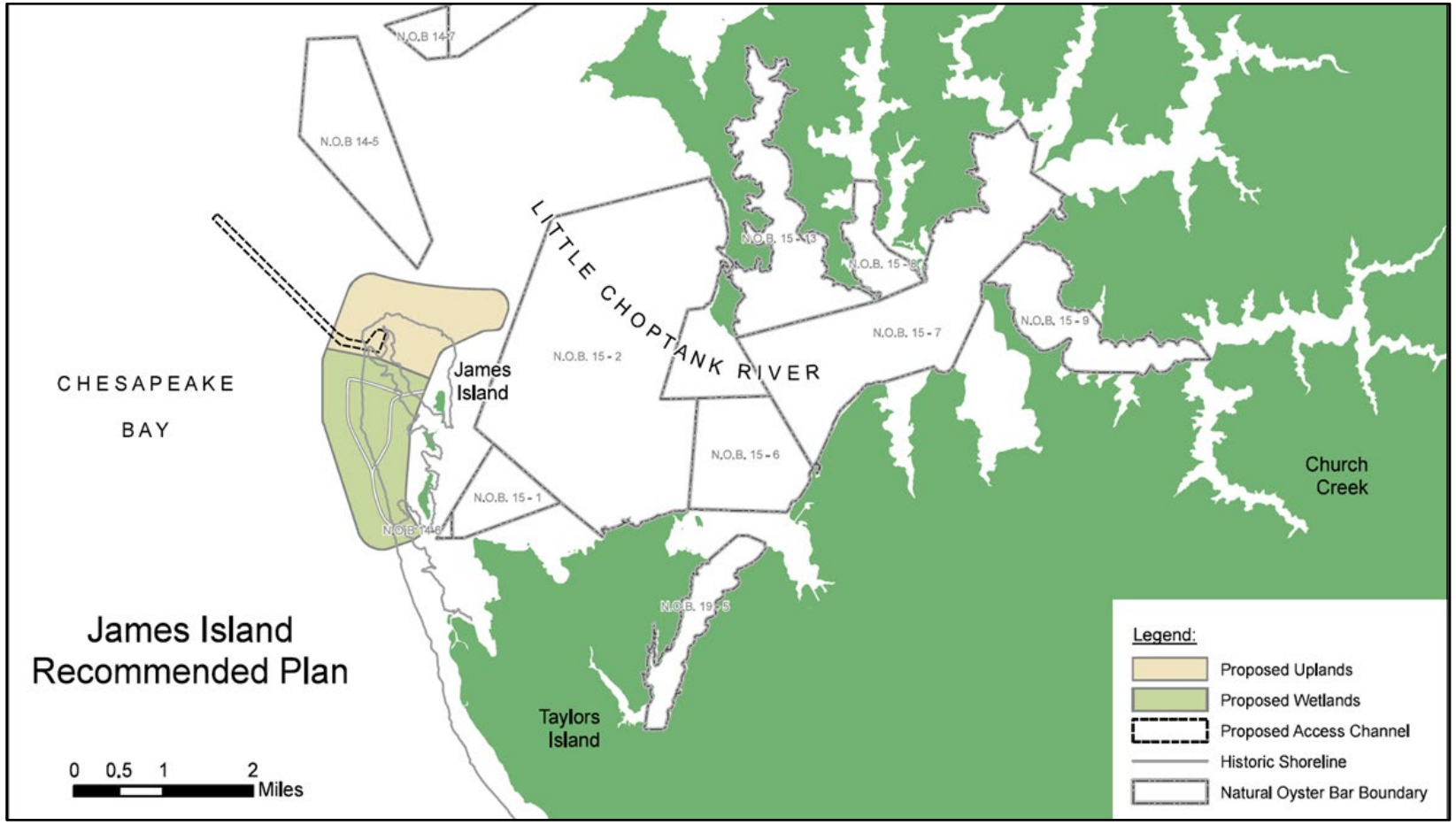
Mid-Chesapeake Bay Island Ecosystem Feasibility Phase Analysis

Alignments Evaluated



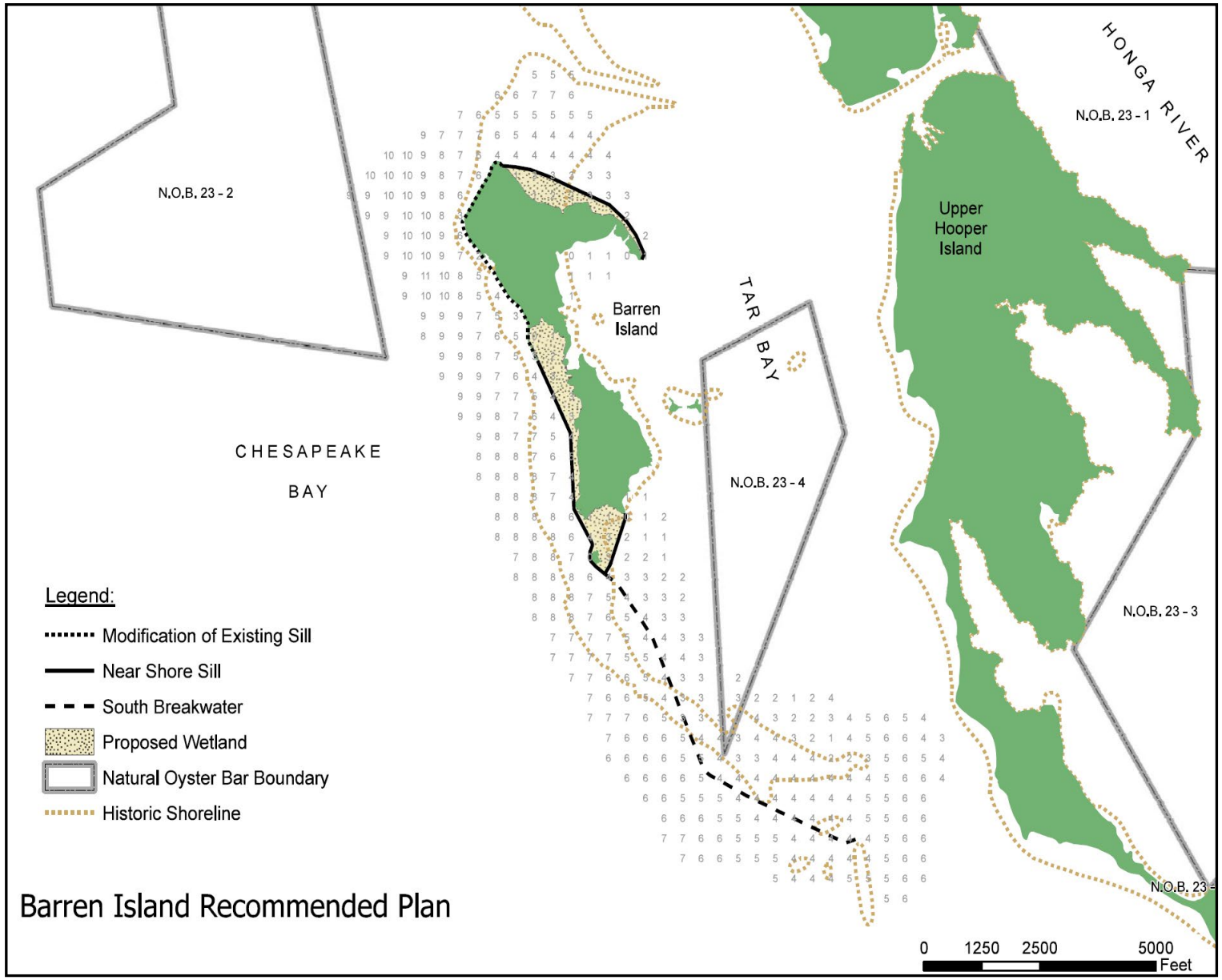


James Island – Recommended Plan (Feasibility)



- 2,072 acres
- 55% wetland, 45% upland
- Upland dike height: 20 ft
- Access Channel Dredging
- Capacity: 90-95 mcy
- Placement Duration: 28-30 years
- Design Features
  - Tidal channels through wetlands
  - Freshwater ponds
  - Intertidal/unvegetated mudflats
  - Bird nesting structures

Barren Island – Recommended Plan (Feasibility)



- 72 acres of wetland restoration, plus protection of existing island remnants and seagrass beds
- Sill height: 4 ft
- Southern Breakwater height: 6 ft
- Capacity: 0.38 mcy
- Placement Duration: ~7 years
- Design Features:
  - Existing sill modifications (4,900 ft)
  - Northern sill construction (9,760-ft)
  - Southern breakwater construction (8,200-ft)

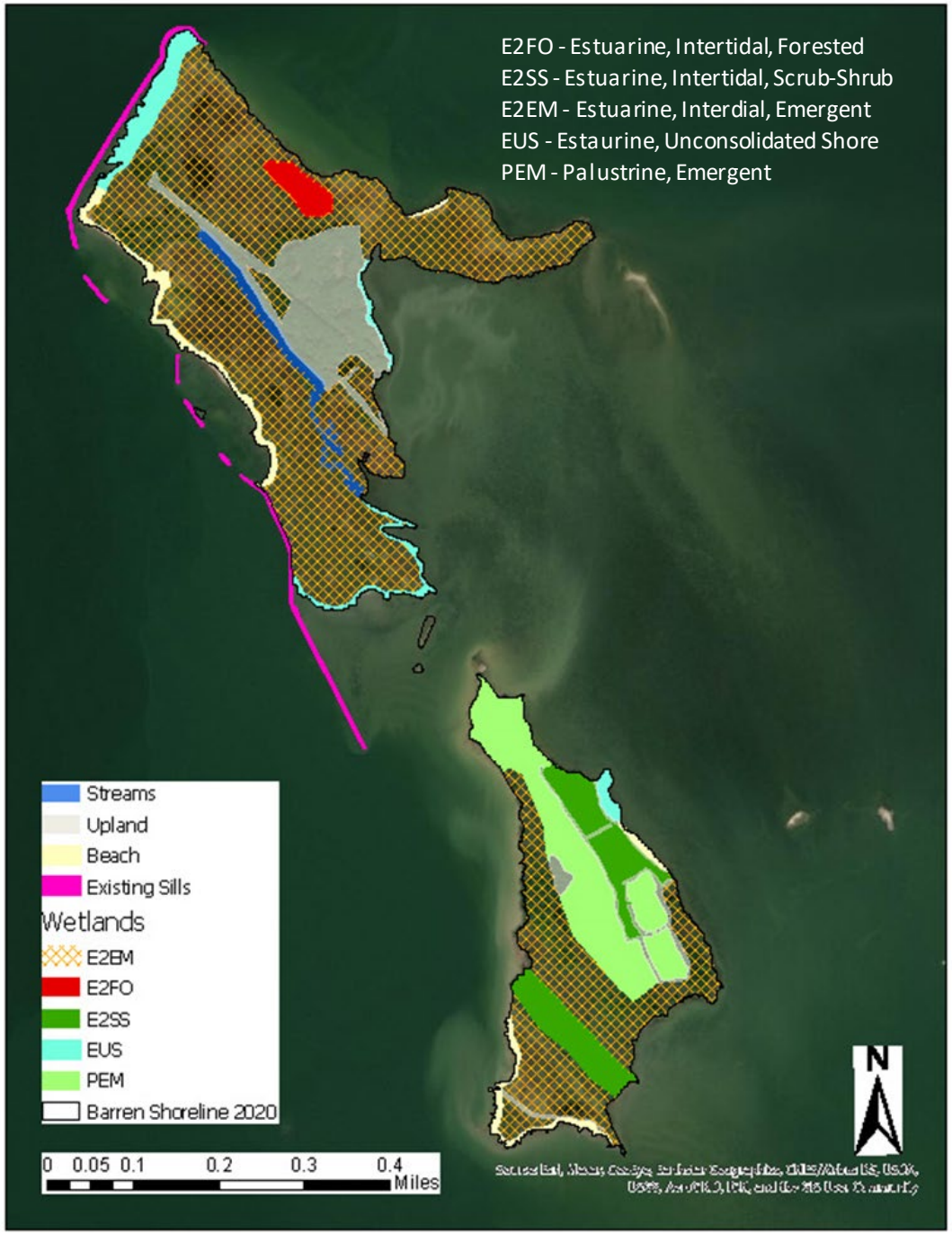
PROJECT OVERVIEW

BARREN ISLAND COMPONENT

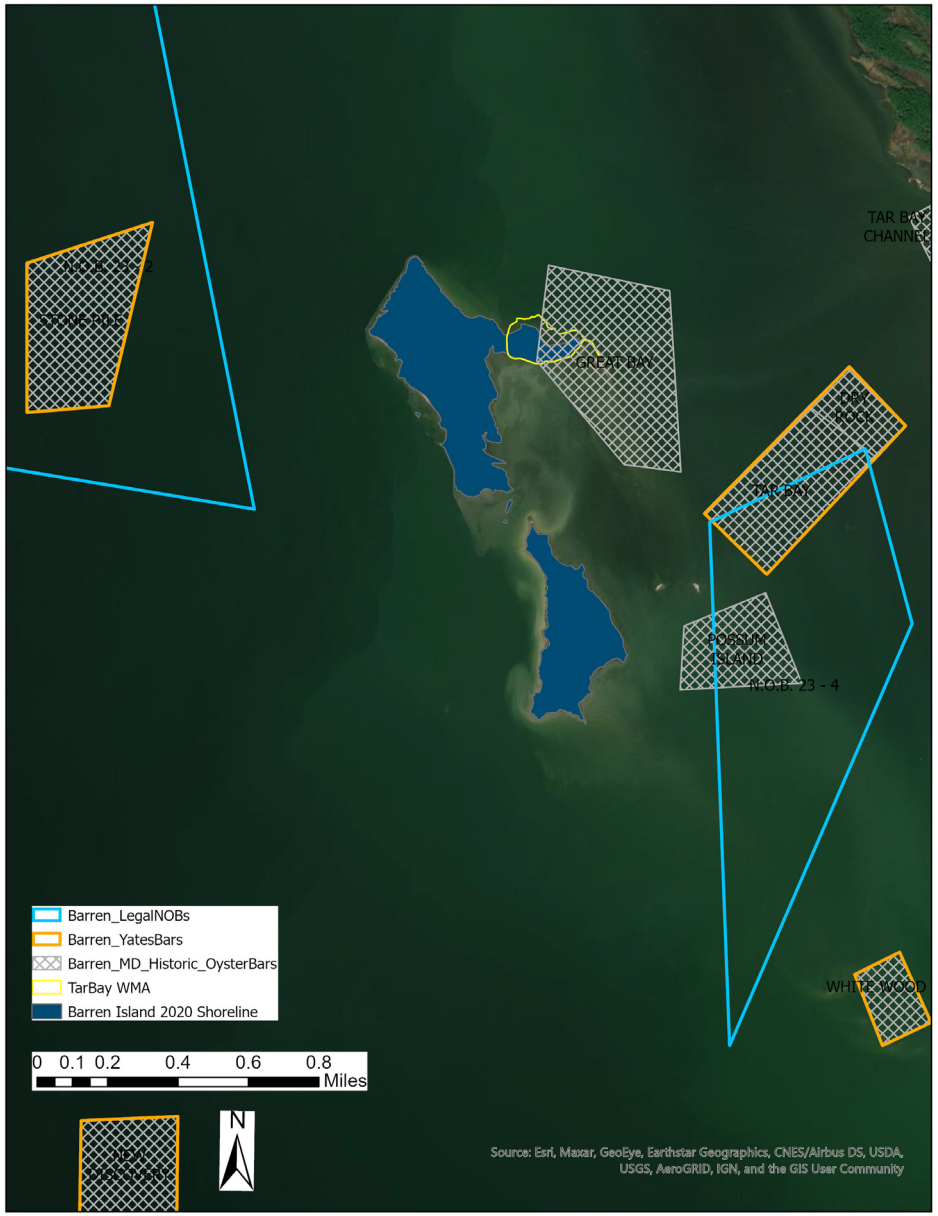
Barren Island: Current Conditions

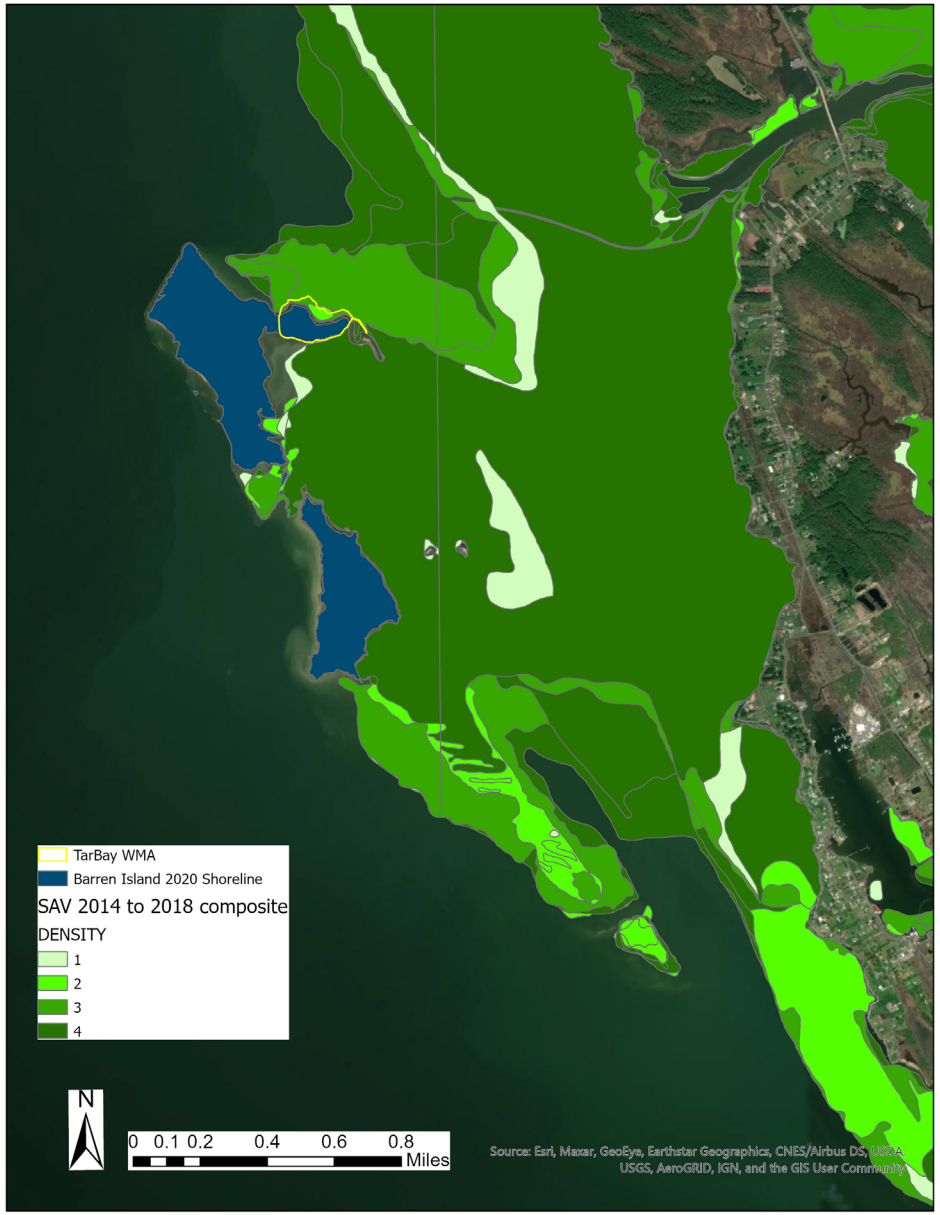
- 138 acres

- Variety of habitats including:
  - Unconsolidated shore
  - 118 acres of wetlands
    - Emergent (75% of wetlands), shrub scrub, forested, and palustrine wetlands
    - Greater diversity of wetland types on southern remnant
  - 3.5 acres of beach
  - 14.5 acres of uplands
  - 2 acres of wetlands
  - Existing sills to the west (protect previous shoreline restoration projects)



Current Conditions: Oysters and SAV



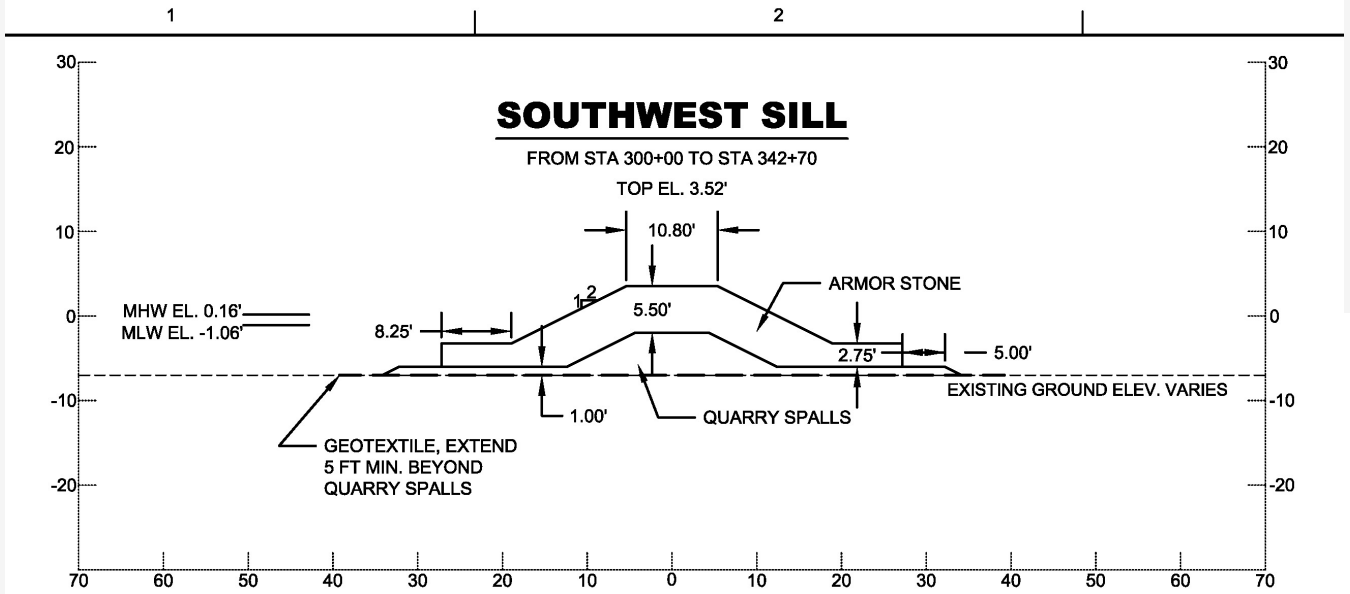


Barren Island Restoration Plan

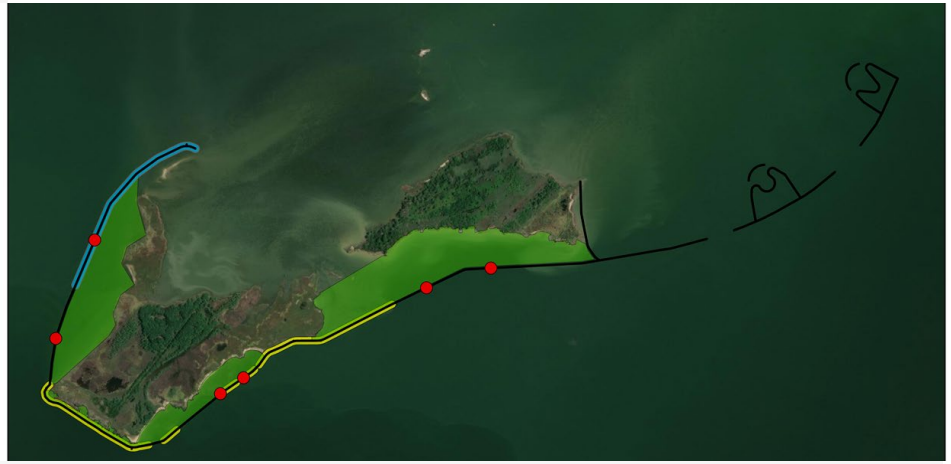
- 13,023 linear feet of sill
- 2,506 linear feet of breakwater
- 2 bird island (8.5 acres total)
- Minimum of 65 acres of wetland and intertidal mudflats

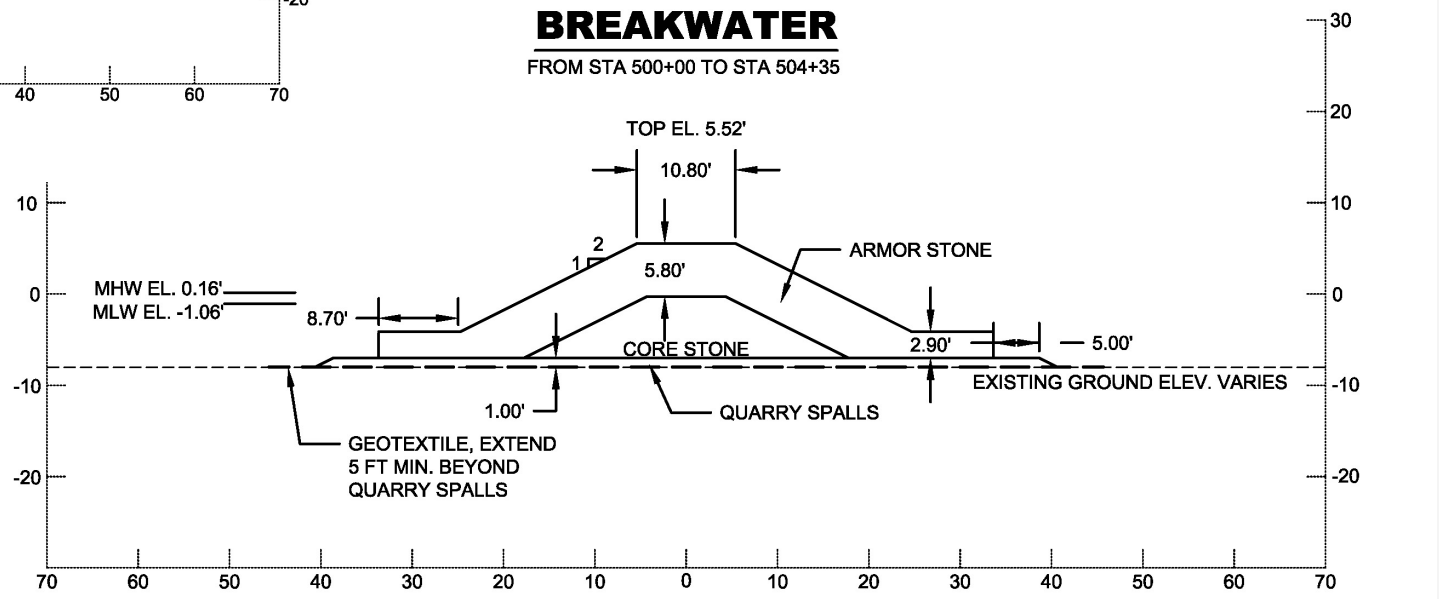
Alternatives Analysis

Sill and Breakwater Construction Cross Sections

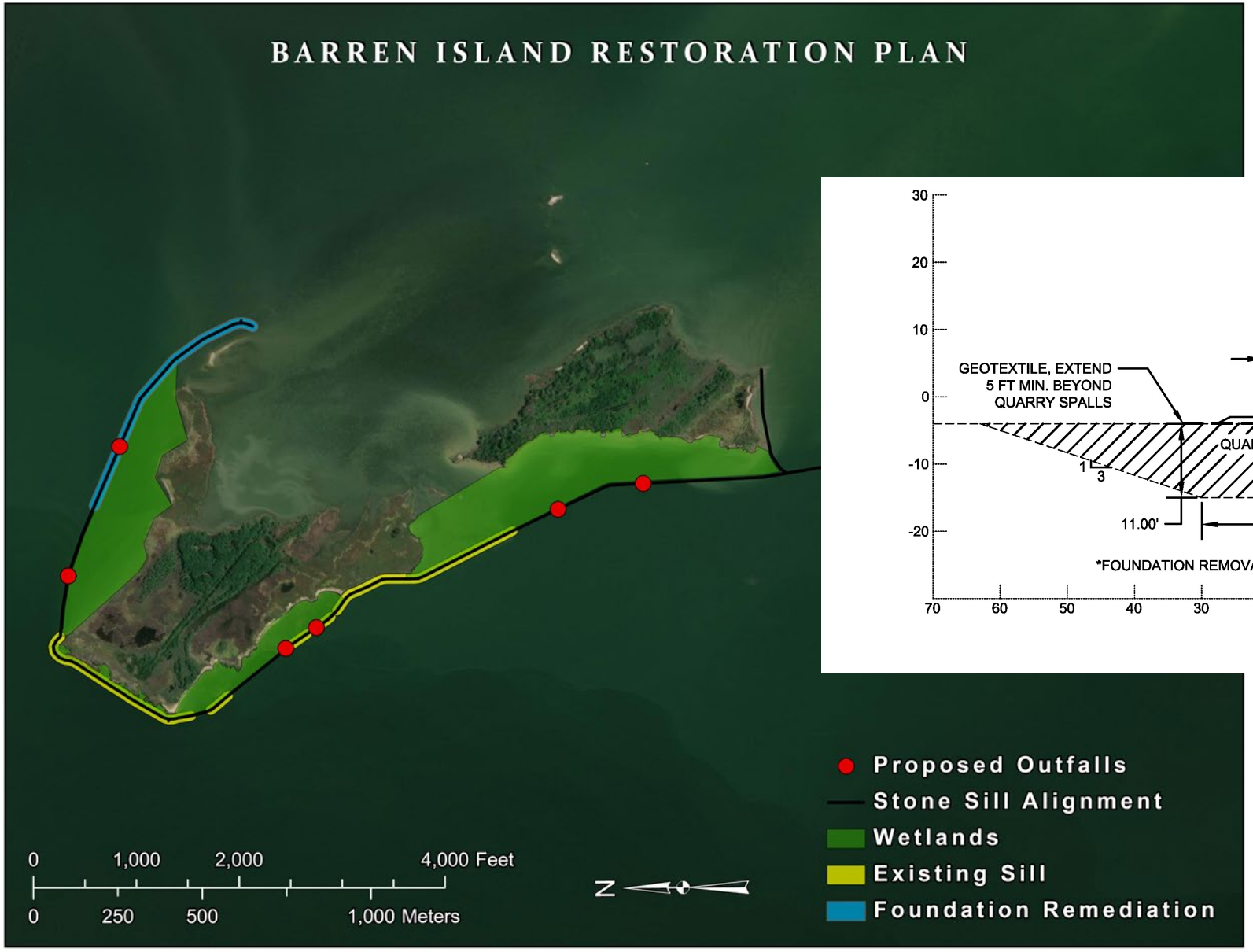


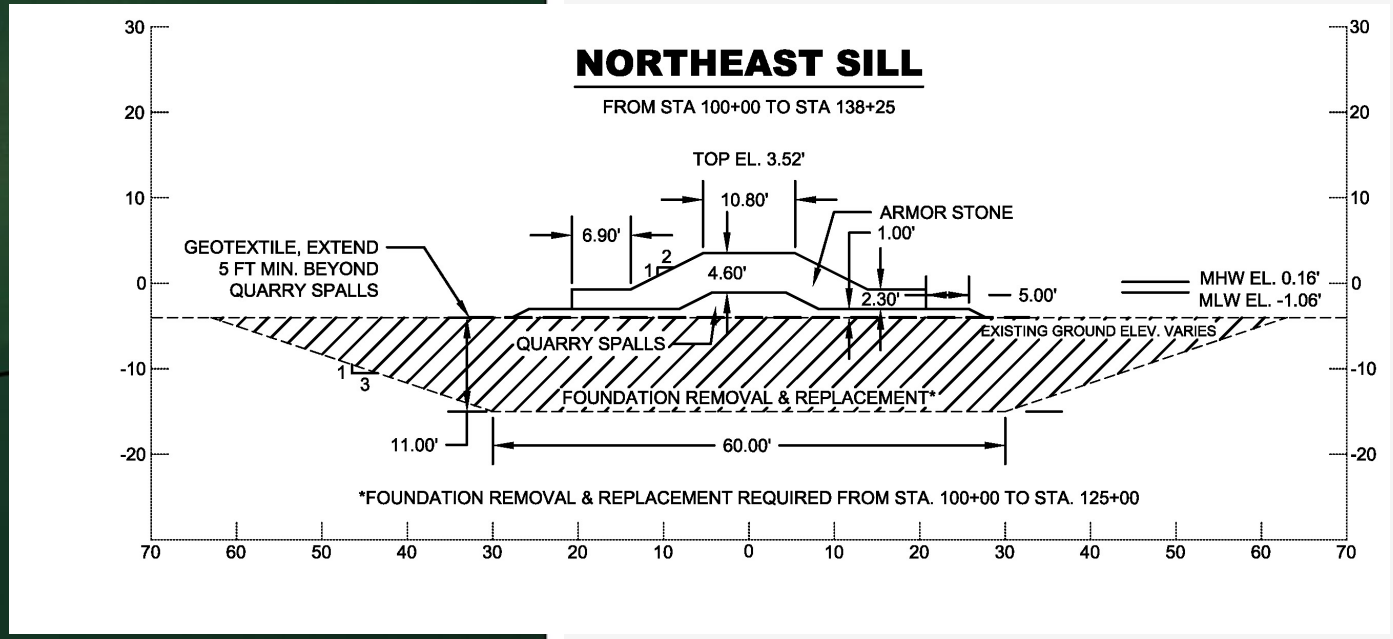
Sills - top elevation of 3.52”
Breakwater – top elevation of 5.52”



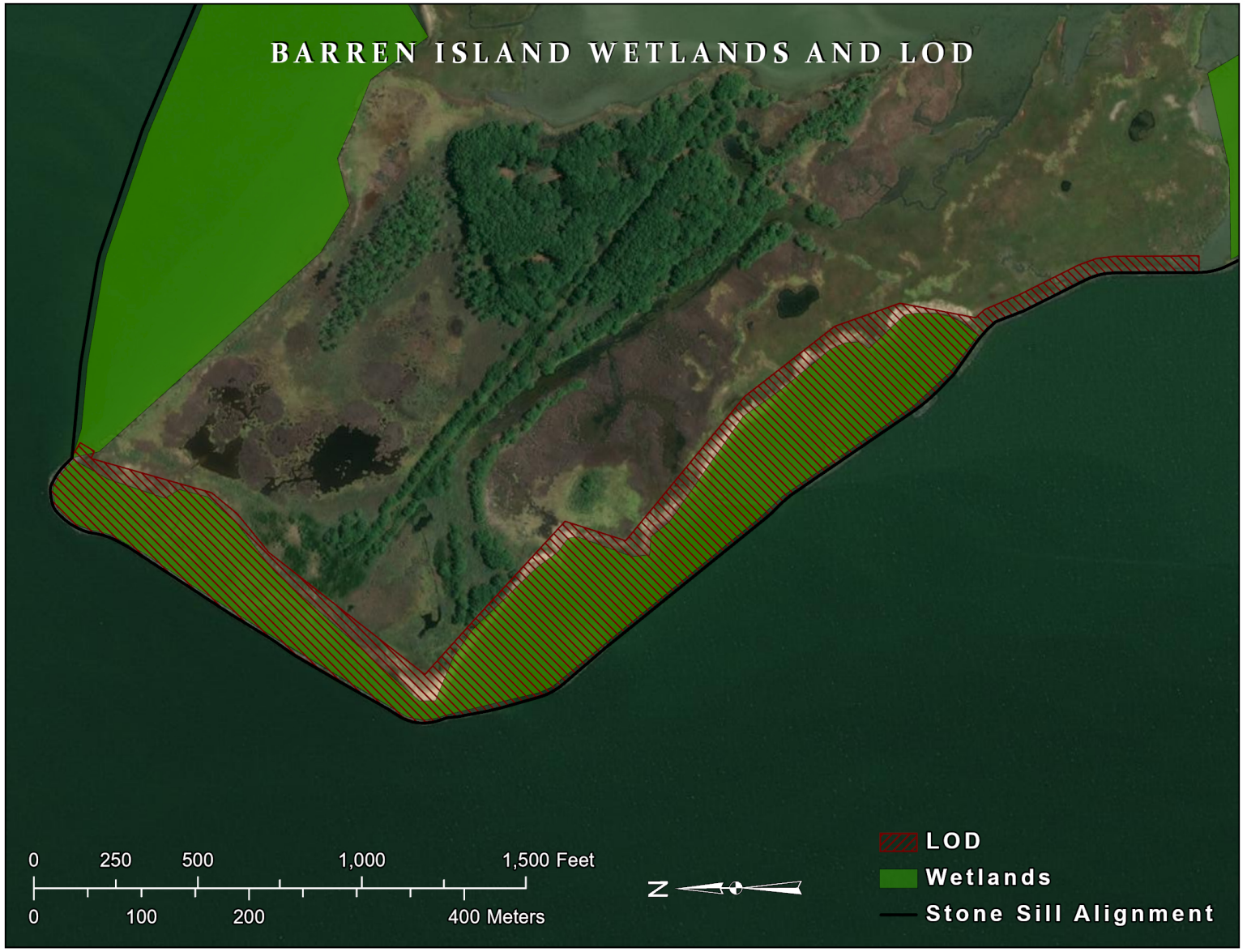


Foundation Replacement





Foundation Material Placement – Wetland Restoration on Northwest



IMPACTS and BENEFITS

Wetland Restoration and Habitat

Wetland Restoration (maximum potential):

- Northwest = 12.4 acres
- Northeast = 22.2 acres
- Southwest = 42.5 acres

TOTAL = 77 acres

Nesting bird island habitat restoration = 8.5 acres

Conserve existing 138 acres of island

Preservation of conditions to support SAV

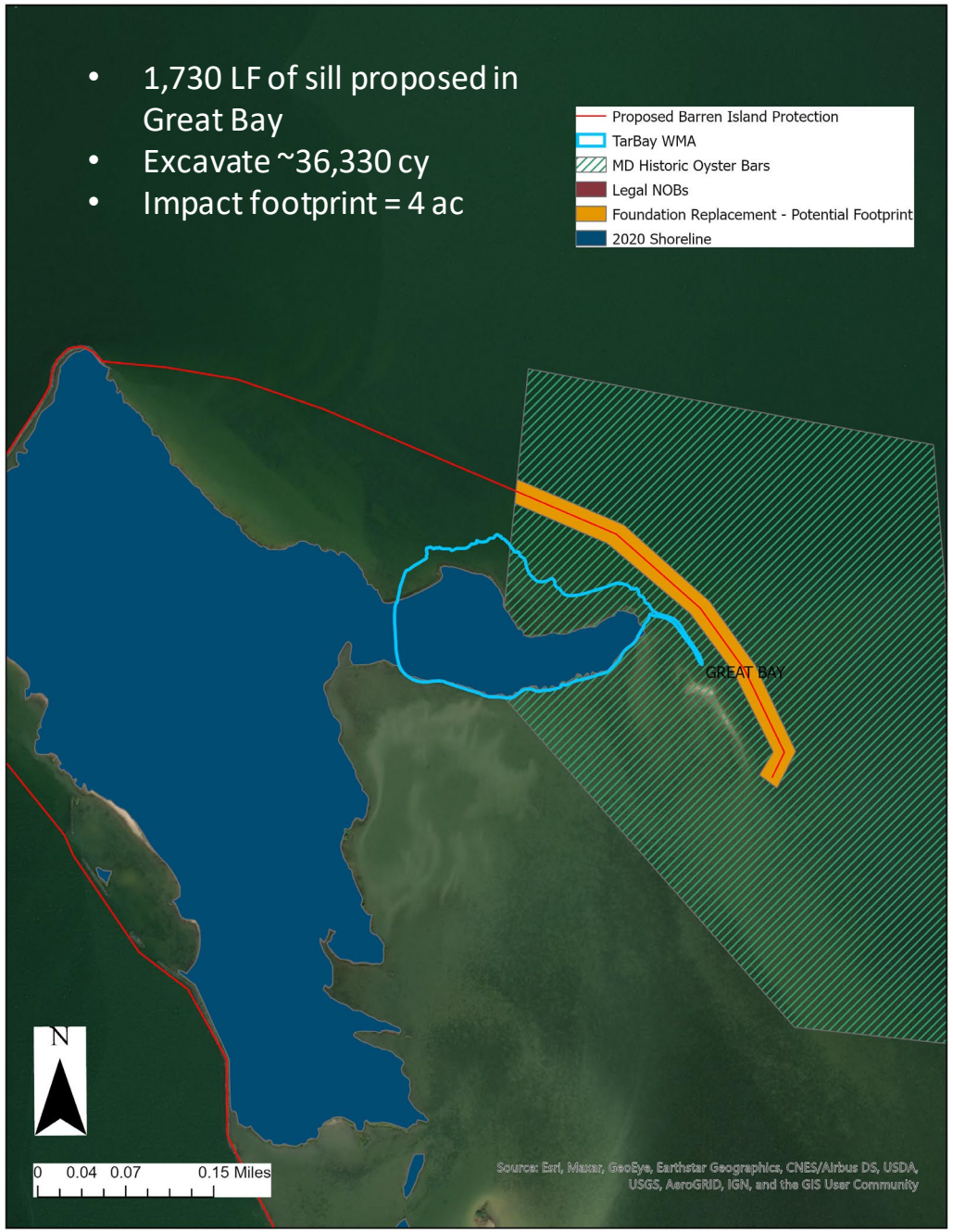
Wetlands impacted by wetland restoration = 1.0 acres

Shallow-water habitat conversion to wetlands and bird islands = 84.5 acres

Shallow-water impacts (sills and breakwater structures) = 30.4 acres

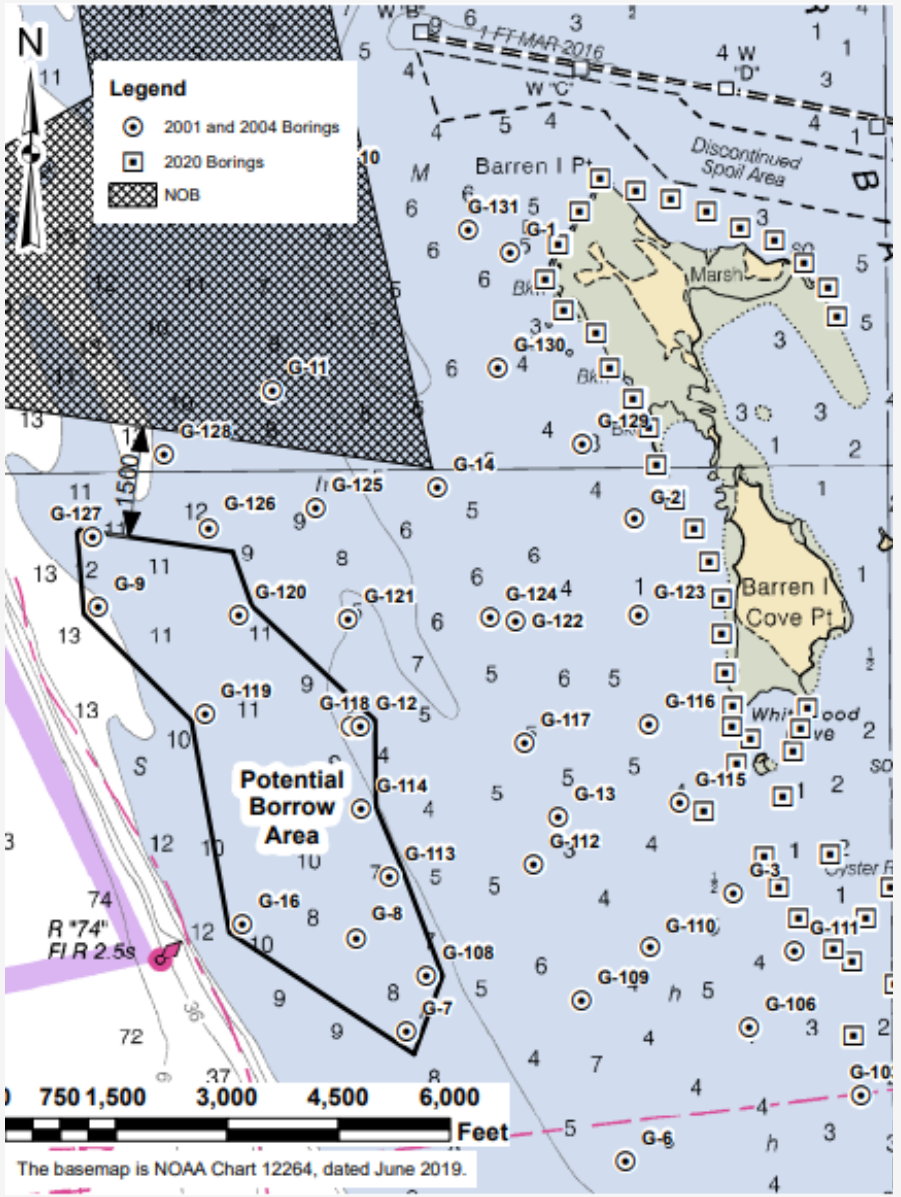
Potential Oyster Impacts

- 1,730 LF of sill proposed in Great Bay
- Excavate ~36,330 cy
- Impact footprint = 4 ac



Borrow Area

- Purpose: acquire sand for foundation replacement under northeast sill, creation of bird islands, and temporary dikes for wetland restoration
- Work is ongoing to determine extent of borrow area that would be needed to provide material needed



NEPA Considerations (National Environmental Policy Act

Development of a supplemental Environmental Assessment

Environmental Compliance

- Draft Feasibility Study/EIS was released in August 2006; ROD signed 2019
- Received highest rating (lack of objections) from US Environmental Protection Agency
- No major objections or comments were received
- During process of updating NEPA in 2017 to enable ROD to be signed, it was decided with relevant agencies to complete update during design phase
  - Essential Fish Habitat
  - Endangered Species Act
  - Fish and Wildlife Coordination Act
  - Clean Water Act – Section 401 and 404
  - Critical Area Commission
  - Cultural

Environmental Surveys – Sampling Plan

James and Barren Island

Survey Type	Spring 2021	Summer 2020	Fall 2020	Winter 2020 - 2021	Spring 2021	Summer 2021
Water Quality/Nutrient		√	√	√	May	
Benthic Invertebrate		√	√		May	
SAV	√				2021	
Fisheries						
Bottom Trawl		√	√	√	May	
Beach Seine*		√	√	√	May	
Gillnet		√	√	√	May	
Pop Net			√		May	
Soft-shell and Razor Clam			√			
Pound Net Telephone Survey***			√			
Commercial Harvest Data Collection				√		
Crab Pot Survey^		√			May, June, July	
Avian						
Avian surveys - point counts		√			April/May	
Avian surveys - wetlands - SHARP					May, June	July
Avian surveys - passive listening counts/flushing survey				√		Aug, Sept
Predatory mammals				√		Aug, Sept

To be conducted by Anchor QEA

To be completed through FWCA - FWS or subcontractor (Audubon or APHIS)

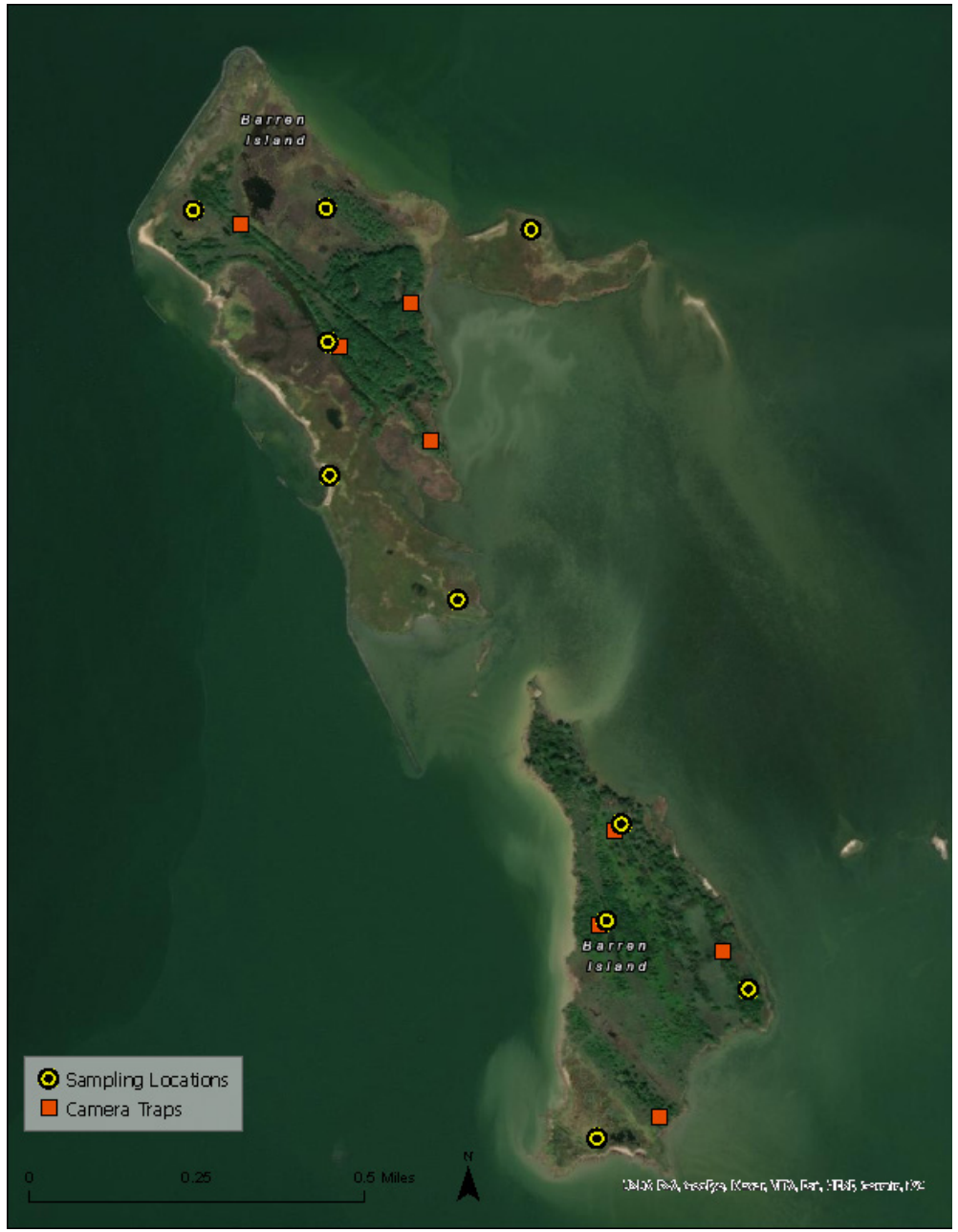
To be completed by DNR

James Island – some initial results

- No terrestrial habitat left – survey included shoreline, mudflat, salt marsh, and open water
- Target locations (sampling locations from feasibility-phase surveys) no longer exist
- Because of lack of habitat diversity, the species list was mostly water birds and shorebirds.
  - Six species of sandpiper/plover - sanderling, spotted sandpiper, semipalmated sandpiper, least sandpiper, semipalmated plover, and ruddy turnstone
  - Gulls, terns, pelicans, and cormorants
  - Fish-eating raptors (osprey and eagle)
- Some locations for fisheries surveys were not able to be sampled due to current conditions

Barren Island – some initial results

- Habitats were more diverse –survey included shoreline, mudflat, salt marsh, and open water plus forest and scrub shrub
- Marsh habitat
  - Hundreds of brown pelicans and double-crested cormorants
  - Shorebirds - sanderling, spotted sandpiper, and semipalmated plover
  - Terns, gulls, and raptors, plus some clapper rails and wading birds in the marshes
  - Terrestrial birds included migrant warblers, flycatchers, hummingbirds, resident brown-headed nuthatches, Carolina wrens, pine warblers, and cardinals



Initial Avian and Predatory Mammals Surveys

Mammals observed Jan 7, 2022

- Red Fox (visual and sign)
- Raccoon (sign)
- River Otter (sign)
- White tailed deer (visual and sign)
- Muskrat (sign)
- Also noted – remains of 1 box turtle and 2 diamond back terrapins

Barren Island NEPA – Next Steps

- Summer 2021 – Complete biological surveys

- Now through July 2021 – Conduct relevant coordination to enable completion of draft assessments for inclusion in supplemental Environmental Assessment (EA)
  1. Essential Fish Habitat,
  2. Endangered Species biological assessment,
  3. Clean Water Act 404(b)(1) Analysis,
  4. Critical Areas Commission response

- July 2021 – Complete draft supplemental EA for internal review

Project Schedule

Mid-Bay Project Phases (Barren and James Island Components)

- Reconnaissance and Feasibility Studies – Identified Recommended Plans – Completed 2008 – Record of Decision signed in 2019
- Pre-Construction Engineering and Design – 2020-2024
- Sill and Breakwater/Exterior Dike Construction Following PED Phase & Funding Availability – ~2022-2028
- Continued Construction (including habitat development) and Operations and Maintenance Activities - ~2024-2065

Barren Island NEPA Schedule

- Permitting – April 2021 – April 2022
- 35% Design Complete – April/May 2021
- 65% Design Complete – October 2021
- NEPA: EA Public Review – December 2021
- Signed FONSI (Finding of No Significant Impact) – March 2022
- Construction Begins – Summer 2022

About Wetlands

Public Notices

MARYLAND DEPARTMENT OF THE ENVIRONMENT
WATER AND SCIENCE ADMINISTRATION
1800 WASHINGTON BOULEVARD
BALTIMORE, MARYLAND 21230

Notice of Application for State Wetland Licenses, Private Wetland Permits, Nontidal Wetlands and Waterways Permits and/or Water Quality

Certification and the Opportunity to Provide Written Comment or Request an Informational Hearing

November 15, 2021

The Water and Science Administration has received the applications listed below. A preliminary review has indicated that the listed projects may be subject to the opportunity for a public hearing once the application is substantially complete. Projects may be significantly altered during the review process. The applications and related information are available for inspection and copying. You may also request written notice of any hearing opportunity by having your name placed on the interested persons list for each project in which you are interested. To inspect the file or to have your name placed on the interested persons list, contact the assigned division at the telephone number indicated below or send an email to the assigned reviewer no later than December 15, 2021, unless otherwise noted in the Public Notice.

Wetlands and Waterways Program - (410) 537-3837

Nontidal Wetlands Division - (410) 537-3456

Baltimore, Cecil, and Harford Counties

201960846/19-NT-0150: MARYLAND TRANSPORTATION AUTHORITY, 300 Authority Drive, Baltimore, Maryland 21222 has applied for a Modification to 19-NT-0150. The modification request includes design changes such as an additional stormwater management facility along southbound I-95 south of MD 152, addition of a floodwater attenuation facility located near Old Joppa Road, various other design changes to erosion and sediment control and stormwater management facilities, culvert and outfall improvements, and stream channel stabilization throughout the corridor. Also included is revised design of I-95 NB widening and a noise wall between MD 24 and Bynum Run, geotechnical borings associated with a potential Park and Ride facility located near Old Mountain Road adjacent to I-95, and clearing of trees within a wetland, buffer, and floodplain along MD 7C in Cecil County. The modification also includes minor changes to impacts at the Eccleston Mitigation Site as well as the addition of the previously constructed HT-3012 Stream Restoration site and removal of the previously proposed Lilly Run Stream and Wetland Mitigation site from the mitigation package. The project is located on I-95 from north of Old Joppa Road to Bynum Run, just south of MD 543 in Harford County, Maryland. The modification results in an overall decrease of permanent impacts to 32,931 square feet of wetland, 103,386 square feet of 25-foot nontidal wetland buffer, 4,586 linear feet waterway, and 107,429 square feet of 100-year floodplain. In total, the project will permanently impact 99,733 square feet of forested nontidal wetland, 7,733 square feet of scrub-shrub nontidal wetland, 31,094 square feet of emergent nontidal wetland, 3,187 square feet of forested/emergent nontidal wetland, 387,739 square feet of 25-foot nontidal wetland buffer, 14,013 linear feet of perennial streams, 9,956 linear feet of intermittent streams, 103,207 square feet of 100-year floodplain, and temporarily impact 58,741 square feet of forested nontidal wetland, 6,258 square feet of scrub-shrub nontidal wetland, 83,592 square feet of emergent nontidal wetland, 5,236 square feet of palustrine, unconsolidated

bottom wetland, 192,652 square feet of 25-foot nontidal wetland buffer, 1,560 linear feet of perennial streams, 954 linear feet of intermittent streams, and 778,357 square feet of 100-year floodplain. Despite an overall reduction in impact, the project will result in new permanent impacts to 22,412 square feet of forested nontidal wetland, 170 square feet of scrub-shrub nontidal wetland, 6,319 square feet of emergent nontidal wetland, 69,795 square feet of 25-foot nontidal wetland buffer, 1,580 linear feet of perennial streams, and 1,663 linear feet of intermittent streams, and new temporary impacts to 2,608 square feet of palustrine, forested wetland, 721 square feet of palustrine, emergent wetland, 1,739 square feet of 25-foot nontidal wetland buffer, 273 linear feet of perennial streams, and 109 linear feet of intermittent streams, not previously authorized for disturbance. The mitigation requirement is 252,400 square feet of wetland mitigation and 10,634 linear feet of stream mitigation. The proposed mitigation will be provided off-site at the following locations: Eccleston Mitigation Site adjacent to Greenspring Valley Road and Park Heights Avenue in Baltimore County, Carsins Run Mitigation Site located along I-95 southbound in Harford County, and HT 3012 Stream Restoration Site in Baltimore County. A virtual public informational hearing for only the proposed work listed in this public notice is being held to gather information and hear testimony to assist the Department in making a determination regarding an application for a Nontidal Wetlands and Waterways Permit. **The virtual public hearing is scheduled for 6:30 p.m. on December 2, 2021.** The plans and an opportunity to ask questions will be provided from 6:30 pm – 7:00 p.m. The public informational hearing will begin promptly at 7:00 pm and end at 9:00 p.m. **In order to view or participate in the hearing, a participant must register at: https://attendee.gotowebinar.com/register/7017776319619504400 , webinar ID 285-539-851 and directions will be electronically forwarded to the email provided. If internet service is not available, the participant may call 1-866-901-6455 and then enter access code 834-073-155 to hear the public hearing.** Phone only participants will not have the ability to provide testimony during the hearing, however, statements may be provided to Jennifer Bird by November 24, 2021, to be read during the hearing which may not be longer than three minutes in length. Information and questions can be provided orally by participants during the hearing through the virtual platform. Written comments and requests to be included on the interested persons list may be sent by December 30, 2021, to the Maryland Department of the Environment. For nontidal wetland concerns, send correspondence to the attention of Jennifer Bird, 1800 Washington Boulevard, Baltimore, MD 21230 or at jennifer.bird@maryland.gov or 410-316-7959. Any further notices concerning actions on the application will be provided on the Maryland Department of the Environment's website, https://mde.maryland.gov/programs/Water/WetlandsandWaterways/Pages/I-95_ETL_North_Sect200_PhaseII.aspx. Please refer to Subsection 5-907 of the Annotated Code of Maryland or the Code of Maryland Regulations 26.23.02 and 26.24.02 for information regarding the application process.

Howard County

202061493/20-NT-3200: LKQ CORPORATION, 3918 Cedar Day Circle, Valrico, Florida 33506, has applied to construct a Pollution Control System (PCS), two storm drain outfalls, and removal and replacement of gravel base at an auto salvage compound. The PCS will entail the construction of two facilities at the top and bottom of Dorsey Run on the property. The storm drain outfalls will convey run-off from offsite and flow from tributaries which will bypass the auto salvage facility. Grading within the 100-year floodplain will result in the removal of existing contaminated gravel and replacement with clean gravel. The project will permanently impact 328 linear feet (3,006 square feet) of Dorsey Run (Use I) and 164,595 square feet of the associated 100-year floodplain. The project will also temporarily impact 665 linear feet (5,340 square feet) of Dorsey Run (Use I) and 40,480 square feet of the associated 100-year floodplain. The project is located at 8125 Washington Boulevard, Jessup, in Howard County. Written comments, requests for a public informational hearing and requests to be included on the interested persons list may be sent by November 30, 2021 to the Maryland Department of the Environment,

Attn: Debra Correia, 1800 Washington Boulevard, Baltimore, MD 21230 or at debra.correia@maryland.gov or 410-537-3900. Any further notices concerning actions on the application will be provided only by mail to those persons on the interested persons list. Please refer to Subsection 5-907 of the Annotated Code of Maryland or the Code of Maryland Regulations 26.23.02 for information regarding the application process.

Prince George's County

202161394/21-NT-0448: WERRLEIN WSSC LLC, 522 Defense Highway, Annapolis, Maryland 21401, has applied for the redevelopment of a vacant Washington Suburban Sanitary Commission (WSSC) administrative facility & associated parking lots into a single-family residential subdivision with associated infrastructure. The applicant has also proposed to provide floodplain compensation for the area being filled. The project will permanently impact 498 square feet of nontidal wetland, 4,914 square feet of the 25-foot nontidal wetland buffer, and 2.36 acres of the 100-year nontidal floodplain. The project is proposed on the Northwest Branch of the Anacostia River (Use I). The project location is 4017 Hamilton Street Hyattsville, MD 20781; at the intersection of 40th place and Gallatin Street in Prince George's County. Written comments, requests for a public informational hearing and requests to be included on the interested persons list may be sent by December 15, 2021 to the Maryland Department of the Environment, Attn: Ryan Din, 1800 Washington Boulevard, Baltimore, MD 21230 or ryan.din@maryland.gov or 410-537-4247. Any further notices concerning actions on the application will be provided only by mail to those persons on the interested persons list. Please refer to Subsection 5-907 of the Annotated Code of Maryland or the Code of Maryland Regulations 26.23.02 and 26.17.04 for information regarding the application process.

Tidal Wetlands Division - (410) 537-3571

Kent County

202160896/21-WL-0641: SAFE HARBOR MARINA c/o Peter Clark at 14785 Preston Road Ste. 975, Dallas, Texas 75254 has applied to (A) construct and backfill 787 linear feet of replacement timber bulkhead within a maximum of 18 inches channelward of a deteriorated bulkhead in addition to (B) reconfigure the Great Oak Landing LLC marina located in the tidal waters of Fairlee Creek at 22170 Great Oak Landing Road, Chestertown, Maryland 21620. The reconfiguration proposes to: (1) remove all fixed piers and piles at docks F and G, remove the dock extension and piles on Dock D, and remove the existing 6.5-foot wide by 56-foot long travel lift pier; (2) Dock D: construct a 362-foot long by 8-foot wide main floating pier, with a 130-foot long by 8-foot wide floating "T" head, six 70-foot long by 7-foot wide floating finger piers, six 60-foot long by 6-foot wide floating finger piers and install 42 mooring piles to create 26 slips, all within a maximum of 660-feet channel ward of the mean high water line; (3) Dock F: construct a 494-foot long by 8-foot wide main floating pier, with a 128-foot long by 8-foot wide floating "T" head, eight 60-foot long by 6-foot wide floating finger piers, eight 50-foot long by 5-foot wide floating finger piers, six 40-foot long by 4-foot wide floating finger piers and install 59 mooring piles to create 46 slips, all within a maximum of 610 feet channel ward of the mean high water line; (4) Dock G: construct a 486-foot long by 8-foot wide floating main pier, with a 128 foot-long by 8-foot wide floating "T" head, eight 60-foot long by 6-foot wide floating finger pier, eight 50-foot long by 5-foot wide floating finger piers, six 40-foot long by 4-foot wide floating finger piers and to install 58 mooring piles to create 46 slips, all within a maximum of 640-feet channelward of the mean high water line; (5) Dock H: construct a 10-foot by 138-foot "L" head floating pier

extension attached to the existing 10-foot wide by 55-foot long H dock, all to extend no more than 180-feet channelward of the of the existing bulkhead; (6) Travel Lift: widen the existing travel lift well from 22.9-feet wide to 30.75-feet wide, by removing the existing Southern travel lift pier, and constructing a 6.5-foot wide by 56-foot long travel lift pier 7.85-feet southwest from its previous location, all to extend no more than 56-feet channelward of the of the existing bulkhead. For more information, please contact Andrew Belfield at Andrew.Belfield@Maryland.gov or 410-537-3514.

Prince George's County

202160863/21-WL-0624: SMOOT HARBOR, LLC at 12500 Fair Lakes Circle, Suite 400, Fairfax, Virginia 22033 has applied to maintenance hydraulic or mechanical dredge a 7.29 acre approach and channel area to a depth of 10.84 feet at mean low water and transport 5800 cubic yards of dredge material; all dredge material to be transported via barge to a site known as the Piney Reclamation located at 12065 Forgotten Farm Place, Waldorf 20602 in Charles County, Maryland. The purpose of the project is to maintain navigation to Smoot Harbor. The proposed project is located within the tidal waters of the Smoot Harbor off the Potomac River along the shoreline of 165 Waterfront Street, National Harbor Maryland 20745 in Oxon Hill, Prince George's County. **The Public Notice period begins November 15, 2021 and ends on December 2, 2021.** For more information, please contact Melissa McCanna at Melissa.mccanna@maryland.gov or at 410-537-4053.

202160863/-WP-0625: SMOOT HARBOR, LLC at 12500 Fair Lakes Circle, Suite 400, Fairfax, Virginia 22033 has applied to authorize regulated activities in private tidal waters of the Potomac River at Smoot Bay to upgrade, expand and reconfigure the present pier system to increase the number and size of marina slips; construct a new boat ramp and add visitor amenities; and maintain and improve navigable access at National Harbor, Oxon Hill, Prince Georges County, Maryland. The proposed project is located within the tidal waters of the Smoot Harbor off the Potomac River along the shoreline of 165 Waterfront Street, National Harbor Maryland 20745 in Oxon Hill, Prince George's County. Additional information can be obtained by contacting Melissa McCanna at Melissa.McCanna@maryland.gov or at 410-537-4053. The proposed project, which has been divided into seven separate categories, is described below.
(A) Heritage Cove (SHA Piers): (1) Pier B, (Western "SHA" pier): Extend the existing pier landward 19 feet by 10 feet wide to connect the pier to uplands; construct one 252-foot long by 10.5-foot wide floating pier with associated gangway, and a 36-foot long by 10.5 foot East/West connector near-shore platform, a 60-foot long by 15-foot wide "L" head platform with associated gangways attached to the pier, and five 40-foot long by 7-foot wide floating finger piers; install eight 40-foot long by 18.5-foot wide boatlifts, emplace up to 16 mooring piles, construct a roof system over all the lifts to create eight covered boat slips, all extending a maximum of 295 feet channelward of the mean high water line. (2) Pier A, (Eastern "SHA" pier): Construct a 252-foot long by 10.5-foot wide floating pier, a 60-foot long by 15-foot wide "L" head platform with associated gangways attached to the pier; construct five 40-foot long by 7-foot wide floating finger piers, install eight 40-foot long by 18.5-foot wide boatlifts, emplace 16 mooring piles, construct a roof system over all the lifts to create eight covered boat slips, all extending a maximum of 295 feet channelward of the mean high water line.
(B) North Pier, North Marina: (1) Remove one 95-foot long by 4-foot wide floating pier; (2) Construct two 100-foot long by 100-foot wide platforms with tensile roof structures attached to an existing pier a maximum of 680 feet channelward of the mean high water line; (3) Construct two floating piers connected to an existing fixed pier with the following dimensions: 286-foot long by 12-foot wide with associated gangway, and 397-foot long by 12-foot wide with associated gang way, extending a maximum of 730 feet from the mean high water line.
(C) South Pier, North Marina: (1) Pier 2: Construct a 249-foot by 10-foot wide floating pier extension with a 130-

foot by 10-foot “T” head platform, eleven 60-foot long by 5-foot wide floating finger piers, and one 60-foot long by 8-foot wide finger pier. (2) Pier 3: Construct a 249-foot long by 10-foot wide floating pier extension with a 130-foot by 10-foot “T” head platform, and eight 60-foot long by 5-foot wide floating finger piers. (3) Pier 4: Construct a 249-foot long by 10-foot wide floating pier extension with a 61-foot by 10-foot “L” head platform, and four 60-foot long by 5-foot wide floating finger piers, all extending a maximum of 750 feet from the mean high water line.
(D) Gaylord Pier: (1) Construct two 60-foot long by 5-foot wide floating finger piers attached to the existing fixed pier and emplace 3 mooring piles extending a maximum of 284 feet from the mean high water line; (2) Construct associated gangways over existing floating structures, extending a maximum of 400 feet from the mean high water line.
(E) South Marina Boat Ramp: (1.) Construct a 61-foot long by 68-foot wide 4 lane boat ramp with two fixed 154-foot long by 8-foot wide launching piers with two 180-foot long sheet pile groins under the pier decking.
(F) South Marina. Construct a floating pier system creating 162 additional boat slips as follows: (1) Remove a 93-foot long by 12-foot wide floating T-head; (2) Construct a 314-foot long by 10-foot wide main access pier comprised of an existing 47-foot long by 10-foot wide South Marina pier with a 12-foot long by 10-foot wide floating pier, and a 255-foot long by 10-foot wide floating pier to be attached to an existing landward concrete pier and steel gangway; (3) Construct four 210-foot long by 8-foot wide floating piers (Piers A, B, C and F) with forty-two 28-foot long by 5-foot wide floating finger piers; (4) Construct two 390-foot long by 8-foot wide floating piers (Piers D and E) with thirty nine 28-foot long by 5-foot wide floating finger piers; (5) Construct a 610-foot long wave screen attached to Piers A and D, and construct a 128-foot long by 16-foot wide wave attenuator at the western end of Pier D, all extending a maximum of 420 feet from the mean high water line.
(G) Smoot Cove: (1) Install eighteen mooring buoys with a 100-foot mooring radius west of the Heritage Cove piers and to extend a maximum of 1,300 feet channel ward of the approximate mean high water line; (2) Install nine mooring buoys with a 140-foot mooring radius south of the Heritage Cove piers to extend a maximum of 700 feet channel ward of the mean high water line; (3) Install three mooring buoys with a 100-foot mooring radius east of the Gaylord Pier and to extend a maximum of 200 feet channel ward of the approximate mean high water line; and (4) Install five mooring buoys with a 100-foot mooring radius east of the South Pier/North Marina and to extend a maximum of 200 feet channel ward of the approximate mean high water line.
(H) Dredging. Mechanically or hydraulically dredge the following areas, all dredge material to be transported via truck to a site known to a site known as the Piney Reclamation located at 12065 Forgotten Farm Place, Waldorf 20602 in Charles County, Maryland. (1) Dredge a portion of a 1.37 acre approach/navigation channel area to a depth of 10.84 feet at mean low water MLW and a 0.14 acre area to excavate the South Marina Boat Ramp to a depth of 4.84 feet at MLW and transport 7,150 cubic yards of dredge material; (2) Dredge an 8.48 acre area of a channel and mooring area to a depth of 10.84 feet at MLW and transport up to 13,100 cubic yards of dredge material. (3) Provide periodic maintenance dredging for a period of six years of previously dredged channel and mooring areas to maintain the following depths: (3.i) A 9.8 acre area to a depth of 4.84 feet at MLW; (3.ii) A 25.8 acre area to a depth of 7.84 feet at MLW, and (3.iii) A 42.41 acre area to a depth of 10.84 feet at MLW.

Dorchester County - EFFECTIVE 10/22/2021

202160895/21-WL-0640/21-WQC-0331/MDOT Maryland Port Administration, Amanda Peñafiel, World Trade Center, 401 E. Pratt Street, Baltimore, MD 21202 has applied to restore a remote island habitat at Barren Island, which is located in Dorchester County adjacent to Upper Hoopers Island. The project is the smaller portion of the Mid-Chesapeake Bay Island Ecosystem Restoration Project and will include the restoration of approximately 83 acres of wetlands, construction of approximately 13,023 linear feet of new and modified stone sills and 4,620 linear feet of segmented breakwater to immediately provide increased protection to the eroding Barren Island and to the potential submerged aquatic vegetation (SAV) habitat to the east of Barren Island, and installation of 2 bird nesting habitat islands (approximately 8.5 acres total). Approximately 52,500 cubic yards of material that is

unsuitable for construction foundation will be dredged from the northeast Barren Island stone sill location to an approximate depth of 7 feet and will be placed hydraulically or mechanically within the confined area behind the constructed stone sills at Barren Island. Approximately 429,000 cubic yards of authorized maintenance material dredged from small local federal navigation channels will be placed behind the confining stone sills up to the mean high water elevation to construct the wetlands. Wetlands will include low and high marsh plantings as well as intertidal mudflats. During final wetland planning, current conditions will be evaluated with respect to sea level rise projections and determinations of sustainable marsh elevations to identify high to low marsh ratios. A public hearing for only the proposed work listed in this public notice is being held to gather information and hear testimony to assist the Department in making a determination regarding an application for a wetlands license and permits. A public hearing was scheduled at the Madison Volunteer Fire Department (1154 Taylors Island Rd, Madison, MD 21648) at 6:30 PM on November 15, 2021, with an informational poster session held from 6:00 PM – 6:30 PM but has been **CANCELLED**. A NEW hearing date is planned to be held, if one is requested by the public during the open public comment period from October 22, 2021 to November 29, 2021 by 5:00 pm. **The informational public hearing is pre-scheduled for 6:30 p.m. on January 6, 2022 at the Madison Volunteer Fire Department, 1154 Taylors Island Rd, Madison, MD 21648. *The pre-scheduled hearing will be cancelled if no hearing requests are received by 5 pm on November 29, 2021*.** A poster session/display will be available from 6:00 PM to 6:30 PM where project drawings can be reviewed and MDOT Maryland Port Administration representatives will also be available to answer questions. Please check the Department's website for updates on the hearing status at the followinglink:
https://mde.maryland.gov/programs/Water/WetlandsandWaterways/Pages/BarrenIsland.aspx
Written comments and requests to be included on the interested persons list may be sent by November 29, 2021 to the Maryland Department of the Environment attention of Mary Phipps-Dickerson, 407 Race Street, Cambridge, Maryland 21613 or at Mary.Phipps-Dickerson@maryland.gov or 410-901-4033. Any further notices concerning actions on the application will be provided only by mail to those persons on the interested persons list.

Water Quality Certification - (410) 537-3837

Dorchester County - EFFECTIVE 10/22/2021

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