Dyke Marsh Wetland Restoration and Long Term Management Plan/EIS

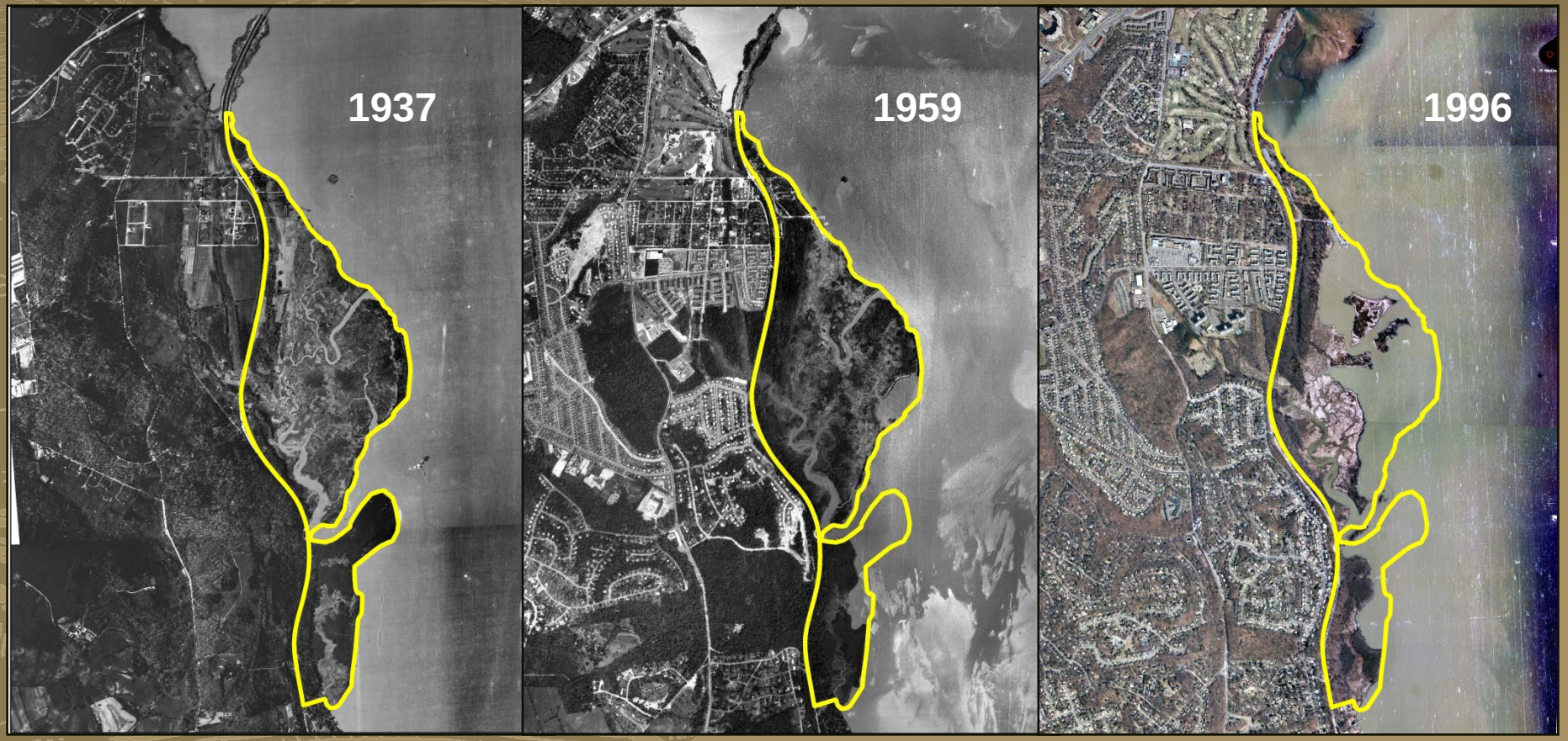
Alternative Concepts Public Meeting

May 8, 2012

Background

- Dyke Marsh is a large tract of tidal freshwater marsh along the Potomac River.
- From 1940-1972, approximately 270 acres of marshland were dredged for sand and gravel. The NPS formally acquired control of the entire 485 acre site in 1976.
- Dyke Marsh is viewed as a national treasure– a natural oasis surrounded by a bustling urban environment. The marsh has extensive value not only in the flora and fauna that exist within, but for the recreational, educational and cultural values the marsh provides as well.

Dyke Marsh



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Purpose

- The purpose of this plan/EIS is to develop a plan for the restoration and long term management of the tidal freshwater marsh and other associated wetland habitats lost or impacted in Dyke Marsh Preserve on the Potomac River.

Need

- Dyke Marsh wetland resources, community structure, and natural ecosystem functions have been damaged by previous human uses and are subject to continuing threats. A restoration and long term management plan is needed at this time to:
  - Protect the existing wetlands from erosion, exotic plant species, loss of habitat and altered hydrologic regimes;
  - Restore wetlands and ecological functions and processes lost through sand and gravel mining and shoreline erosion;
  - Reduce increased restoration and management costs associated with continued wetland loss;
  - Improve ecosystem services that benefit the Potomac Watershed.

Work completed on the EIS to date

- **November 2007:** Internal scoping initiating the EIS was held at the park.
  Purpose, need, objectives, issues and preliminary alternative concepts were identified.
- **April 2008:** The Notice of Intent to prepare an EIS was published.
- **May 2009:** Alternatives Development meeting to develop alternatives for wetland restoration. The interdisciplinary team identified preliminary alternative elements, however, numerous technical questions related to engineering, modeling and design were identified.

USGS Study

- May 2009: USGS presented preliminary findings of their work to the interdisciplinary team at the Alternatives Development meeting.
- March 2011: USGS Open-File Report published. *"Analysis of the Deconstruction of Dyke Marsh, George Washington Memorial Parkway, Virginia: Progression, Geologic and Manmade Causes, and Effective Restoration Scenarios."*
- Available at http://pubs.usgs.gov/of/2010/1269/

USGS Study- Findings

- Dyke Marsh has lost >25 percent of post-mining acreage between 1976 and 2006.
- The primary cause of marsh erosion is from storm waves driven northward up the Potomac from large weather events such as hurricanes and nor'easters.
- Shoreline erosion averages 6-7.8 ft per year and is fragmenting the last significant tidal creek network (Hog Island Gut) on the marsh.
- Restoring geologic protections likely will restore the marsh's ability to regenerate by tidal deposition, or diminish its erosion significantly.

USACE Study

- Recognizing the need for special expertise, NPS contacted the United States Army Corps of Engineers (USACE), Baltimore District for assistance with hydrologic modeling and conceptual design.
- Their work has informed the development of the alternative concepts.
- Once the USACE has finished their study, NPS will use the technical information to complete the NEPA process.

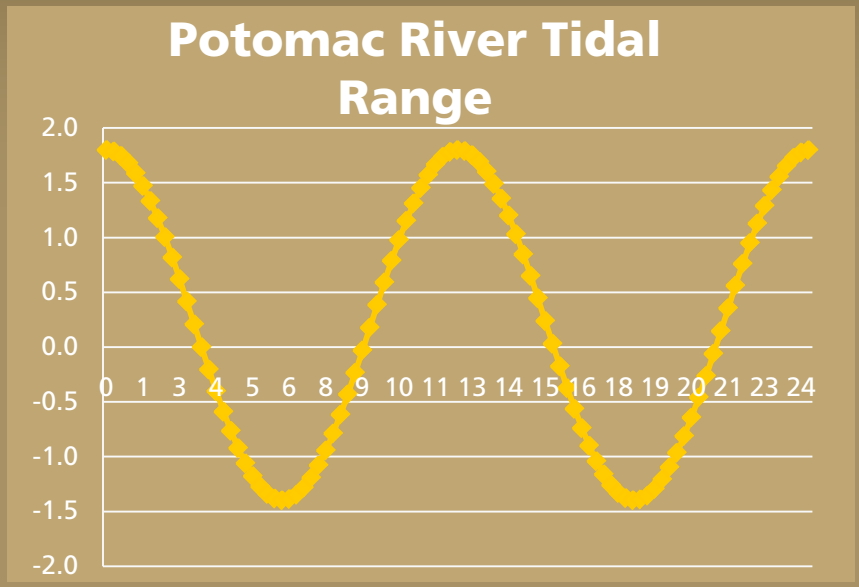
Project Purpose

USACE Study (Work Completed)

- Phase 1 (Oct 09-Sep 10):
  - Bathymetric surveys conducted
  - Sediment sampling and analysis
  - Hydrologic analysis
  - 1-D hydraulic model developed
  - Emergency stabilization concept plans
- Phase 2 (Dec 10 – now)
  - Existing conditions 2-D Hydrodynamic Model Analysis
  - Revised Four (4) Alternatives Concept Plans
  - Alternatives 2-D Hydrodynamic Model Analysis
  - Containment Cell Materials, Layout, Cost

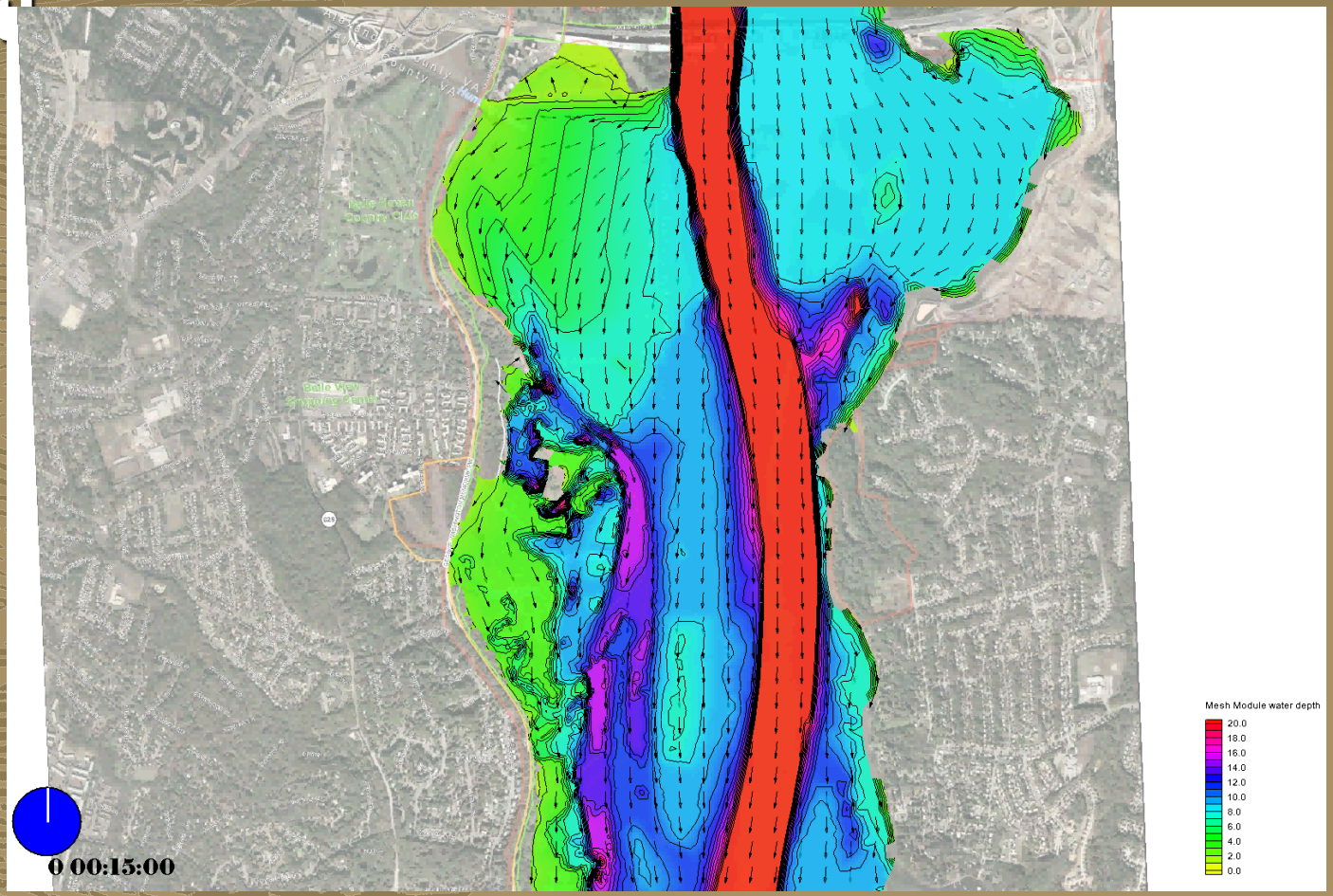
Existing Analysis

- 2-Dimensional Modeling (FESWMS)- General Information
  - Modeling Platform: FESWMS (SMS 10.1-mesh editor)
  - Hydrodynamic model- Diurnal Tide (MHHW=1.8', MLLW= -1.4', every 6.2-hours)
  - Base flow of Potomac River Q=24,500 cfs
  - Computational time-step every 15 minutes over 24-hour period.
  - Boundary Conditions:
  - Lower Boundary: Tidal Elevations
  - Upper Boundary: Q=24,500 cfs
  - Four (4) hour run time



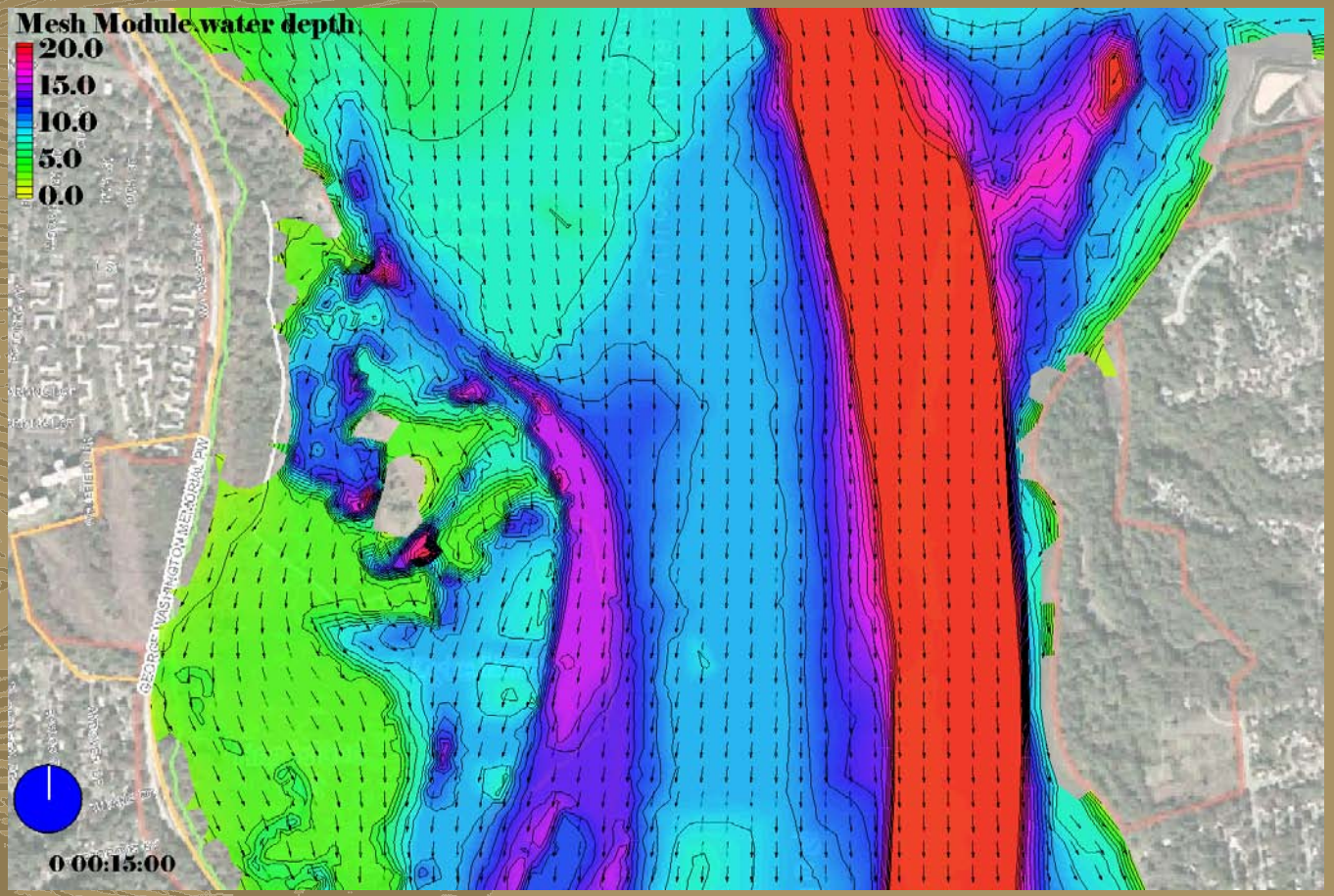
Existing Analysis

- 2-D Modeling (FESWMS)- Existing Flow Depth



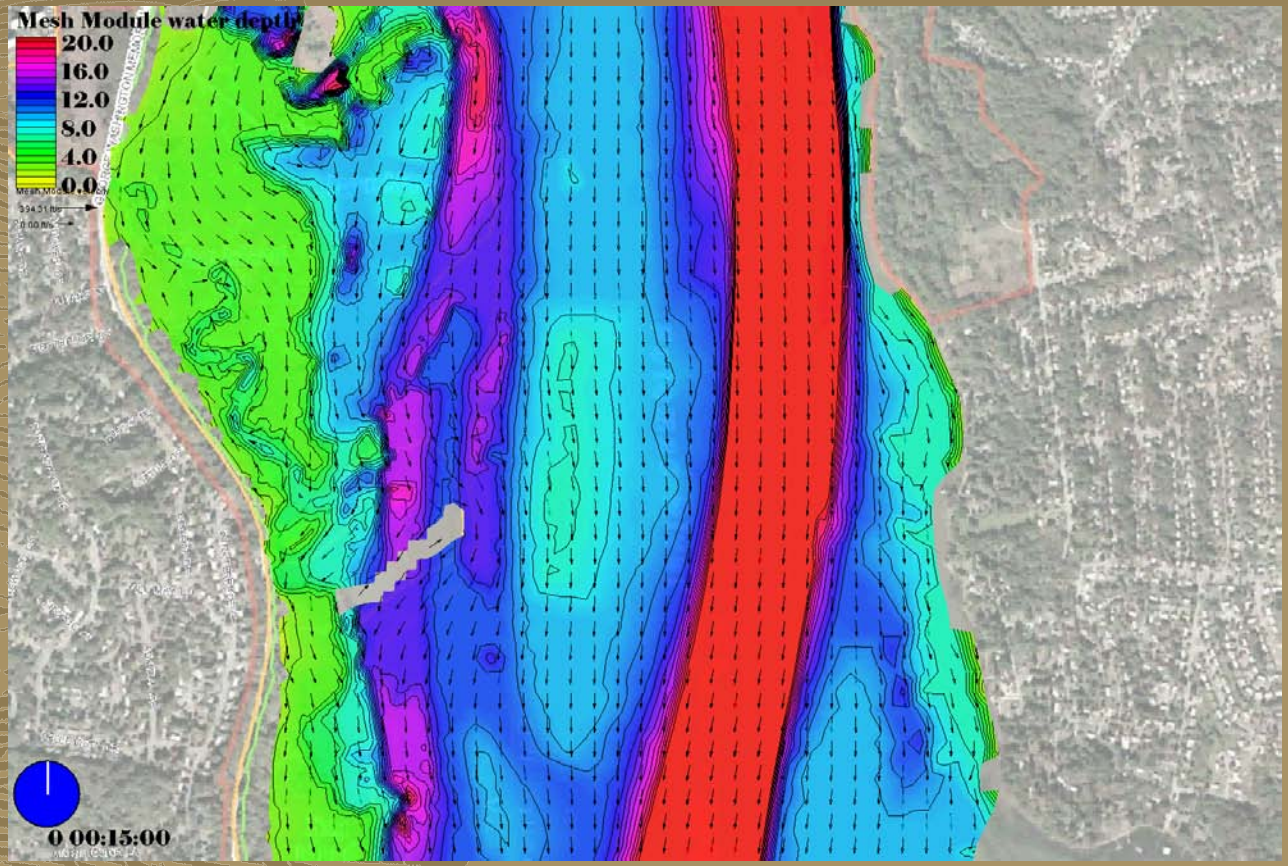
Existing Analysis

- **Channel Fill of Deep Holes to -12.0’**



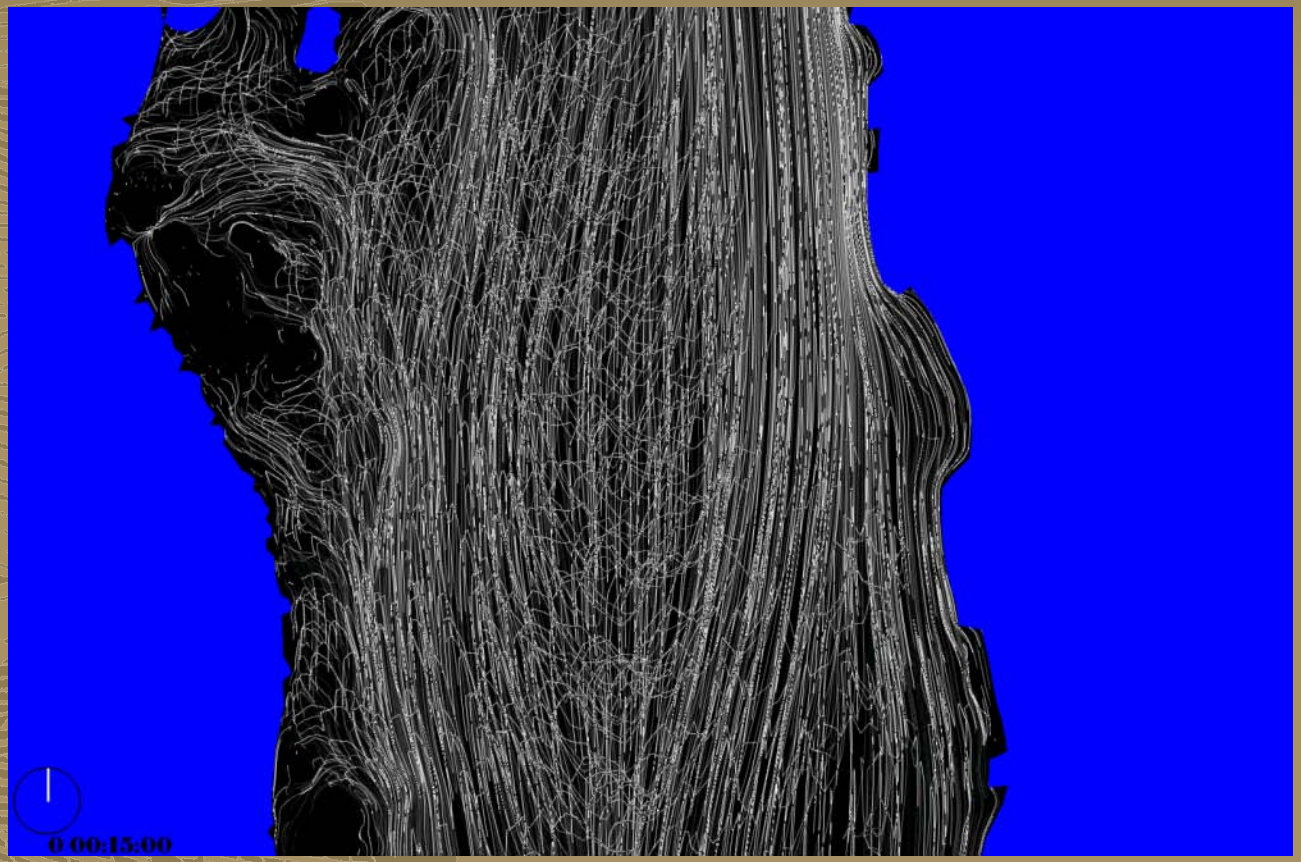
Existing Analysis

- **Southern Promontory**



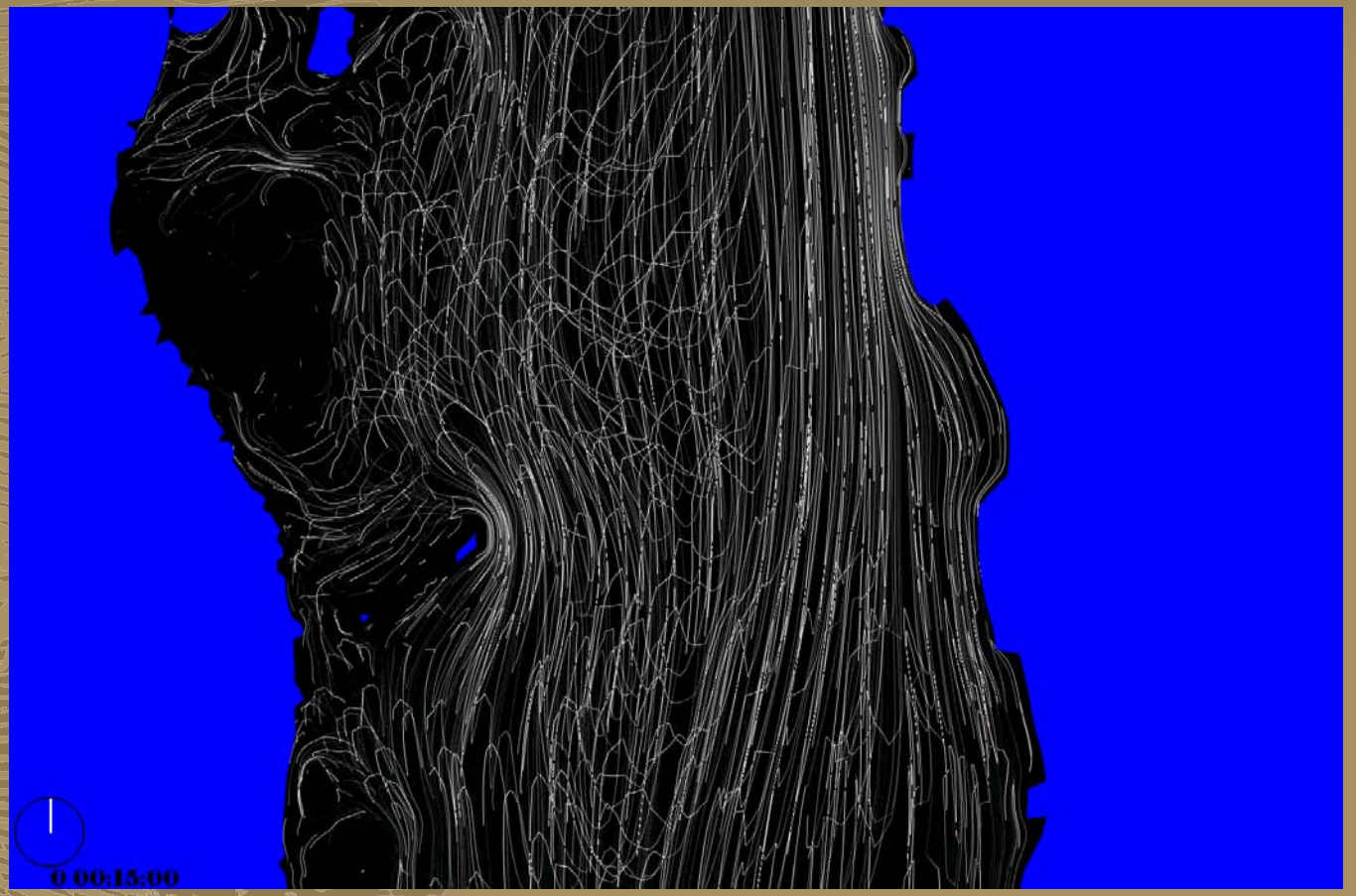
Existing Analysis

- **Flow Trace- Existing**



Existing Analysis

- **Sediment Trace Southern Promontory**



Proposed Solutions Fall 2011

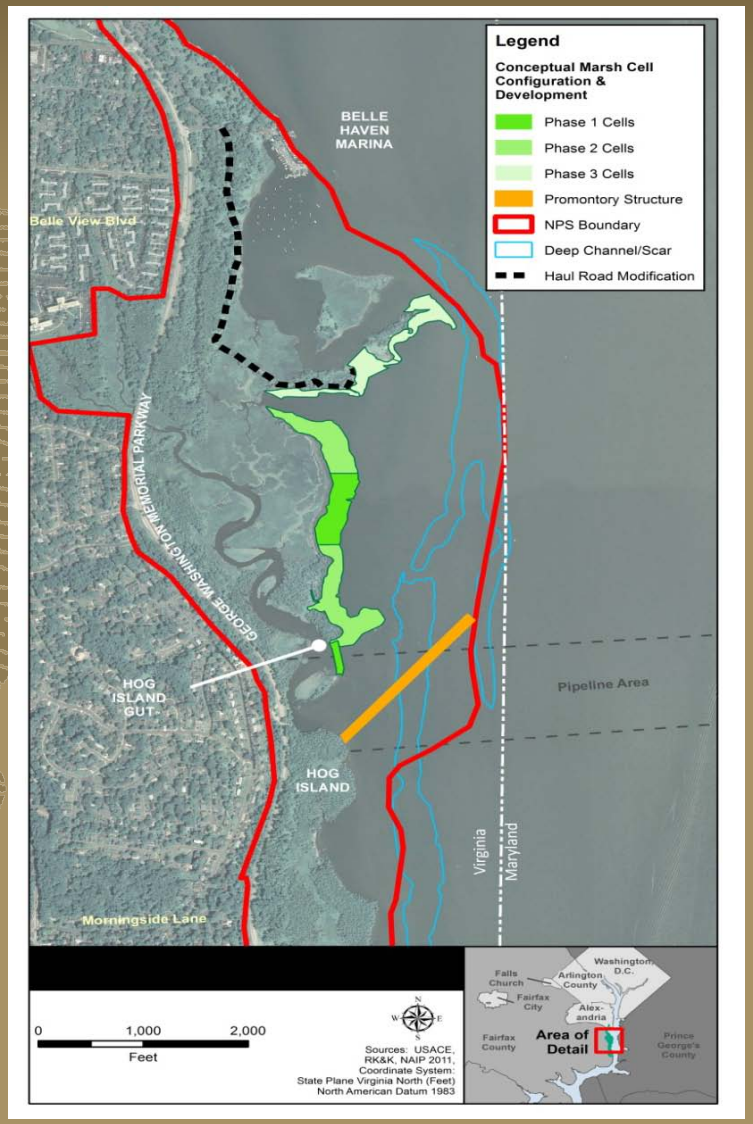
- NPS Developed Four (4) Alternative Plans
  - Alternative A: No Action, No Restoration
  - Alternative B: Minimum Restoration
  - Alternative C: Moderate Restoration
  - Alternative D: Full Restoration

Alternative A

- No Action, No Restoration

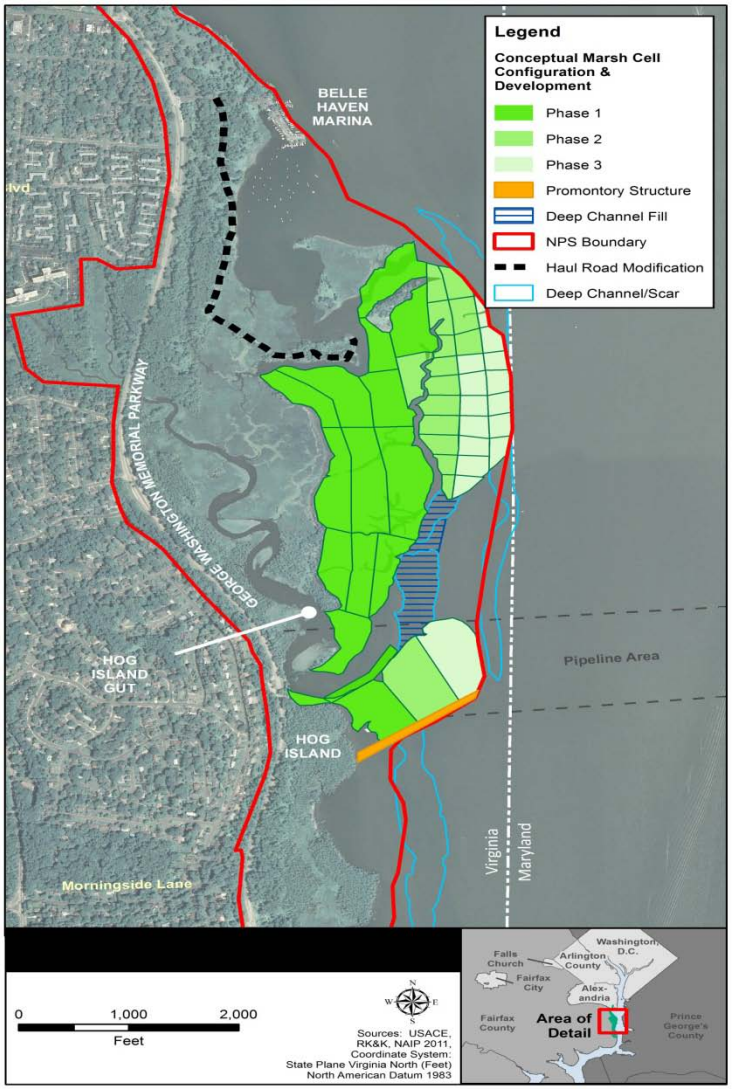
Alternative B

- Approximately 30 Acres of Restoration



Alternative C

- Approximately 140 Acres of Restoration



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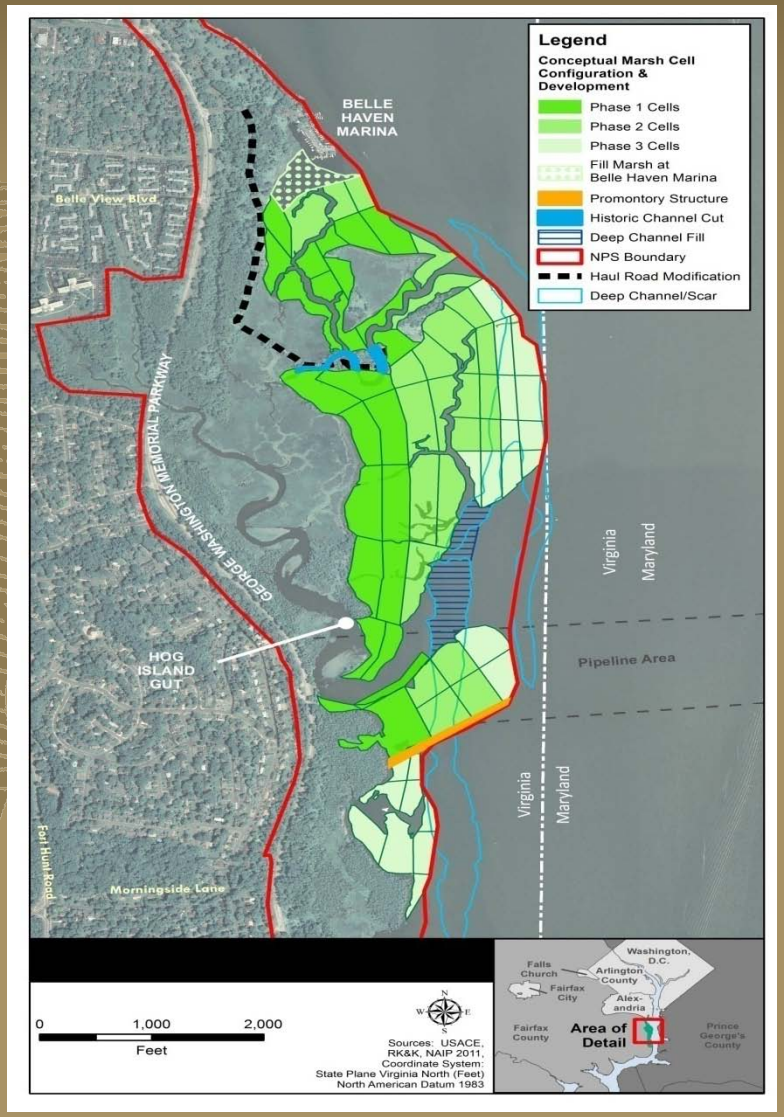
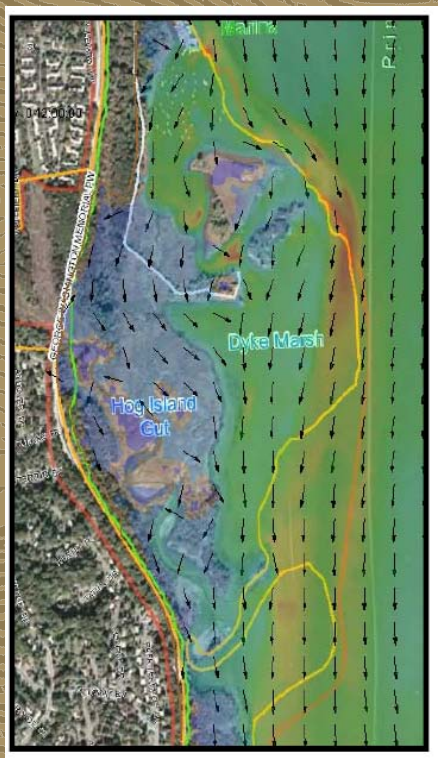
Alternative D

- Approximately 180 Acres of Restoration

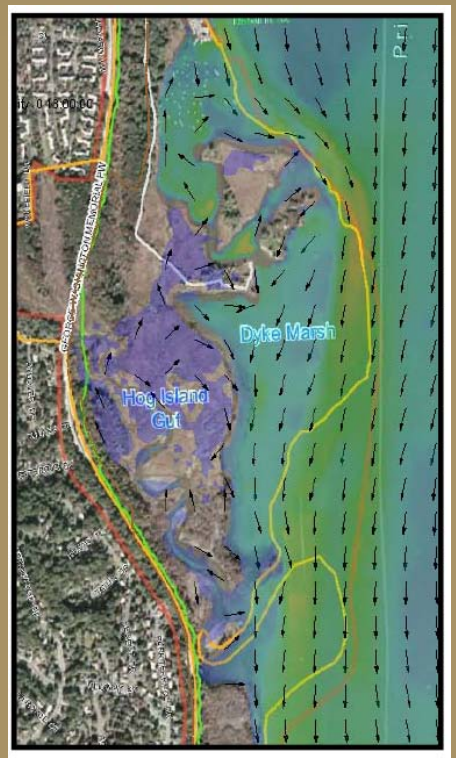


Detailed Modeling of Alternatives

- **Alternative A: No Action, No Restoration**
  - Marsh will continue to erode over time



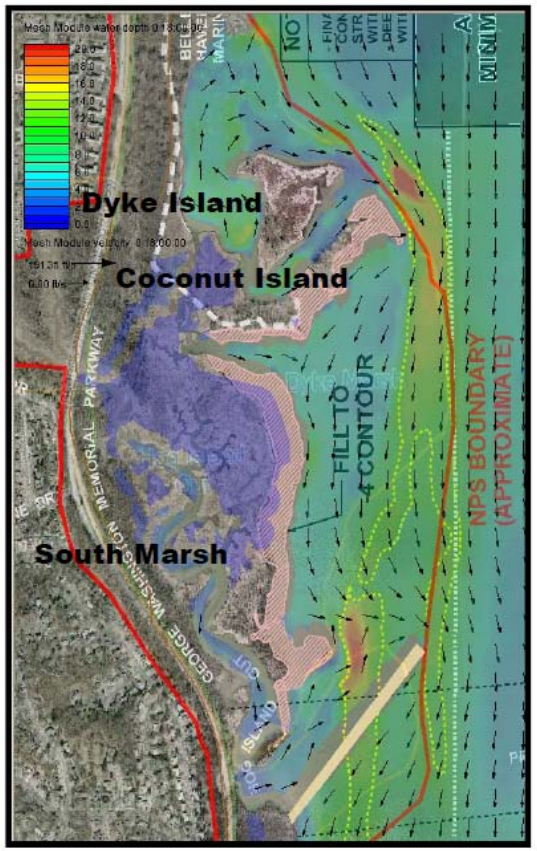
Existing Conditions at High Tide (12:00)



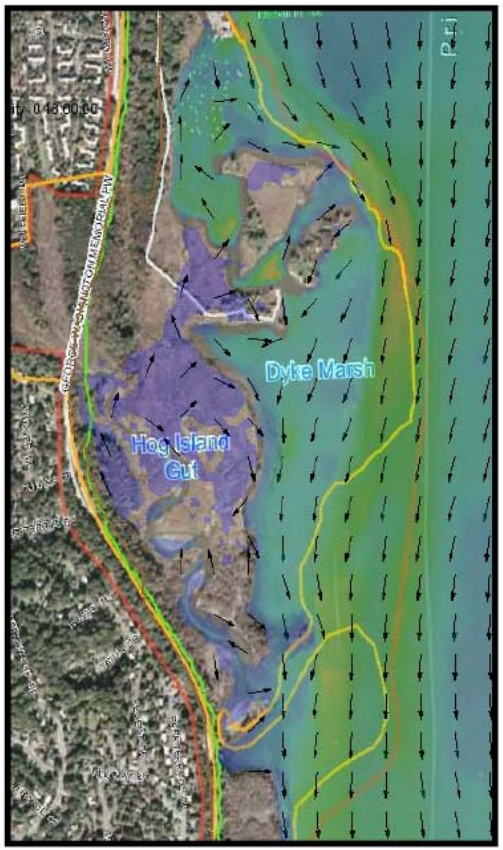
Existing Conditions at Low Tide (18:00)

Detailed Modeling of Alternatives

- **Alternative B: Minimum Restoration- Low Tide (18:00)**
  - Flows no longer overtop Coconut Island, but redirected Northerly
  - Flow vectors continue to show flow being pulled into South marsh (Low Energy)
  - Sediment deposition likely



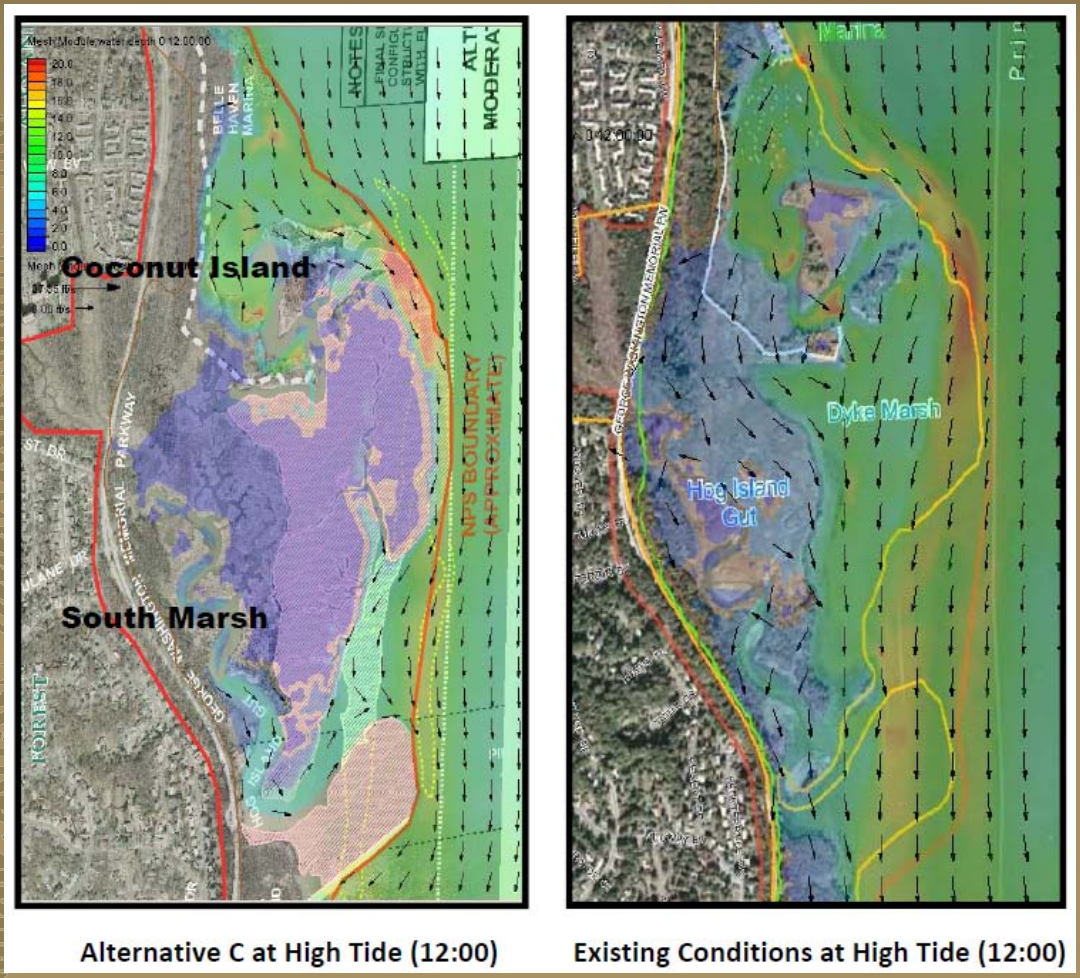
Alternative B at Low Tide (18:00)



Existing Conditions at Low Tide (18:00)

Detailed Modeling of Alternatives

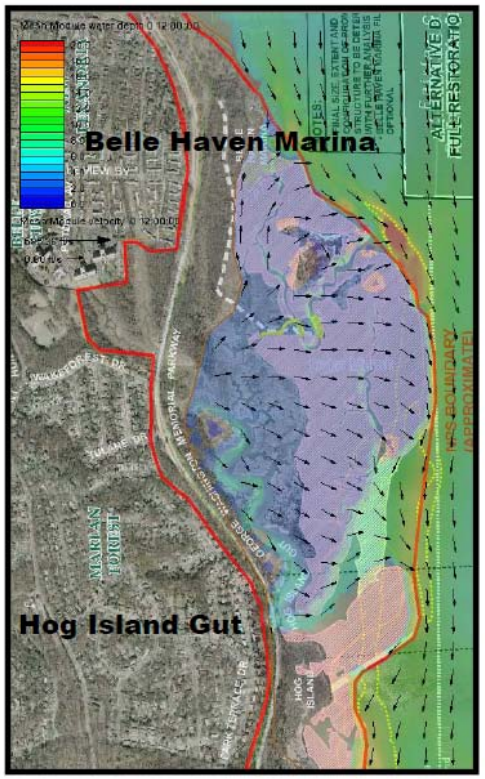
- **Alternative C: Moderate Restoration- High Tide (12:00)**
  - Marsh inundated
  - Erosion hot spot likely near Coconut Island- strong redirection of flows



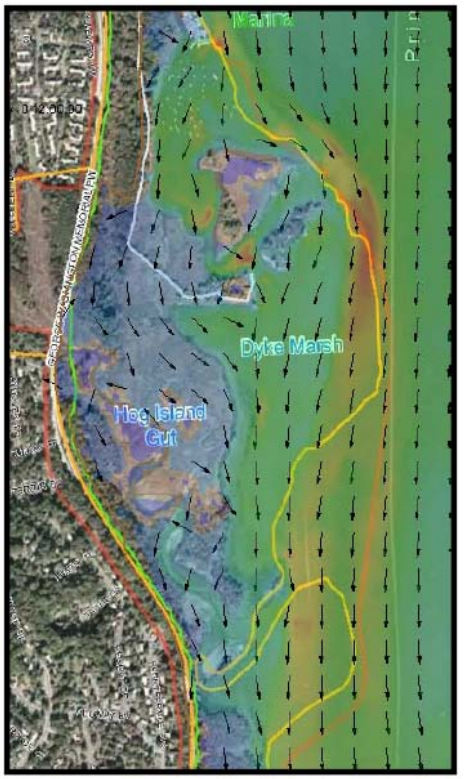
Alternative C at High Tide (12:00) | Existing Conditions at High Tide (12:00)

Detailed Modeling of Alternatives

- **Alternative D: Full Restoration- High Tide (12:00)**
  - During the high tide cycle, the flows from the fully inundated marsh will outfall through the tidal guts, while the flows along the Potomac River continue in a North to South direction.



Alternative D at High Tide (12:00)



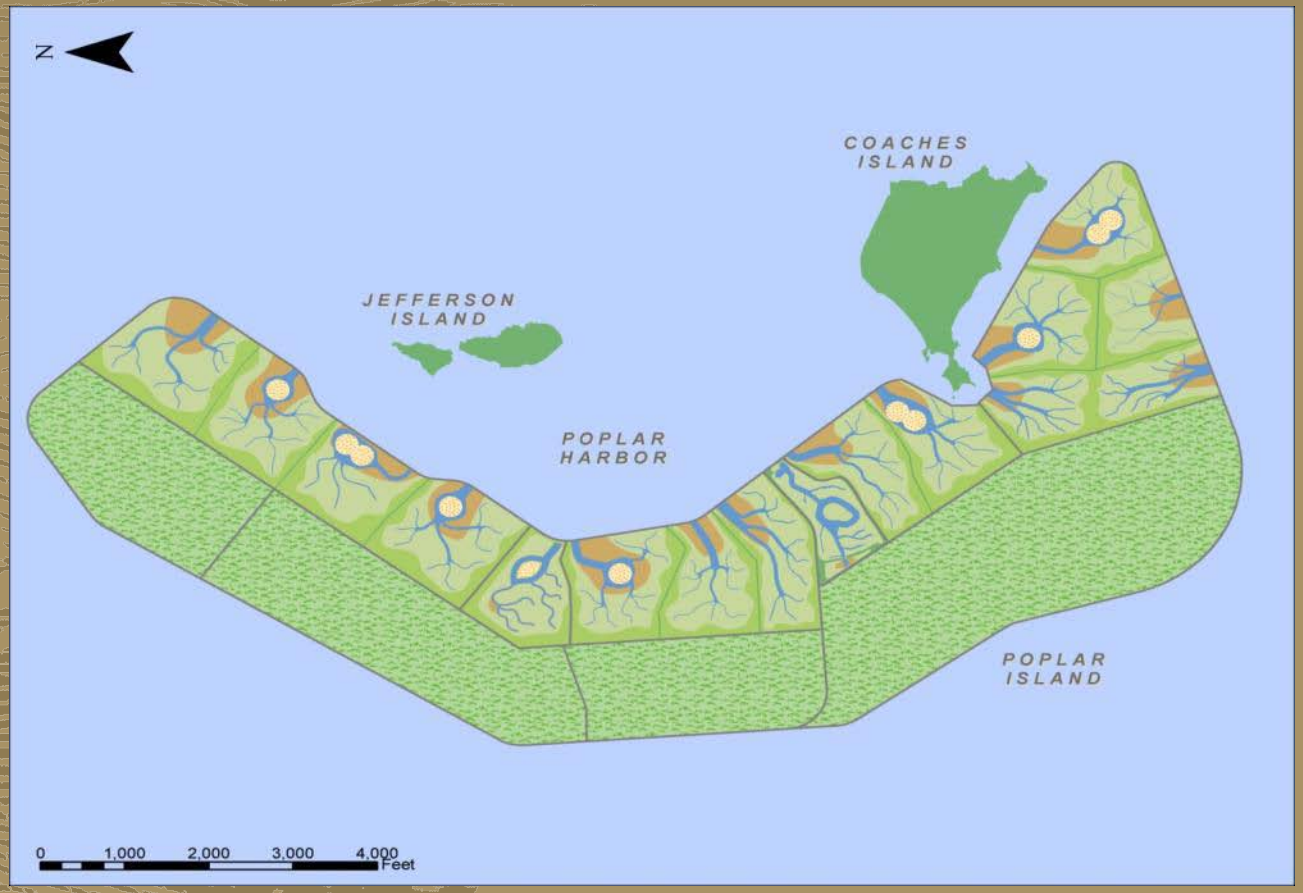
Existing Conditions at High Tide (12:00)

Implementation Methods

Poplar Island Containment Cells

Implementation Methods

Example: Poplar Island, Maryland



Implementation Methods

Example: Poplar Island, Maryland

- Poplar Island was build outside-in.

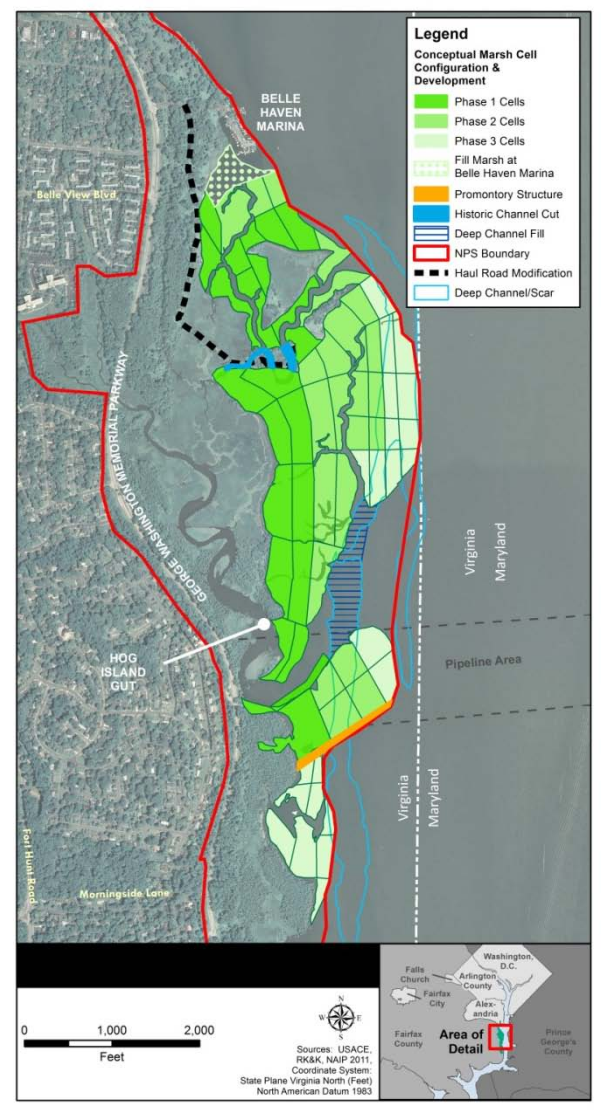
- Water depths ranged from 6-9 feet below *Mean Lower Low Water* (*MLLW*) on the western side of the island, while the depths on the eastern side of ranged from 3-4 feet. This was because on the eastern side, the dike was closer to the original island remnants.

- The outside dike was built using sand, geo-textile fabric, followed by three successively coarser stone layers

- After the outside perimeter was built, 6 small containment structures, or cells were constructed completely out of sand since they are protected from the exterior wave action, armor stone is not required

- The cost to build the containment structures, inside and out, was about $100 million

Containment Structures



Containment Structures

- Sheet Piles

- Stone Breakwater

Containment Structures

- Dynamic Stone Revetment

- Gabion Wire Basket

Containment Structures

- Timber Bulkhead

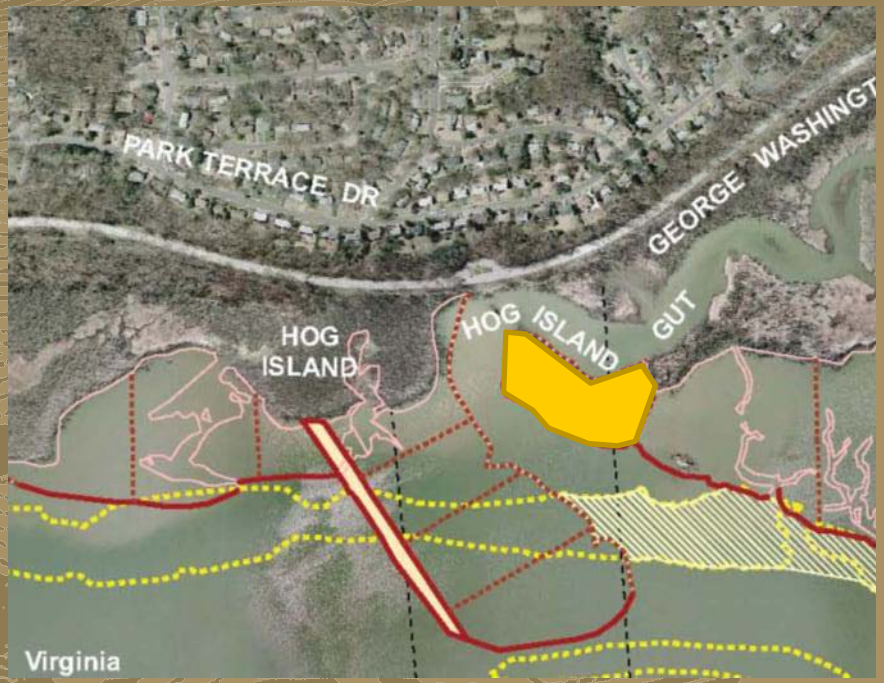
- Fiber Matting

Containment Structures

- Geotextile Tubes

- Vegetated Reinforced Soil Slope (VRSS)

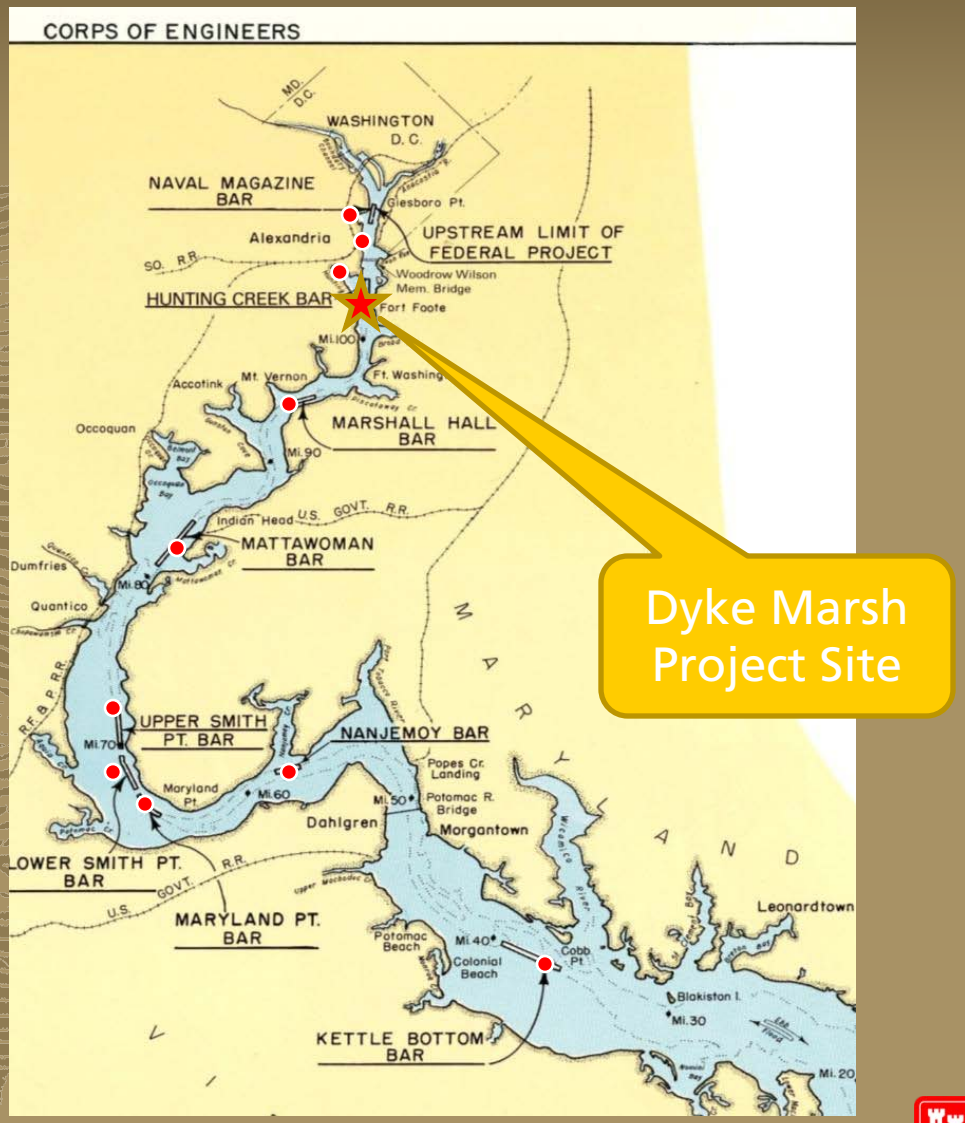
Containment Structures



- Typical Containment Cell Size, Volume
- Area: 5.0 acres.
- Volume: 36,138 CY

Containment Structures

- Map of Federal Channels in Relation to Dyke Marsh
  - Potential Locations of Fill / Dredge Materials (Federally Owned)



USACE Path Forward

- Commence Phase III- Work to be completed during this phase include:
  - Update the 1-D modeling
  - Complete fetch analysis for the promontory structure
  - Phasing plans and potential containment structures
  - Prepare quantity cost estimates
  - Technical Report

Path Forward- EIS

- Analyze public comments and refine alternatives.
- Complete the Draft plan/EIS using modeling/schematic design information from USACE's technical report.
- Release the Draft plan/EIS for public review and comment.
- Analyze public comments received on Draft plan/EIS and revise plan/EIS.
- Release Final plan/EIS to the public.
- Sign the Record of Decision.