DELAWARE BENEFICIAL USE OF DREDGED MATERIAL FOR THE DELAWARE RIVER FEASIBILITY STUDY

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STUDY PURPOSE & AUTHORITY

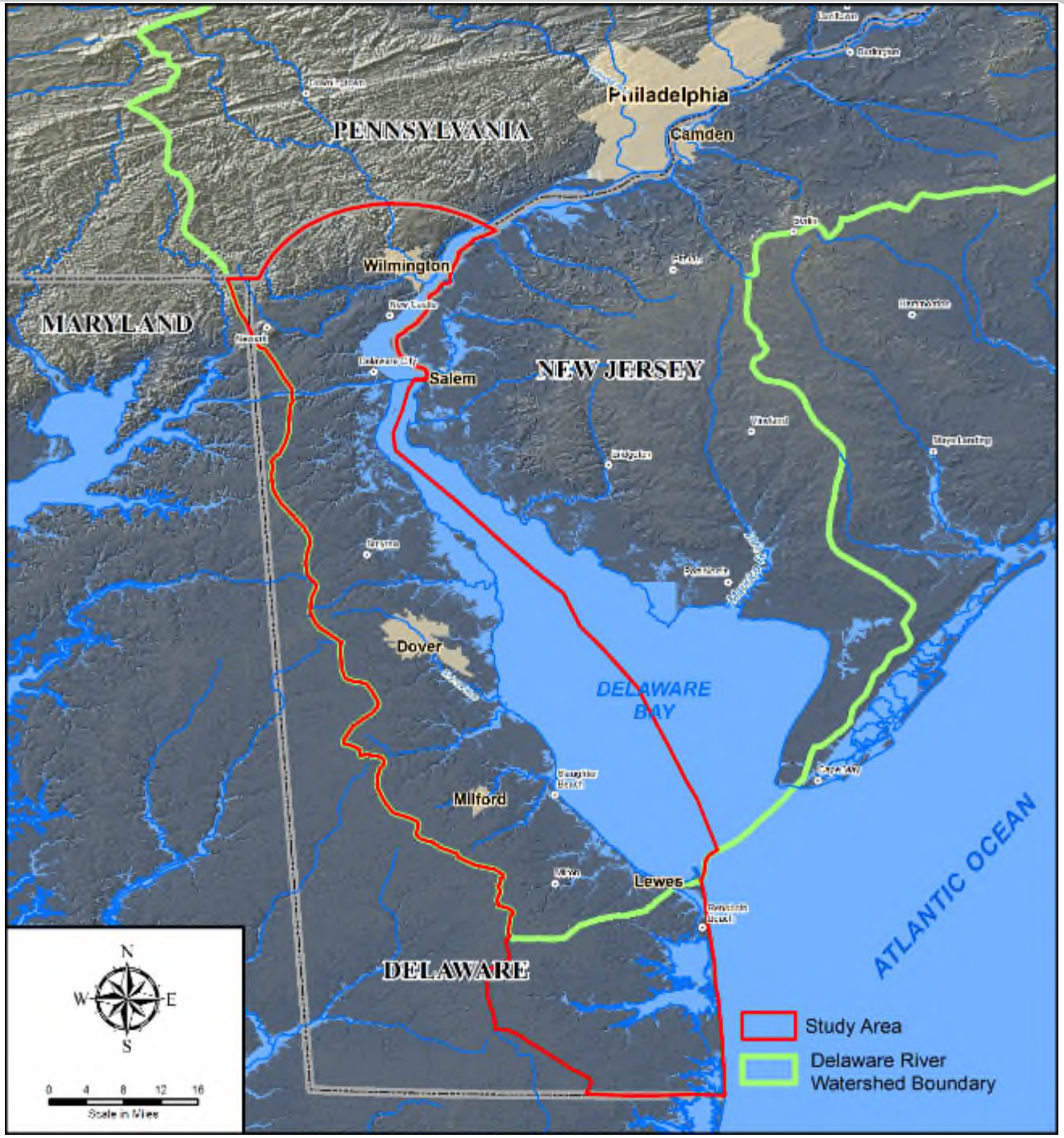
Study Purpose: The Delaware Beneficial Use of Dredge Material for the Delaware River Feasibility Study is an investigation of the feasibility to address Coastal Storm Risk Management (CSRM) problems at various Delaware communities through the beneficial use of dredged material from Federal navigation channels within the Delaware Estuary. CSRM alternatives utilizing dredged material were formulated, compared & evaluated against the without project condition and were optimized in order to identify the National Economic development (NED) Plan.

Study Authority: Committee on Environment and Public Works of the United States Senate ("Resolution") October 26, 2005

Study Appropriation: Disaster Relief Appropriations Act, 2013 (PL-113-2)

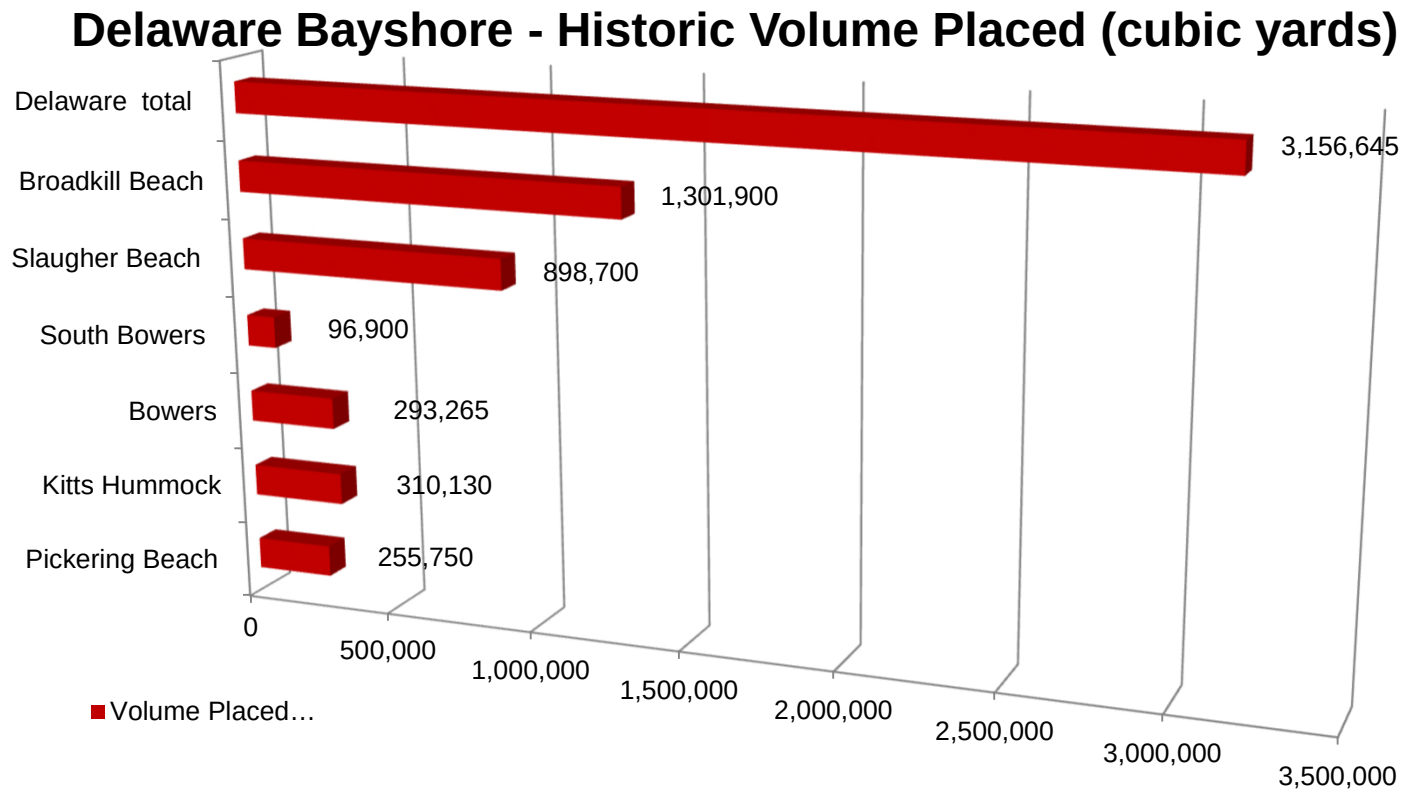
STUDY AREA

DELAWARE RIVER WATERSHED IN THE STATE OF DELAWARE EXTENDING FROM THE DE/PA STATE LINE TO THE DE/MD STATE LINE



WITHOUT PROJECT CONDITIONS

- Low-lying coastal plains subject to tidal flooding, storm surge, as well as SLC.
- Most of the Delaware Bay shoreline is characterized by broad marshes with a narrow barrier of sand along the beach.
- The sand beach barrier is widest and most well-developed near the mouth of the bay south of Prime Hook, becoming less prevalent to the north.

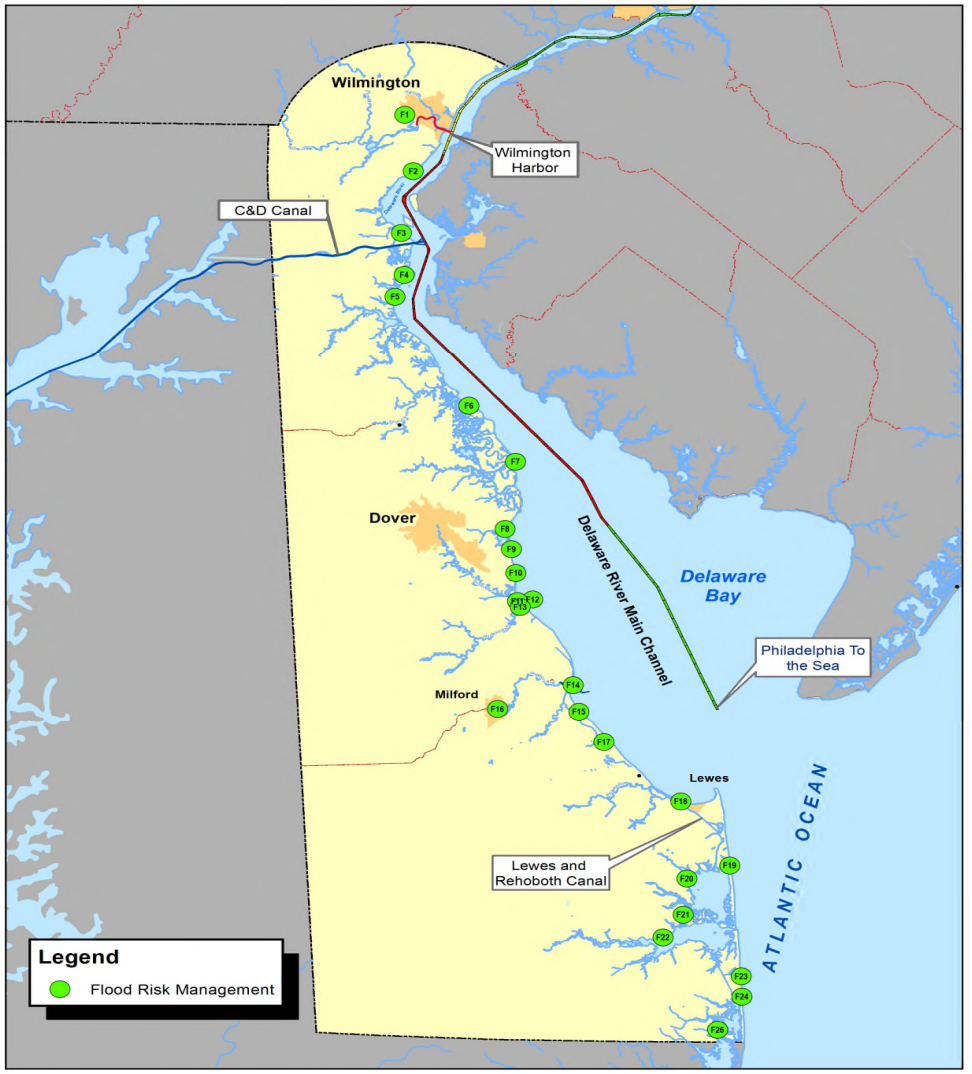


WITHOUT PROJECT CONDITIONS

PROBLEMS & OPPORTUNITIES

Problems & Opportunities:

- The primary **problems** identified in this study are damages along the Delaware Estuary shoreline (as well as along Delaware's Inland Bays) caused by *erosion, wave attack and inundation* due to *coastal storms*, along with rising water levels due to *RSLC*.
- The nature of the CSRM problems and the study area characteristics also present the **opportunity** to beneficially use dredged material to *reduce vulnerability to coastal storms* by *minimizing erosion, wave and storm-surge related damages* to Delaware communities and increase resiliency along the Delaware Estuary shoreline.



OBJECTIVES & CONSTRAINTS

Objectives:

- Improve CSRM for people, property and infrastructure along and adjacent to the Delaware shoreline from 2020 to 2070, via the beneficial use of dredged material.
- Increase the resiliency of coastal Delaware, specifically along the Delaware River/Bay and Delaware Inland Bay shoreline, via the beneficial use of dredged material.

Constraints:

- Avoid inducing flood damages
- Existing engineering policies for CSRM projects
- Do not formulate CSRM plans for a single private property
- Threatened & Endangered Species
- Avoid degradation to water quality
- Cultural resources and historic structures
- Timing of maintenance dredging and sand availability
- Existing topography for dune tie in(s)

PLAN FORMULATION RATIONALE

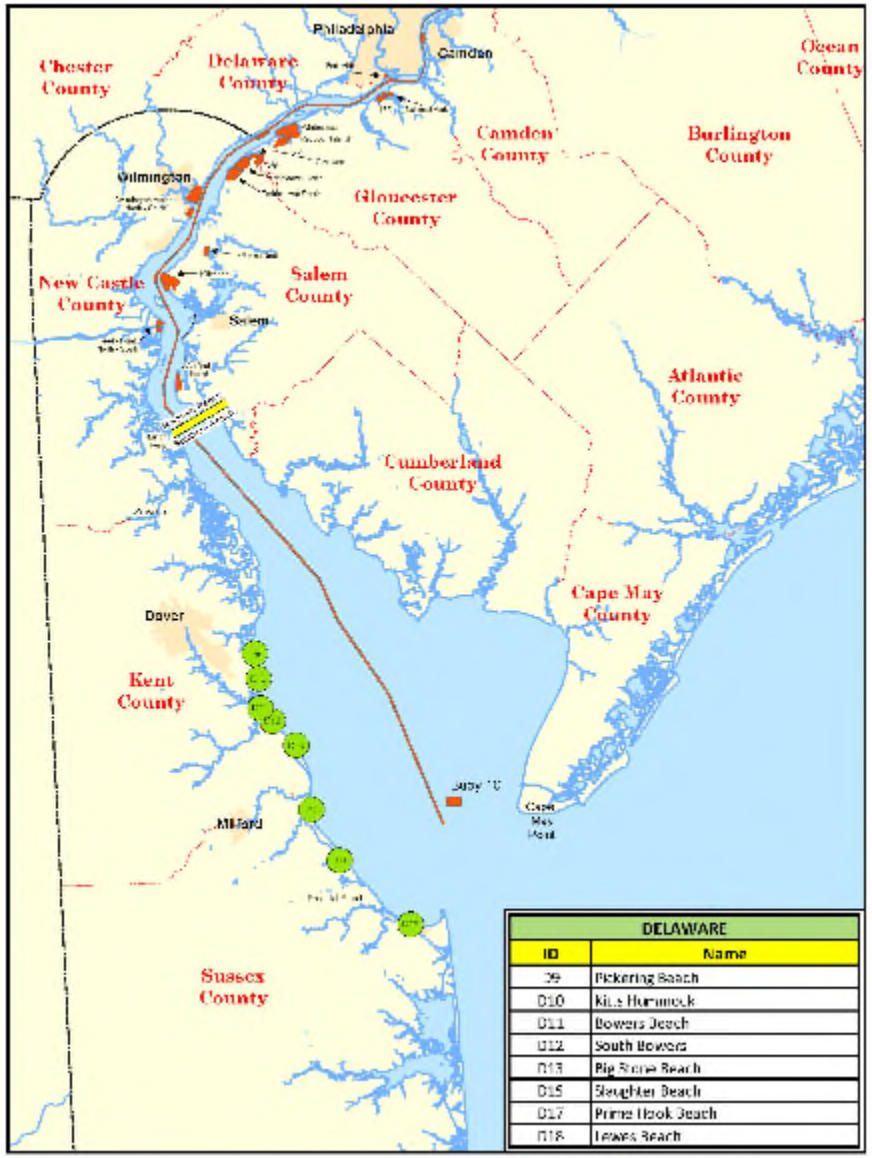
This feasibility study evaluated CSRM in Delaware occurring in two defined planning reaches (Northern and Southern) within the Delaware River/Bay system.

Northern Reach

- Narrower waterway
- Principal CSRM damages from inundation related to coastal storm surge
- Fine-grained sediment (silt and silty sand)

Southern Reach

- Wider waterway
- CSRM damages related to inundation, waves (increased fetch) and storm erosion
- Coarse-grained sediment (sand and sandy gravel)



FINAL ARRAY OF ALTERNATIVES

1. No Action
2. Levee/Dike Plan
3. Beach Restoration Plan
4. Beach Restoration with Groin(s) Plan
5. Beach Restoration with Breakwater Plan
6. Beach Restoration with Groin(s), Breakwater, Living Shoreline & Wetland Creation Plan

ALTERNATIVE EVALUATION / COMPARISON

Northern Planning Reach: The array of alternatives were evaluated and compared across 4 CSRM problem areas (New Castle, Augustine Beach, Bay View Beach and Woodland Beach)

- No modeling conducted: Dredged material source area proximity and suitability for the CSRM problem areas impacted evaluation and comparison
  - Analysis supported by Value Engineering (VE) Study (New Castle)
  - Analysis supported by proximity of suitable dredged material, cost of transporting the dredged material and the limited structural inventory of the placement sites (Augustine Beach, Bay View Beach, Woodland Beach)
- Results: No Action recommended in the Northern Planning Reach

ALTERNATIVE EVALUATION / COMPARISON

Southern Planning Reach: The array of alternatives were evaluated and compared across 8 CSRM problem areas (Pickering Beach, Kitts Hummock, Bowers Beach, South Bowers Beach, Big Stone Beach, Slaughter Beach, Prime Hook Beach and Lewes Beach)

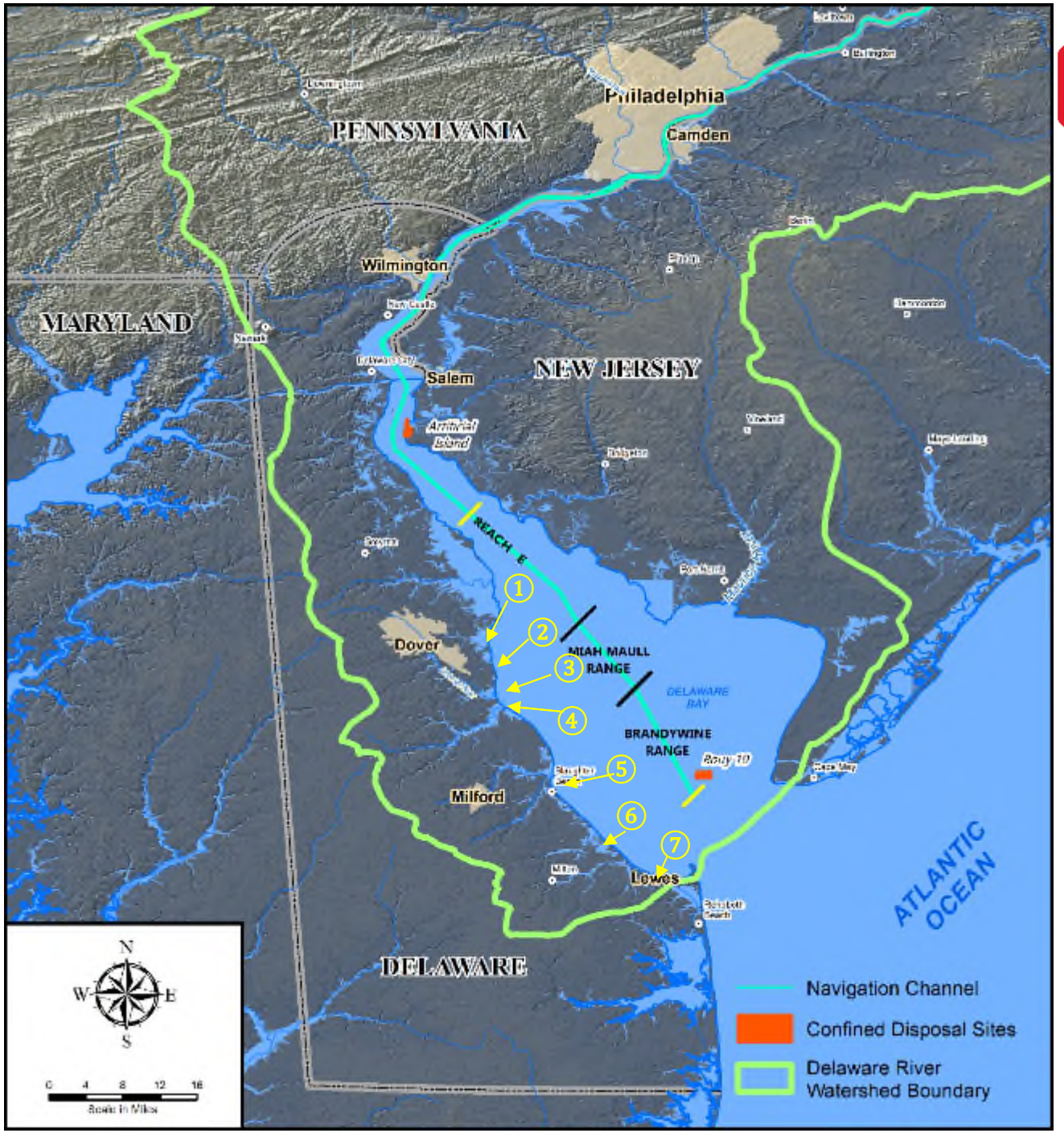
- Beach-fx modeling conducted: For each placement location (Beach-fx required the application of the model SBEACH to simulate with and without project beach profiles)
- Project Cost Assumptions:
  - Dredged material source area is Lower Reach E (Miah Maull and Brandywine Ranges) of the main Delaware River channel
  - Continuous Hopper dredge operation with one primary mobilization and continuous incremental preparatory costs to nourish all 8 sites in the southern planning reach
  - Project costs are based on the difference between the Federal Standard and placement of dredged material at the beach sites

Recommended Plan

Delaware Beneficial Use Project Map

- Seven Locations -

1. Pickering Beach
2. Kitts Hummock
3. Bowers Beach
4. S. Bowers Beach
5. Slaughter Beach
6. Prime Hook Beach
7. Lewes Beach



CRITICAL STUDY ASSUMPTIONS & CHALLENGES

- Coastal Barrier Resources Act (CBRA) and Coastal Barrier Improvement Act (CBIA)
- Environmental Windows
- Least Cost Environmentally Acceptable Disposal Location (Federal Standard)

CBRA/CBIA

	Pickering Beach	Kitts Hummock	Big Stone Beach	Bowers Beach	South Bowers Beach	Slaughter Beach	Prime Hook Beach*	Lewes Beach
Bayward Edge of Berm	No CBRA Restrictions	N/A	No CBRA Restrictions	N/A				
Lateral Berm Footprint	Avoid CBRA System Unit at southern project limit	Avoid CBRA System Unit at northern project limit	N/A		Avoid CBRA System Unit at southern project limit			N/A
Lateral Dune Footprint	Avoid CBRA System Unit at southern project limit	Avoid CBRA System Unit at northern project limit	N/A		Avoid CBRA System Unit at southern project limit			N/A
Berm Taper	No CBRA restrictions							

* While the Prime Hook Beach dune/berm has to avoid the CBRA/CBIA System Unit at the southern portion of the project, USFWS will allow the dune/berm at the northern project limit to enter CBRA/CBIA because it will benefit the existing USFWS Refuge project.

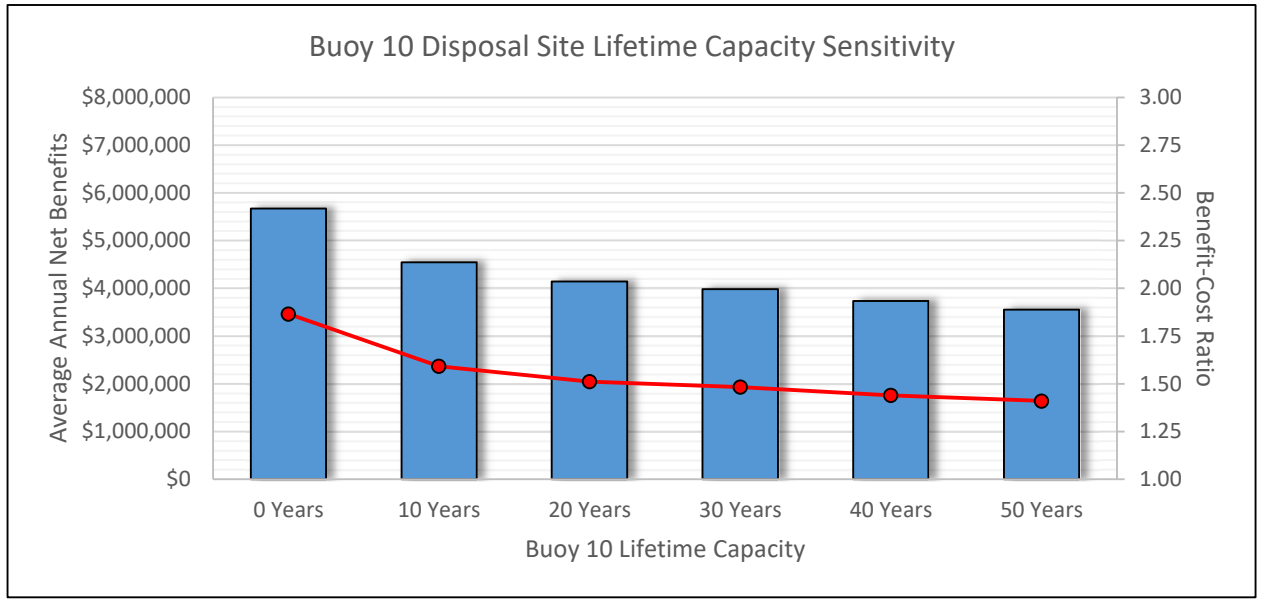
ENVIRONMENTAL WINDOW

- The USFWS recommended a seasonal restriction from 15 April through 15 June (for the migratory red knot) for construction activities in the proposed project area

  - Through a phased initial construction, USACE is able to adhere to the environmental window
  - The southernmost 3 sites (Lewes, Prime Hook, and Slaughter) will be constructed in year 2024, and the remaining 4 northern sites (Pickering, Kitts Hummock, Bowers, and South Bowers) will be constructed in year 2030.
  - In year 2036 all 7 sites will be on the same 6-year periodic renourishment cycle.

LEAST COST ENVIRONMENTAL ACCEPTABLE DISPOSAL LOCATION (FEDERAL STANDARD)

- The current Federal Standard for dredged material disposal from the proposed recommended plan source area is dredging via a hopper dredged and bottom dumping at Buoy 10 (open water disposal site):
  - Buoy 10 currently has approximately 10 years of operational capacity remaining.
  - The nearest approved disposal area to Buoy 10 is Artificial Island (approximately 40 miles upriver).



QUESTIONS?

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