Using Dredged Sediments to Uplift Marshes, Build Subtidal Shallows and Provide Marsh Edge Protection in the Seven Mile Island Innovation
New Jersey

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- Encompassing 24 mi², and 15,000 Acres of Back Bay Tidal Marshes, Shallow Bays, and Inlets
- Bisected by the NJ Intracoastal Waterway and Part of the Cape May Wetlands Wildlife Management Area (NJDEP)
- Collaborative Partnership to Advance Marsh Restoration Techniques Using Dredged Sediments

**PROJECTS AND FEATURES OVERVIEW**
- Federal Beach Fill and Navigation Projects
- Confined Disposal Facilities (CDF)
- Prior Placement Sites (PP)
- Elevated Nesting Habitat (ENH)
- Thin Layer Placement (TLP)
- Marsh Enhancement (ME)
- Intertidal Shallows (IS)
- Marsh Edge Protection (MEP)
- Tidal Flat Enhancement (TFE)
- Navigation Channel Creation and Maintenance Historically Placed Materials on Marshes and Built Islands
- Unconfined on Marsh and In Water Sediment Placement Created Important Habitats
- Most of the Remaining High Marsh Habitat in the Area Occurs on Historic Fill
  - Created important wading bird nesting habitats (98A,B,C)
  - Accounts for 27% of all colonial nesting wading birds in New Jersey
  - Experiencing Habitat Degradation with Elevation Loss Impacting Nesting Success
- Unintentional Beneficial Use with Engineering with Nature Principles that Provides Lessons Learned

LEGACY SEDIMENT PLACEMENT
- **Gull Island**
  - Large portion of tidal marsh on southern Gull Island is projected to convert to mud flats and open water
  - Southern margin experiencing marsh edge erosion and risks of breaching

- **Sturgeon Island**
  - Northern portions of island at low elevation and at risk of conversion to flats
  - Northwestern island experiencing marsh edge erosion

- **Both Islands**
  - Low-vigor *Spartina* flats border directly to open water or are functioning as low marsh and transitioning to high-vigor *Spartina*
Ecological Goals

- Raise Elevations of Southeastern Marsh Platform Across a Gradient of Elevations
  - Target Wading Bird Nesting Elevations - Transitional Upland Shrub Habitat (>3.5’ NAVD88)
  - Target High Marsh Elevations for Salt Marsh Sparrow (2.8’ – 3.3’ NAVD88)
  - Target Low Marsh Elevation for Fish Habitat (2.1 – 2.7’ NAVD88) and Shorebird and Wader Foraging

- Create Marsh Edge Protection Zone
  - More Natural Marsh Edge Slope
  - Create Wave Energy Buffer
  - Intertidal Shoal to Marsh Edge Elevation (2.0’NAVD88)

- Enhance Intertidal and Subtidal Shallows
  - Target Elevations to MLLW Where Macroalgal Flats Transition from Sparse to Densely Vegetated (-1.0 MLLW – 0’ MLLW)
Preserved marsh pools noted to be high quality habitat via avian use surveys and SAV occurrence.

Targeted marsh enhancement to areas of unvegetated flats at elevations below benchmark elevations for *Spartina alterniflora*.

Used benthic surveys and macroalgae assessments to set goals for intertidal shallows and mudflat target depths.

Used marsh erosion assessments and offshore slopes to locate marsh edge features.
September 2020
- Placed 40,000 cubic yards of mixed fine sand and mud

Marsh Elevation Enhancement (MEE)
- 21 acres of elevation lift
- 3.9’ NAVD88 grading down to 1.8’ NAVD88

Marsh Edge Protection (MEP)
- Built to marsh edge (2.0’ NAVD88) grading down to MLLW

Enhanced Intertidal Shallows (ISS)
- Shallowed up to MLLW along southern island flank

INITIAL ASSESSMENT GULL ISLAND
Ecological Goals

- Marsh Elevation Enhancement to Create Nesting Habitat for Wading Birds
  - Target Elevation 3.5' NAVD88
  - Shrub Habitat Elevation Benchmark
  - Above 2.41' NAVD88 MHHW (old epoch) and 3.5' NAVD88 Frequent Storm Flood Elevation

- Create Sandy Marsh Edge Protection Feature
  - Protect Erosional Marsh Edge
  - Create Diamondback Terrapin / Horseshoe Crab Nesting Areas

- Enhance Intertidal and Subtidal Shallows
  - Target Elevations to MLLW Where Macroalgal Flats Transition from Sparse to Densely Vegetated (-1.0 MLLW – 0' MLLW)

STURGEON ISLAND PROJECT GOALS
- Placed in Two Phases
  - March 2020
    - 4,200 cubic yards
  - September 2020
    - 15,000 cubic yards
    - Mixed fine sand and mud
- Marsh Elevation Enhancement (MEE)
  - 3.5 acres of enhancement
  - 3.0' NAVD88 grading down to 1.9'
- Marsh Edge Protection (MEP)
  - Placed small sand ridge along toe of erosional slope
- Enhanced Intertidal Shallows (ISS)
  - Shallowed above MLLW along eastern island to extend flats northward
- Plan to return to add additional material to reach ecological goals

INITIAL ASSESSMENT STURGEON ISLAND
Background Turbidity Assessment

October – December 2019:

- Very low turbidity system overall
- Spikes in turbidity of 250 – 380 ntu during periods of winds >5 m/s (11 mph) corresponding to the passage of a Nor’easter and with a southerly wind event.

TURBIDITY MONITORING DURING STORMS
TURBIDITY MONITORING DURING AND POST-PLACEMENT

During Placement

X = Location of Discharge Pipe

1 Month Post-Placement
MONITORING AND ASSESSMENT

- Pre-Placement
  - Topographic and Bathymetric Surveys
  - Winds, Waves, Currents, and Turbidity Monitoring
  - Water Levels and Flooding Elevations
  - Vegetation Benchmark Elevation Surveys
  - Benthic Community Assessment
  - Macroalgae Assessment
  - Avian Site Usage and Nesting Success Assessment
  - Panne and Pool Survey

- Post-Placement
  - Topographic and Bathymetric Surveys
  - Sediment Dynamics and Evolution
  - Water Levels and Flooding Elevations
  - Benthic Community Assessment
  - Macroalgae Assessment
  - Avian Site Usage Assessment
  - Vegetation Response
ADVANCING SCIENCE AND PRACTICE AT THE SEVEN MILE ISLAND INNOVATION LABORATORY

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