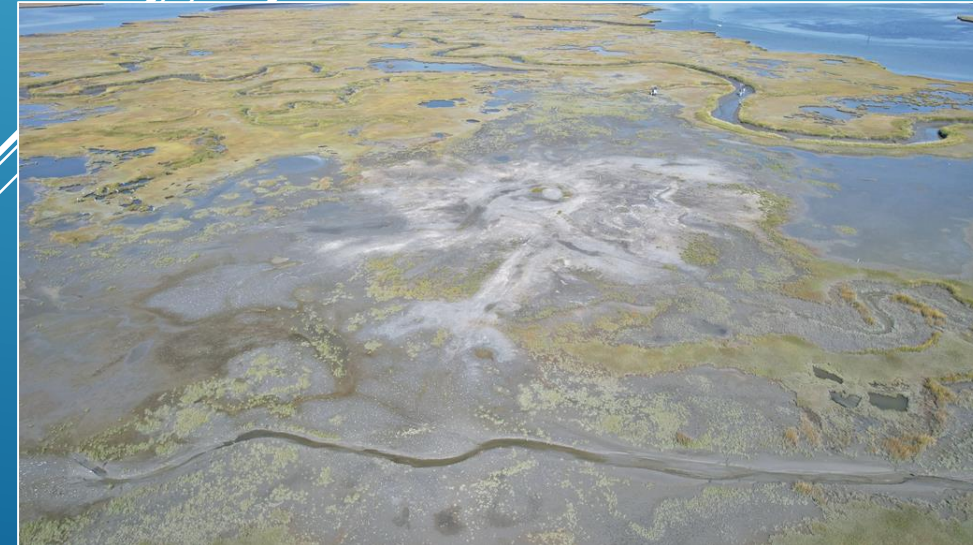




# Overview of Beneficial Use Projects: Seven Mile Island Innovation Lab, New Jersey



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Lisa Ferguson, Sam Collins and Julie Blum, The Wetlands Institute  
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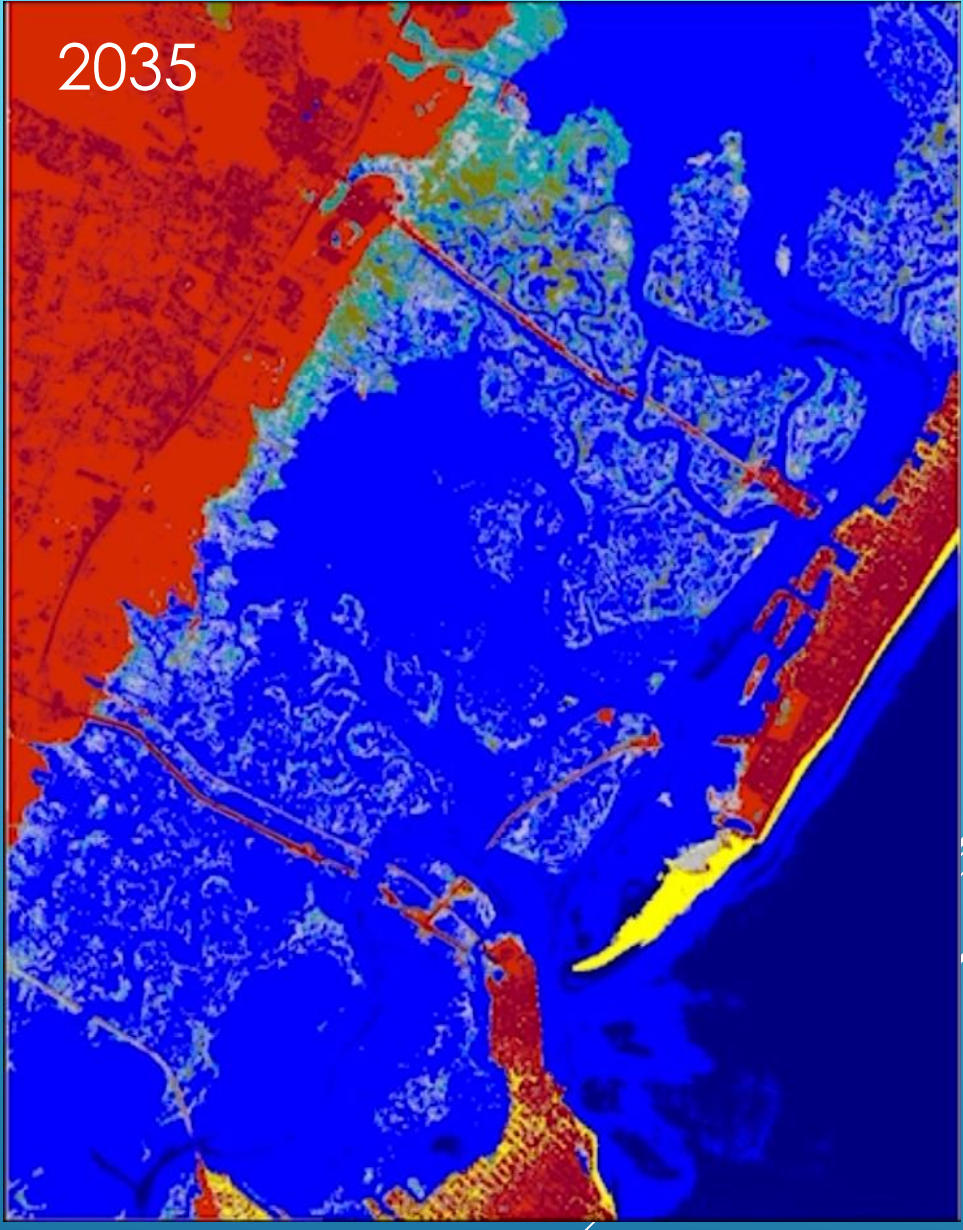


- ▶ A Proving Ground Using Natural and Nature-Based Features to Provide Ecological Uplift and Enhanced Resilience for Ecosystems and Coastal Communities
- ▶ A Test Bed to Advance and Improve Dredging Techniques and Marsh Restoration and Coastal Feature Creation Techniques in Coastal New Jersey
- ▶ Using a Landscape Approach and Adaptive Management to Move From Pilot Projects to Ecosystem Solutions
- ▶ Based on an International Concept Pioneered by the Dutch
- ▶ 24 sq mi Back Bay Marsh Dominated System with Shallow Bays, Sounds and Tidal Inlets Bisected by the NJ Intracoastal Waterway
- ▶ 50+ Member Working Group for Knowledge Sharing
- ▶ More than 30 Scientists Working in SMILL



# SEVEN MILE ISLAND INNOVATION LABORATORY





HIGH TIDE FLOODING (MHW SLAMM) AND COASTAL RESILIENCE

## Step 1

### Project Impetus & Location Considerations:

- Navigational Dredging Needs of NJ Intracoastal Waterway
- Shoaled Areas and Transport Distance

- SMIL Projects to Date Are Driven by USACE NJIWW Maintenance Dredging
- SMIL Goals Include Advancing Dredging Technology and Beneficial Use Innovation

## Step 2

### Project Partners

- Project Area Land Owners
- Permitting Agencies
- Ecological Experts
- Navigation Managers and Engineers

## Step 3

### Project Selection

- Ecological Condition Assessments
- Habitat and Wildlife Needs
- Sediment Suitability, Type and Volumes

## Step 4

### Project Design, Construction, Monitoring

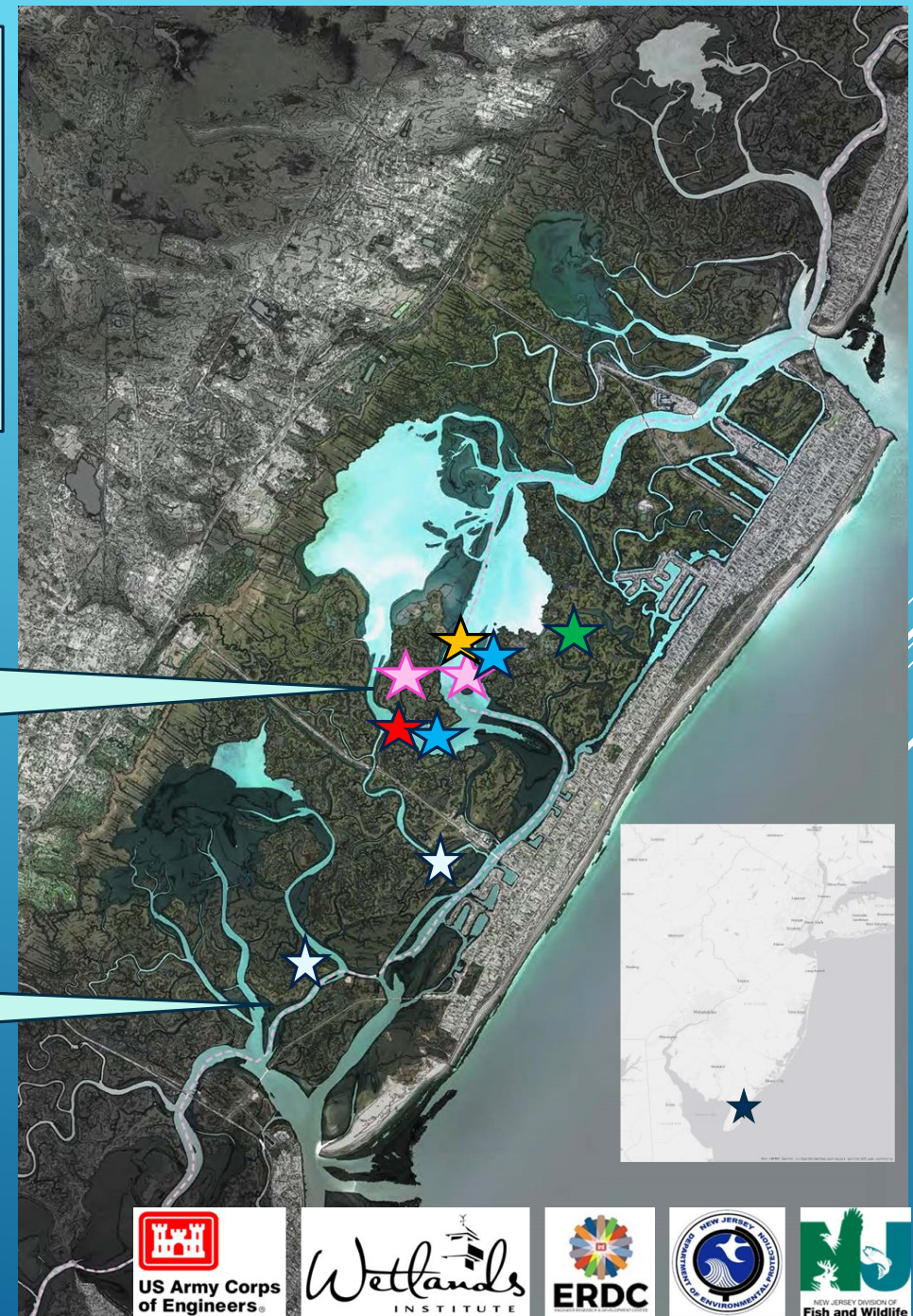
- Ecological and Construction Goals
- Construction Planning and Implementation
- Permitting and Construction
- Monitoring and Adaptive Management



- ★ Marsh Elevation Enhancement/Wading Bird Nesting Habitat
- ★ Sandy Marsh Edge Protection
- ★ Intertidal Shallows and Tidal Delta Enhancement
- ★ Edge Protection and Tidal Flat Enhancement
- ★ Marsh Elevation Enhancement
- ★ Elevated Nesting Habitat

Sediment Type Mixed Fine Sand and Mud  
 Maintenance Dredging NJIWW  
 Hydraulic Dredging and Transport  
 Unconfined Placement; Direct Subtidal  
 Placement, Indirect Intertidal Placement

Sediment Type: Fine to Medium Sand  
 Maintenance Dredging NJIWW  
 Hydraulic Dredging and Transport  
 Unconfined Placement Followed by Onsite  
 Berm Construction to Build Elevation



# SMIL BENEFICIAL USE PROJECTS





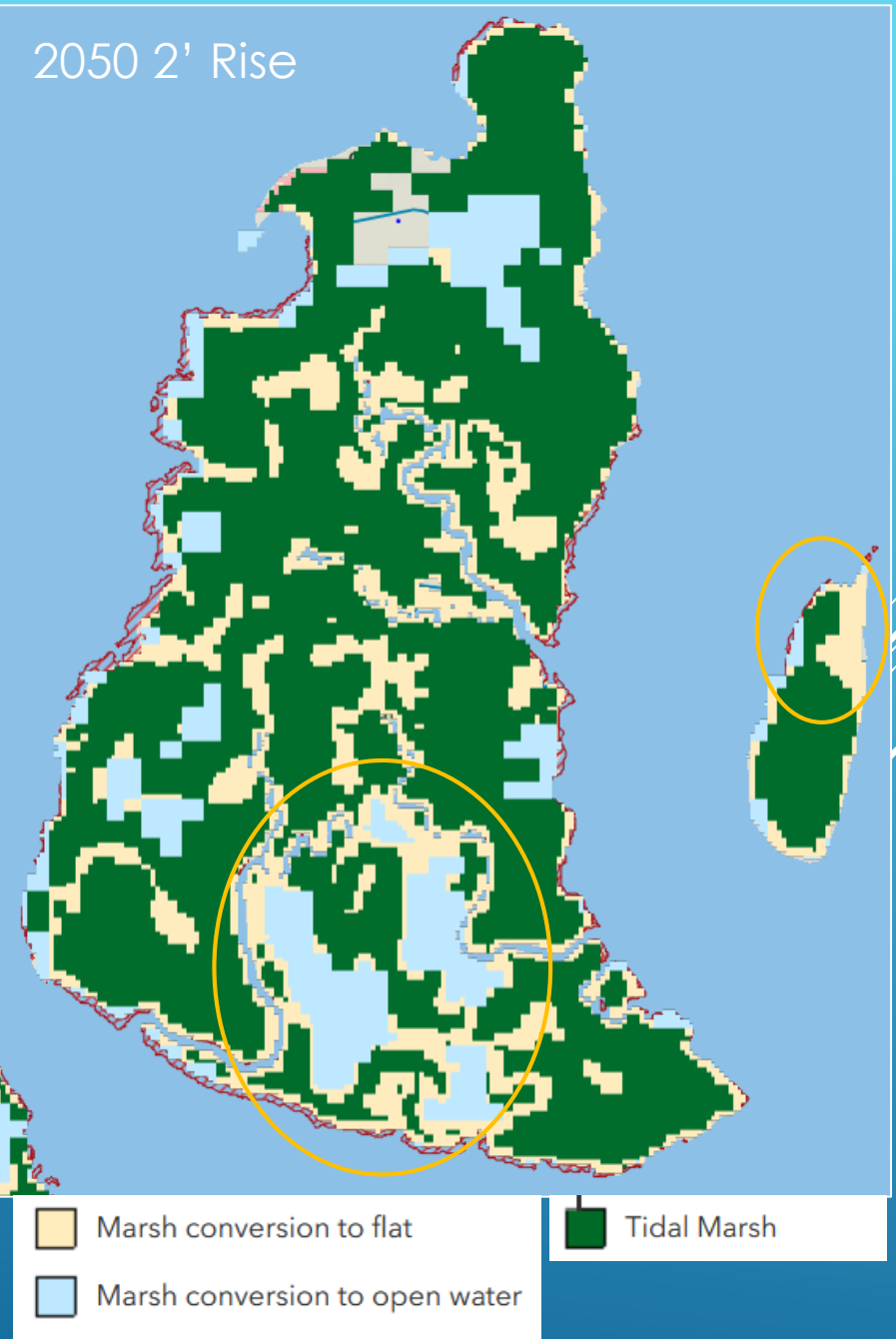
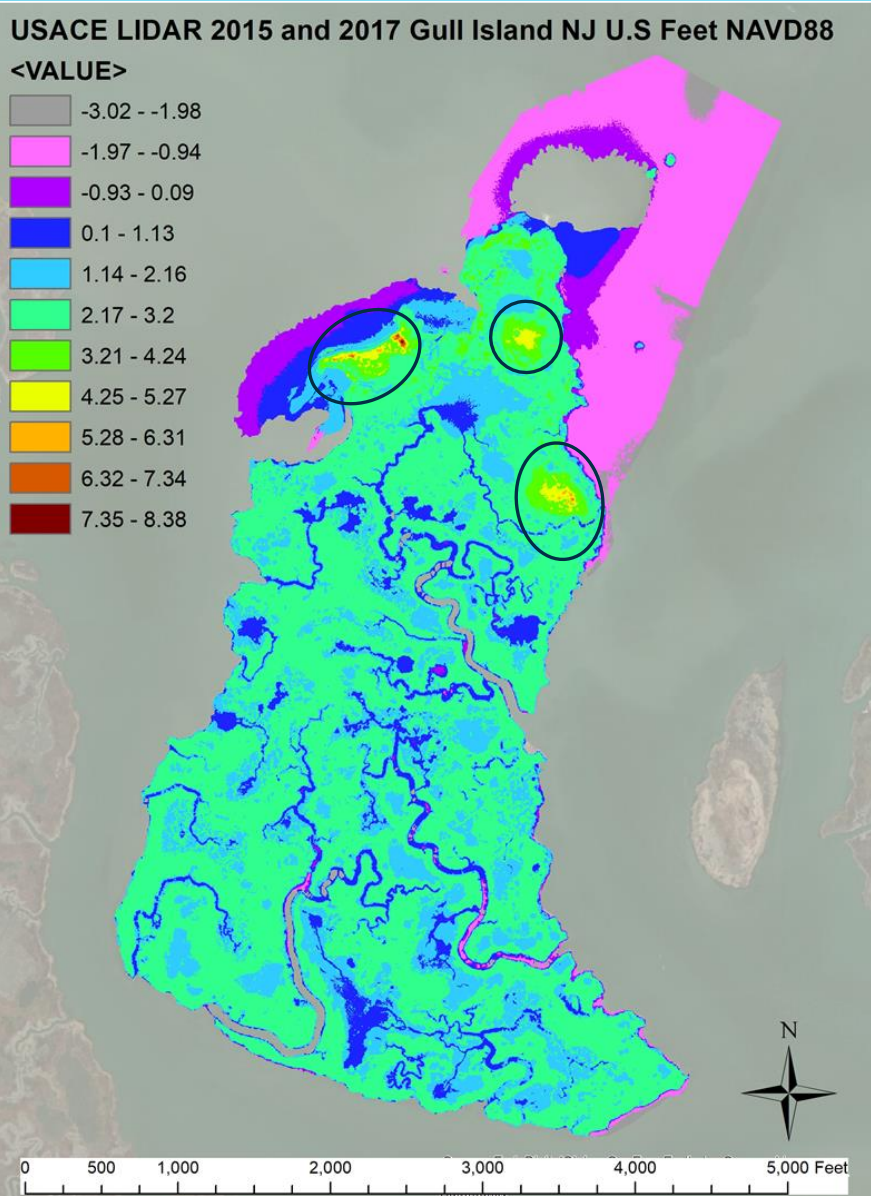
- ▶ Sturgeon and Gull Islands are low lying marsh islands that are drowning
- ▶ Historic Dredge material placement sites created important wading bird habitat
  - ▶ Nesting areas account for nesting for 35% of all colonial wading birds in NJ
- ▶ Habitat degrading with elevation loss
- ▶ Island drowning destabilizing marshes

▶ Gull Island

- ▶ Large portion of tidal marsh projected to convert to mud flats and open water
- ▶ Southern margin experiencing marsh edge erosion and risks of breaching
- ▶ Pre-placement almost all of Gull Island flooded daily with vast areas of interior intertidal flats and open water area
- ▶ High marsh areas are now restricted to prior dredged material placement sites

▶ Sturgeon Island

- ▶ Northern portions of island at risk of conversion to flats and experiencing marsh edge erosion



## ▶ Ecologic Goals

- ▶ Raise Elevations of Marsh Platforms Across a Gradient of Elevations – Gull and Sturgeon Islands (MEE)
  - ▶ Target Wading Bird Nesting Elevations - Transitional Upland Shrub Habitat (>3.5' NAVD88)
  - ▶ Target High Marsh Elevations for Salt Marsh Sparrow (2.7' – 3.1' NAVD88)
  - ▶ Target Low Marsh Elevation for Fish Habitat (2.0 – 2.7' NAVD88) and Shorebird and Wader Foraging
- ▶ Create Marsh Edge Protection Zone - Gull and Sturgeon Islands (MEP)
  - ▶ More Natural Marsh Edge Slope and Wave Energy Buffer
  - ▶ Strategic Placement for Marsh Nourishment
  - ▶ Intertidal Shoal to Marsh Edge Elevation (2.0' NAVD88)
- ▶ Enhance Intertidal and Subtidal Shallows – Gull and Sturgeon Islands (ISS)
  - ▶ Target Elevations to MLLW Where Macroalgal Flats Transition from Sparse to Densely Vegetated (-1.0 MLLW – 0' MLLW)

# GULL AND STURGEON ISLAND PLACEMENTS



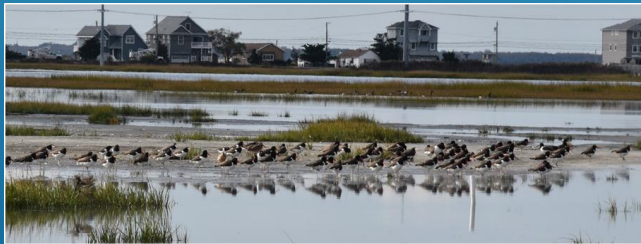


- ▶ September 2020
  - ▶ Placed 40,000 cubic yards of mixed fine sand and mud
- ▶ Marsh Elevation Enhancement (MEE)
  - ▶ ~22 acres of elevation lift
  - ▶ 3.9' NAVD88 grading down to 1.8' NAVD88
- ▶ Marsh Edge Protection (MEP)
  - ▶ Built to marsh edge (2.0' NAVD88) grading down to MLLW
- ▶ Enhanced Intertidal Shallows (ISS)
  - ▶ Shallowed up to MLLW along southern island flank

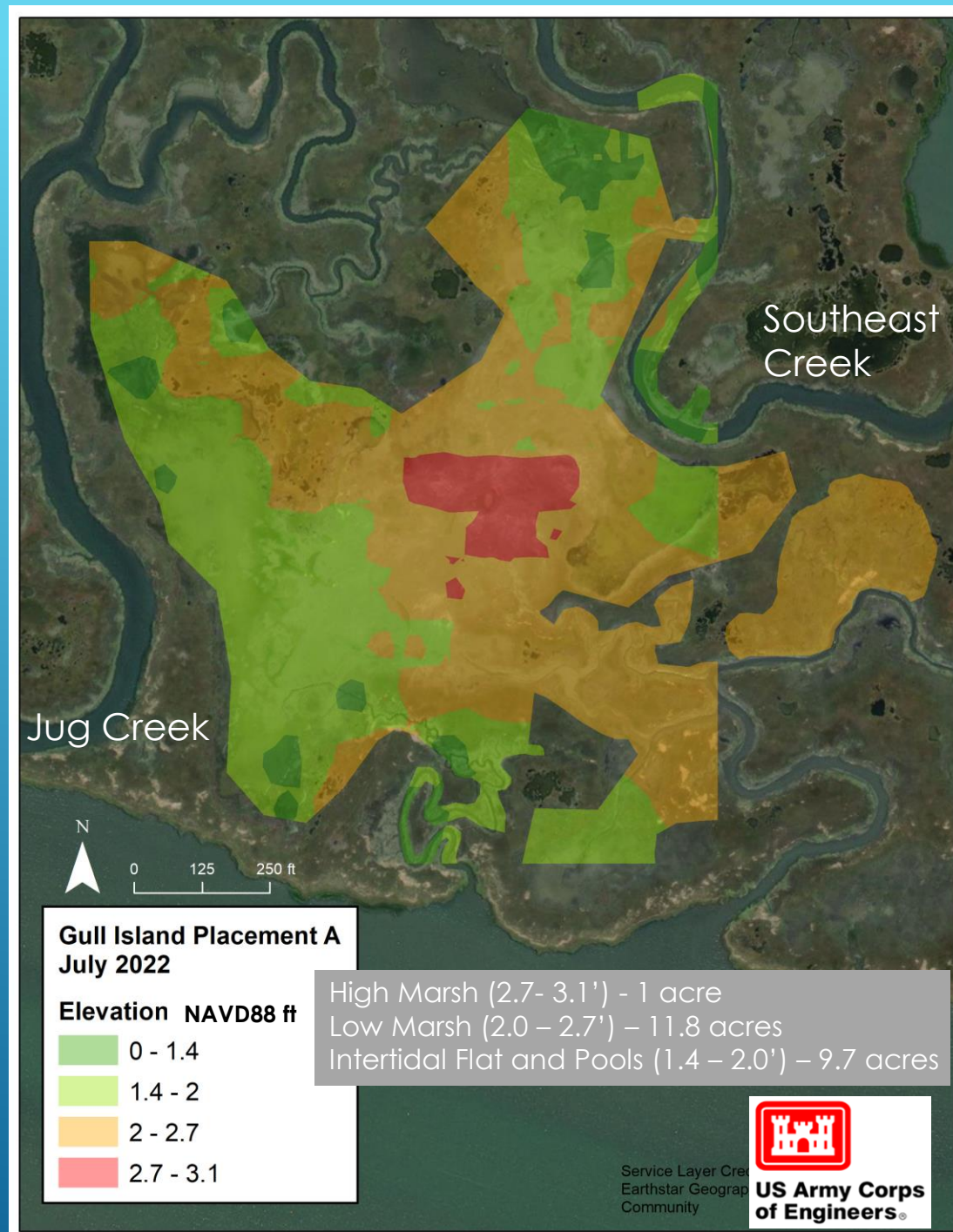


# INITIAL ASSESSMENT GULL ISLAND PROJECTS

- ▶ Below target elevations for transitional wading bird habitat and only small area of high marsh
  - ▶ Acoustic monitoring detecting both Salt Marsh and Seaside Sparrows foraging on site
- ▶ Effectively created low marsh habitat and shallowed intertidal flats and pools
  - ▶ Avian surveys documenting more than 25 species utilizing placement area for foraging including several surveys with 500-1000 Semipalmated Sandpipers
- ▶ Vegetation recolonization and expansion proceeding well at 2 year post-placement timeframe



# GULL ISLAND RESULTS 2 YEARS POST PLACEMENT



2020-11-04

View W Point 2



2021-07-12



2021-09-12



2022-08-02



## ▶ Turbidity Monitoring

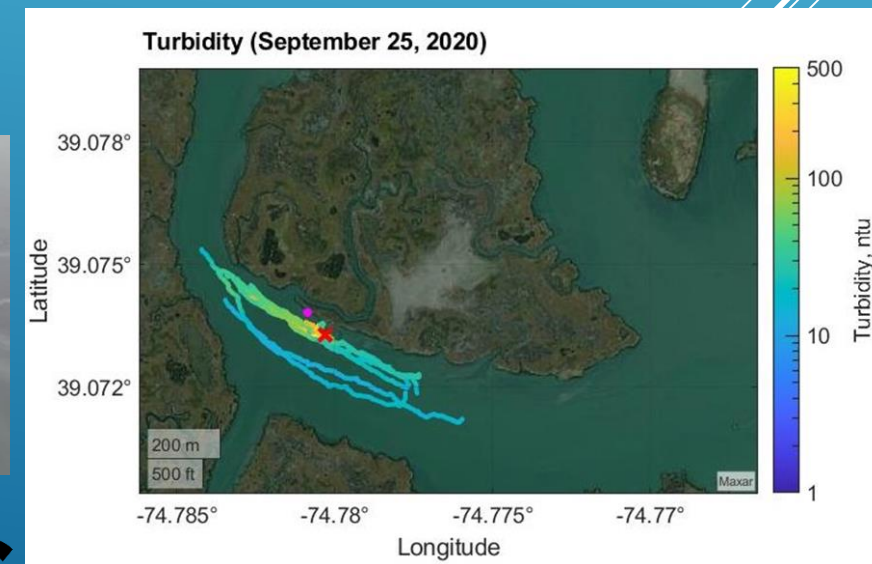
- ▶ Turbidity plume localized, only extending ~50 m off marsh edge and <200 m along shore.
- ▶ Was at similar levels (250-380 ntu) to those measured during passage of Nor'easter and southerly wind events (>5 m/s).

## ▶ Berm Monitoring

- ▶ Placed ~9000 cy and ~8700 cy on two subtidal features and gained 1 – 2.5' of elevation
- ▶ Documented ~4700 and ~4100 cy after 16 months and 1-1.5' of elevation gain so ~50% reduction in volume
- ▶ Measured wave height and energy reduction along marsh edge during May Nor'easter (Perkey et al.)



## Marsh Edge Protection Feature 1 Month Post-placement



# ADVANCING SCIENCE AND PRACTICE AT THE SEVEN MILE ISLAND INNOVATION LABORATORY

For more information:

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