Overview of 2020/2021 SMIIL Placements: Gull and Sturgeon Islands and Great Flats

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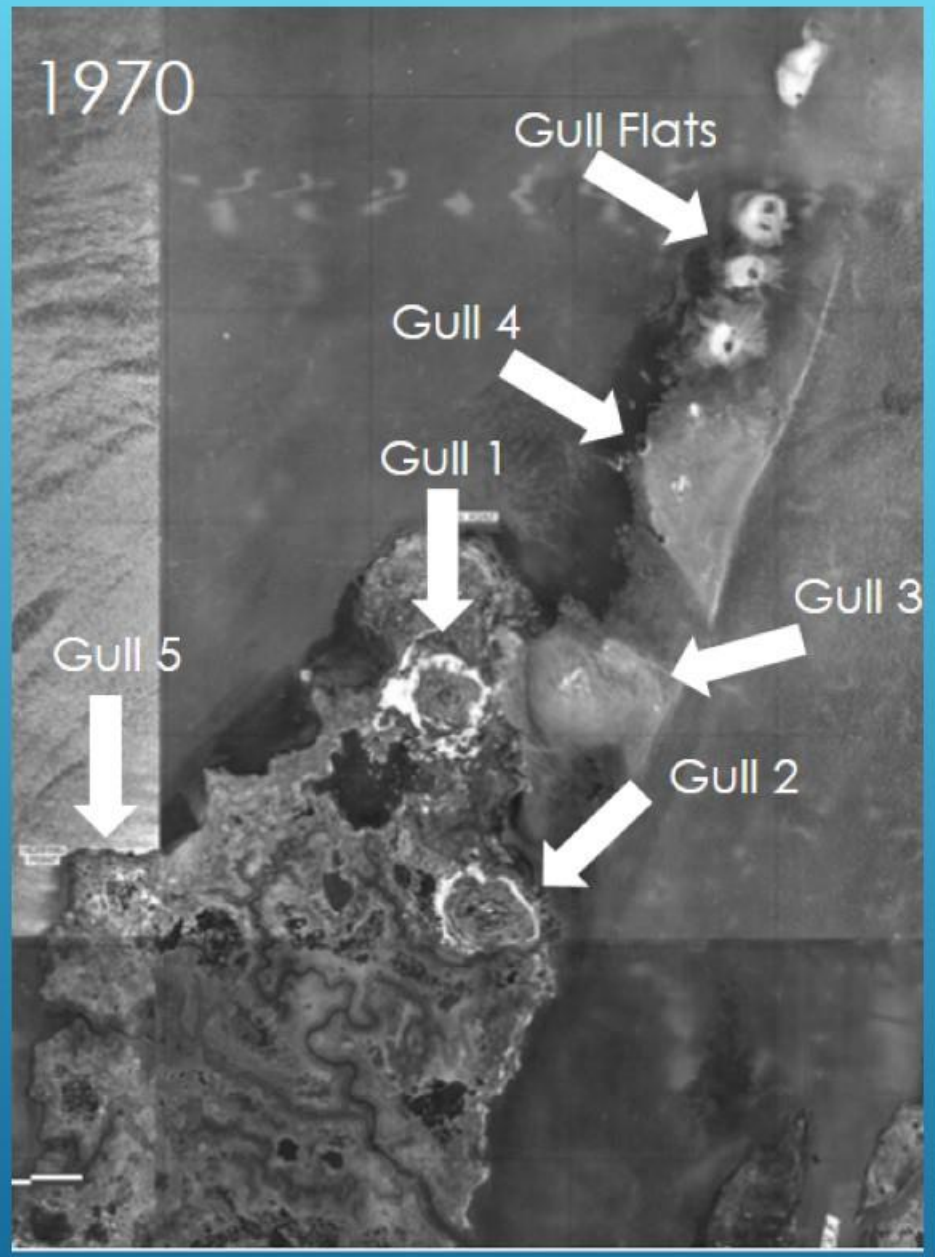
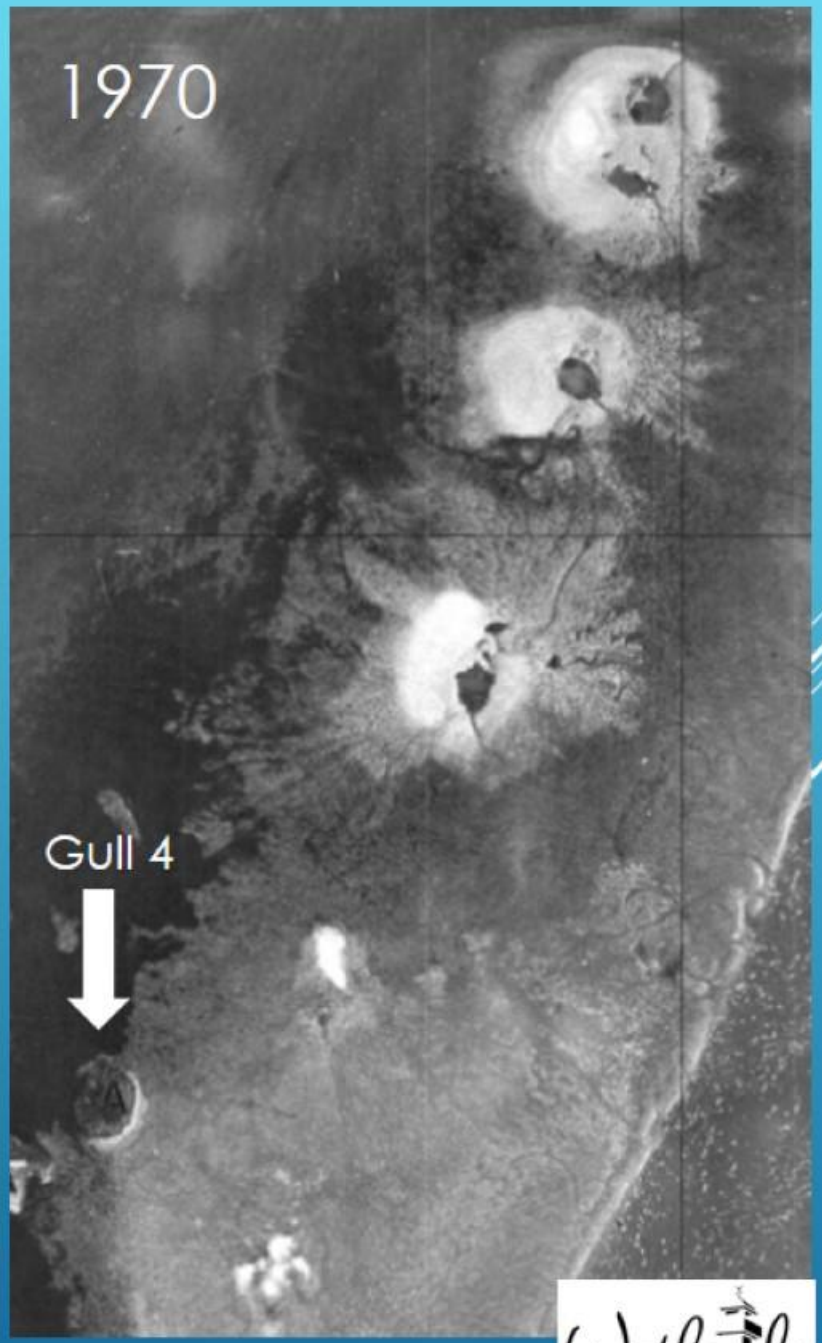
LEGACY SEDIMENT PLACEMENT

- 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 SMIIL 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 for Current Projects





Historic Placement on Gull Island Complex

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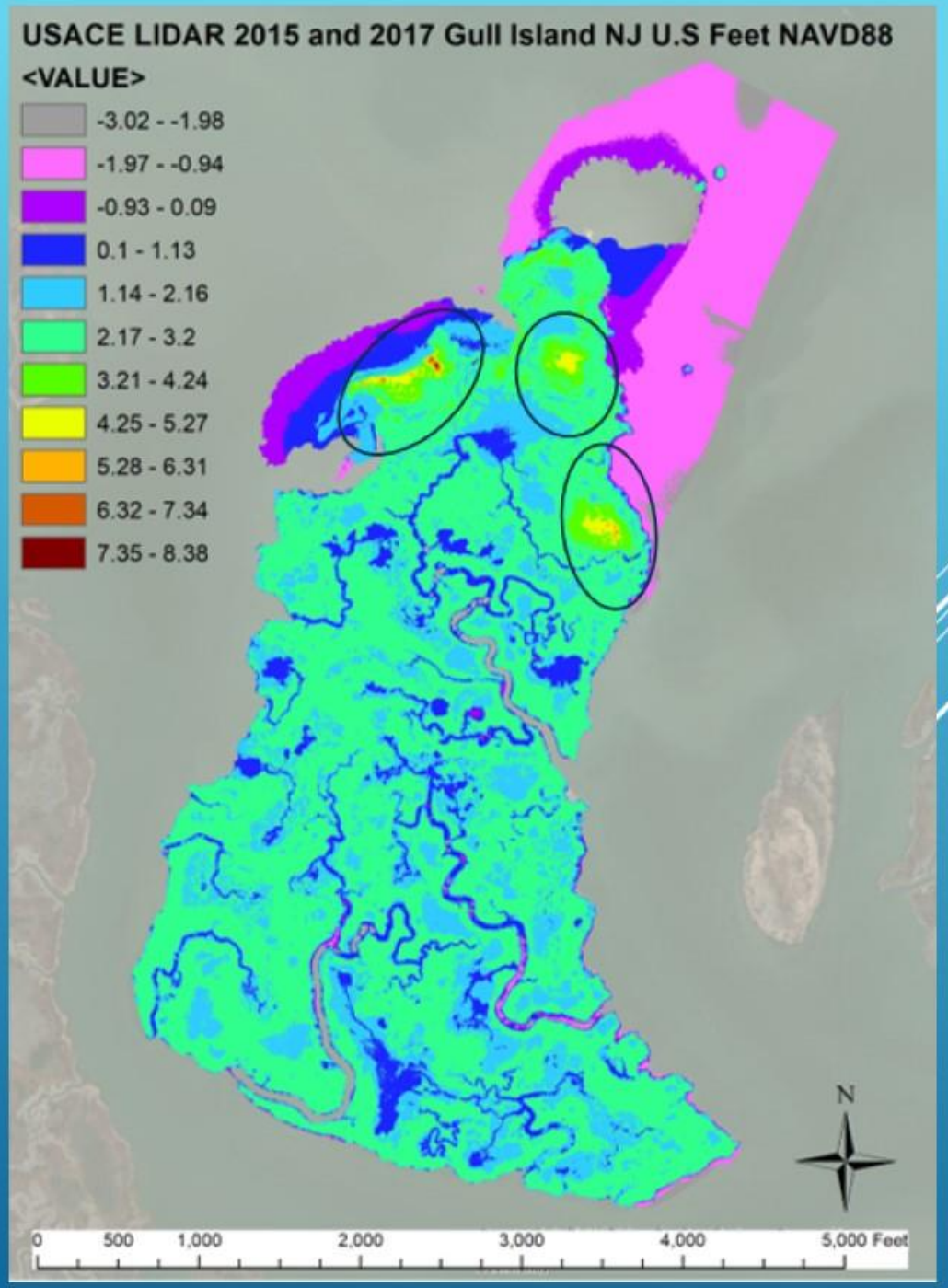
- Gull Island
  - Large portion of tidal marsh on southern Gull Island is projected to convert to mud flats and open water
  - Southern margin experiencing marsh edge erosion and risks of breaching
- Sturgeon Island
  - Northern portions of island at low elevation and at risk of conversion to flats
  - 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*

GULL ISLAND MARSH ELEVATIONS

- Extensive areas of Gull Island are very low
- MHHW 2.14' NAVD88 – last tidal epoch (1983-2001)
- TWI calculates it to be closer to 2.8' NAVD88 now
- Pre-placement almost all of Gull Island floods daily with vast areas of interior intertidal flats and open marsh area
- High marsh areas are now restricted to prior dredged material placement sites
  - Here and elsewhere throughout SMIIL



GULL ISLAND PROJECT GOALS

- 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
  - Adjusted placement location for avoidance
  - Used natural elevations and tidal creeks for dividers
- Targeted marsh enhancement to areas of unvegetated flats at elevations below benchmark elevatio 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

GULL ISLAND: MARSH ELEVATION ENHANCEMENT

INITIAL ASSESSMENT GULL ISLAND PLACEMENT

- 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

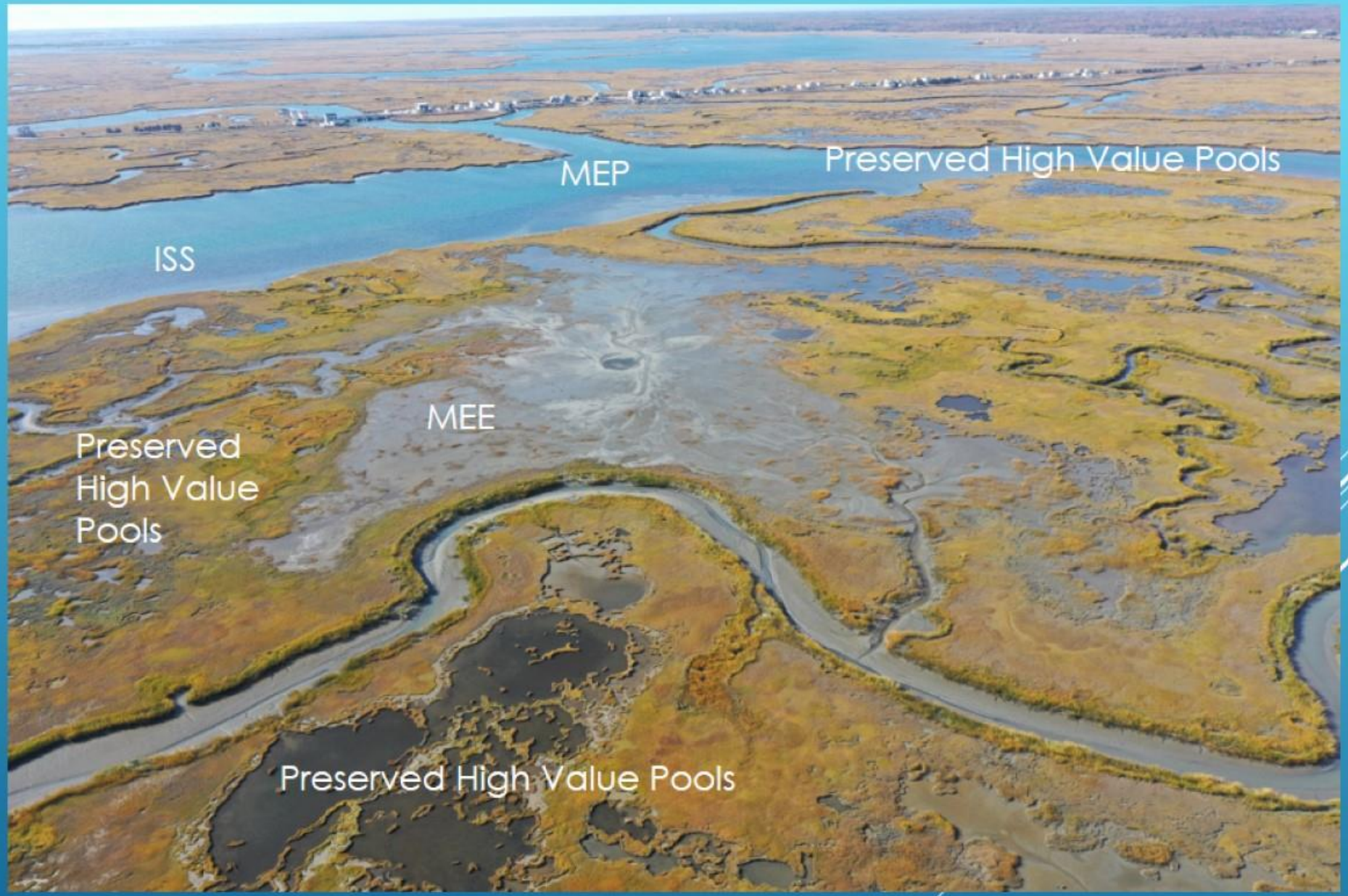
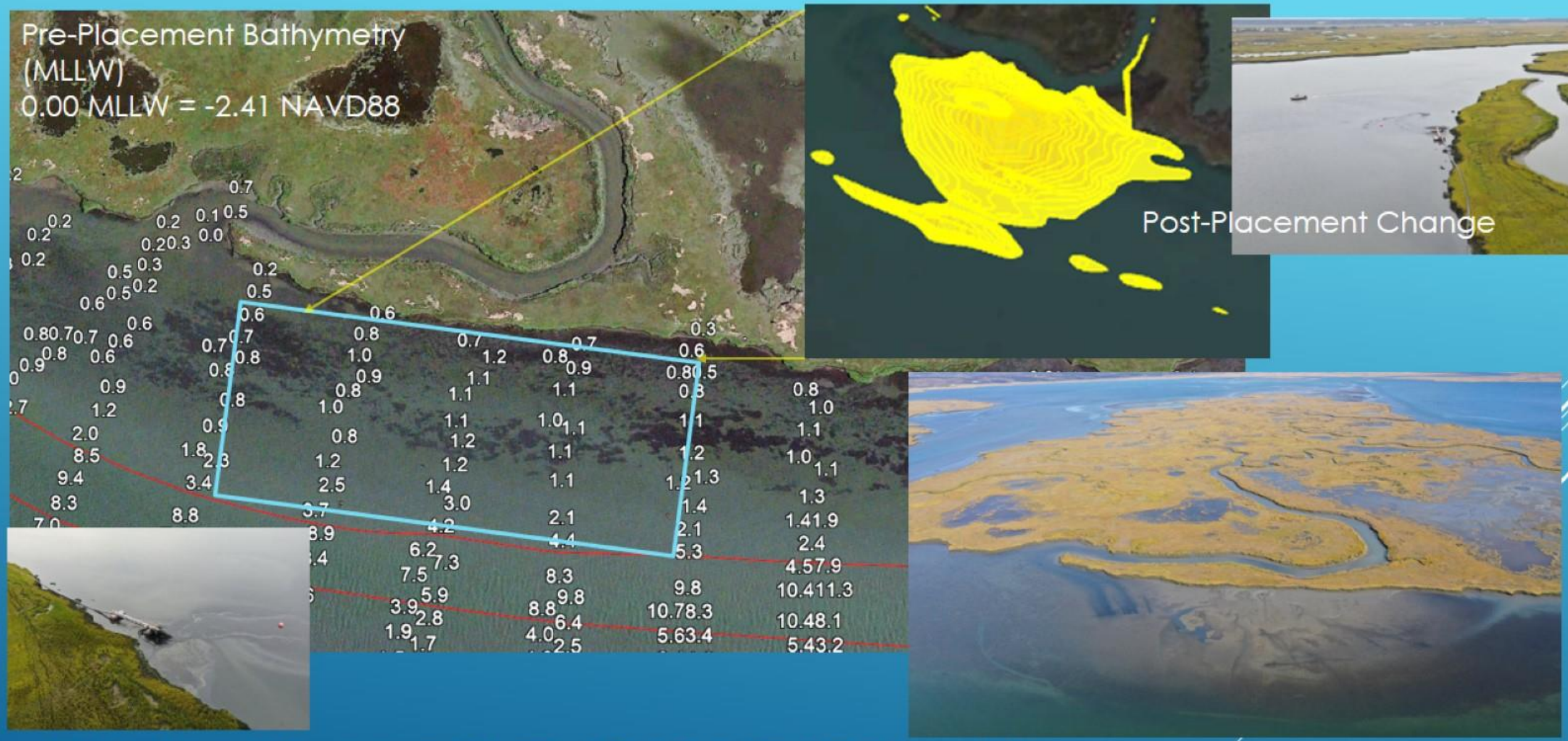


PHOTO POINTS / VEGETATION RESPONSE 6/2021



GULL ISLAND: MARSH EDGE PROTECTION AND INTERTIDAL SHALLOWS DEVELOPMENT

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

STURGEON ISLAND PROJECT GOALS

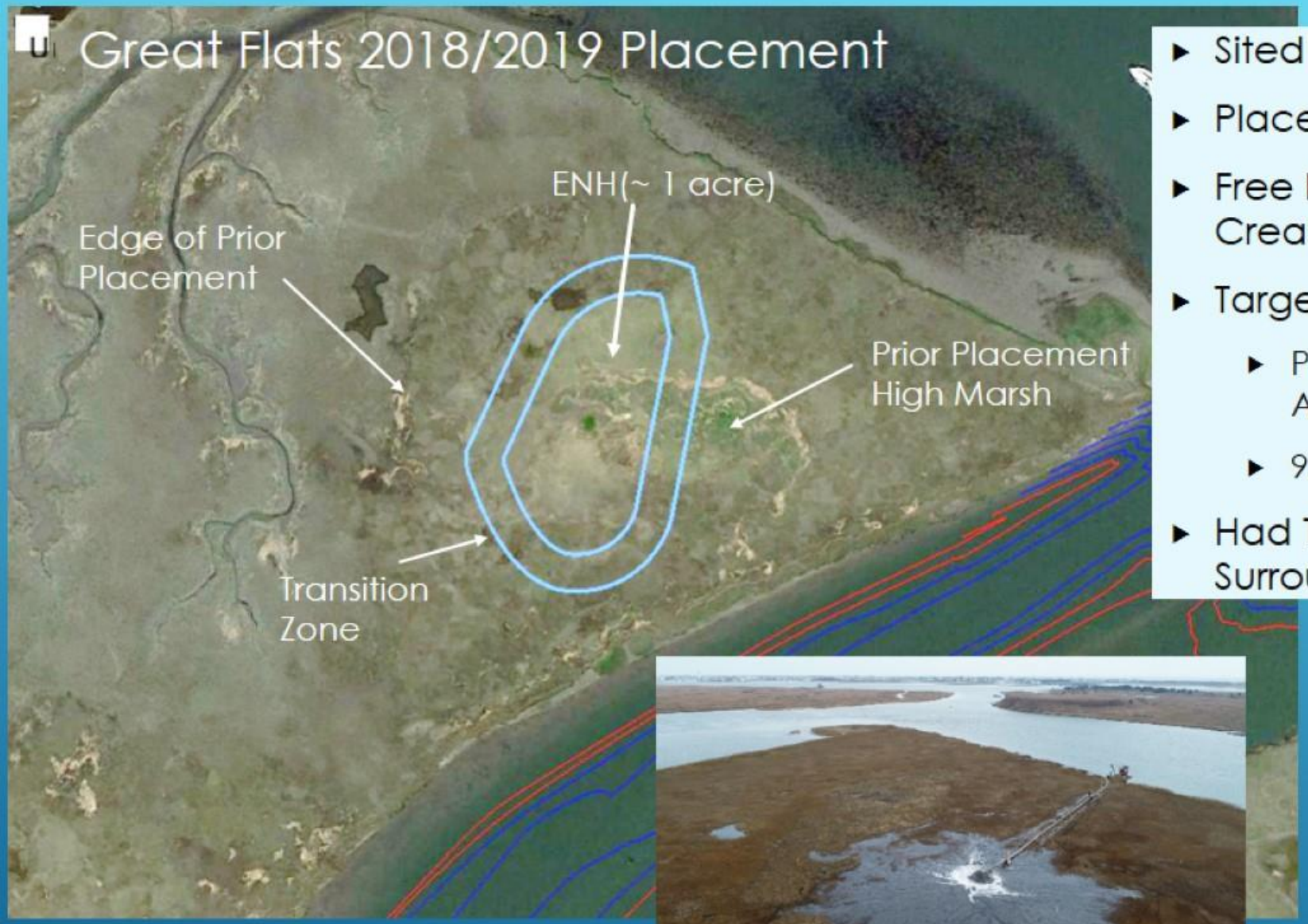
INITIAL ASSESSMENT STURGEON ISLAND

- 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 in fall 2021

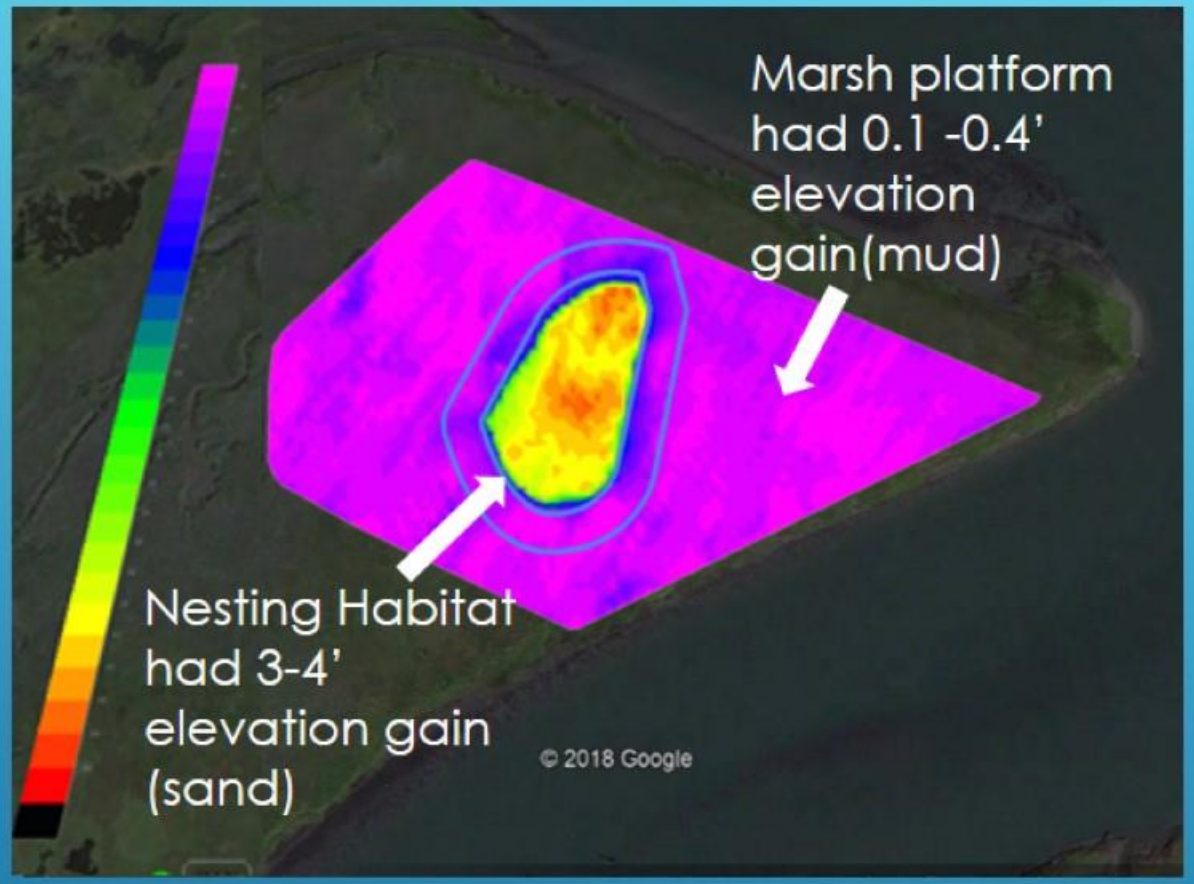
STURGEON CHALLENGES

- Small placement area and low elevation created challenges
- Flows bypassed longer flow paths directly to tidal channel
- High water content in outflows created challenges with channel blockage strategies
- Utilized existing elevations to direct flows and 14" containment pipe along the eastern edge to hold elevation and material on island
- Entire eastern margin of placement did not dewater until we removed the containment pipe (3/2021) when dewatering occurred within days.

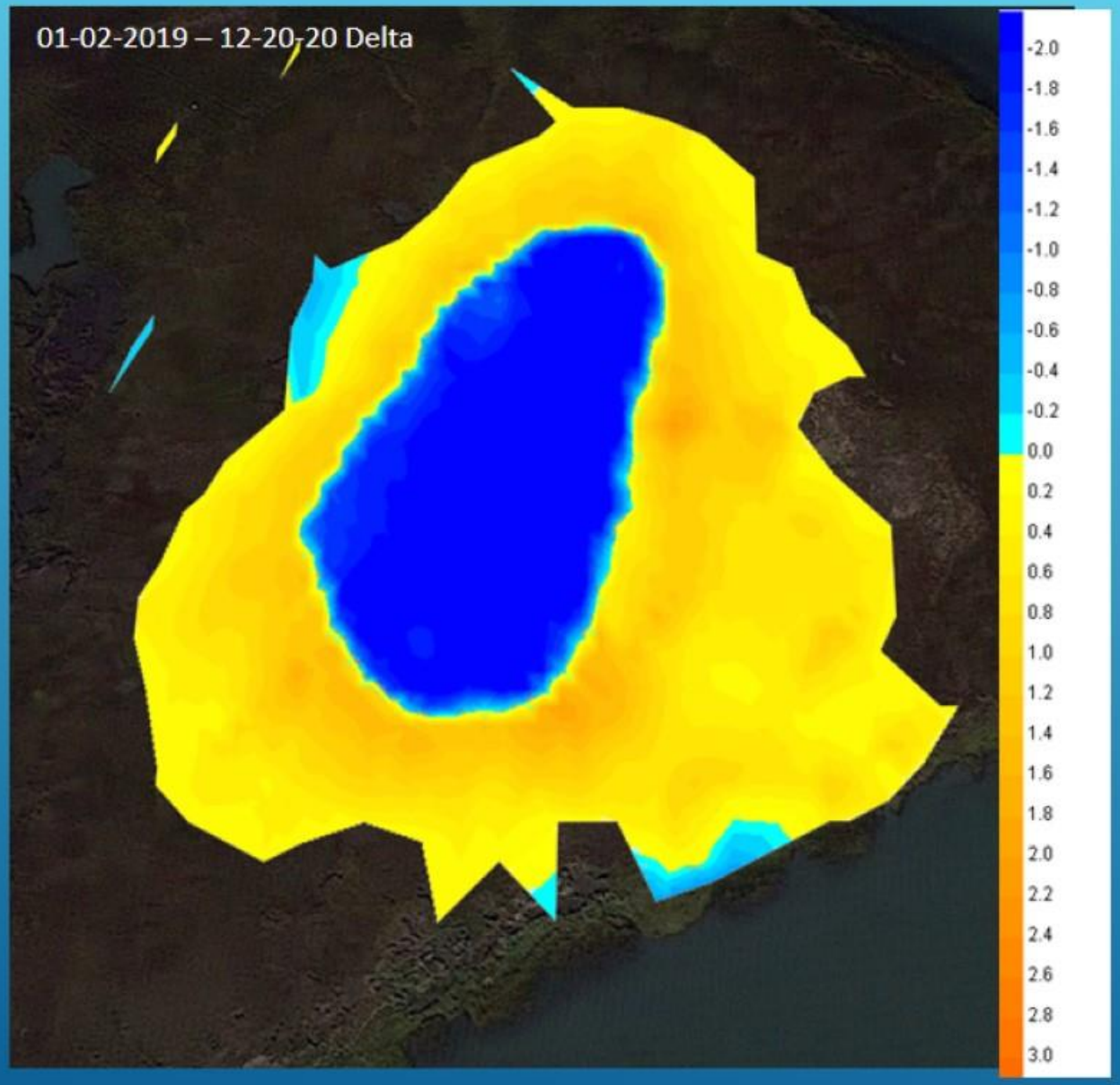
Great Flats 2018/2019 Placement



- Sited Project on Historic Fill Area
- Placed 6,000 yd^3 on 1 Acre Habitat
- Free Pump until Enough Material to Create Containment
- Target Ecological Elevation 5.5'
  - Placement to 6.5' for Settling and Anticipated Wind Transport
  - 95%+ Fine Sand
- Had Thin Layer Placement of Mud on Surrounding Marsh Platform



GREAT FLATS ELEVATED NESTING HABITAT


01-02-2019 – 12-20-20 Delta
-2.0
-1.8
-1.6
-1.4
-1.2
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
3.0


03/2019


10/2020

Phase One – Southern Cell Fill

Phase Two – Northern Cell Fill

GREAT FLATS REFURBISHMENT

- Total volume placed – 4,600 cy
- Volume on habitat only – 4,000 cy
- Main habitat 6.0' target elevation
- Smaller habitat 4.0' target elevation
- Added dikes (2' high) to avoid concentrated dewatering flows

2021 Great Flats Refurbishment

ADVANCING SCIENCE AND PRACTICE AT THE SEVEN MILE ISLAND INNOVATION LABORATORY

- Early initial assessments with several monitoring projects and experimental research on going
- Will continue to inform projects and practices
- Some projects moving into adaptive management phases while others in very early stages or not yet completed
- Lots more information about these projects coming up

US Army Corps of Engineers

Wetlands Institute

ERDC

New Jersey Department of Environmental Protection

New Jersey Division of Fish and Wildlife