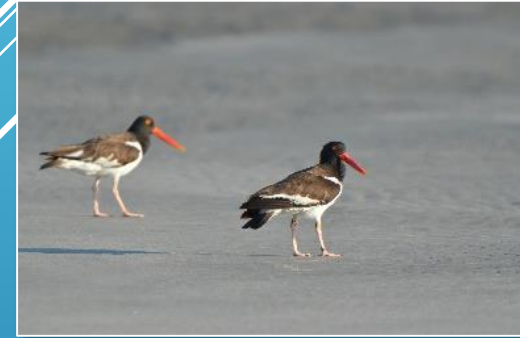




Gull Island – Two-Year Post Placement Update



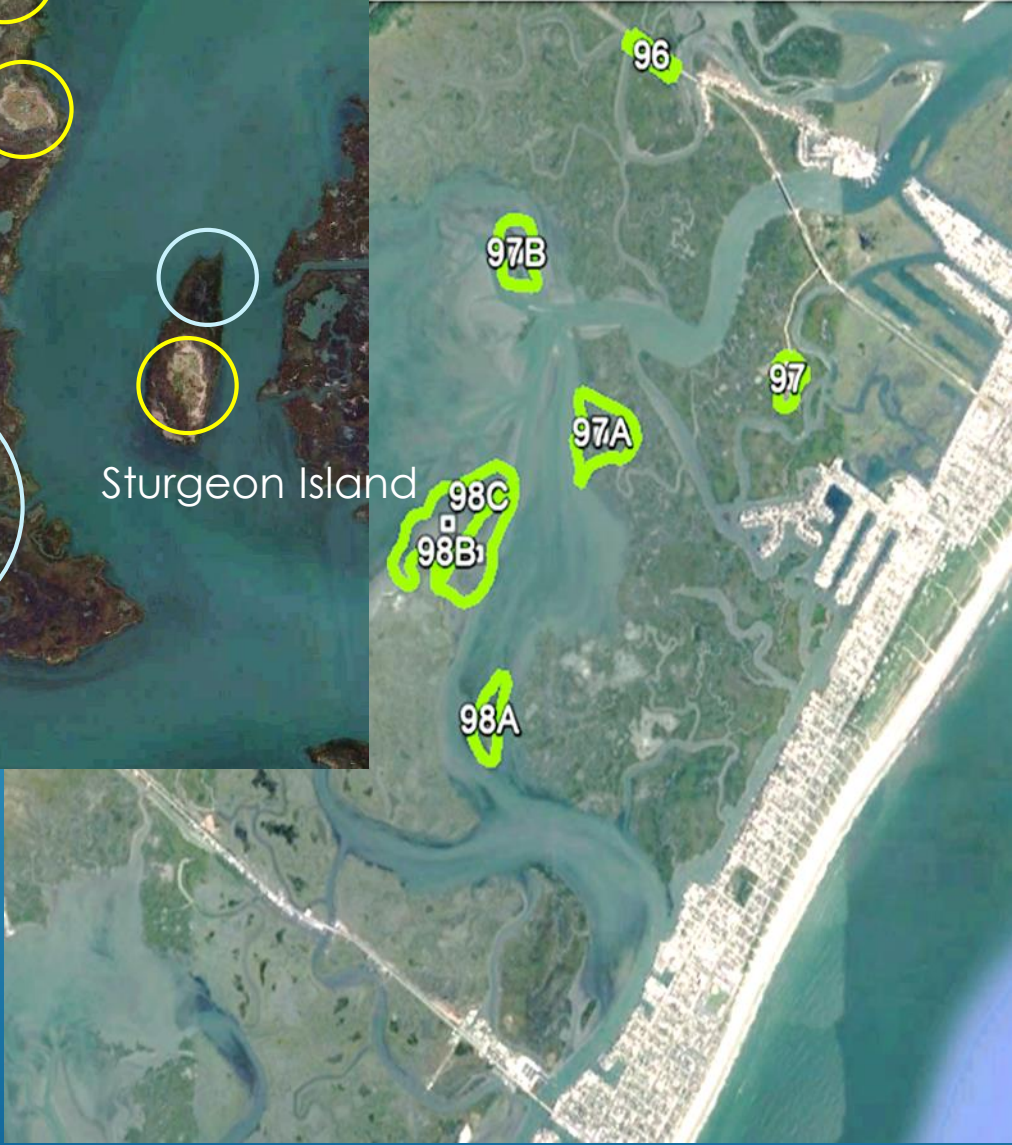
Lenore P. Tedesco, The Wetlands Institute
Monica Chasten, USACE – Philadelphia District
Jeffrey McAleer, USACE – Philadelphia District
Lisa Ferguson, Sam Collins, & Julie Blum, The Wetlands Institute
Christina Davis, NJ Division of Fish and Wildlife



- ▶ 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 SMILL Occurs on Historic Fill
 - ▶ Created important wading bird nesting habitats (98A,B,C)
 - ▶ Accounts for 35% of all colonial nesting wading birds in New Jersey (NJ DEP aerial survey, 2021)
 - ▶ 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



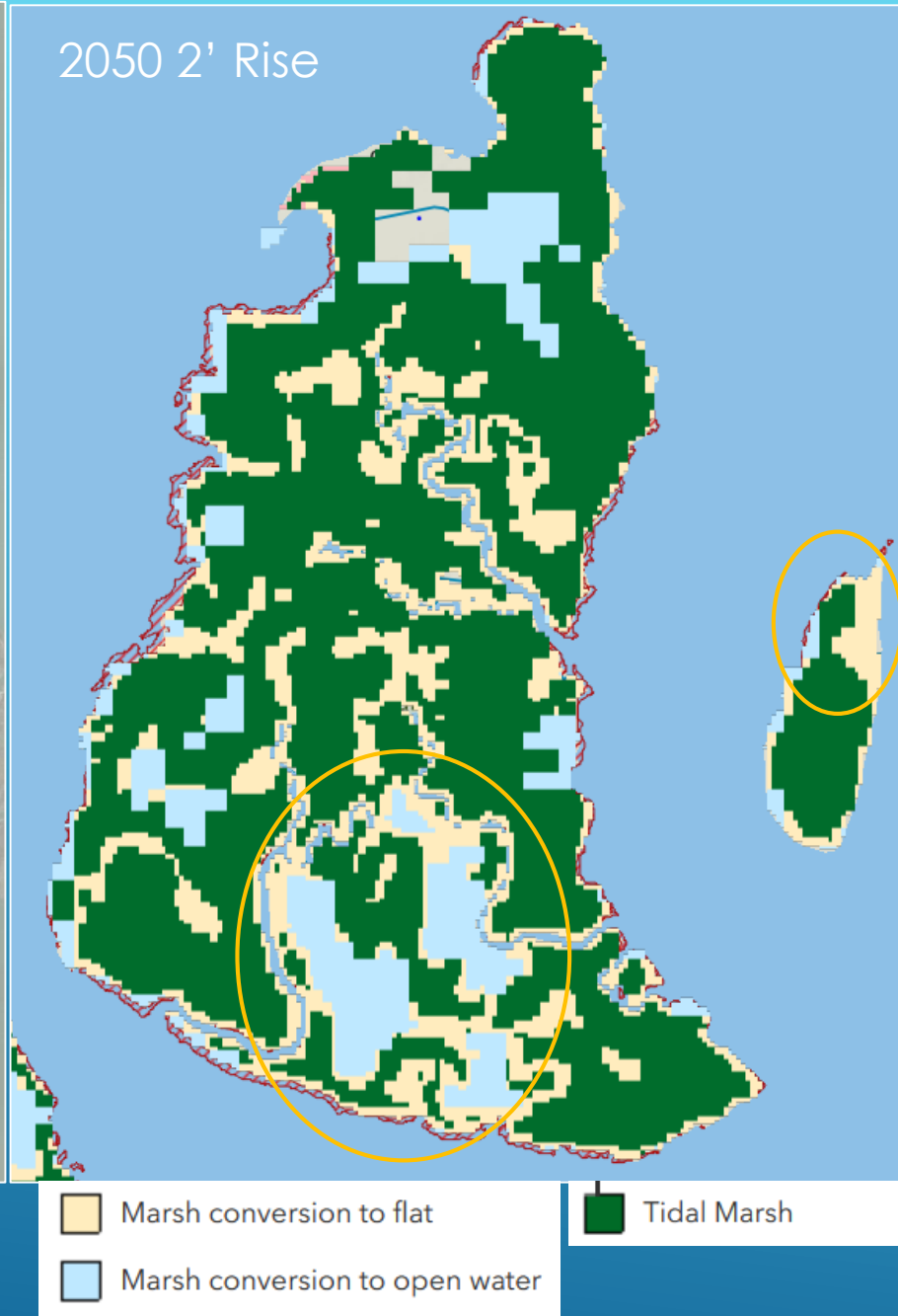
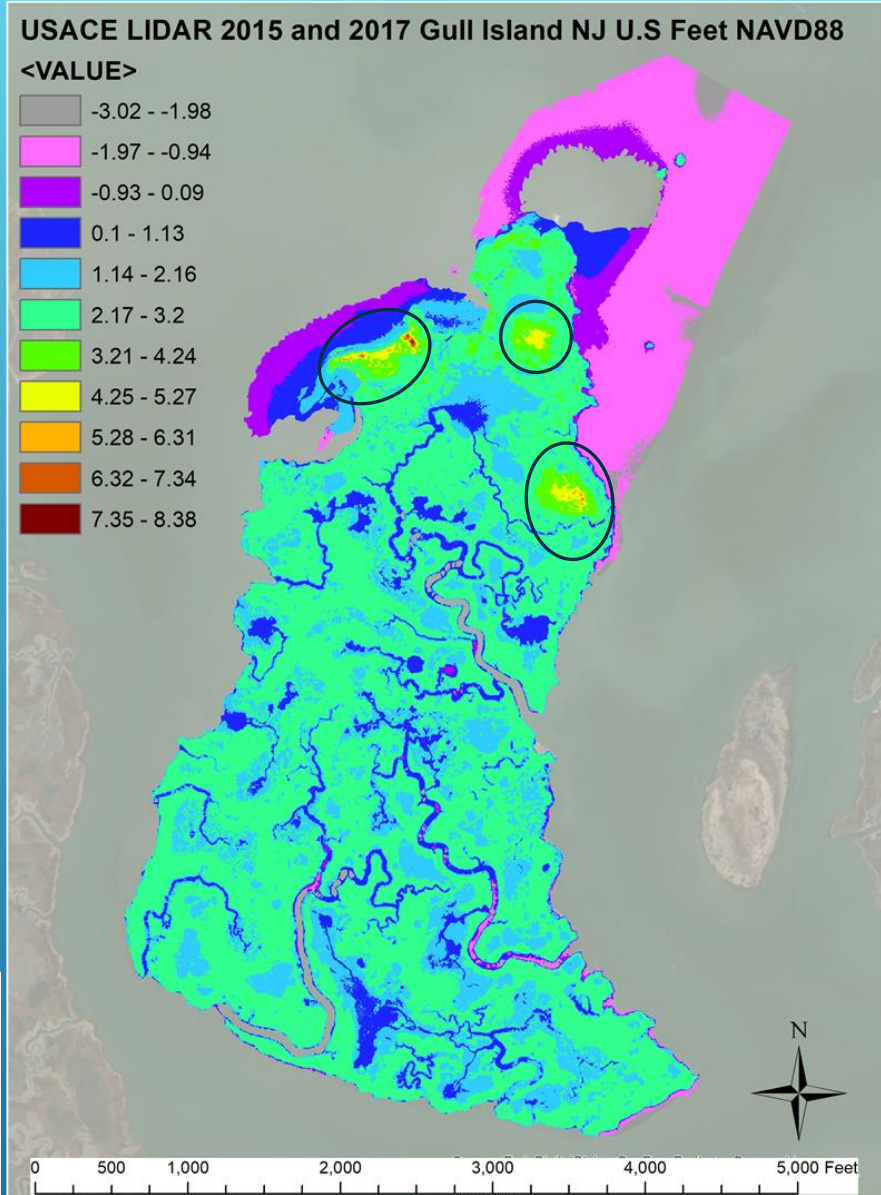
LEGACY SEDIMENT PLACEMENT

▶ 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
- ▶ 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 low elevation and at risk of conversion to flats
- ▶ Northwestern island experiencing marsh edge erosion



► 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)
 - Shallow interior flat for Shorebird and Wader Foraging (<2.0' NAVD88)
- Create Marsh Edge Protection Zone
 - 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)



GULL ISLAND PROJECT GOALS



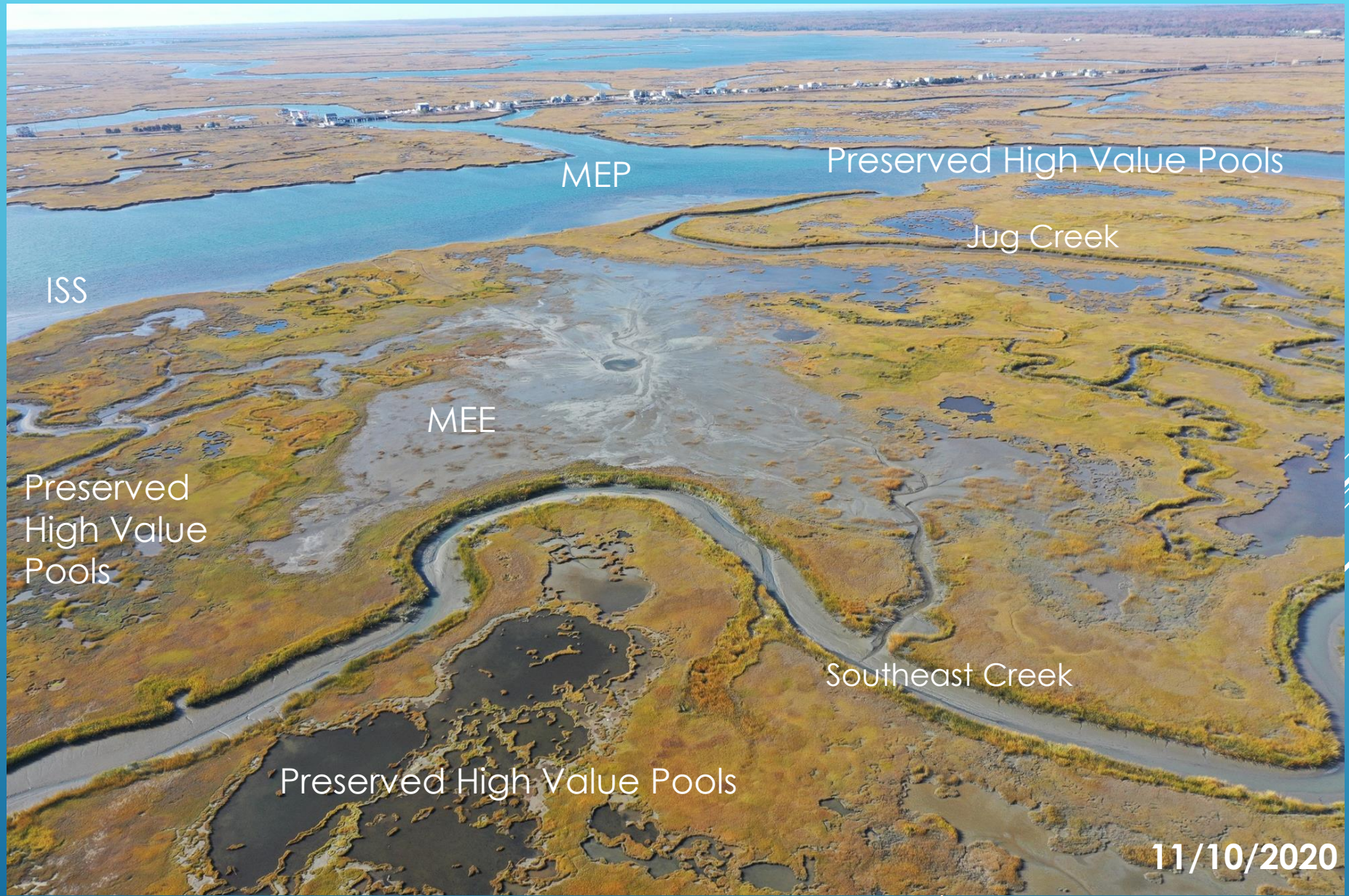
Gull Island Interior Pool and Flat
Interior Pool Expansion and Marsh Loss
Preplacement (2020-08-28)





Southern Gull Island
Preplacement 2020-08-28

- ▶ 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

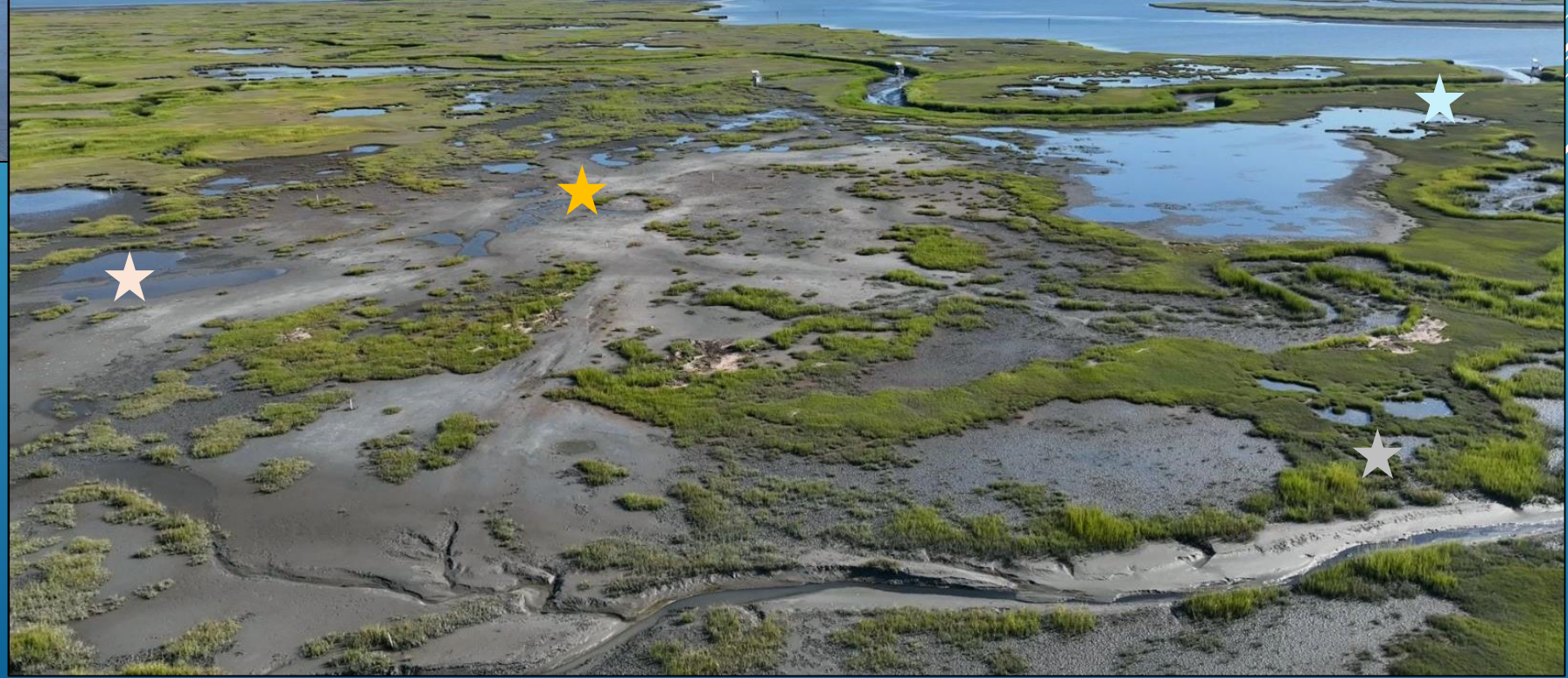


INITIAL ASSESSMENT GULL ISLAND PLACEMENT

1 month Post Placement (2020-11-10)

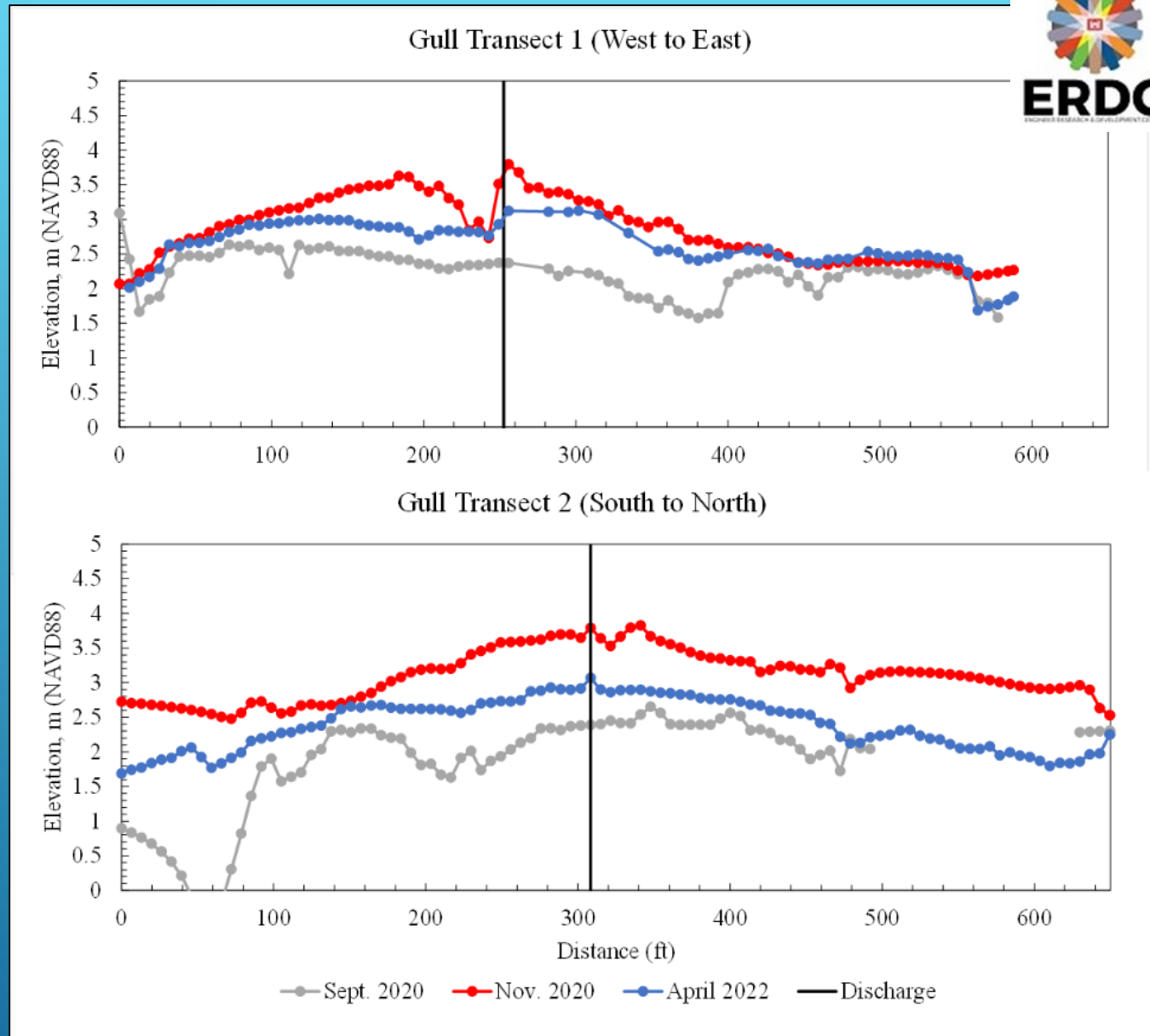


2 Years Post Placement (2022-08-19)





- ▶ Placed approximately 2' of material over central placement area
- ▶ Dewatering/Compaction reduced elevation gain by 0.5' – 1' depending on location
- ▶ ERDC research working to evaluate compaction and dewatering as well as additional studies documenting transport of material from placement

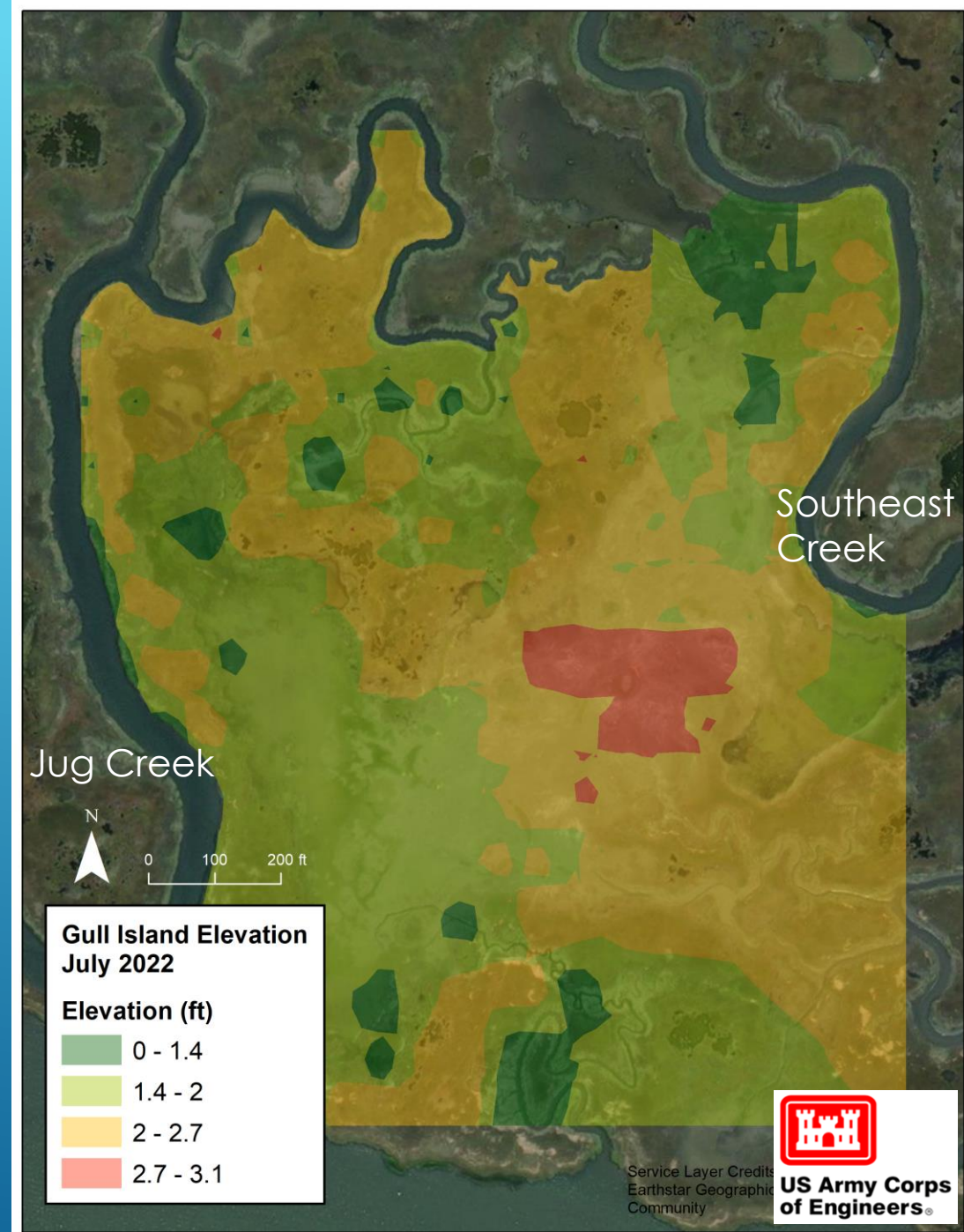


GULL ISLAND - ELEVATION EVOLUTION

Courtesy Harris et al.

- ▶ USACE-NAP rtk survey in July 2022
 - ▶ High Marsh (2.7 - 3.1' NAVD88) - 1 acre
 - ▶ Low Marsh (2.0 – 2.7' NAVD88) - 16.5 acres
 - ▶ Intertidal Flat and Pools (1.4 – 2.0' NAVD88) - 14.8 acres
 - ▶ Represents the distribution of habitat types across the southern platform placement area and includes some areas that may not have received materials.
- ▶ Below target elevations for transitional wading bird habitat and only small area of high marsh
- ▶ Effectively created low marsh habitat and shallowed intertidal flats and pools
- ▶ Adaptive management under discussion to determine if additional placement will be undertaken to increase elevations to target ecological goals.

GULL ISLAND ELEVATION 2 YEARS POST PLACEMENT





★ Photo Points



VEGETATION
RESPONSE
1 YEAR POST-
PLACEMENT
(6/2021)



Point 2 ★

3 ★

Vegetation Establishment

Tidally Flushed Pool →

2 YEARS POST-
PLACEMENT
(8/2022)

2020-11-04

View W Point 2



2021-09-12



2021-07-12



2022-08-02



Central Placement Area

2021-06-30

Platforms Under Construction



2021-09-12



2022-06-20



Point 3

2022-08-02





▶ Geochemistry

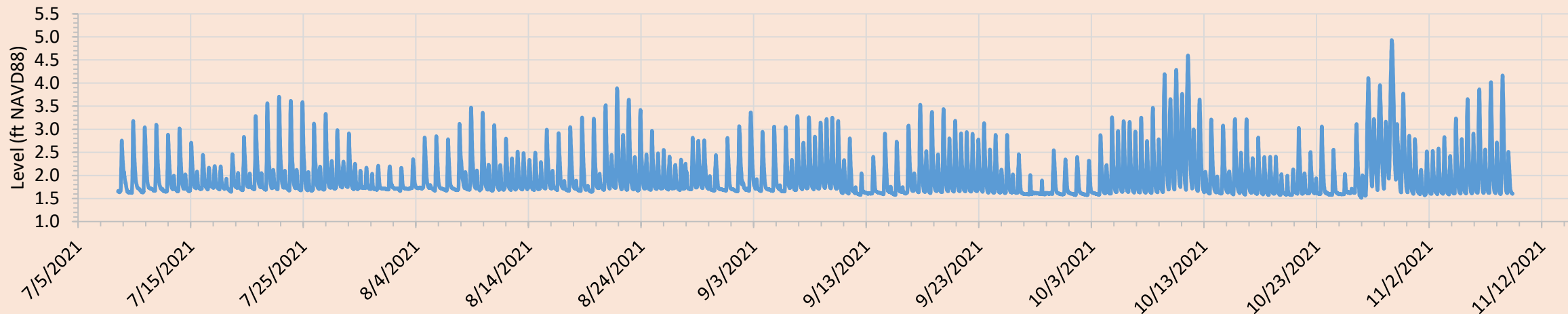
- ▶ Measuring suite of chemical parameters in creeks, pools (yellow) and wells (red) at Gull Island and TWI Property.
- ▶ Sites include creeks, pools and wells with (placement) and without dredge material (control).
- ▶ Sampling relative to tidal flushing (spring) vs stagnation (neap).
- ▶ Ongoing since July 2021 monthly (growing season) to seasonally (winter).

▶ Water Level

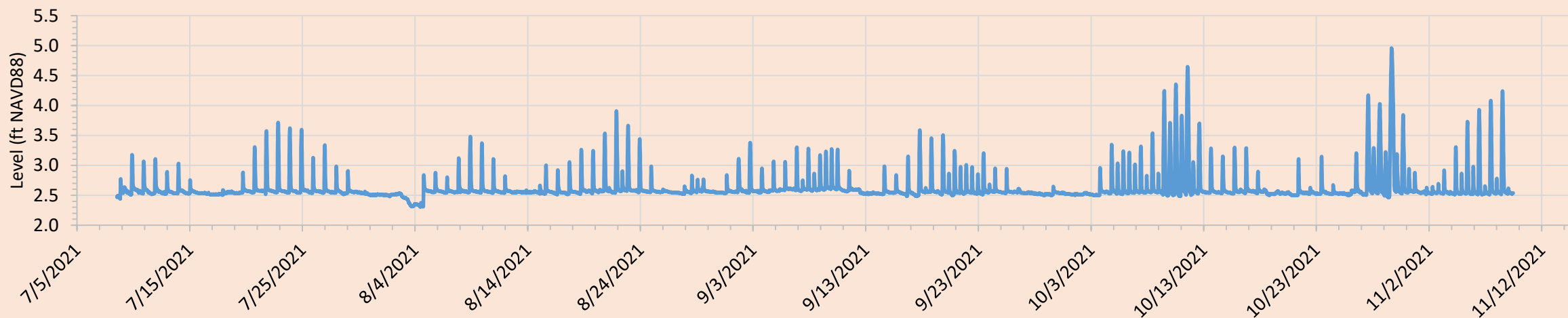
- ▶ Measuring water level in groundwater wells with (placement) and without dredge material (control).

WATER LEVEL & GEOCHEMISTRY OF GULL ISLAND PLACEMENT VS CONTROLS

Gull Island Well 2 – GI-B – Southern Interior Pool

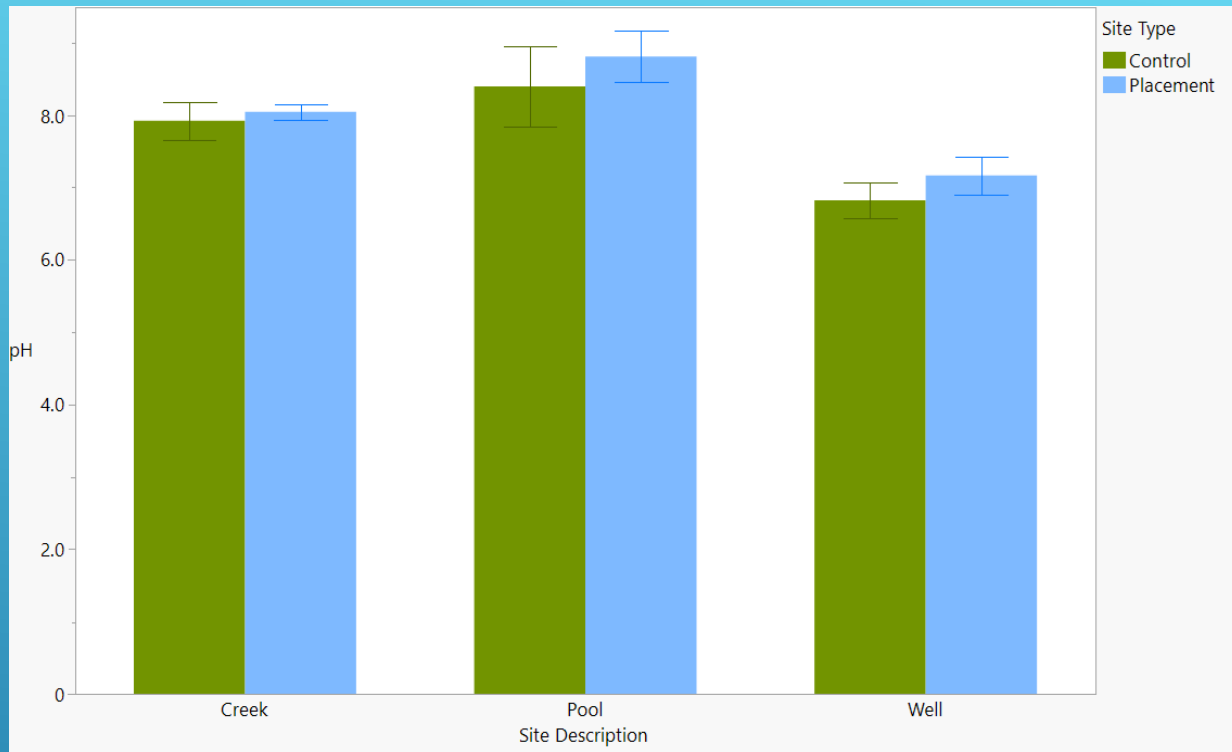


Gull Island Well 3 – GI-G – Northeastern Pool



- ▶ Both interior ponded areas are tidally connected with the lower elevation southern pool receiving more flushing than the more isolated northeastern pool at higher elevation
- ▶ A new tidal connection developed in late spring 2022 in the NE potentially increasing flushing

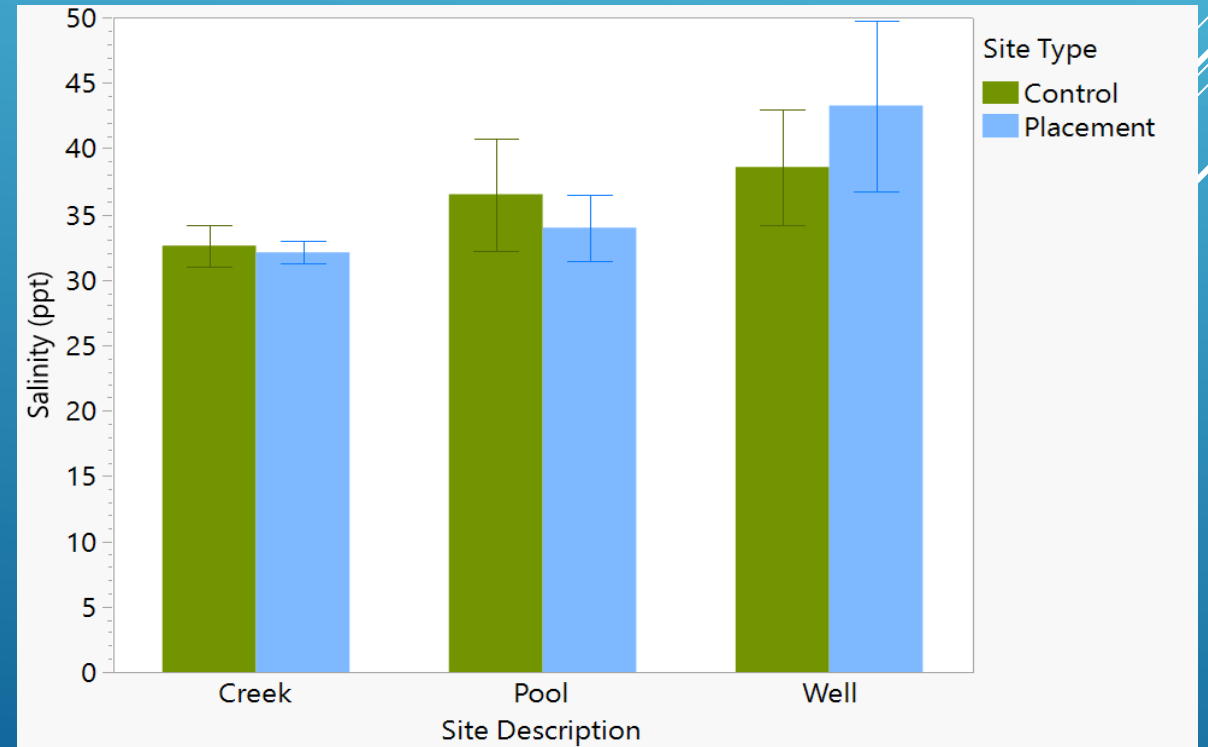
TIDAL FLUSHING OF INTERIOR PONDED AREAS



- ▶ Lowest pH occurred in wells with lowest pH recorded in a control well on Gull Island (5.99)
 - ▶ Lowest pH in placement wells 7.0
- ▶ Highest pH occurs in pools with both control and placement pools displaying values as high as 9.3 – biologically driven and tracks with DO supersaturation.
- ▶ Highest surface water salinity was in control pools vs placement areas reflecting degree of isolation.

▶ Sampling 7/2021 – 7/2022

- ▶ 5 sampling trips (3 Spring tide; 2 Neap tide)
- ▶ Creek N=25
- ▶ Pool N=35
- ▶ Well N=33



GEOCHEMISTRY AT GULL ISLAND

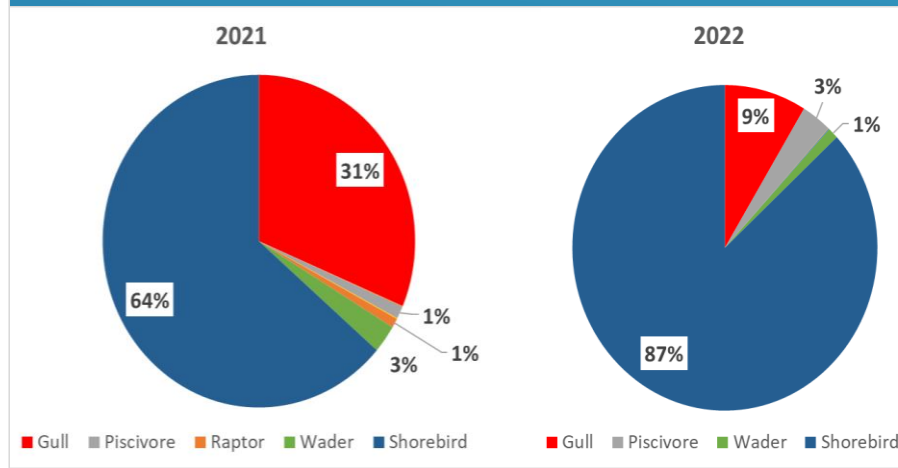
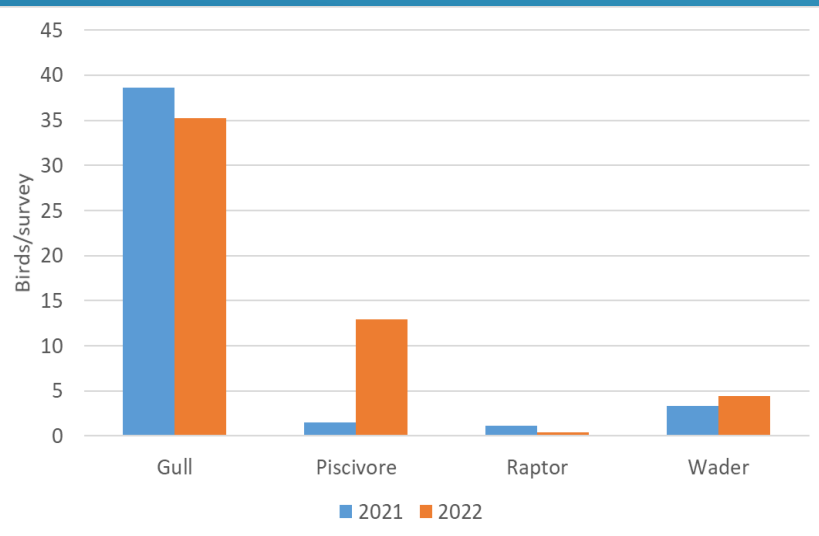
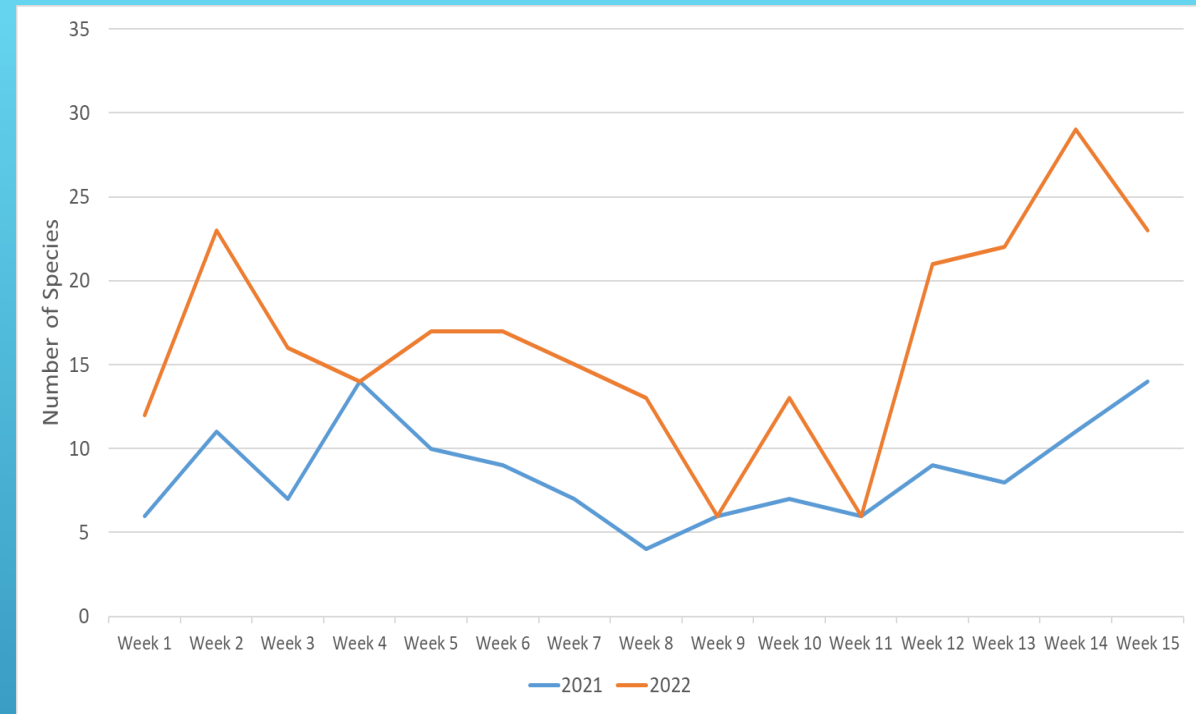
AVIAN MONITORING



- ▶ Weekly surveys of the placement area during the nesting season (May 4 – August 10) in 2021 and 2022.
 - ▶ Documented species, number of individuals, age classes (if known), location, behavior, nest searching.
- ▶ Point counts and passive acoustic monitor on placement area in 2022 (June and July).
 - ▶ Biweekly point counts conducted for 10min between 9-11am.
 - Recorded all individuals/species within 50m radius in center of placement area – excludes birds in pannes (with the exception of focal species).
 - Documented any focal species (Saltmarsh Sparrow, Seaside Sparrow, Clapper Rail, American Oystercatcher) observed/heard at any distance.
 - ▶ Acoustic monitors set to record 30min before sunrise to 5.5hrs after sunrise (~11am)
 - Used bioacoustic software to investigate the number of sparrow detections during peak activity periods (7-8 am for Seaside Sparrow, 7-9 am for Saltmarsh Sparrow)

AVIAN RESPONSE

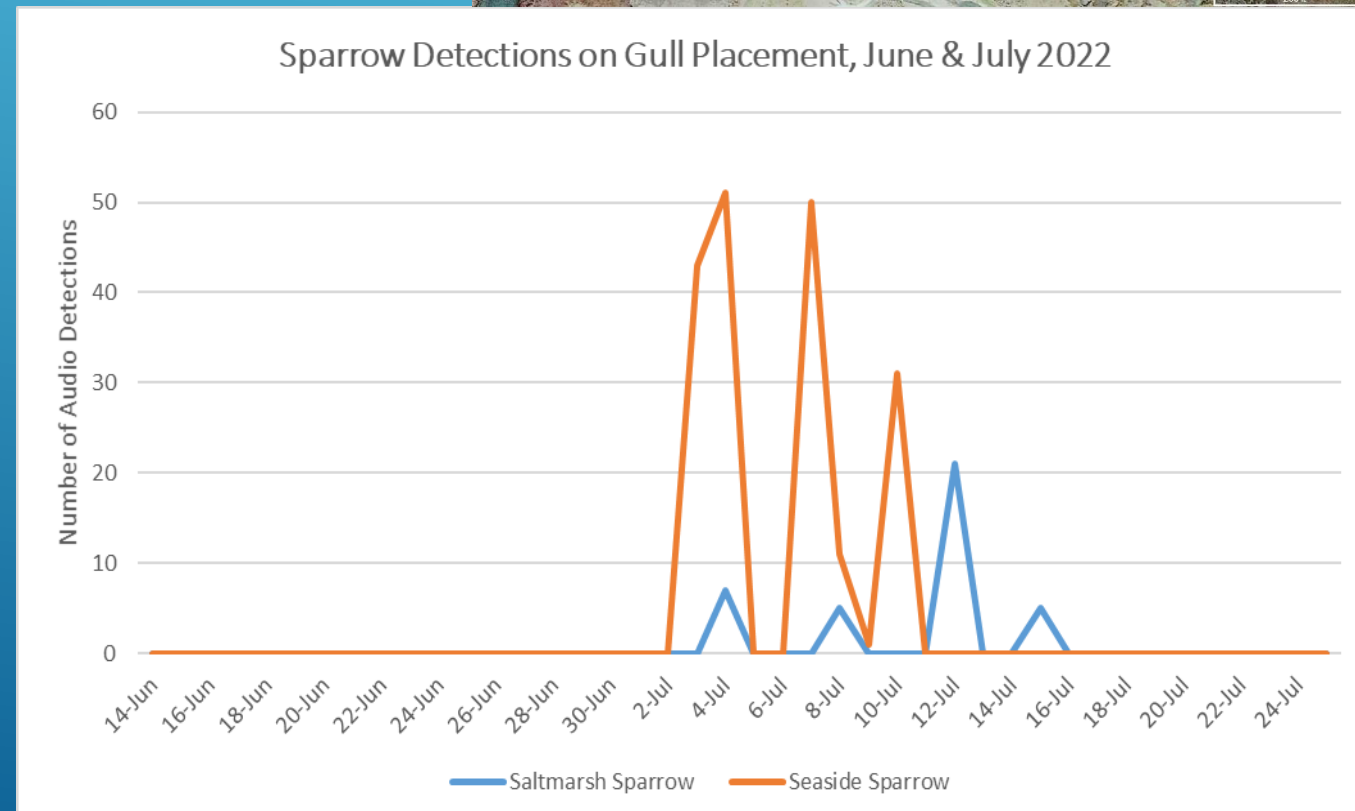
- ▶ Surveys: 17 in 2021, 13 in 2022.
- ▶ Higher proportion and number of shorebirds observed on placement area in 2022.
 - ▶ 2021: only one survey documented ~500 Semipalmated Sandpipers (May 25).
 - ▶ 2022: four surveys with >500 Semipalmated Sandpipers in May (~690), June (~1150), and August (~980 and ~860).
- ▶ Lower proportion of gulls but similar number of individuals/survey between years.
- ▶ Higher number of piscivores in 2022 (terns using mudflat/panne).



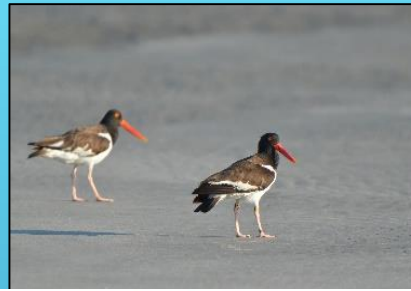
POINT COUNTS AND ACOUSTIC MONITORING



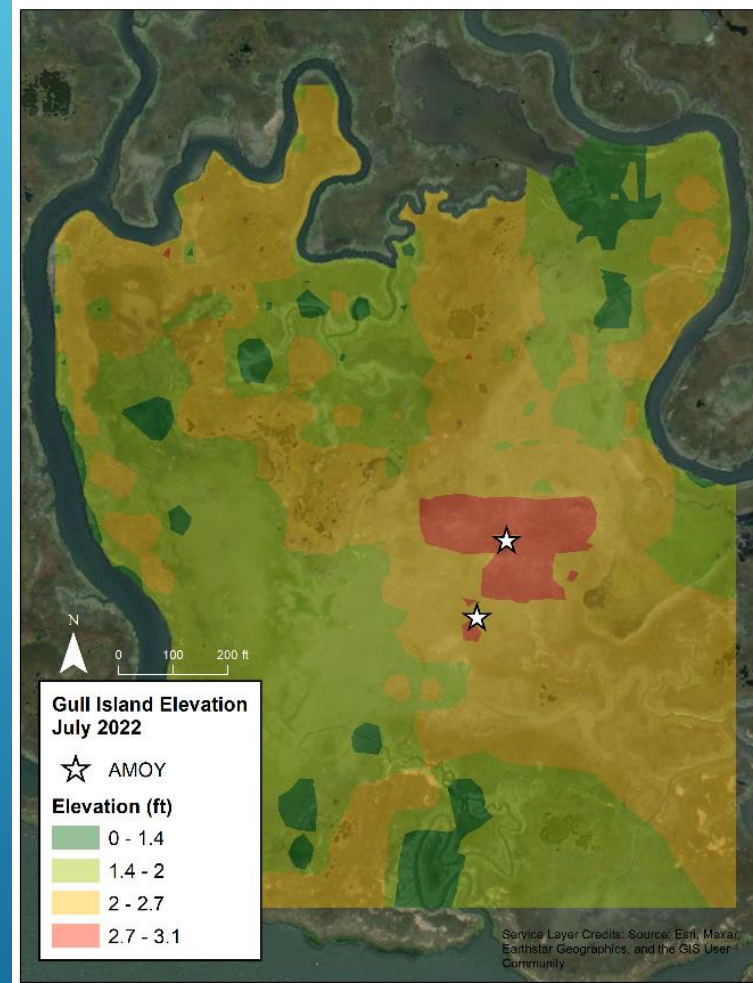
- ▶ Sparrows not detected during any point count survey, four Clapper Rails detected in one survey (June 13).
- ▶ 14 species documented within 50m plot, Laughing Gulls and Forster's Terns documented every survey.
- ▶ All acoustic monitoring sparrow detections during peak activity windows occurred at the end of the season (July 3 – July 15).



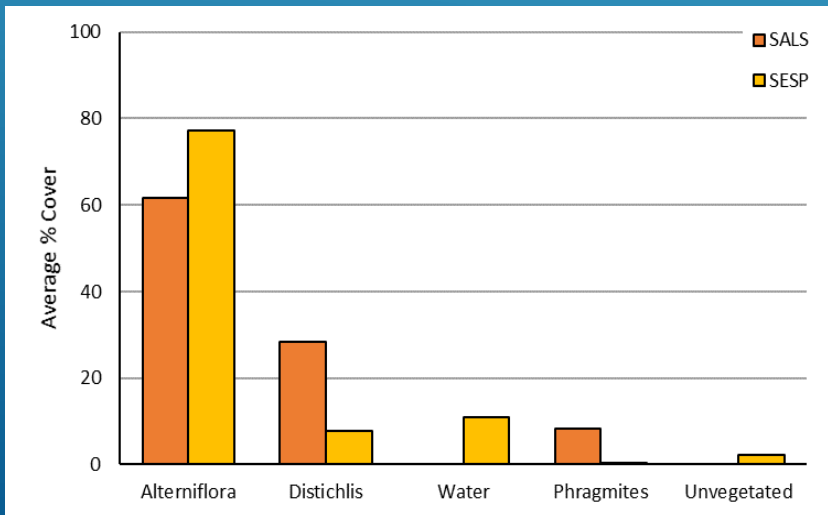
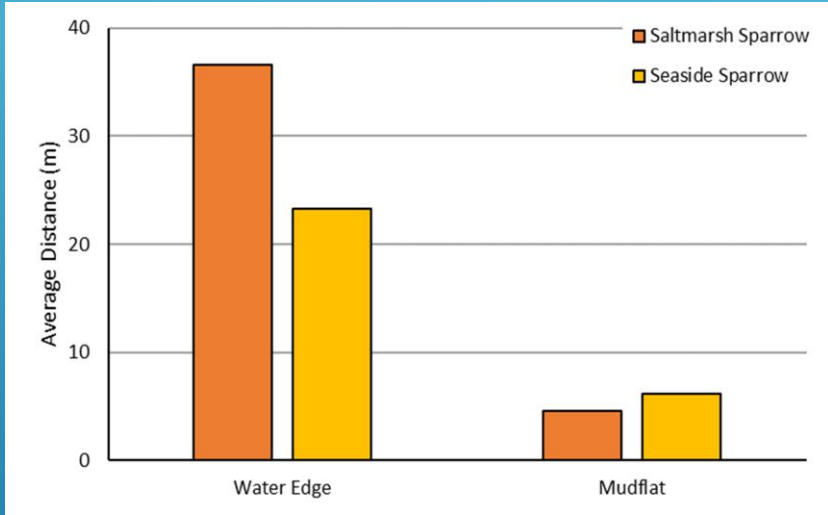
NESTING ACTIVITY (2022)



- ▶ 1 American Oystercatcher pair
 - ▶ First nest attempt in pannes north of placement area (May 3 -18; flooded).
 - ▶ Second nesting attempt in mud/shell on placement area (June 1-13; MAX WL 3.26ft NAVD88).
 - ▶ Third nesting attempt in wrack on placement area (July 13-19; MAX WL 3.49ft NAVD88).



NORTH GULL ISLAND SPARROW HABITAT



Nest Fates:

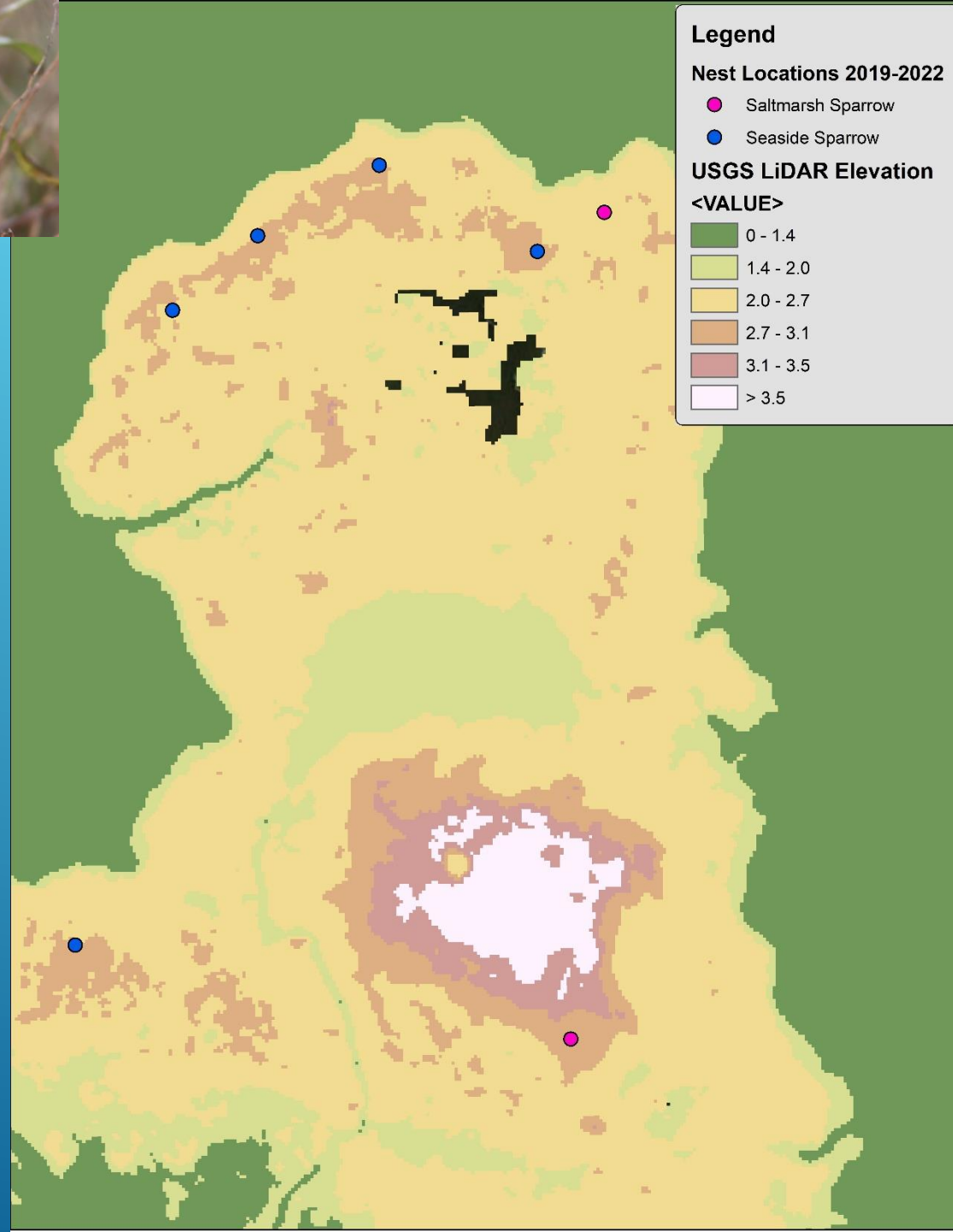
2021

Seaside Sparrow
1 nest = fledged

2022

Seaside Sparrow
4 nests = 3 fledged,
1 failed (flooded)

Saltmarsh Sparrow
2 nests = fledged



ADVANCING SCIENCE AND PRACTICE AT THE SEVEN MILE ISLAND INNOVATION LABORATORY

- ▶ Initial assessments and several monitoring projects and experimental research on going
- ▶ Free pumping of material allowed for material placement over wide areas
- ▶ Unconfined placement allowed for maintenance and/or development of tidal flushing
- ▶ Elevation building to transitional and high marsh target elevations is requiring sequential placement
 - ▶ Additional material is needed to create suitable conditions for avian nesting habitat
- ▶ Vegetation recovery is largely by new recruitment and progressing well at the 2 years post placement benchmark
- ▶ Lots more information about these projects will be coming



ADVANCING SCIENCE AND PRACTICE AT THE SEVEN MILE ISLAND INNOVATION LABORATORY

For more information:

- ▶ Lenore Tedesco – ltedesco@wetlandsinstitute.org
- ▶ Monica Chasten - Monica.A.Chasten@usace.army.mil
- ▶ Wetlandsinstitute.org/SMIL

