

EXPERIENCES WITH ENGINEERING WITH NATURE AND THIN-LAYER PLACEMENT IN NEW JERSEY

Lenore P. Tedesco
The Wetlands Institute

Monica A. Chasten
Philadelphia District of USACE



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SEA LEVEL RISE RATES NOW EXCEED MOST MARSH ACCRETION RATES IN NJ

- ▶ A Proving Ground Using Natural and Nature-Based Features to Provide Ecological Uplift and Enhanced Resilience for Ecosystems and Coastal Communities
- ▶ Test Bed to Advance and Improve Dredging and Marsh Restoration Techniques in Coastal New Jersey
- ▶ Using an Adaptive Management and Systems Approach and Moving Forward From Pilots to Solutions
- ▶ Based on an International Concept Pioneered by the Dutch
- ▶ Back Bay Marsh Dominated System with Shallow Bays, Sounds and Tidal Inlets

SEVEN MILE ISLAND LIVING LABORATORY



SEVEN MILE ISLAND LIVING LAB SYSTEM

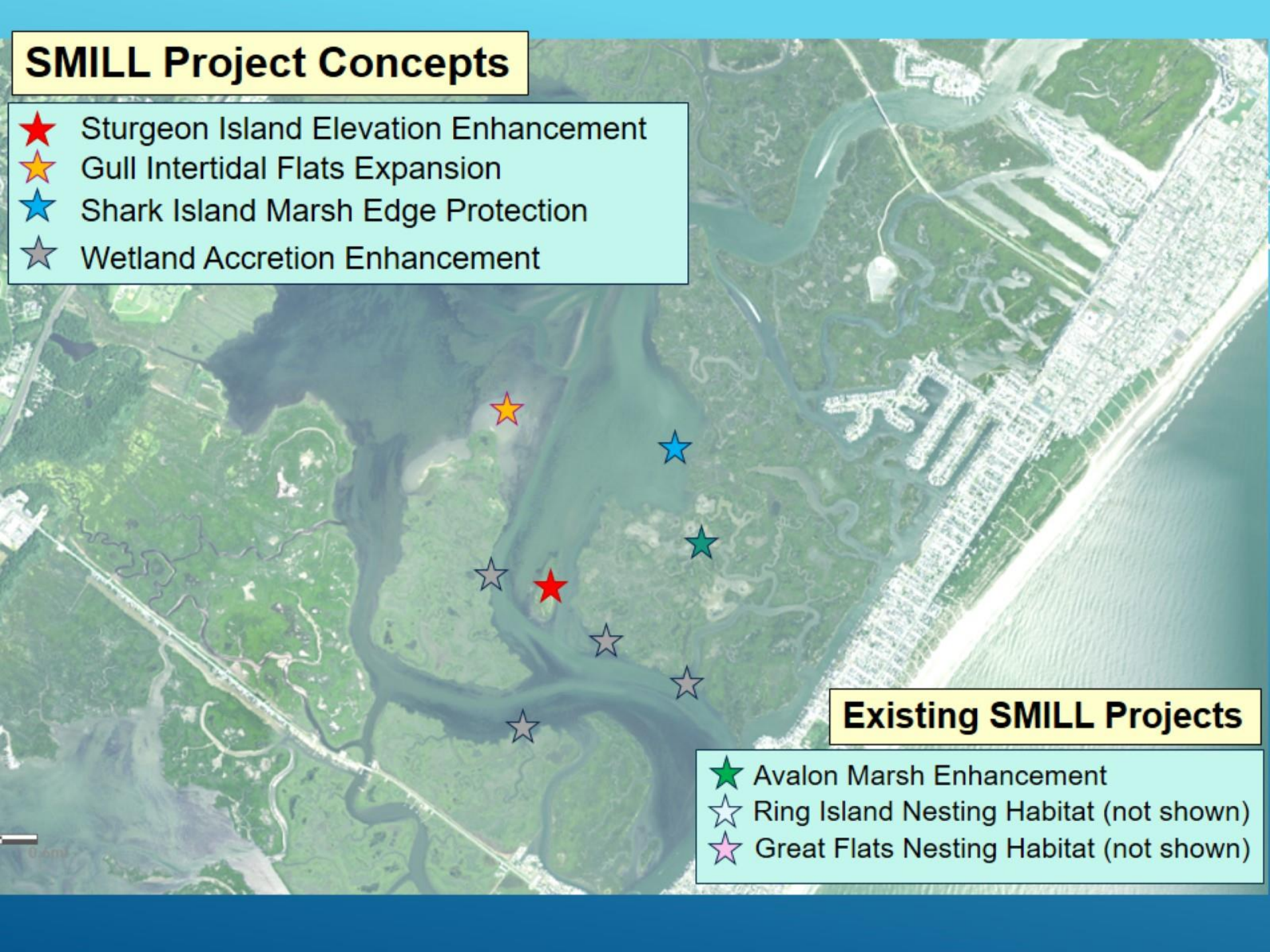


- ▶ Confined Disposal Facility (CDF)
- ▶ Sandy Elevated Nesting Habitat (ENH)
- ▶ Thin Layer Placement (TLP)
- ▶ Marsh Enhancement (ME)
- ▶ Prior Placement Sites (PP)
- ▶ Habitat Enhancement (HE)



SMILL Project Concepts

- ★ Sturgeon Island Elevation Enhancement
- ★ Gull Intertidal Flats Expansion
- ★ Shark Island Marsh Edge Protection
- ★ Wetland Accretion Enhancement



Existing SMILL Projects

- ★ Avalon Marsh Enhancement
- ★ Ring Island Nesting Habitat (not shown)
- ★ Great Flats Nesting Habitat (not shown)

▶ NFWF
Hurricane
Sandy Coastal
Resilience
Grant

▶ Pilot Testing
Beneficial Use
Concepts

▶ Pool Filling and
Thin Layer
Placement

▶ Winter 2014
6,000 cy

▶ Winter 2015
49,000 cy

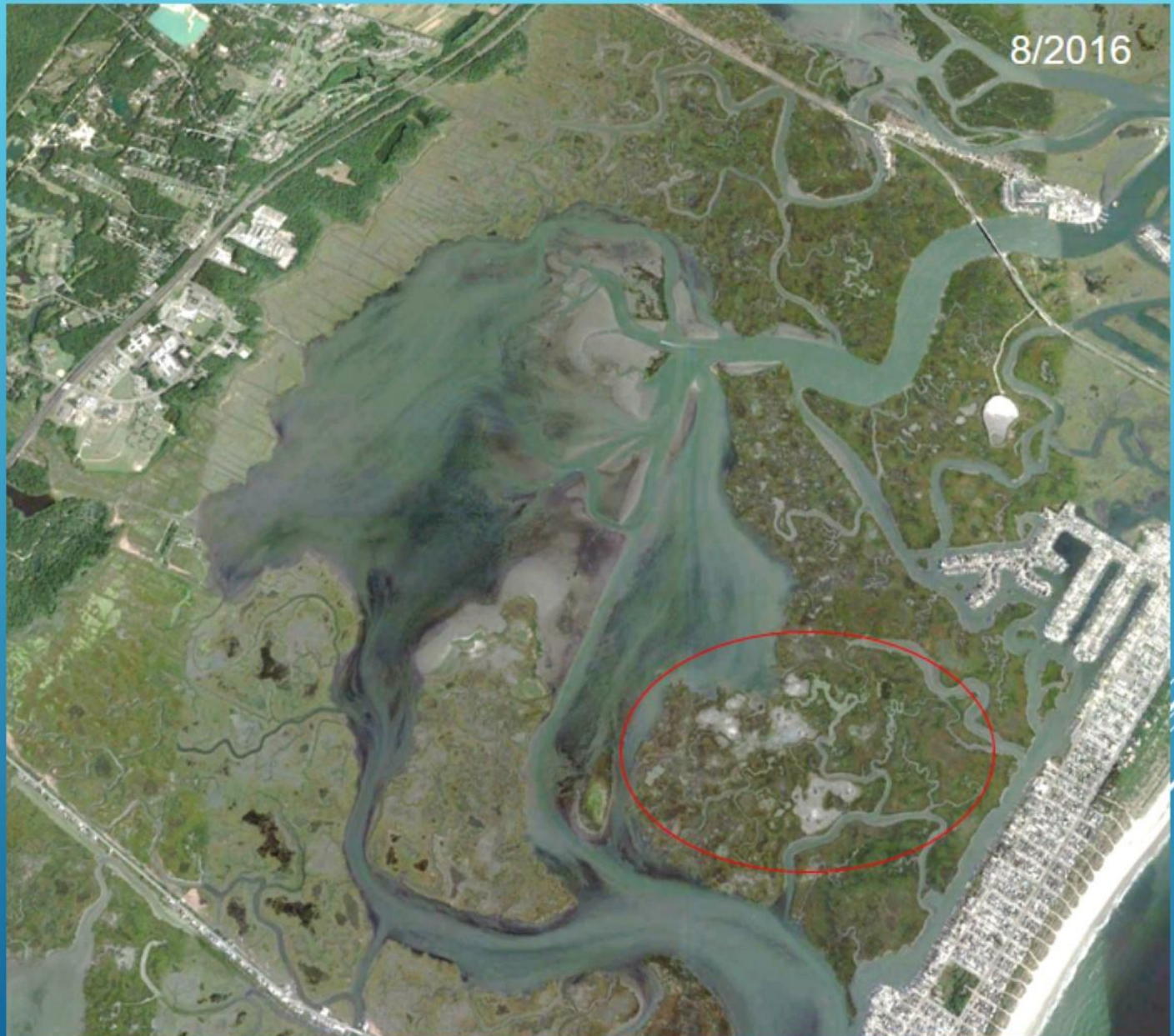


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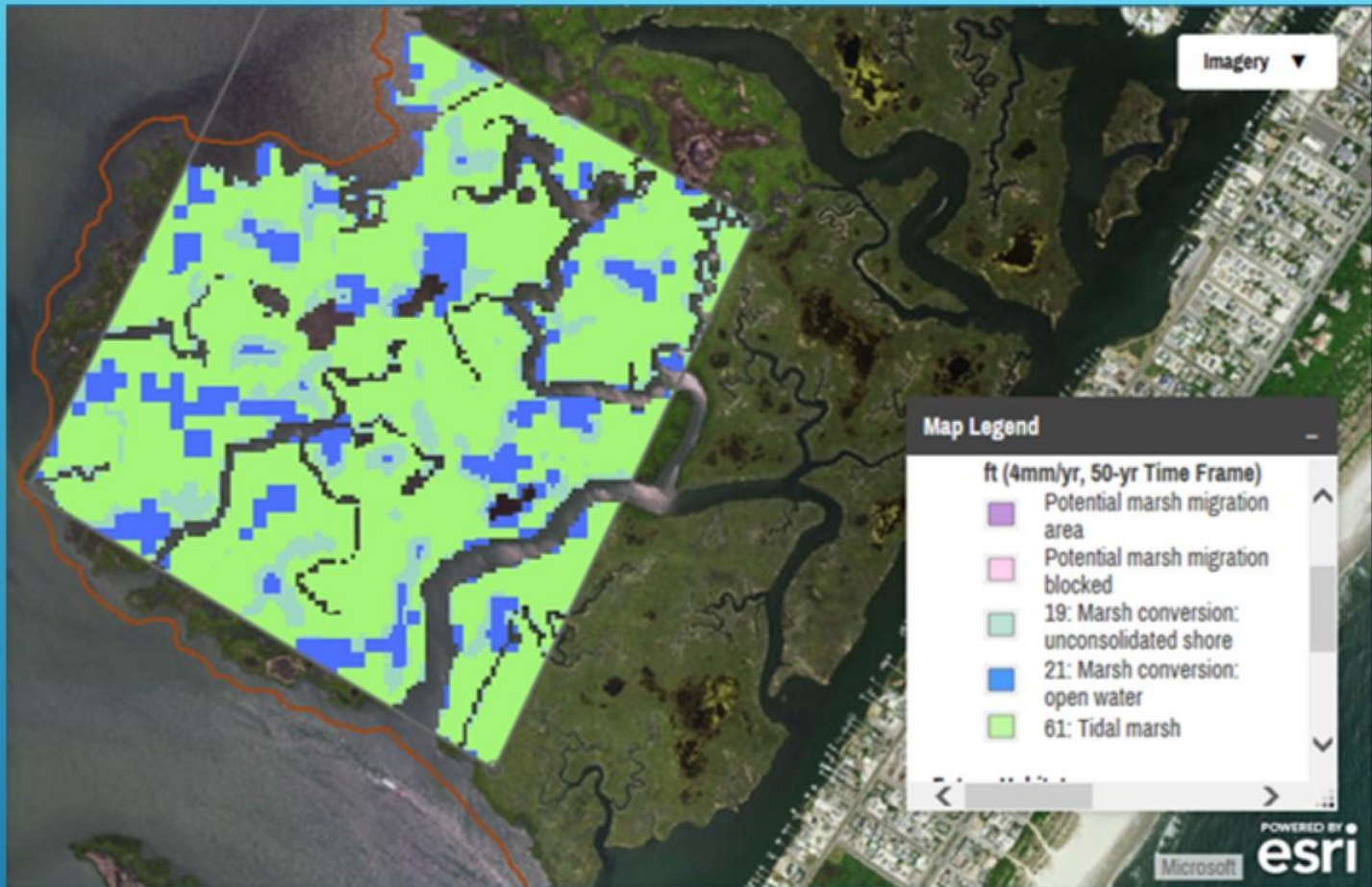


GreenTrust
ALLIANCE

The Nature
Conservancy 



AVALON MARSH ENHANCEMENT PROJECT



From The Nature Conservancy Coastal Resilience Tool

MARSH LOSS PROJECTIONS AT AVALON

AVALON MARSH PLATFORM ENHANCEMENT



10/2014



- ▶ Average elevation change ranged between 0.9' – 1.2' but as much as 3' in some areas
- ▶ On average, sites lost ½ elevation gain by 2017, 2 years post-placement
- ▶ Overall are close to ecological target elevations

8/2016

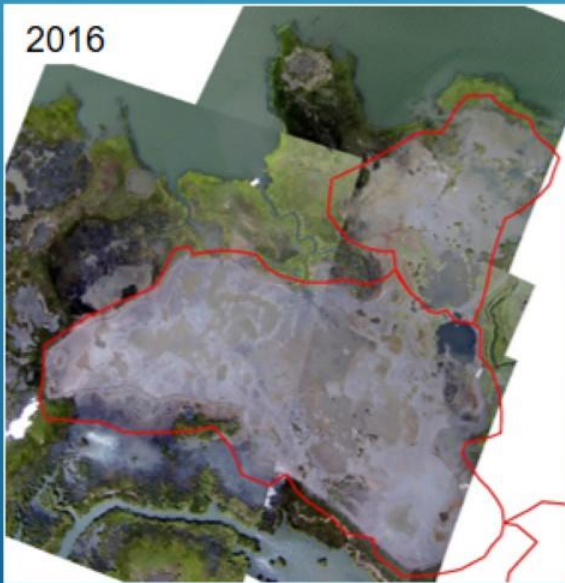


Avalon Marsh Enhancement

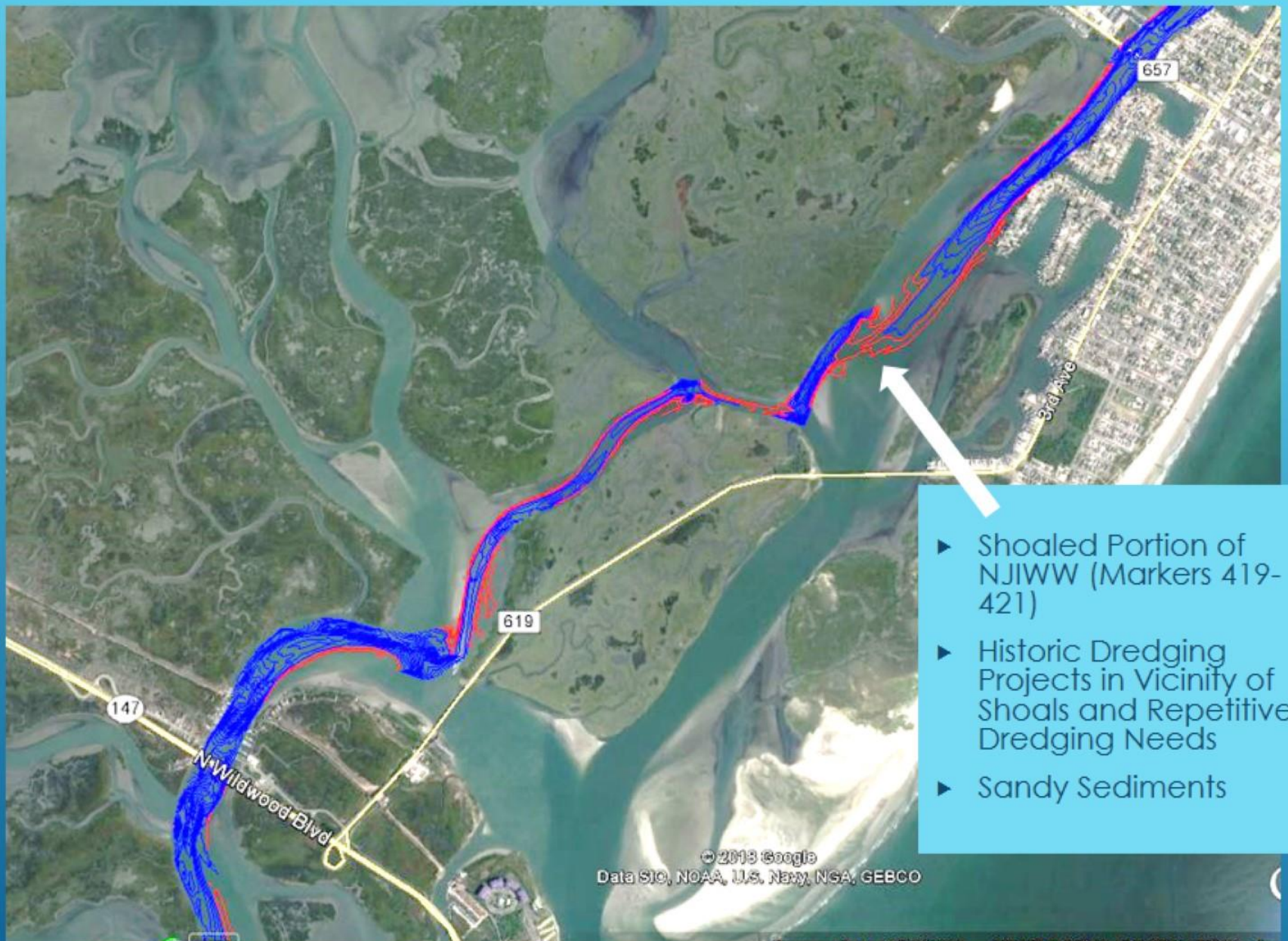
Pre-Placement



Post -Placement



- ▶ Sites are revegetating slowly from plantings, existing vegetation, and possibly seed



NJIWW IN SOUTHERN SEVEN MILE ISLAND LIVING LAB



← The Wetlands Institute

- ▶ Elevated Nesting Habitat Creation
 - ▶ Fall 2014 – 1 acre 6000 cy
- ▶ Sandy Thin Layer Placement
 - ▶ 2 sites – 0.9 acre 1000 cy



Ring Island Beneficial Use Projects





3/10/2018 USACE



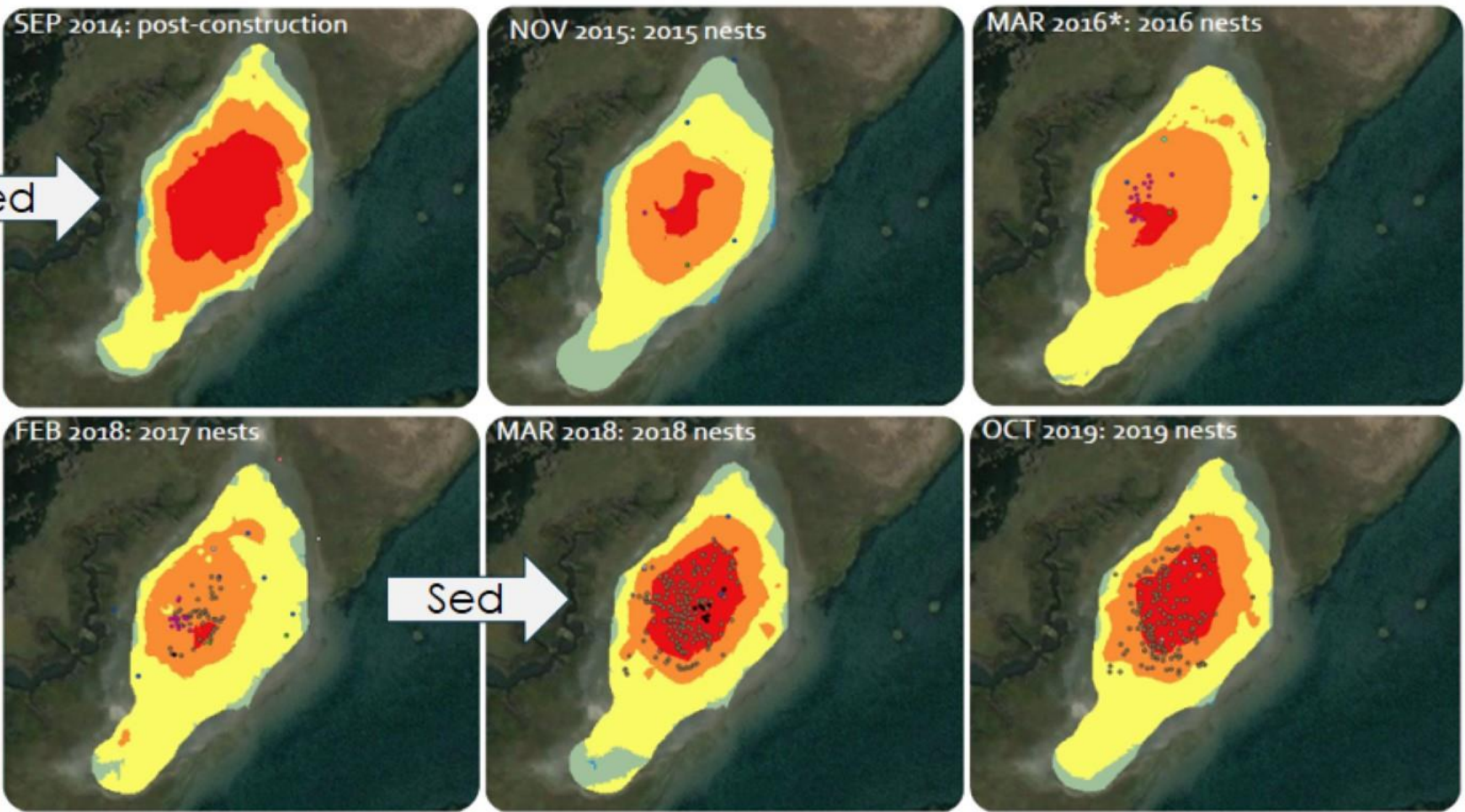
2/26/2018 USACE

- ▶ Elevated Nesting Habitat Maintenance
 - ▶ March 2018 1,200 cy
 - ▶ 120' of Channel
 - ▶ Reestablish Berm Crest at 6'

RING ISLAND ELEVATED NESTING HABITAT REPETITIVE PLACEMENT



How did elevation affect nesting bird use of the site?



Elevation ft, NAVD88	Species
0.0 - 2.1	● AMOY ● BLSK ● CLRA ● COTE ● GBBG ● LETE ● SESP ● WILL
2.1 - 2.8	
2.8 - 3.6	
3.6 - 5.0	
5.0 - 7.0	

Fig. 7. Elevation models (ft, NAVD88) and nest locations on Ring Island elevated nesting habitat over 5 years. Images labeled by 'Elevation data month year: nest data year' Nest displayed by species, collected by Garmin GPS or Trimble GPS. Elevations modeled from RTK data using empirical kriging model in ArcGIS, all years except 2016. *2016 elevations modeled from LiDAR data, provided by USACE, modeled by Princeton Hydro.

HABITAT CLUSTERS: FROM PILOTS TO SYSTEM SOLUTIONS

▶ Ecologic Value

- ▶ Creates Network of Sites at Different Stages of Succession
- ▶ Separates Populations for Resiliency
- ▶ Mimics Historic Distribution of Colonial Nesting Birds

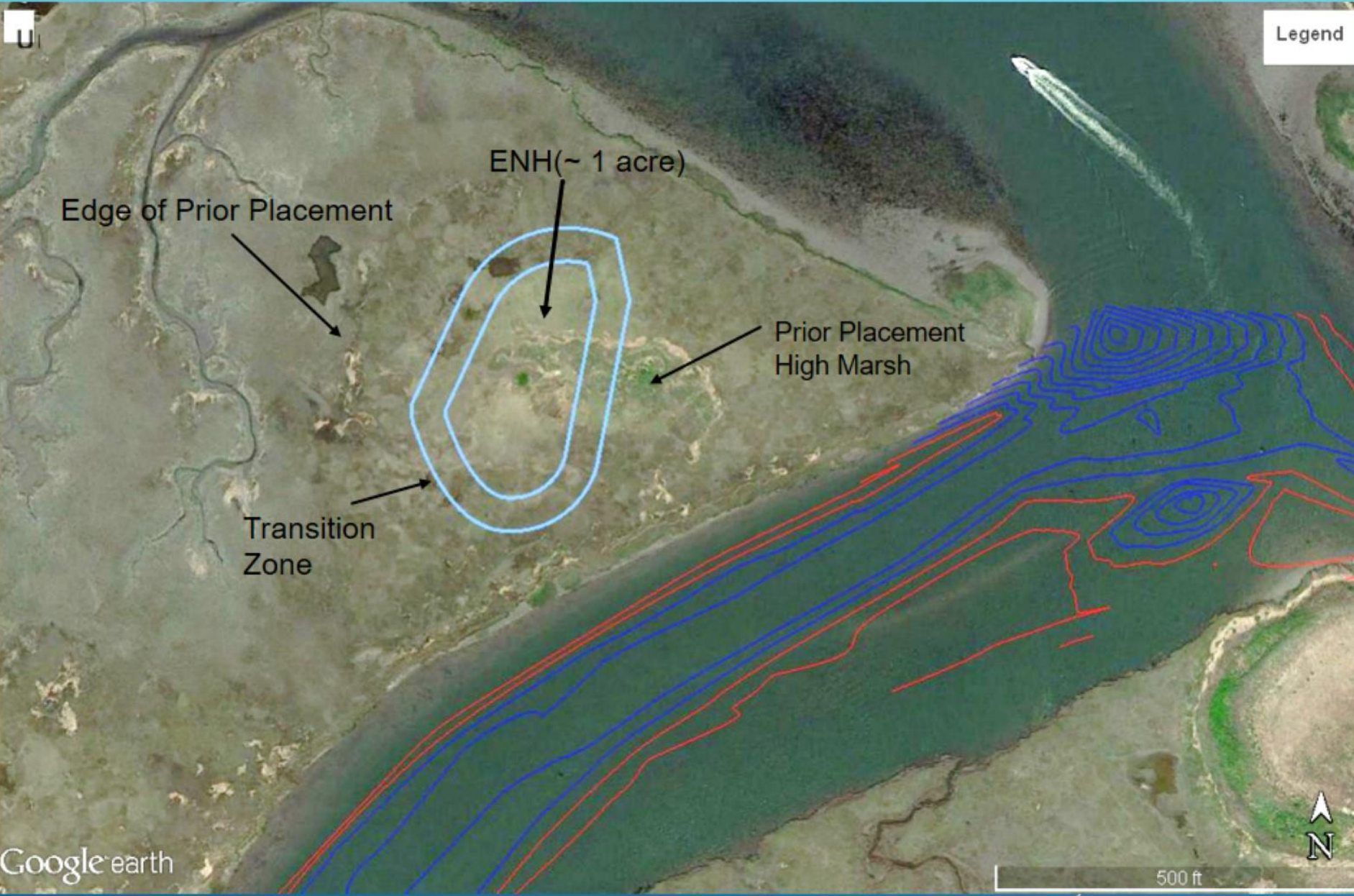
▶ Dredging Value

- ▶ Provides Opportunities for Repetitive Placement
- ▶ Creates More Volume Utilization
- ▶ Allows for Staggered Placement

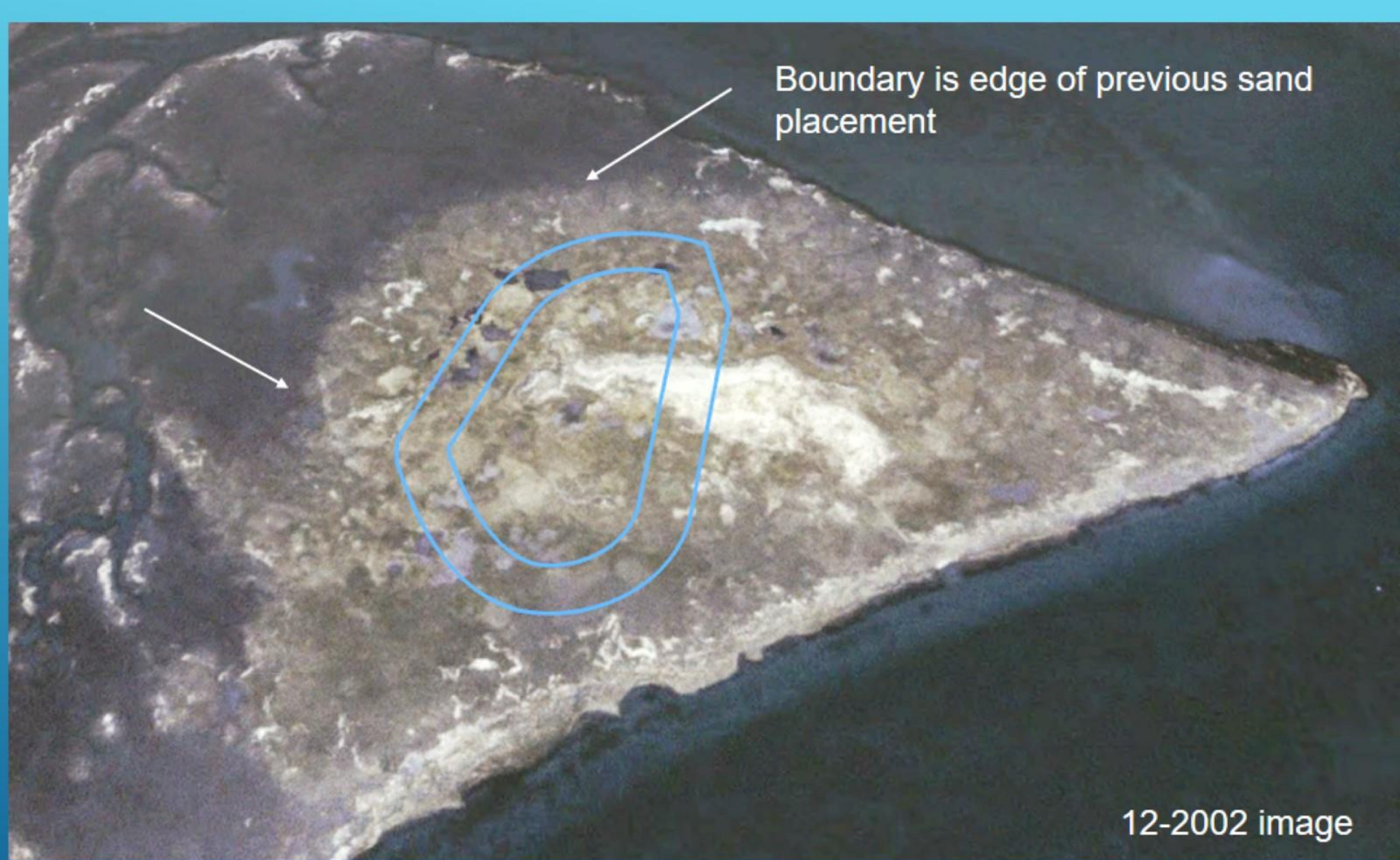
- ★ Ring Island A (2014; 2018)
- ★ Great Flats (2018)
- ★ Ring Island B (Future?)
- ★ Stone Harbor Point



Legend



GREAT FLATS NESTING HABITAT



Boundary is edge of previous sand placement

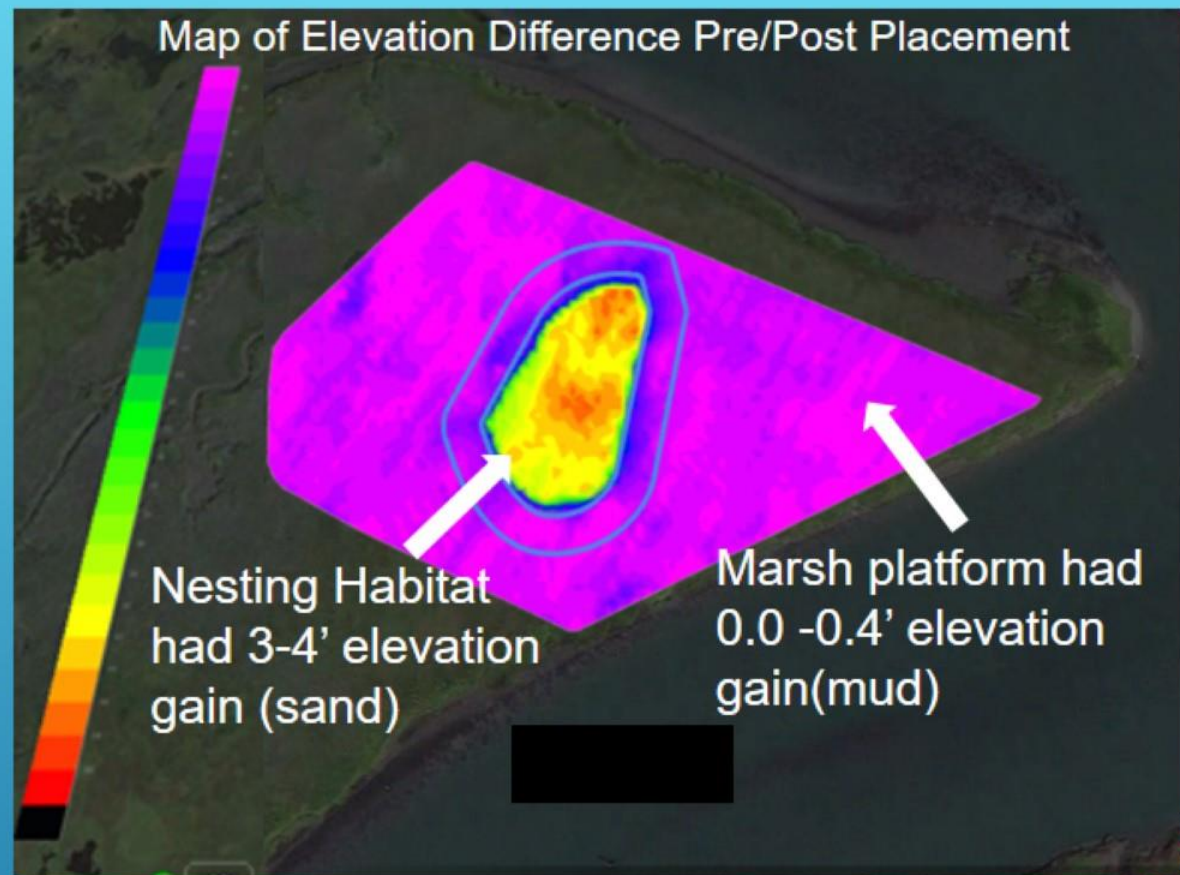
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GREAT FLATS HISTORICAL IMAGERY

- ▶ Placed 6,000 yd³ on 1 acre habitat
- ▶ 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 platform



GREAT FLATS NESTING HABITAT



- ▶ Created small habitat switching area (1 acre)
- ▶ Able to manage muddy runoff to be tip
- ▶ Wind transport of fine sand to surrounding areas augments marsh build up rates providing added benefit
- ▶ Future refurbishment allows for ongoing channel maintenance

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NORTHERN SMILL USACE PRIOR PLACEMENT AREAS



- ▶ Prior placement sites created important wading bird habitat
 - ▶ Nesting areas account for nearly 1/3 of wading birds in State of NJ
- ▶ Habitat degrading with elevation loss



ISLAND ELEVATION ENHANCEMENT AND SACRIFICIAL BERM PLACEMENT

- ▶ Sacrificial berm creation with sandier sediments for edge erosion protection and maintenance
- ▶ Unconfined sediment placement to elevate marsh platform to high marsh
- ▶ Elevated nesting habitat enhancement and creation to low supratidal elevations



- ▶ In water placement created important intertidal foraging flats for shorebirds and wading birds
- ▶ Unconfined on marsh sediment placement created elevated nesting habitat for wading birds



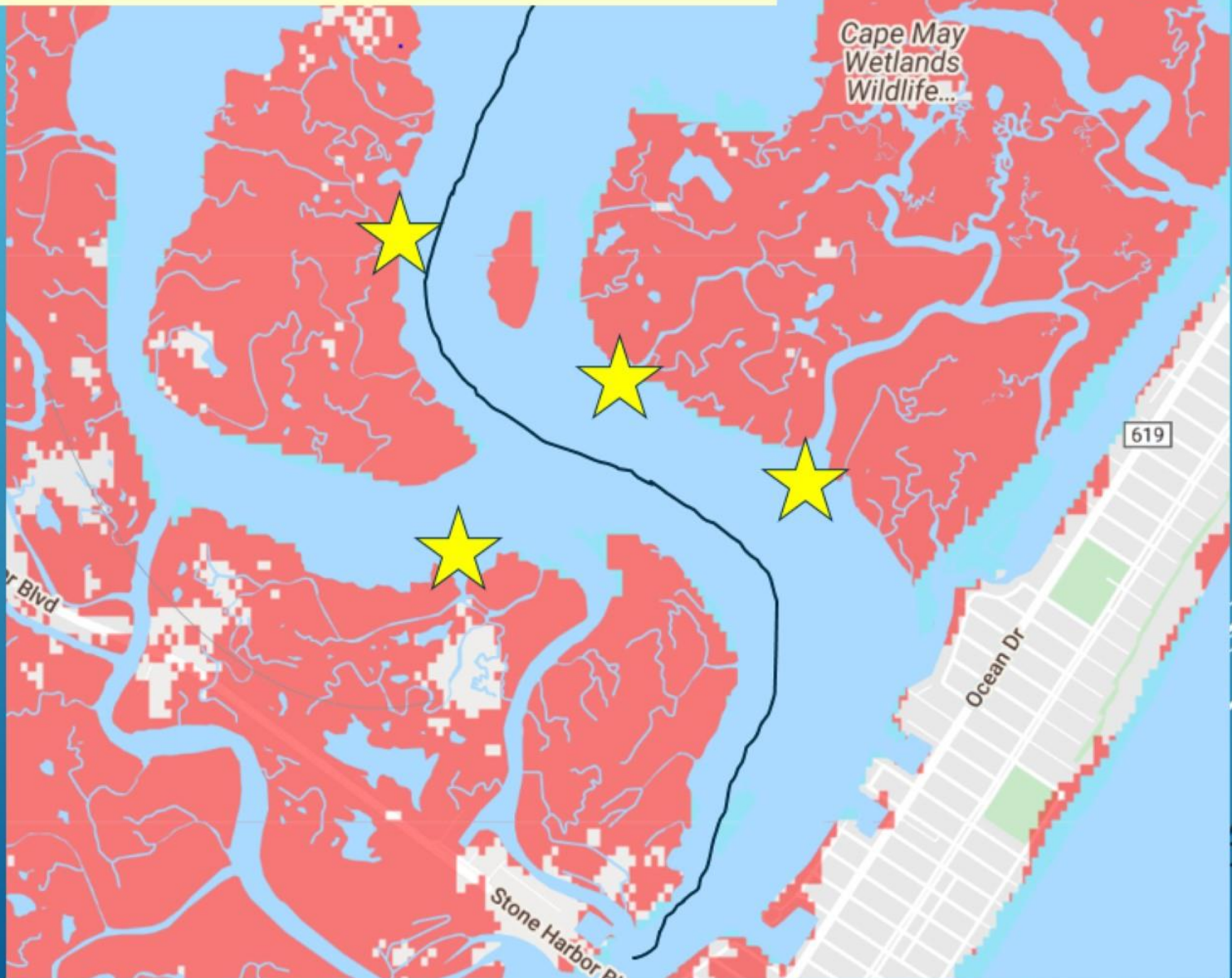
GULL ISLAND FLATS



- ▶ Unconfined in water placement to enhance intertidal flats
- ▶ Feeding and loafing areas for wading and shorebirds
- ▶ Large volume for channel clearing dredging
- ▶ Reoccupy prior placement areas

GULL ISLAND FLATS

STRATEGIC SEDIMENT RELEASE INTO TIDAL CHANNELS



Environmental Conditions

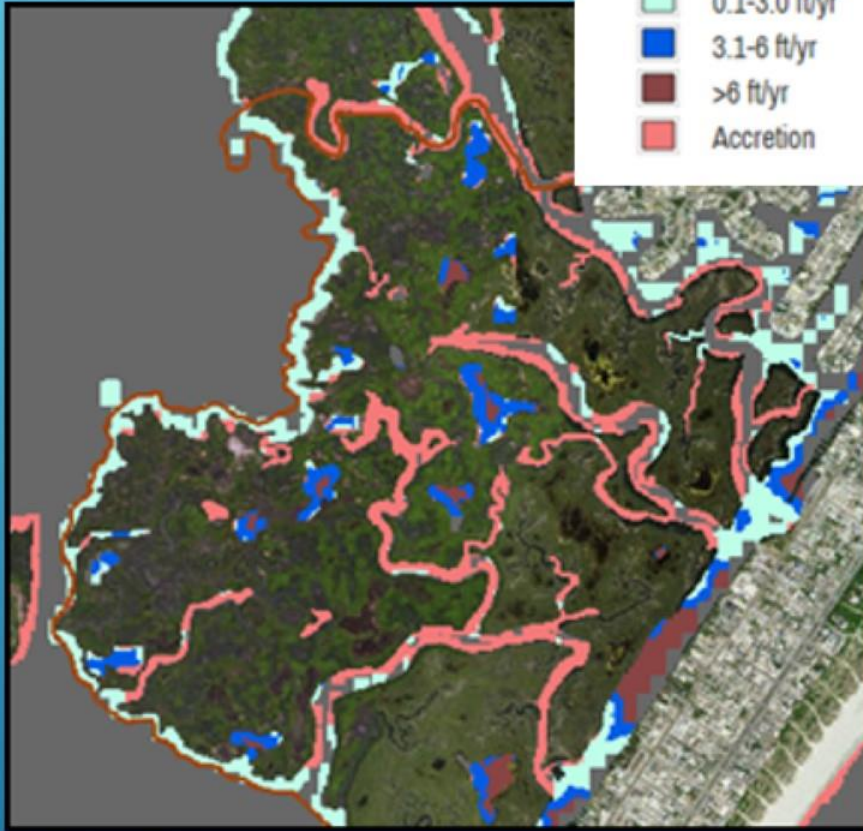
Shoreline Change Rate

- No Change
- 0.1-3.0 ft/yr
- 3.1-6 ft/yr
- >6 ft/yr
- Accretion



Marsh Loss: 1930- 2012
204.74 Acres

1930 Marsh Limits



From The Nature Conservancy Coastal Resilience Tool



MARSH EDGE EROSION IN SHARK ISLAND EMBAYMENT

SEVEN MILE ISLAND LIVING LABORATORY

Monica A. Chasten monica.a.chasten@usace.army.mil
Lenore P. Tedesco ltedesco@wetlandsinstitute.org

