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# Thin Layer Deposition Projects

January 9<sup>th</sup>, 2018 – Rob Tunstead

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# Thin-Layer Deposition / Placement

**Definition:** beneficial reuse of soil materials on tidal marsh platforms by adding dredged materials to the marsh surface raising the elevation of the marsh plain



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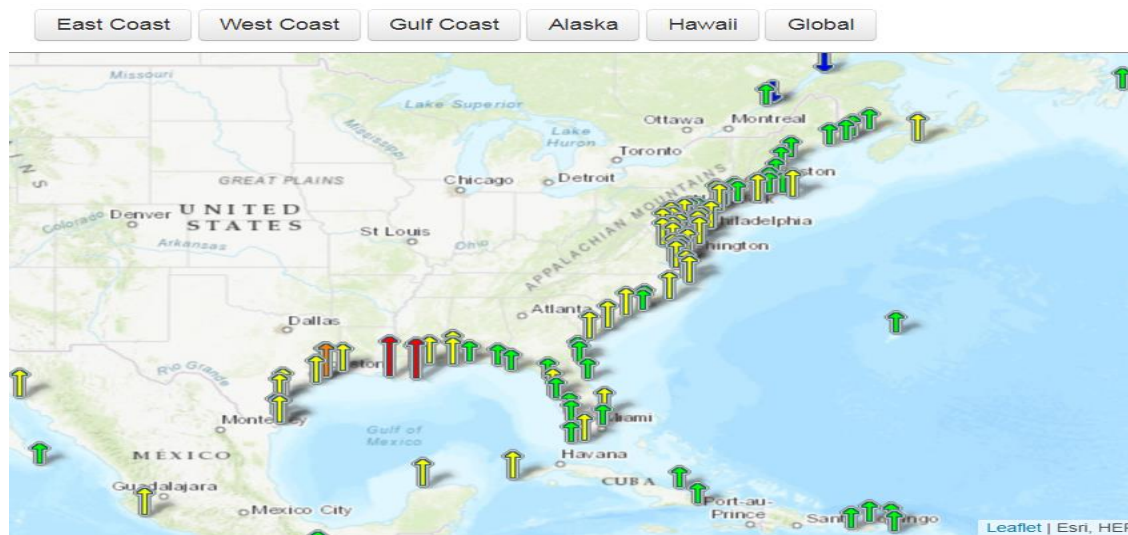
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# Thin-Layer Deposition / Placement Justifications

- Sea level rise (SLR)
- Lack of soil / sediment supply for accretion (tidal restriction)
- Marsh platform subsidence / pooling
- Ditching and draining
- Invasive species colonization

## Sea Level Trends



... trends in sea level, with arrows representing the direction and magnitude of change. Click on an arrow to access addi

### Sea Level Trends mm/yr (feet/century)

15 to 21 (5 to 7)	6 to 9 (2 to 3)	-3 to 0 (-1 to 0)	-12 to -9 (-4 to -3)
12 to 15 (4 to 5)	3 to 6 (1 to 2)	-6 to -3 (-2 to -1)	-15 to -12 (-5 to -4)
9 to 12 (3 to 4)	0 to 3 (0 to 1)	-9 to -6 (-3 to -2)	-18 to -15 (-6 to -5)



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# Prime Hook NWR, DE Marsh Restoration



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# Thin Layer Deposition Projects

## Pre – Placement Project Considerations / Challenges

- Where is marsh being lost (edge or interior)? If interior than do you have enough sediment / soil transport in the system to support platform accretion?
- Pre-existing marsh platform health / Soil type
- Platform potential weight bearing capacity
- Acid sulfate soil potential
- Placement thickness



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# Tidal Marsh Edge Erosion / Loss



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# Tidal Marsh Edge Erosion / Loss



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# Marsh Pool / Panne - Interior Erosion



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# Prime Hook Vegetation Response

*Pluchea odorata*  
(Saltmarsh fleabane)

*Leptochloa fascicularis* (bearded sprangletop)

*Spartina alterniflora*  
(Saltmarsh cordgrass)

*Eleocharis parvula*  
(dwarf spikerush)

*Echinochloa crus-galli* (barnyardgrass)



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# Prime Hook Vegetation Response

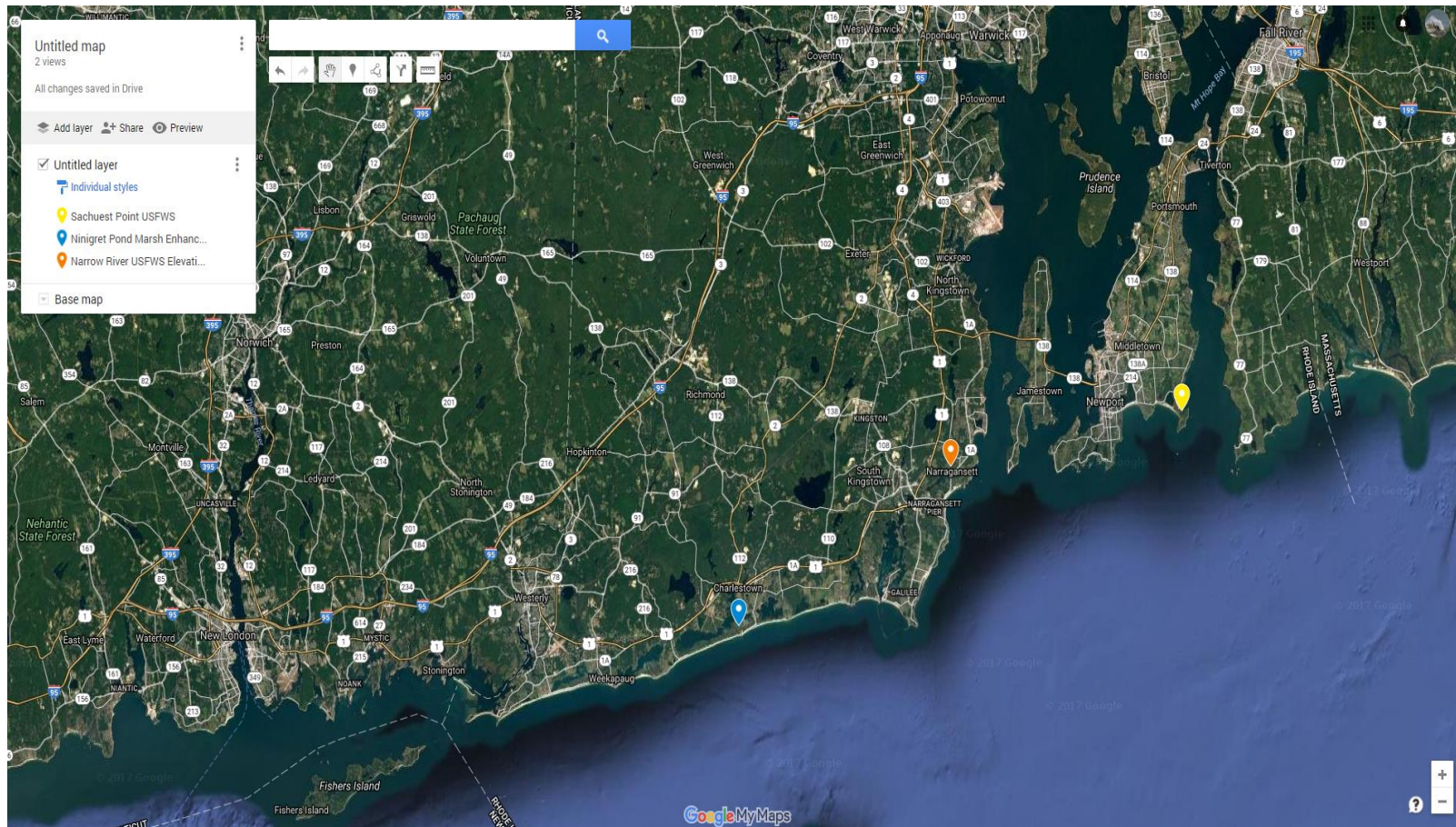


Dredged channel  
and thin-layer  
deposited material





# Rhode Island Marsh Elevation Enhancement Projects



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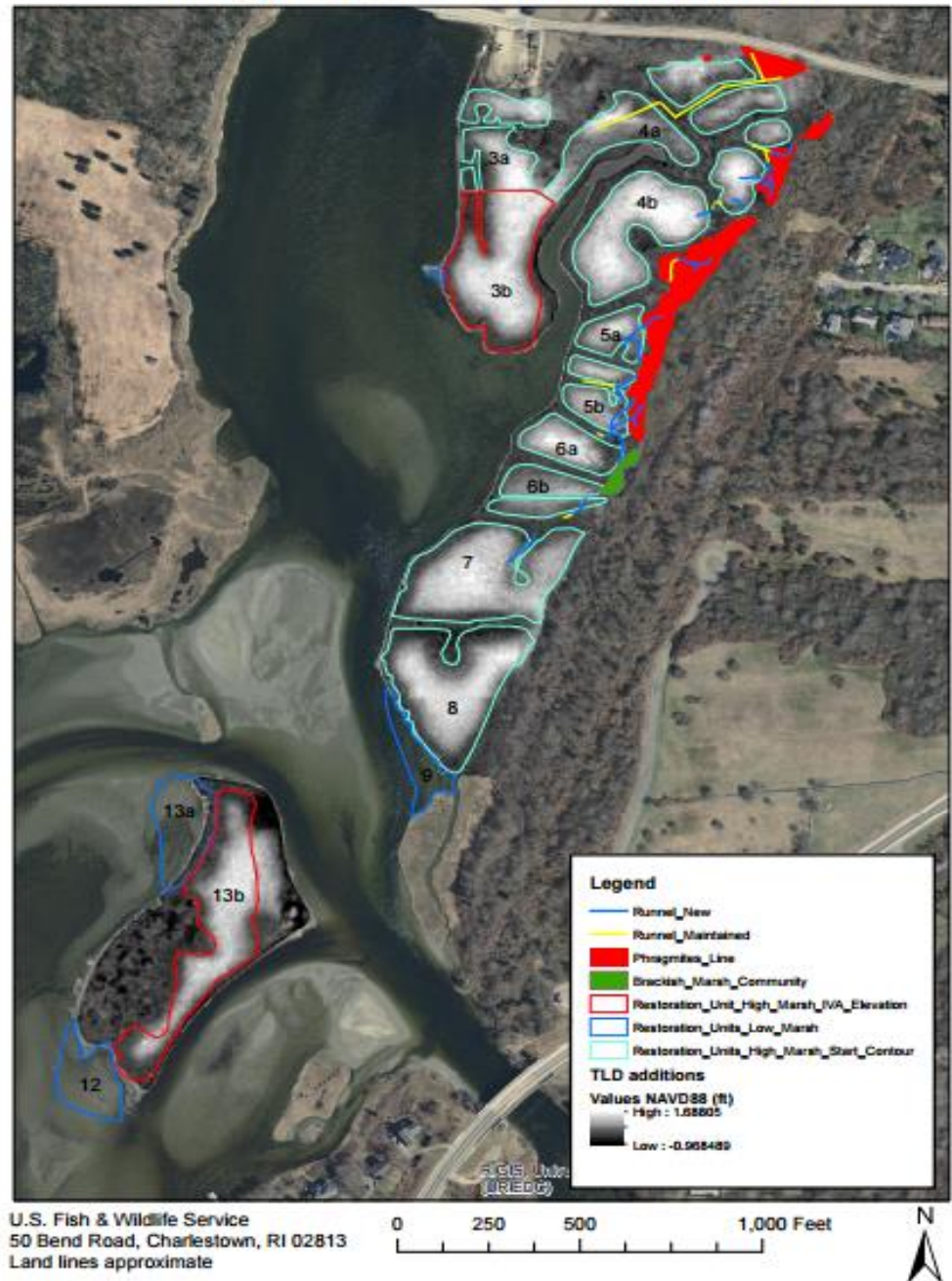
- Contoured to maintain drainage
- Avoiding old pools, *Phragmites*, brackish marsh, creeks & channel

### Design Criteria

- Sediment criteria
  - Sand, sieve size 10, tested for contaminants
- Marsh plain slope
  - 1 - 3% high marsh, maximize high marsh vegetation area
  - 10 - 30% rise for low marsh, bank edge



### John H. Chafee NWR Narrow River Resiliency Project Thin Layer Deposition Contours Draft Additions





Sand slurry being pumped on marsh



Elevation enhancement area



Use of coir fabric to protect existing fish pool



Juncus growing through ~ 3" of placed sand





# Ninigret Pond - Implementation







May 2017  
Photos: Save The Bay





October 2017  
(photo CRMC)





*Distichlis*: Sept. 2017



*Panicum and Amophila*: Sept. 2017



*S. patens, Amophila and Iva*: Sept. 2017



*S. patens*, Sept. 2017

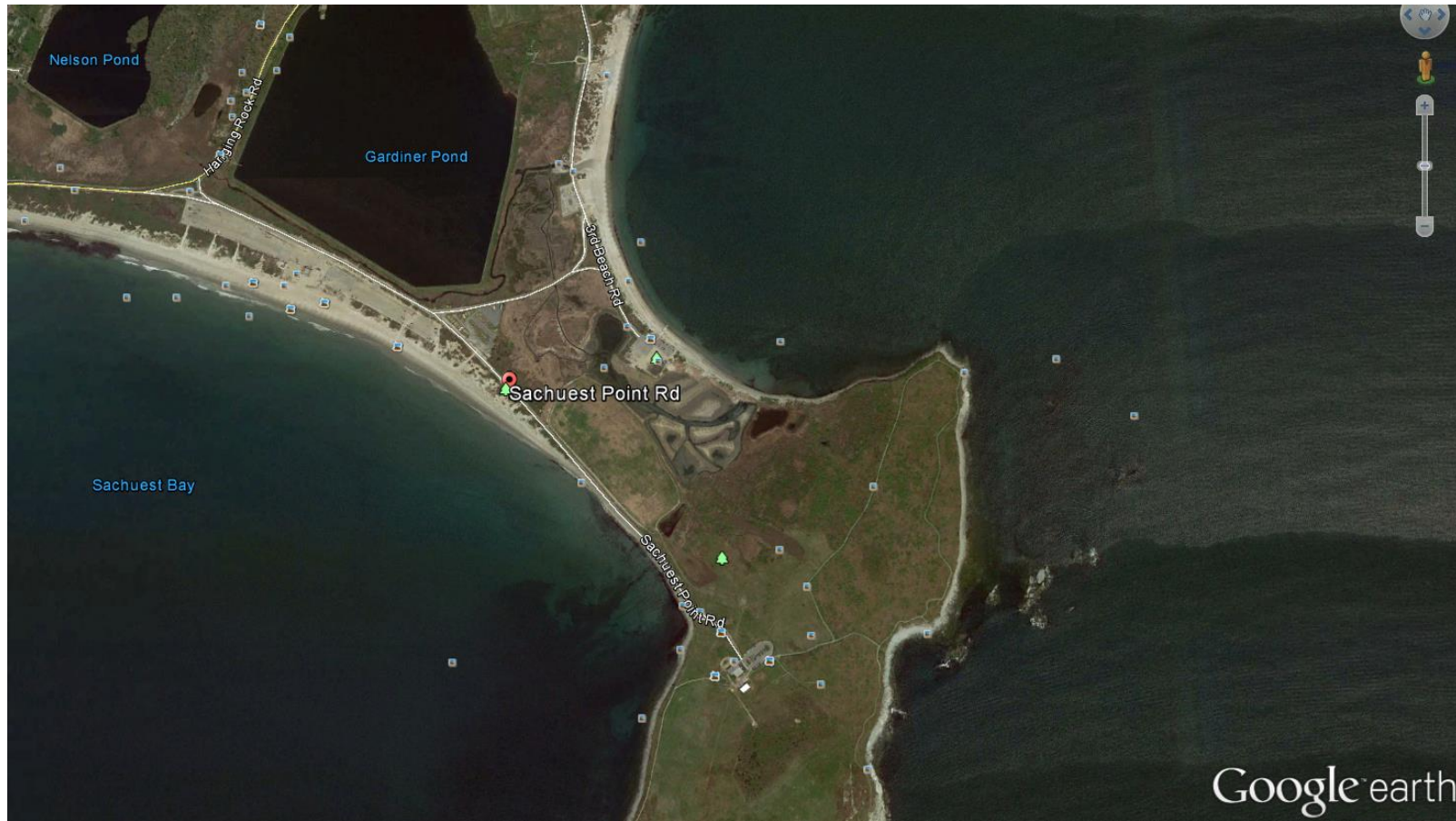


Natural recolonization





# Sachuest Point USFWS Elevation Enhancement Project, Middletown, RI



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# Sachuest Point USFWS Wildlife Refuge Elevation Enhancement Project: Middle

-conducted in the winter of 2016



Thin layer deposition of sand from upland source on low marsh area





# Sachuest Marsh Planting:

-planting of *Spartina alterniflora* and *Distichlis spicata* occurred in spring of 2016 and 2017



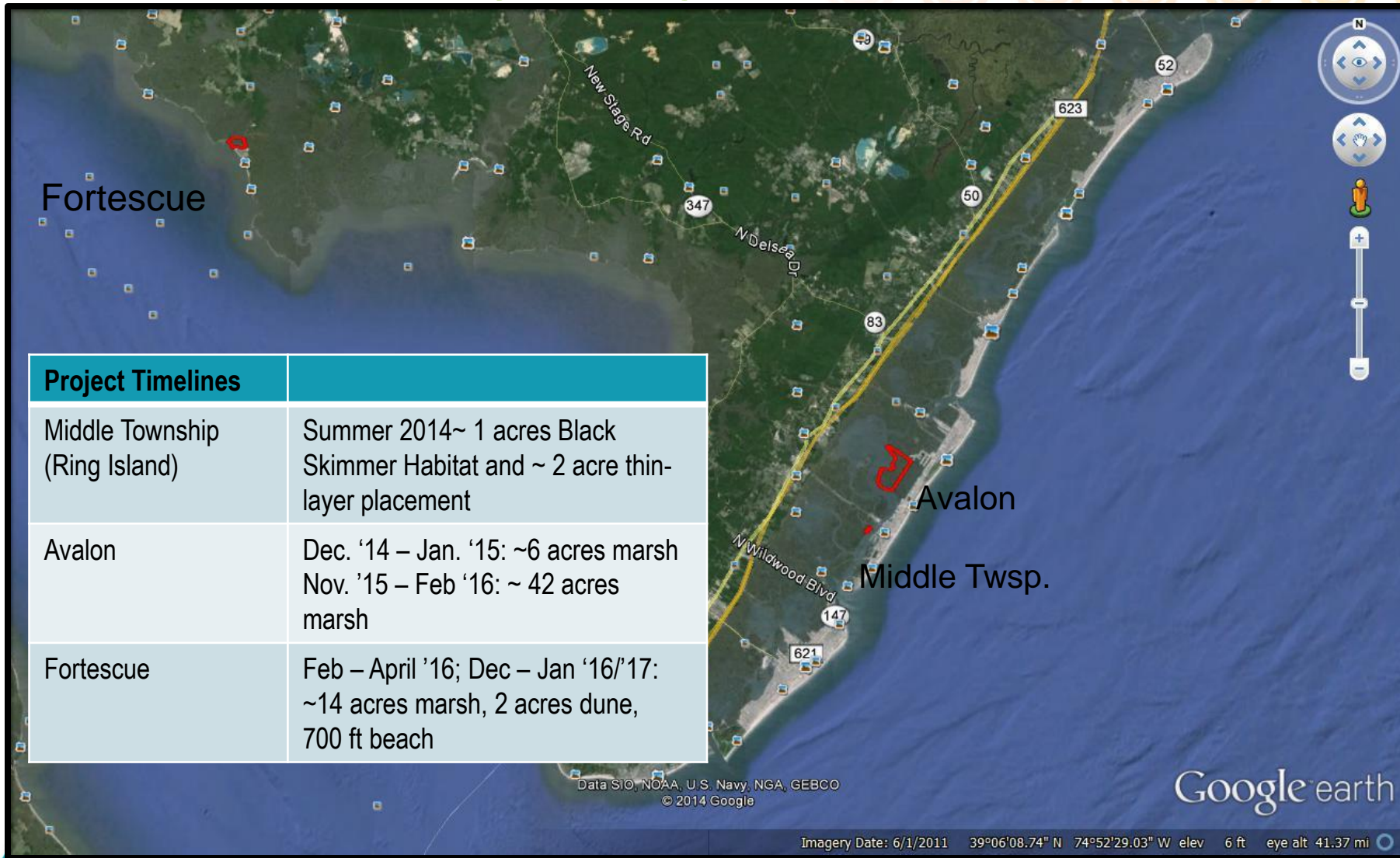
August 2016



September 2017



# New Jersey Project Locations



# Avalon, NJ





# Avalon After One Growing Season

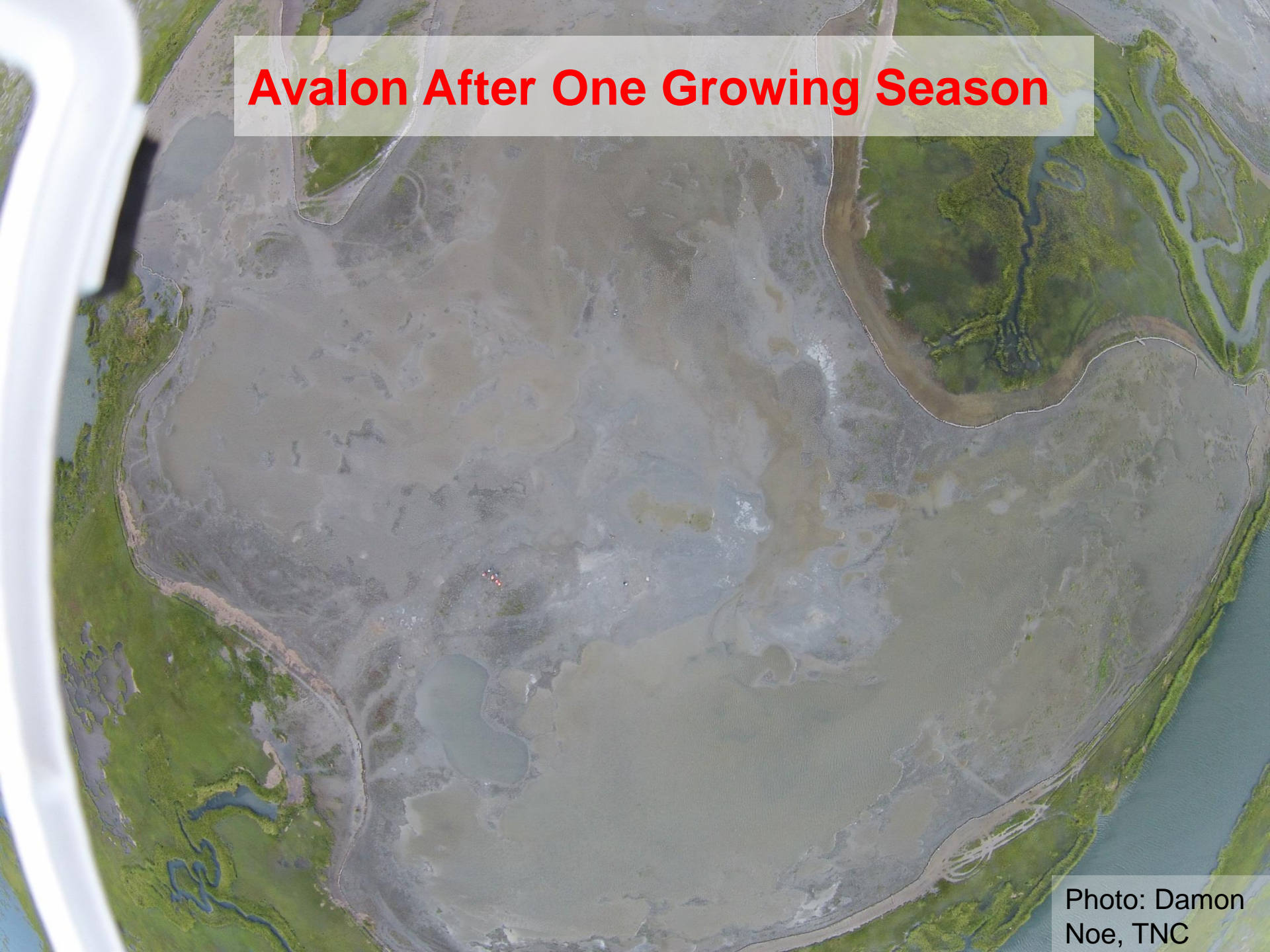
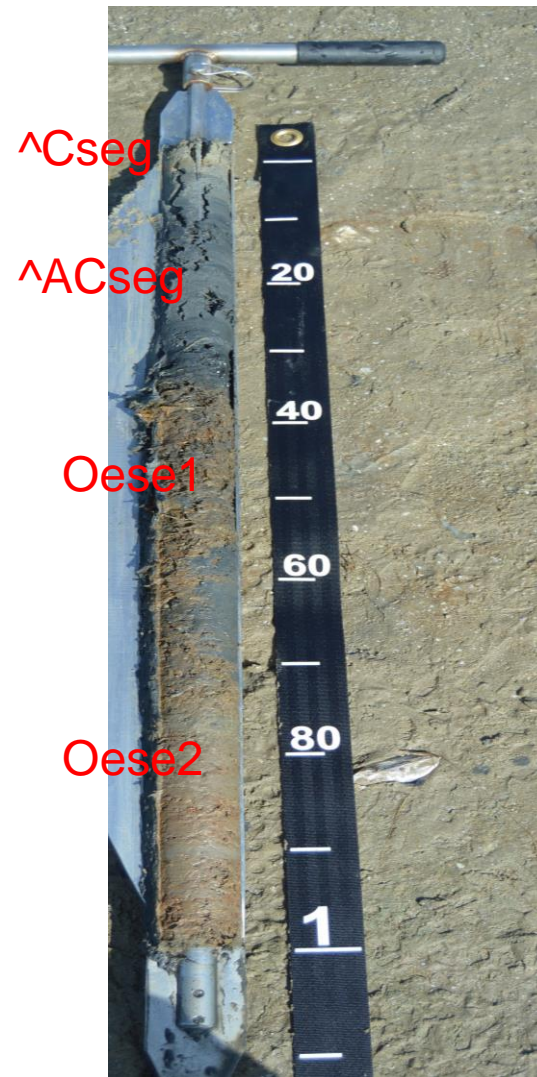


Photo: Damon  
Noe, TNC



# Avalon, NJ



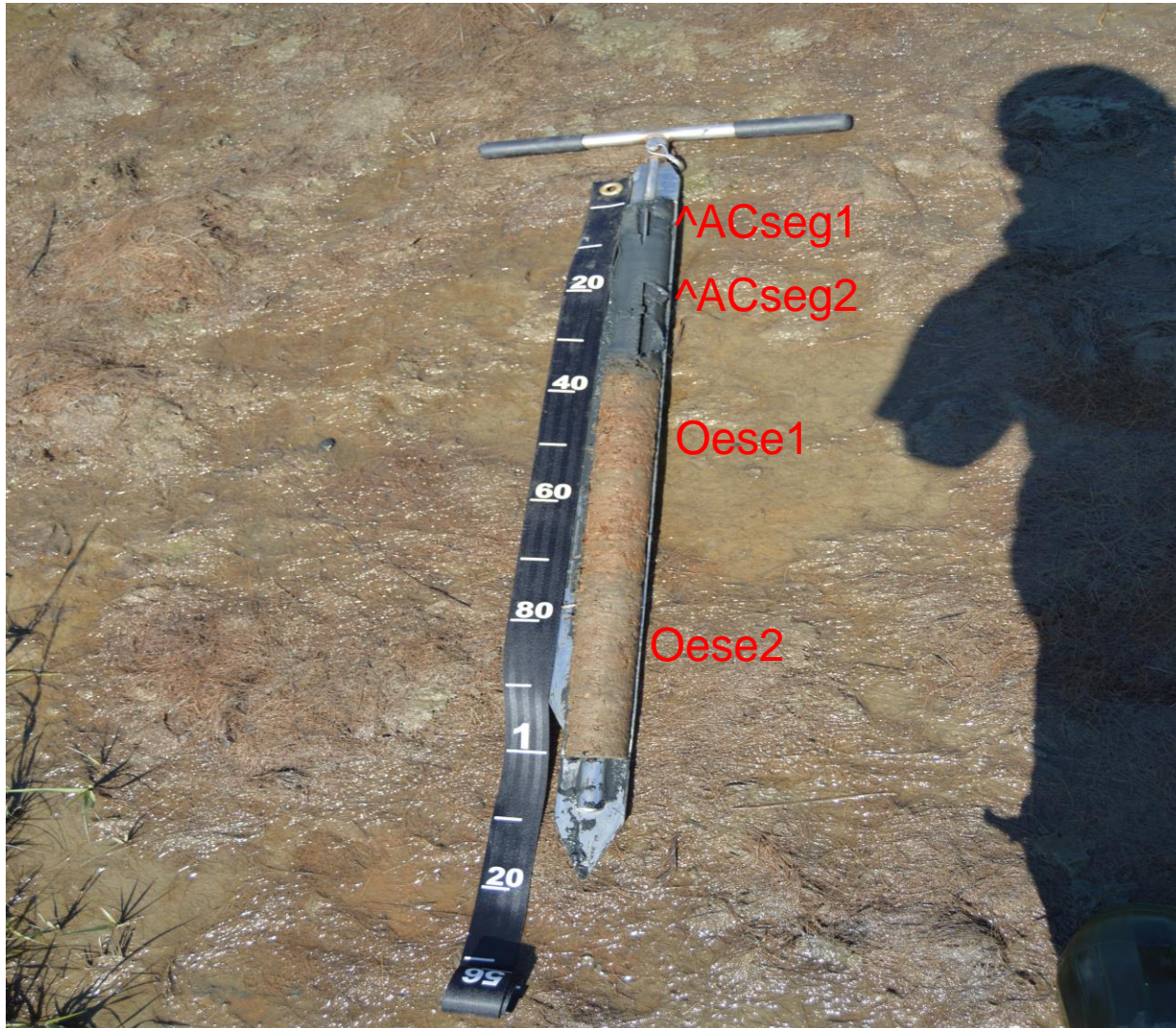


# Avalon, NJ





# Avalon, NJ







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# Avalon Project – Jackie Jahn



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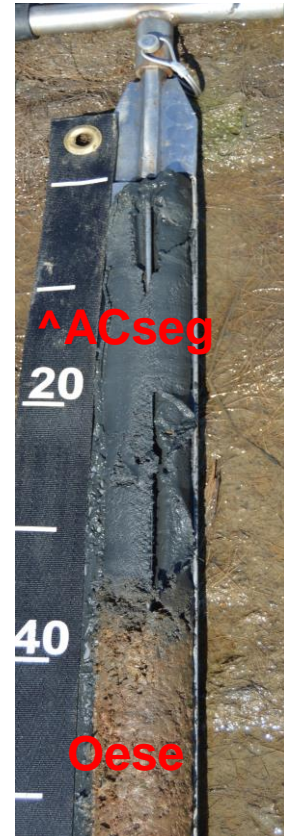


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# Thin Layer Deposition Projects

## Post - Placement Considerations / Challenges

- Acid sulfate soil potential
- Placement thickness
- Soil Hydrology post-placement
- Vegetation re-establishment
- Soil placement material characterization / textural analysis / pH, etc.
- Dewatering and subsidence and uneven distribution of deposition soil materials
- Extensive Monitoring (vegetation, pH, water quality, subsidence, etc.)



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