

# Tidal salt marsh restoration at John H. Chafee NWR.

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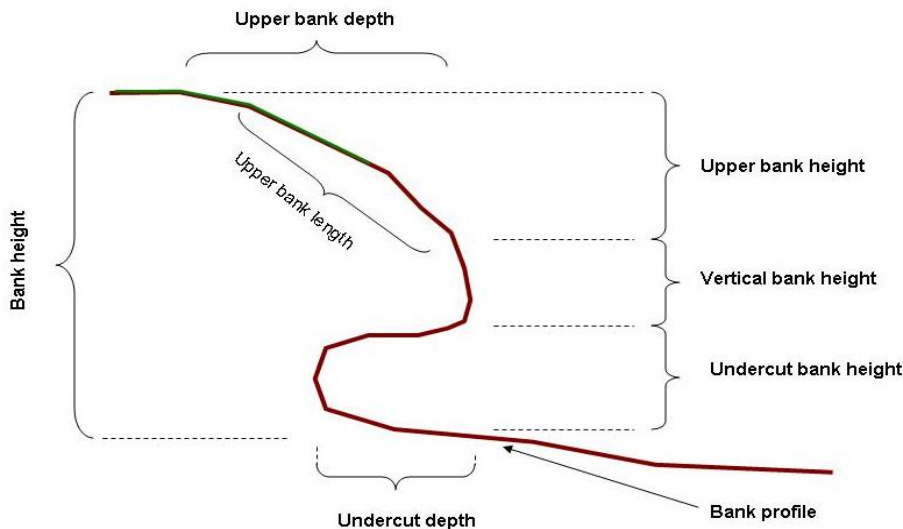
On Pett Cove, January 29, 2017



# Initial observations - Shoreline Erosion

- Unstable Banks, Narrow River
  - Sections of marsh slump into river
  - Wind driven waves, boat wakes, crabs (green/fiddler)

Cross sectional view of typical saltmarsh riverbank, Lower Narrow River











# Initial observations – Impounded Water on Marsh

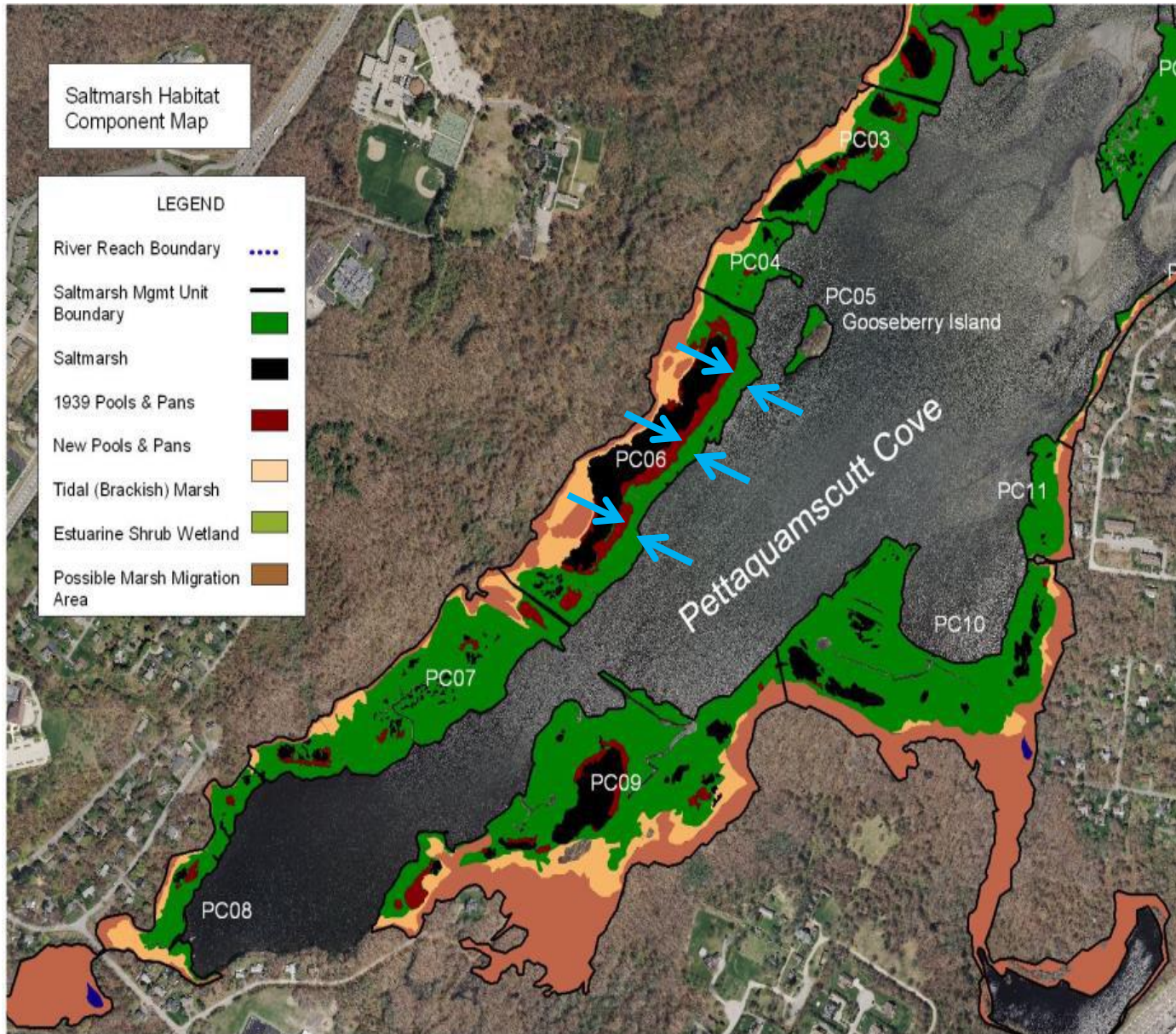
- Standing water on marsh
- Panne expansion (low plant density, stunted growth)
- Pool expansion







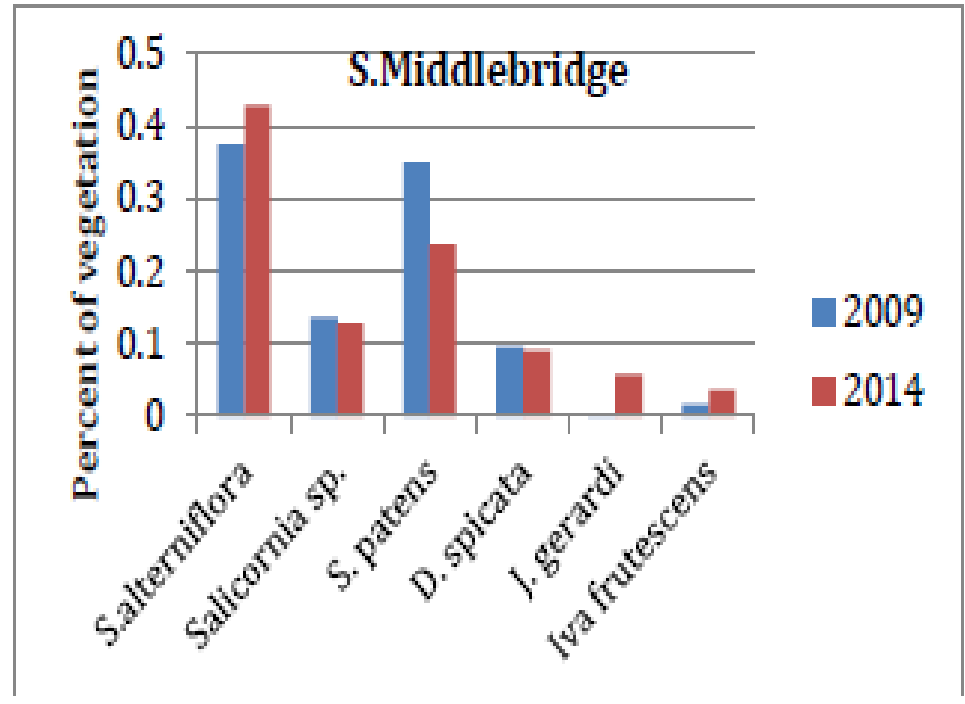
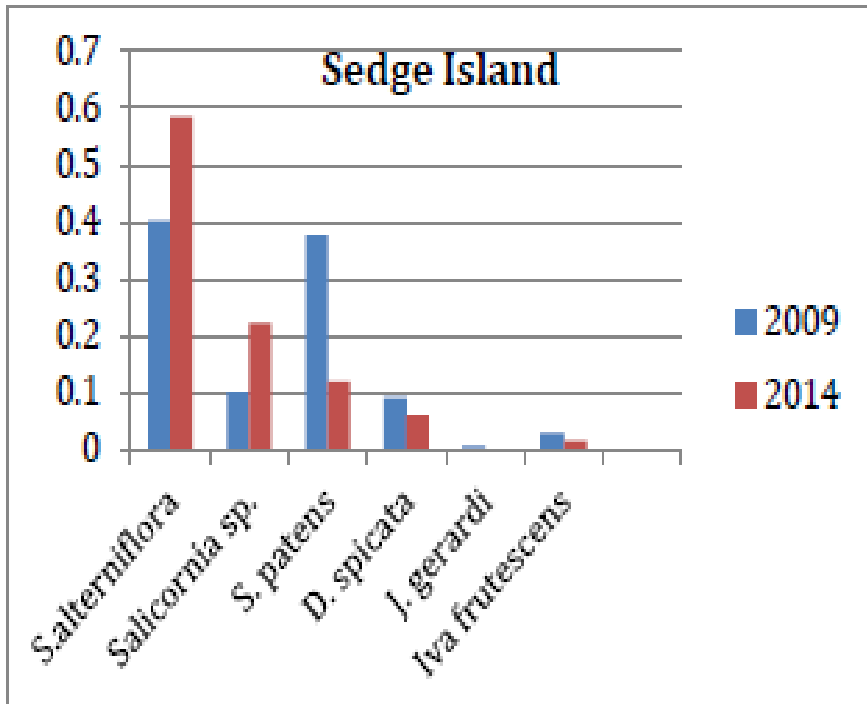
# Pool Expansion & Erosion





# Initial observations - Vegetation Transition

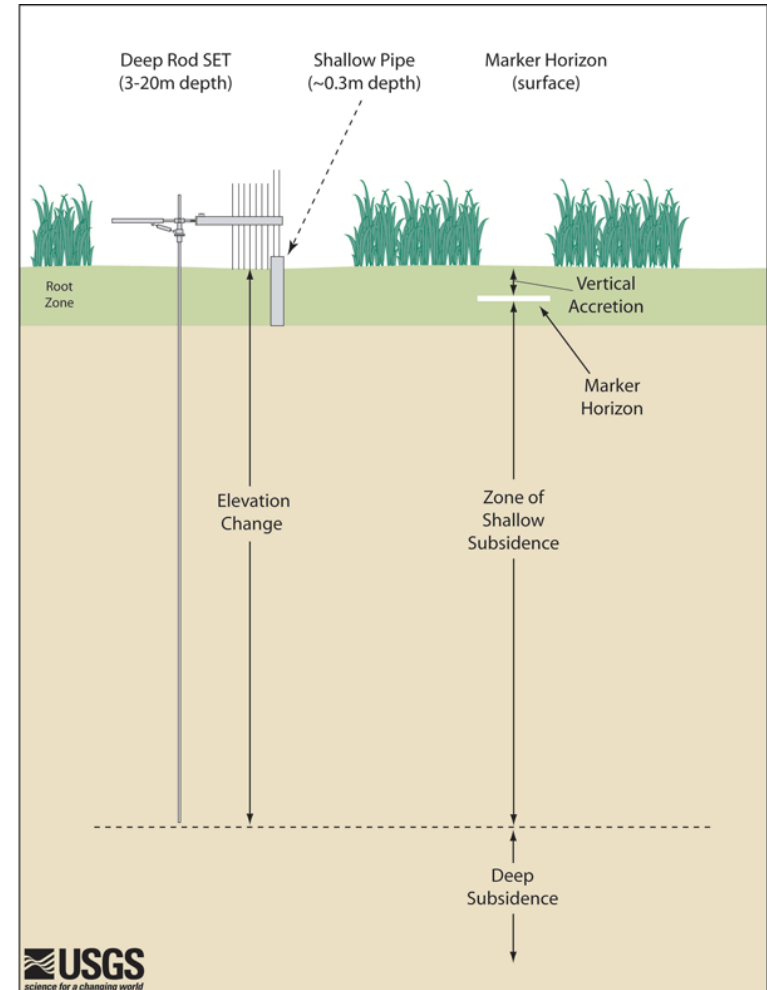
- Saltmarsh Sparrow occupancy study (S. Paton, 2009)
- Loss of *Spartina patens* (high marsh species)
- Increase in *S. alterniflora* (low, mixed marsh species)





# Initial observations – Sea Level Rise Faster than Accretion

- Raposa et al. 2016.
  - Salt marsh growth = 1.83 mm/year (n = 24)
  - Sea level rise (SLR)
    - 1930 – 2015 = 2.78 mm/yr
    - 1999 – 2015 = 5.26 mm/yr





# Early Studies & Assessments

- Documented...
  - Marsh loss due to edge erosion
  - Dieback due to impounded water (pool & panne formation)
  - Rapid loss of *S. patens* (high marsh), increase in *S. alterniflora* (low marsh)
  - Accretion not keeping up with SLR (low sediment in system, accretion due to biomass)





# Restoration Goals

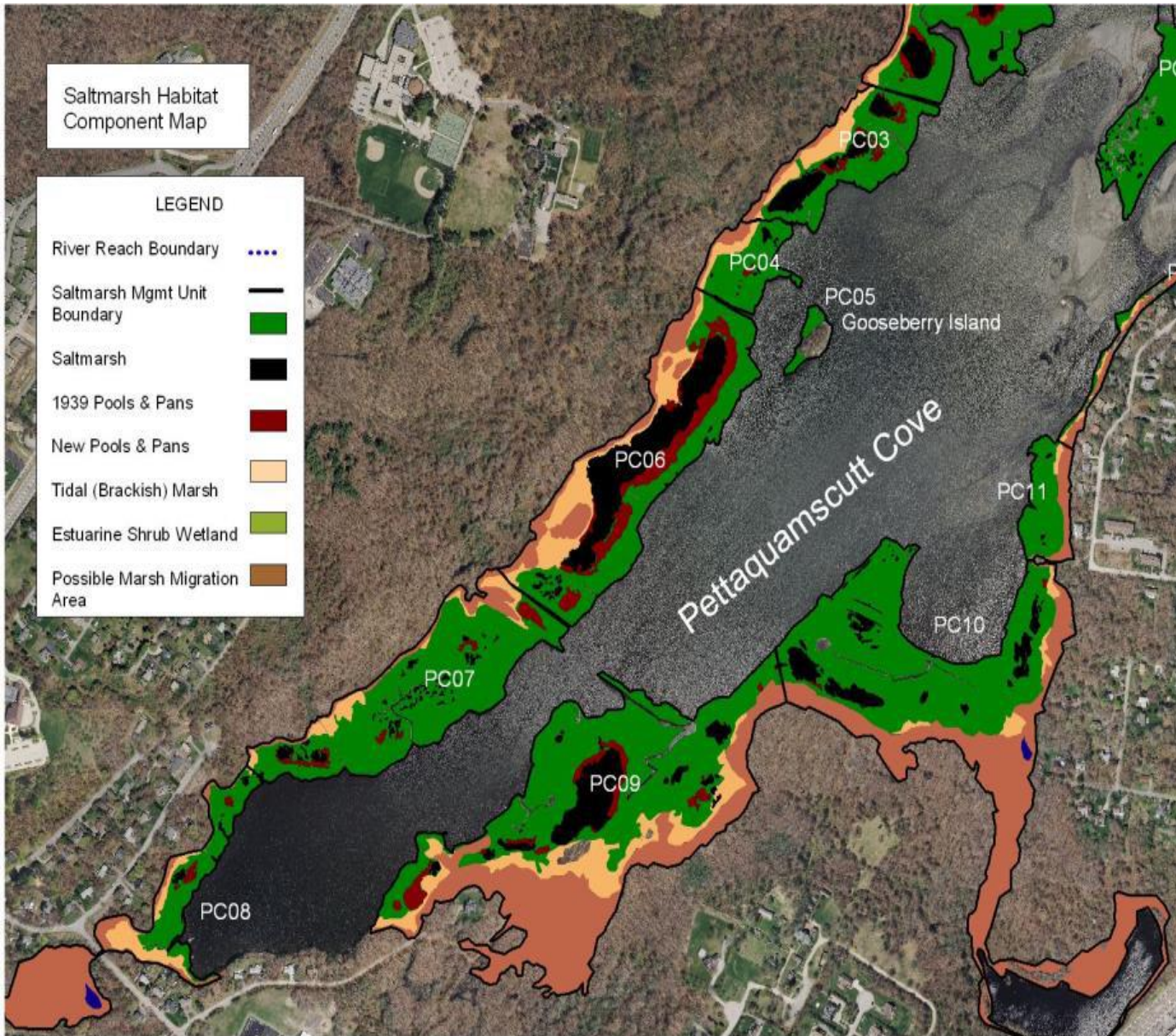
- Restore marsh health
  - Promote plant growth and marsh accretion
  - Prevent marsh loss
- Build marsh elevation
  - Restore high marsh
  - Provide nesting habitat into the future  
(Saltmarsh Sparrow, Willet)







# Marsh Migration

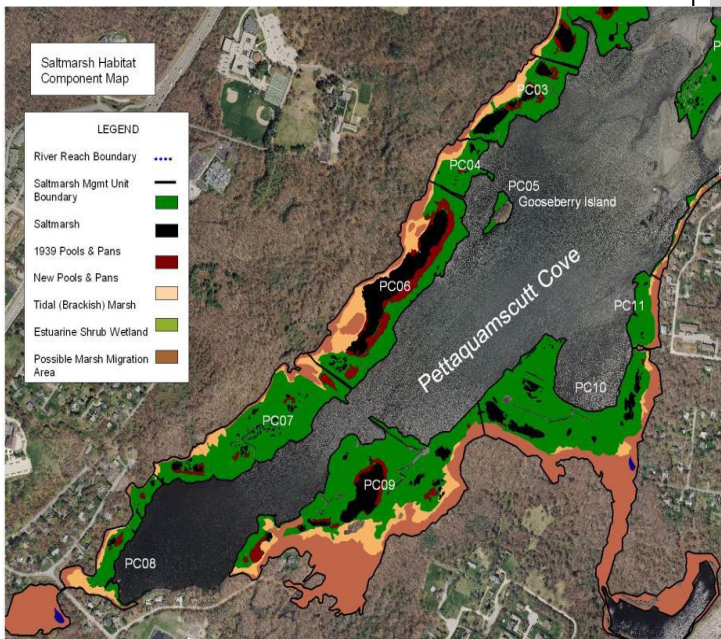
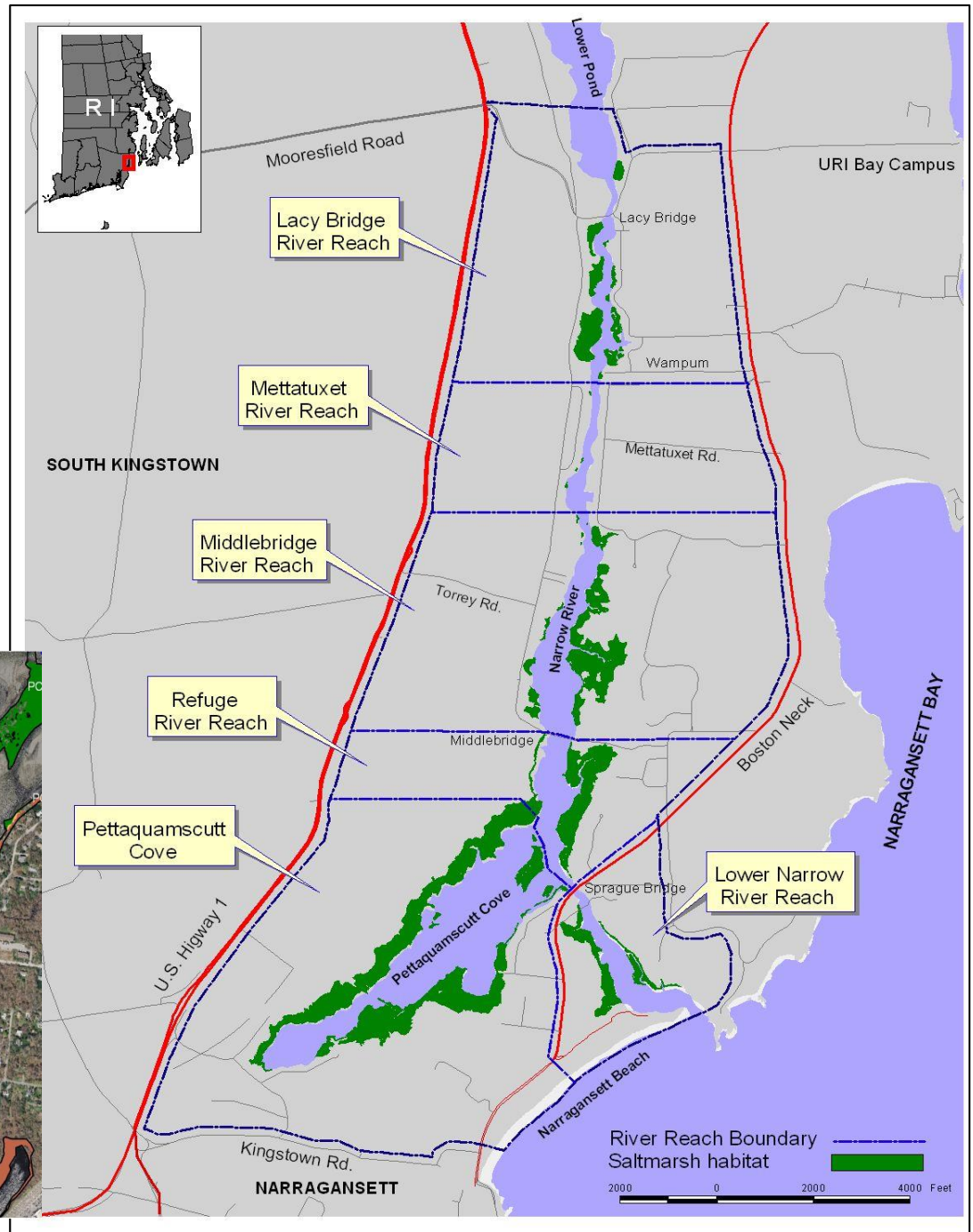






# Restoration Plan

- 174 acres of salt marsh, 40% poorly drained
- Drainage via runnels







# Runnels to promote vegetation growth



April 28, 2015



Sept. 10, 2015





# Pickleweed (*Salicornia depressa*) colonizing bare pannes





# Runnels to prevent pool expansion

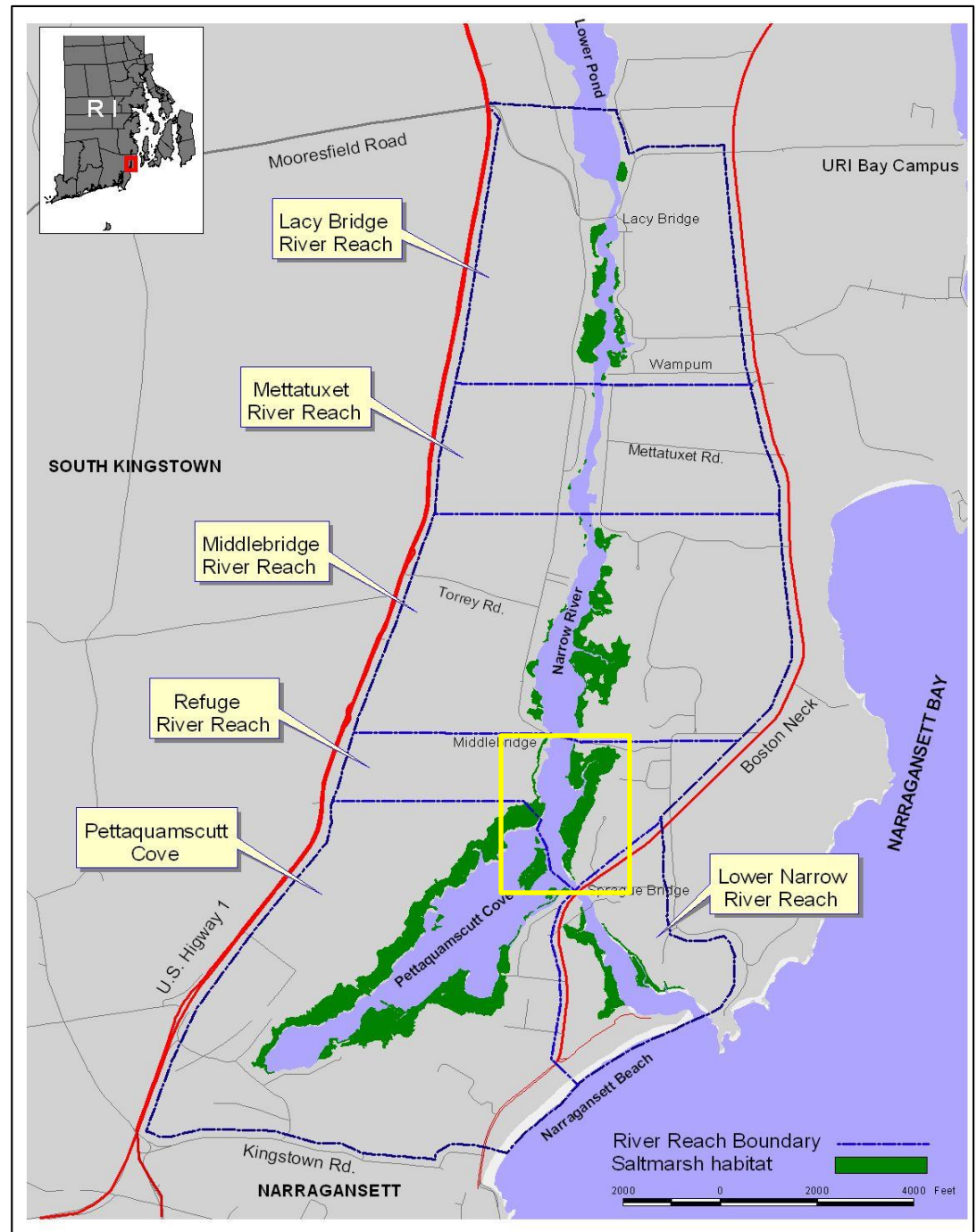






# Restoration Plan

- Sediment addition
  - 30 acres
  - Access/feasibility





# Restoration Plan

- Dredge areas
  - Create central channel for boats
  - Dredge depth, -4 ft (eelgrass, artifacts)
- Erosion control

John H. Chafee NWR Resiliency Project - Narrow River  
Units 1 and 10 Coordinates



U.S. Fish & Wildlife Service  
50 Bend Road, Charlestown, RI 02813  
Land lines approximate

0 250 500 1,000 Feet













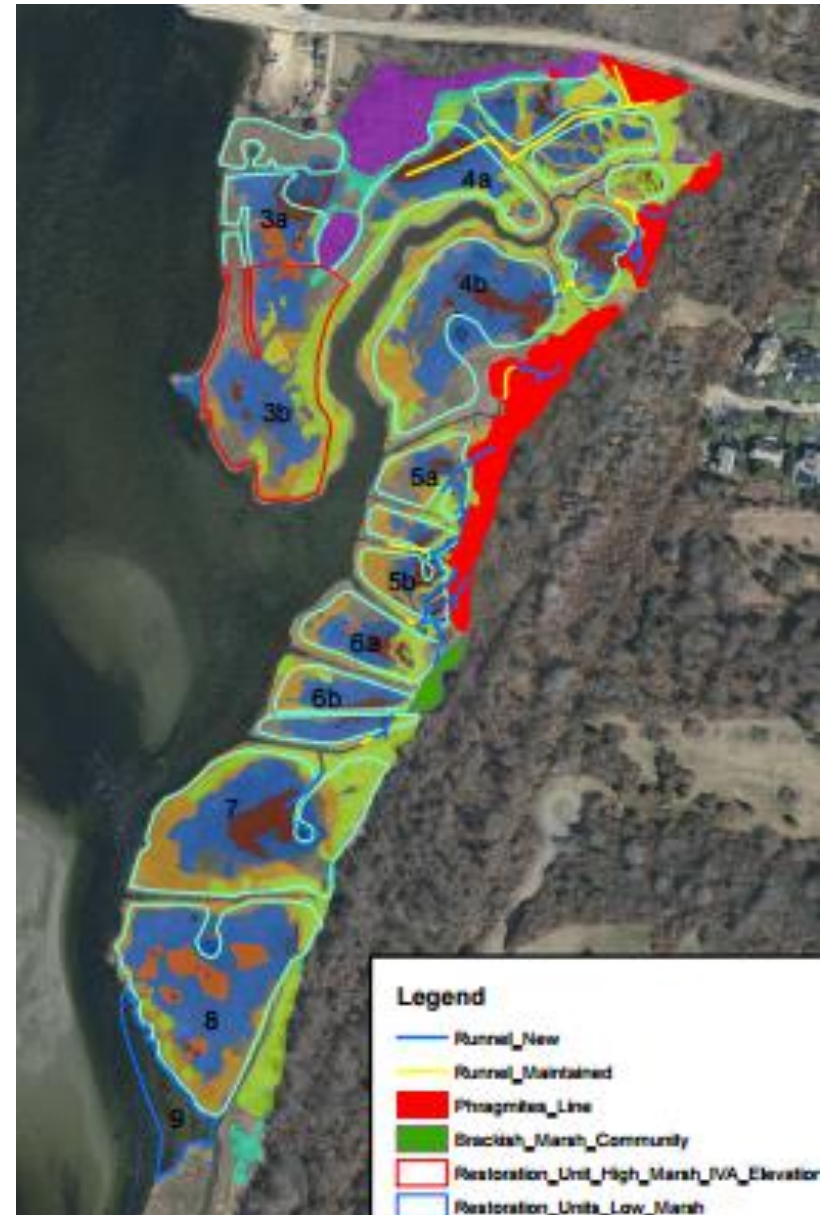






# Sediment addition design

- Mapped vegetation communities
- Target elevation
- Marsh plain slope
  - 1 - 3% high marsh
  - 10 - 30% low marsh



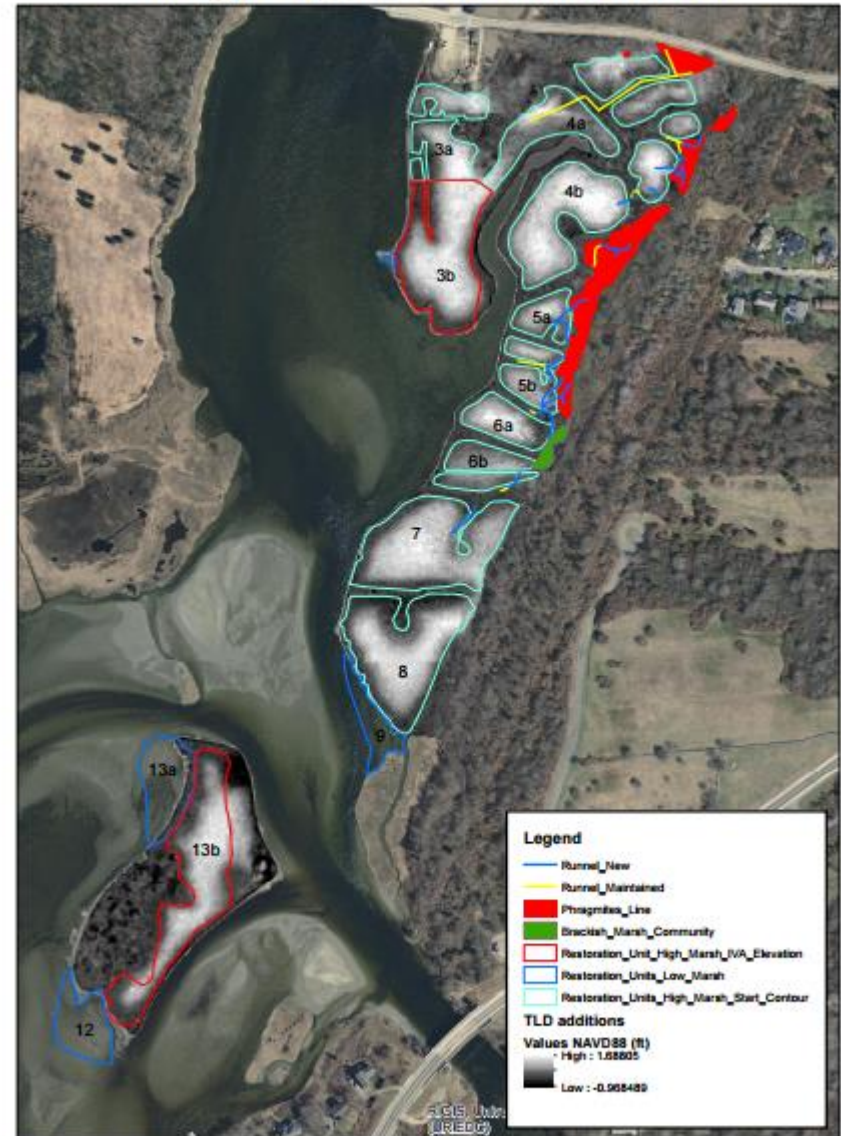




# Sediment addition design

- Contoured to maintain drainage
- Avoiding old pools, *Phragmites*, brackish marsh, creek & channels
- Outlines
  - Green = high marsh
  - Red = *Iva* elevation
  - Blue = low marsh

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



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0 250 500 1,000 Feet





# Bulldozer that can read CAD files

<https://vimeo.com/161192389>







# Preparation for dredge work

- Vertical dredge
  - Small
  - Higher % solids (40% JHC)





# Application

- Pipe, material stockpiled
- Rough spread (de-water)
- Contoured this March









# Low marsh creation



- Containment
  - Silt fence
  - Shell bags







# Acknowledgments



UNIVERSITY OF  
Rhode Island



U.S. Army Corps  
of Engineers®

