

A RECIPE FOR TIDAL SALTMARSH RESTORATION

Nicole Maher, Ph.D.

Senior Coastal Scientist

The Nature Conservancy in New York, Long Island Chapter

Special thanks: Adam Starke, Estuary Specialist

Stephen Lloyd, Sr. Spatial Analyst/GIS Manager



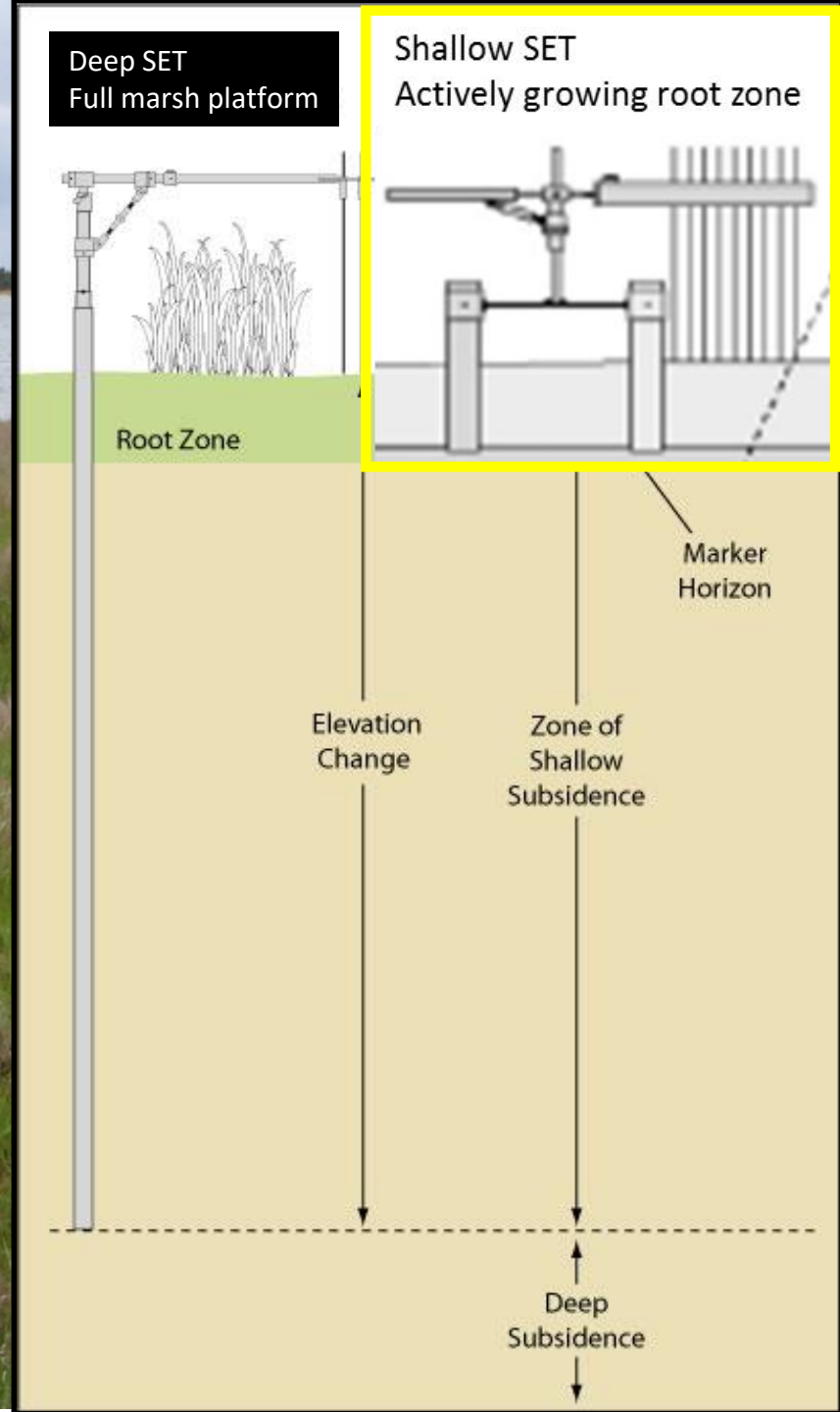
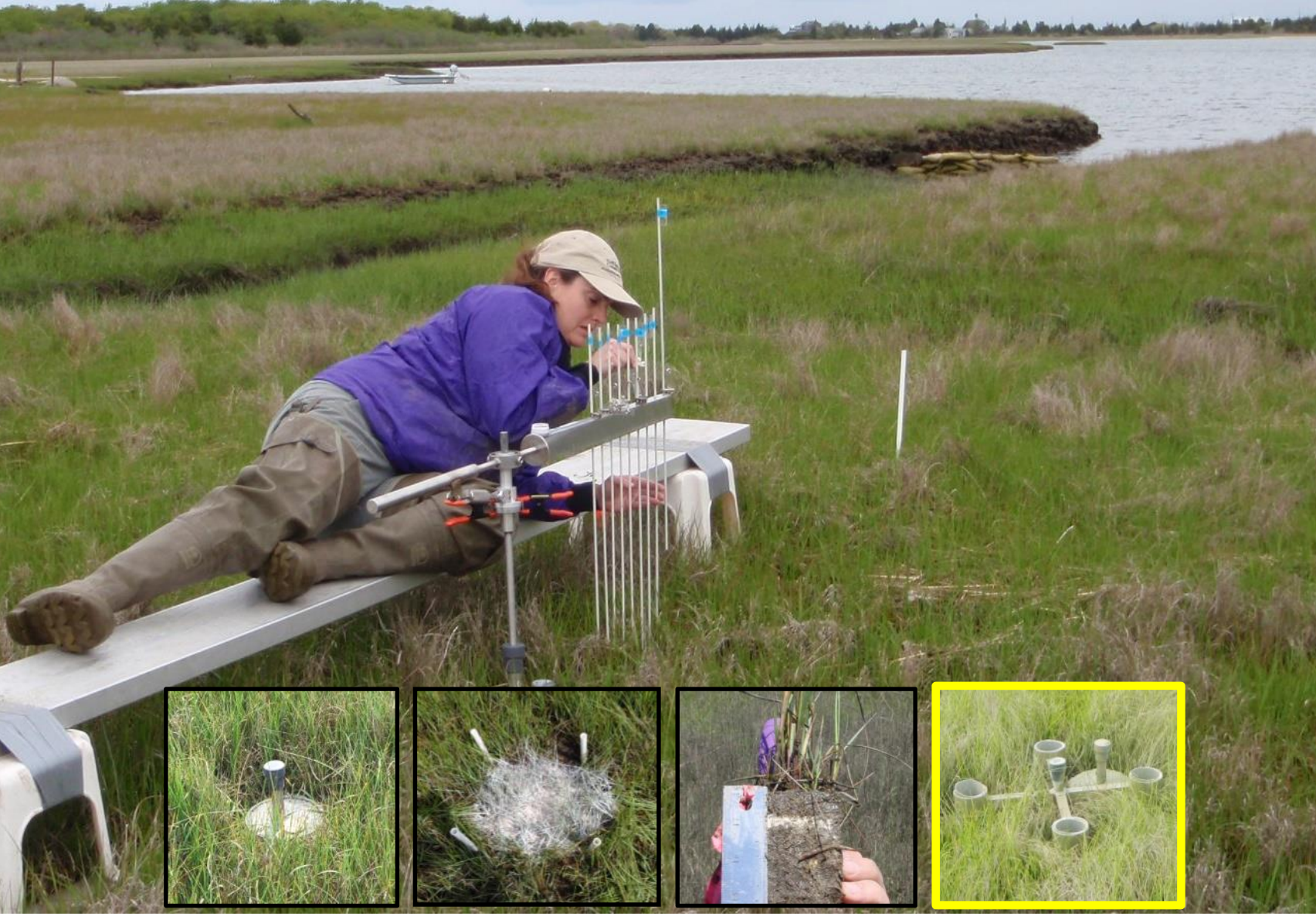
5 INGREDIENTS FOR HEALTHY TIDAL SALTMARSHES

- 1. Mobile sediment supply**
- 2. Clean water**
- 3. Room to move / migrate**
- 4. Full tidal signal**
- 5. Appreciation of their value**



MOBILE SEDIMENT SUPPLY

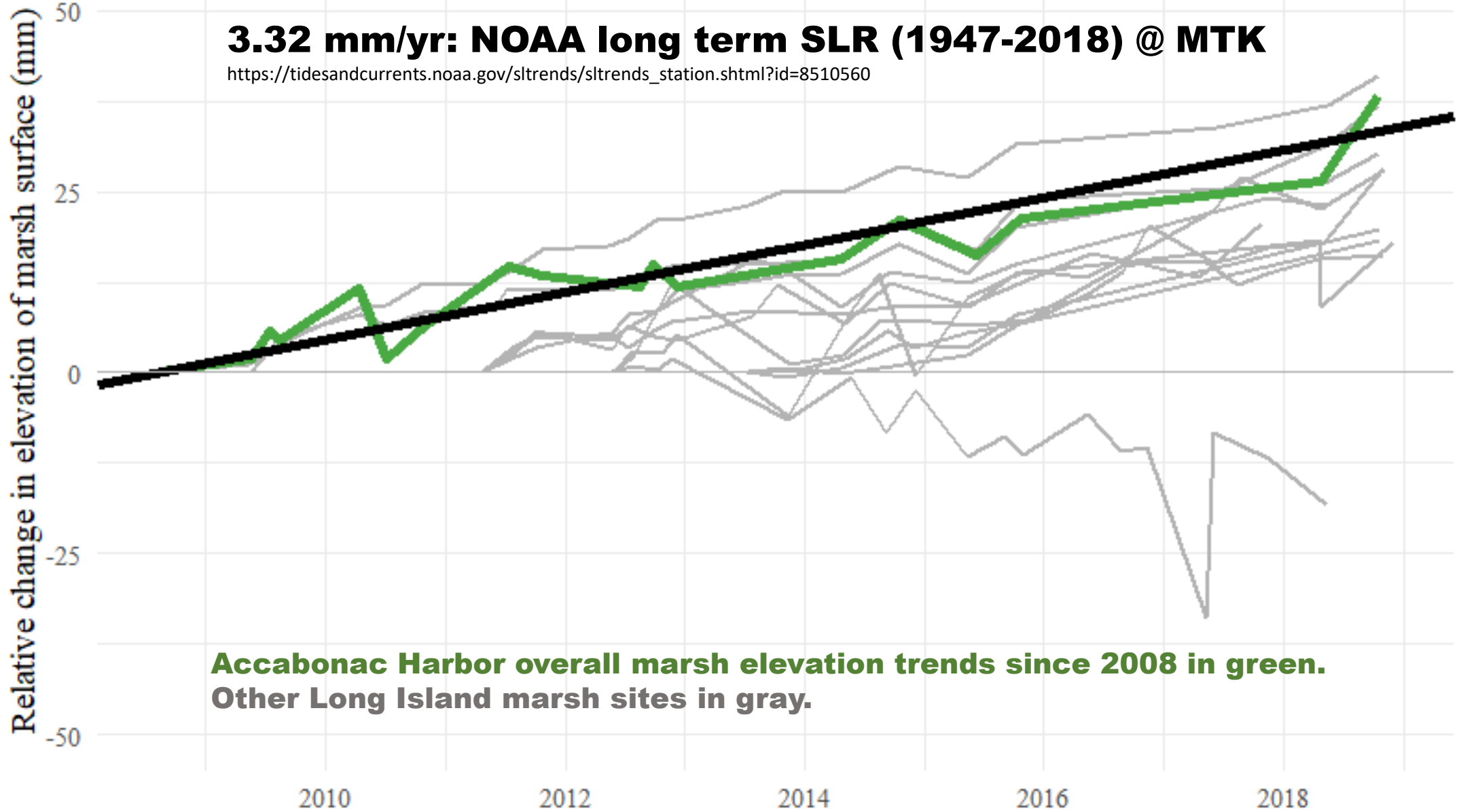
Measuring marsh elevation response to SLR



Marsh elevation changes

3.32 mm/yr: NOAA long term SLR (1947-2018) @ MTK

https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=8510560

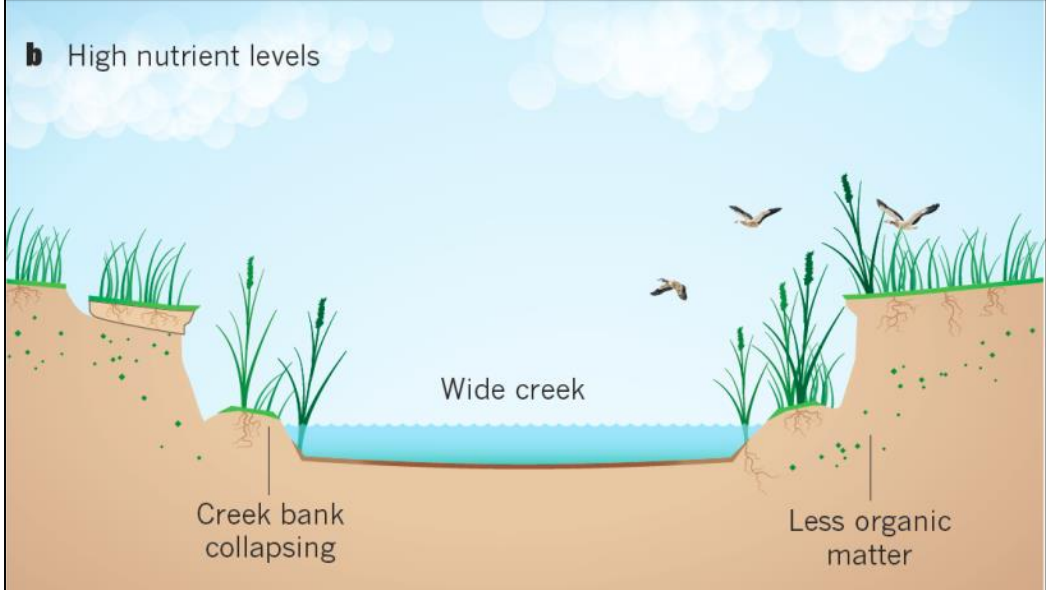
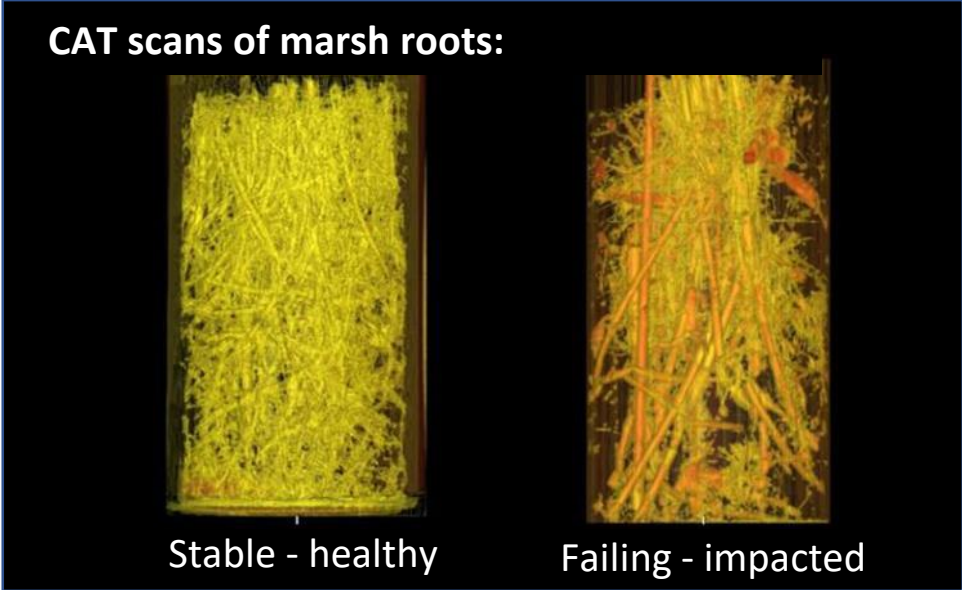
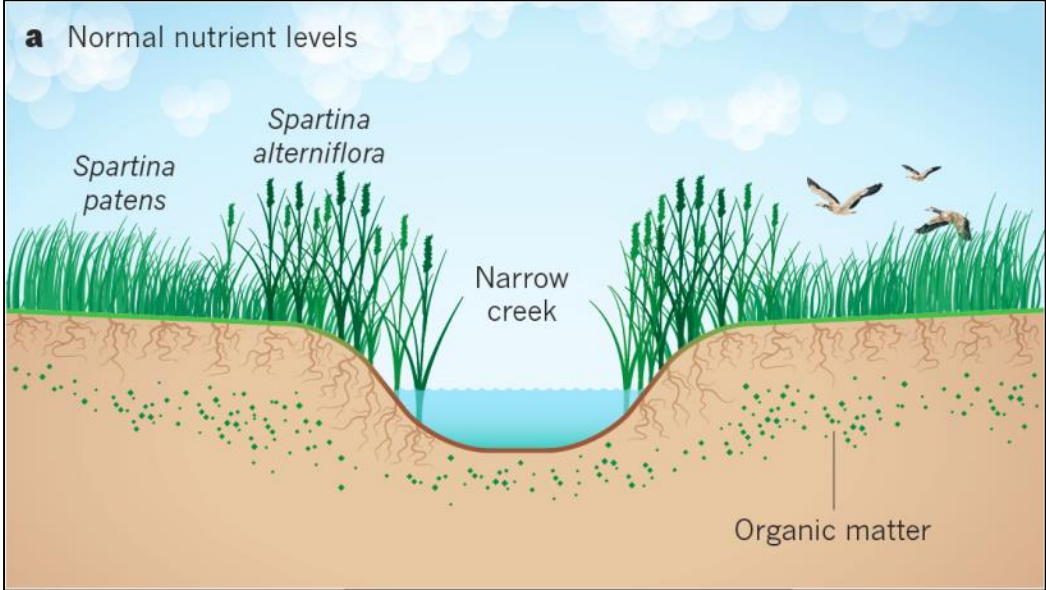


Accabonac Harbor overall marsh elevation trends since 2008 in green.
Other Long Island marsh sites in gray.



CLEAN WATER

Excess Nitrogen negatively effects: marsh peat, extent, elevation, grass stiffness, ecosystem services...



Figures from Pennings 2012 illustrating Deegan et al. 2012



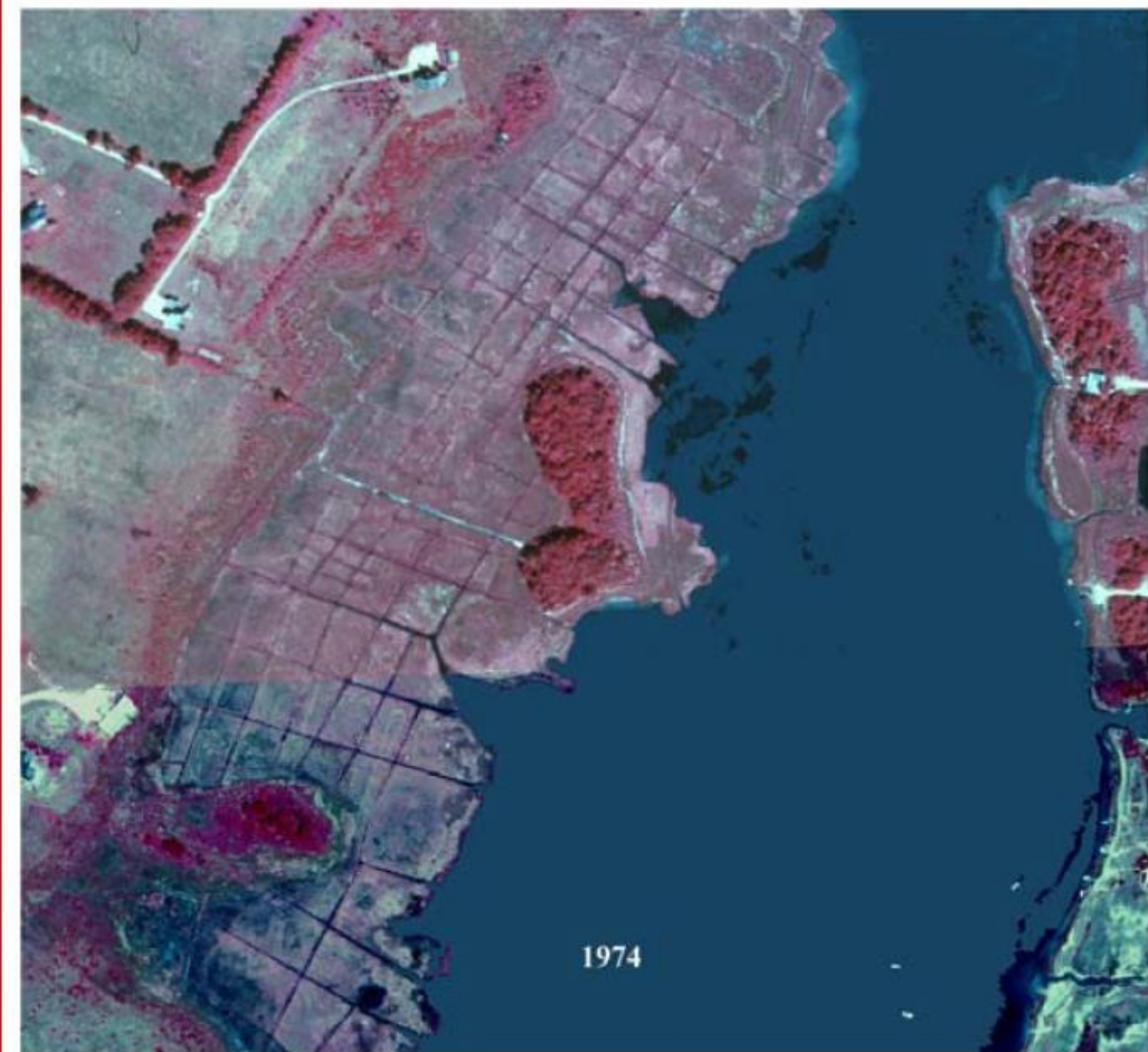
ROOM TO MOVE

Infrared aerial imagery showing changes from 1974-2005

- **Shifting habitat
from high marsh
to low marsh**
- **Shoreline retreat**
- **Widening
mosquito ditches**



Still captures of Kaplan Meadows 1974 - 2005

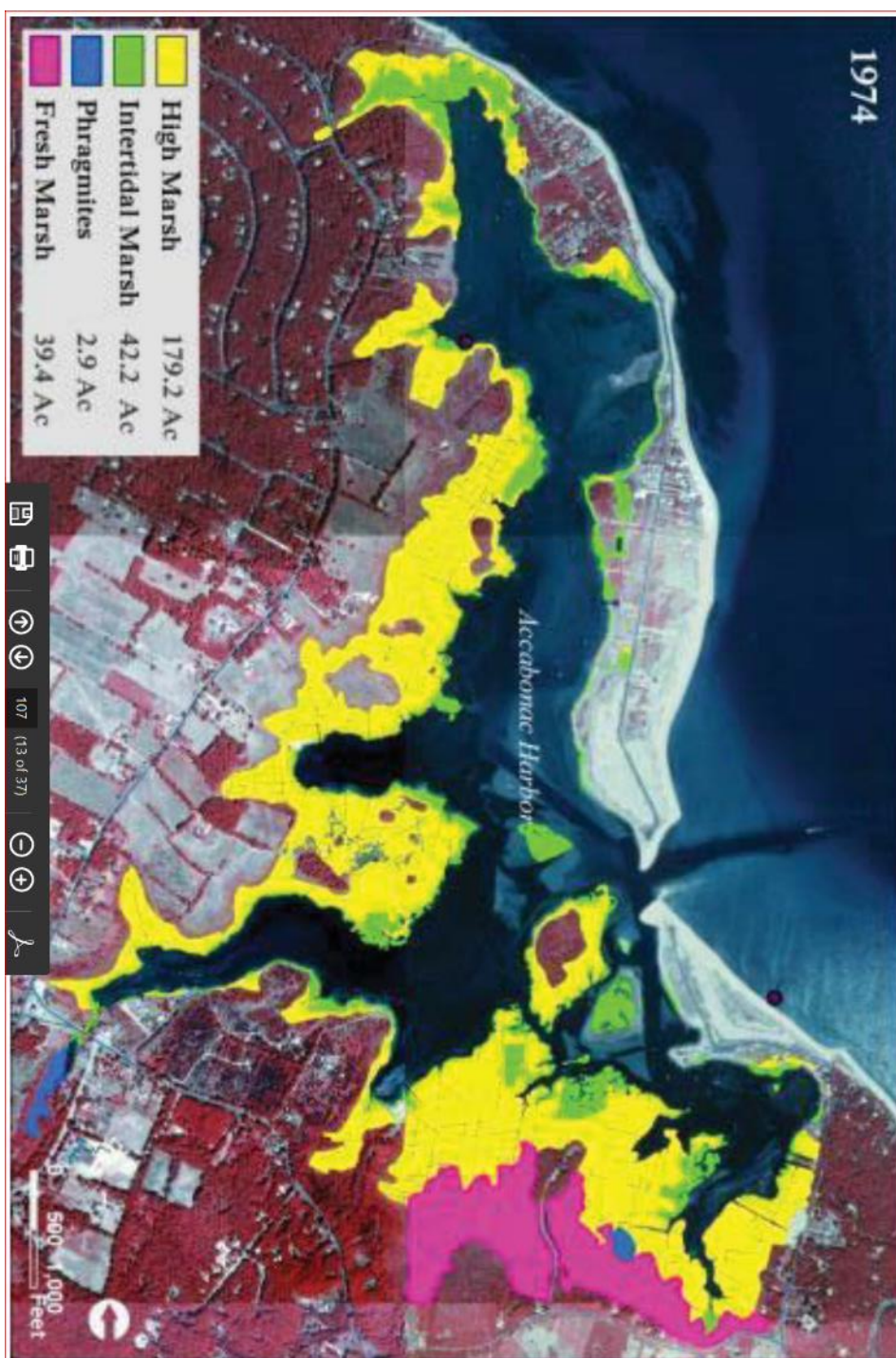


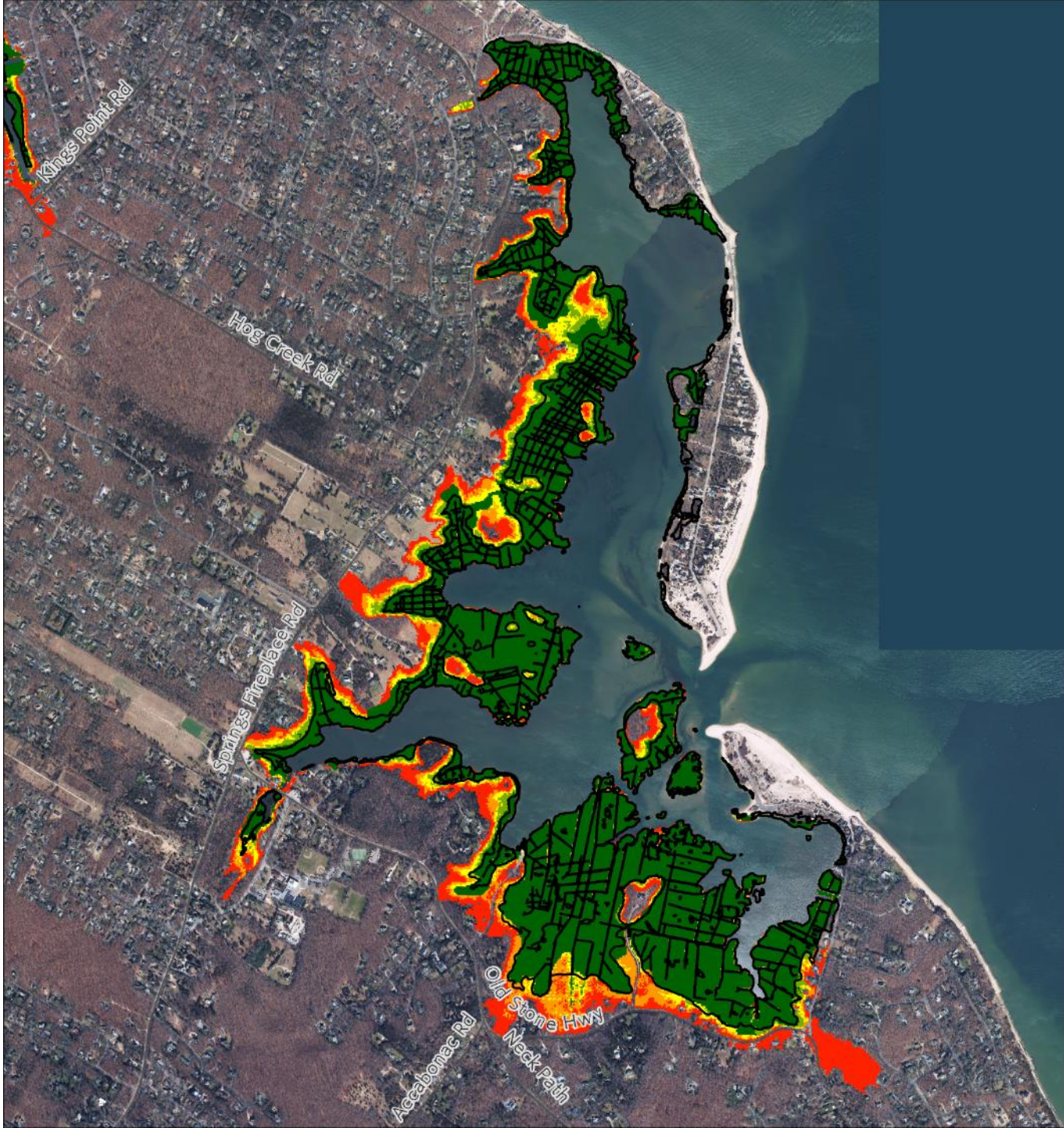
Changes in Accabonac saltmarsh 1974-2005:

18% loss overall

50% reduction in High Marsh (loss of 90 acres)

Phragmites increased from 3 to 41 acres





Marsh migration potential (2055)

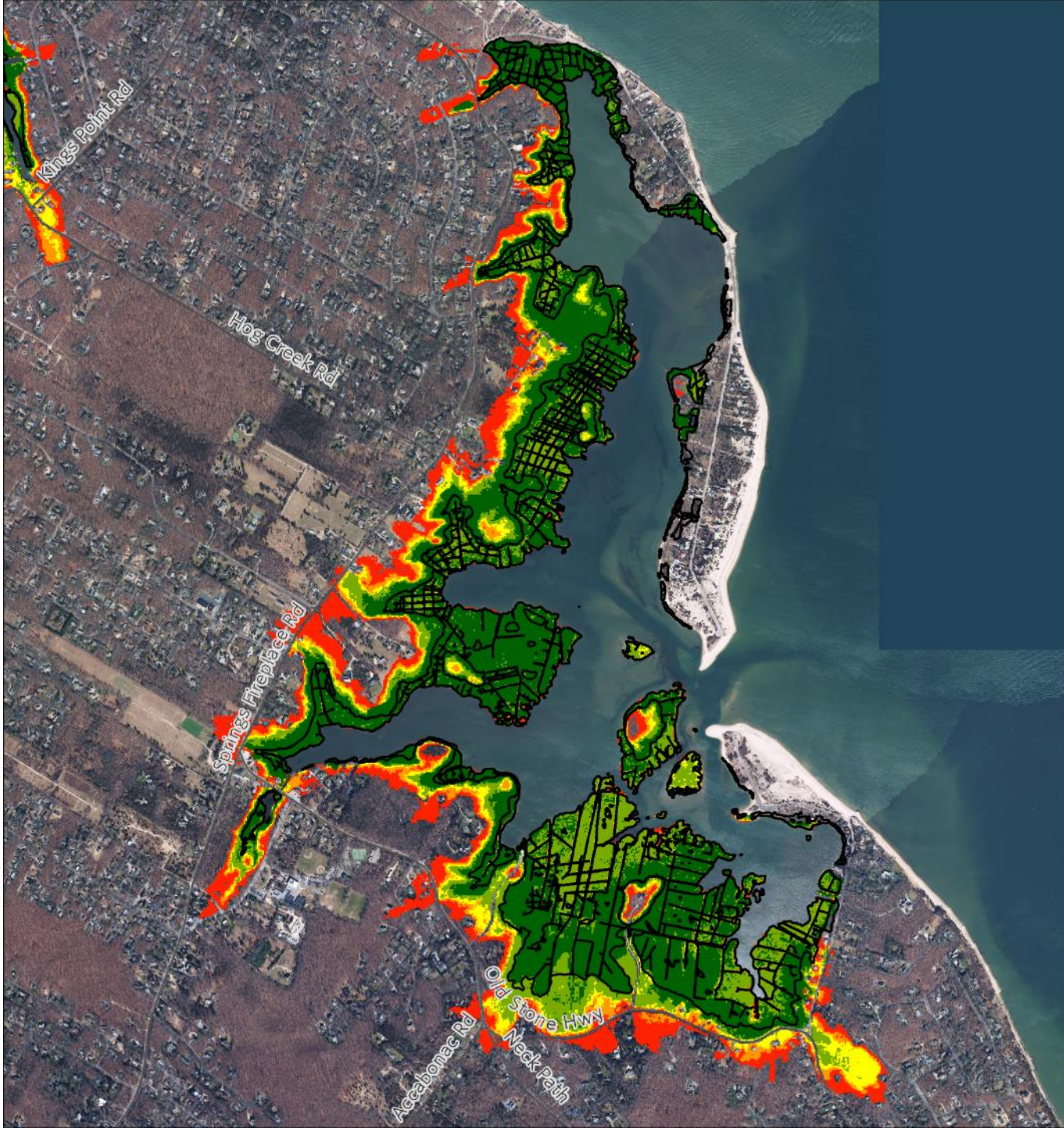
□ Current tidal marsh extent

Likelihood of coastal marsh 2055

- 0.01 - 20%
- 20 - 40%
- 40 - 60%
- 60 - 80%
- 80 - 100%








Data sources:
Sea-Level Affecting Marshes Model (SLAMM), NYSERDA 2014
NYS Digital Orthoimagery 2016



Marsh migration potential (2085)

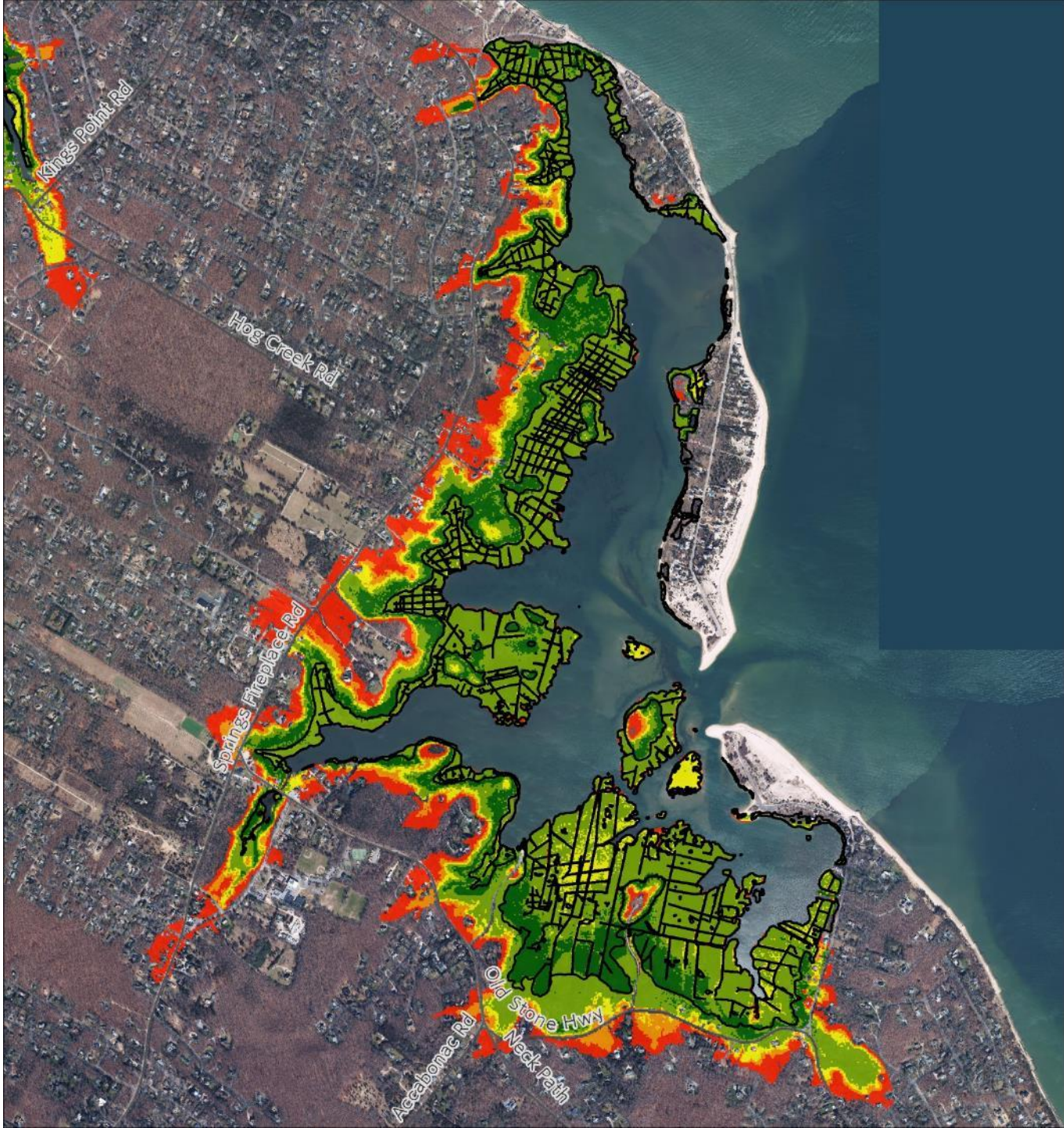
 Current tidal marsh extent

Likelihood of coastal marsh 2085

-  0.01 - 20%
-  20 - 40%
-  40 - 60%
-  60 - 80%
-  80 - 100%








Data sources:
Sea-Level Affecting Marshes Model
(SLAMM), NYSERDA 2014
NYS Digital Orthoimagery 2016



Marsh migration potential (2100)

 Current tidal marsh extent

Likelihood of coastal marsh 2100


-  0.01 - 20%
-  20 - 40%
-  40 - 60%
-  60 - 80%
-  80 - 100%



Data sources:
Sea-Level Affecting Marshes Model
(SLAMM), NYSERDA 2014
NYS Digital Orthoimagery 2016



FULL TIDAL SIGNAL



Impounded
water on
marsh
surface



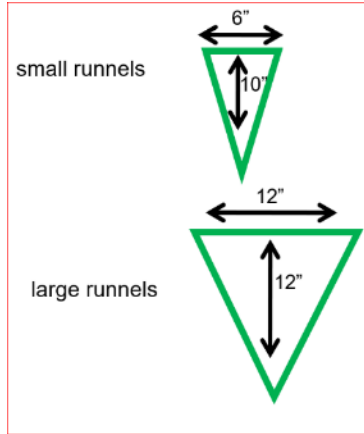
Impounded
water on
marsh
surface

Hydrologic/drainage restoration: RUNNELS

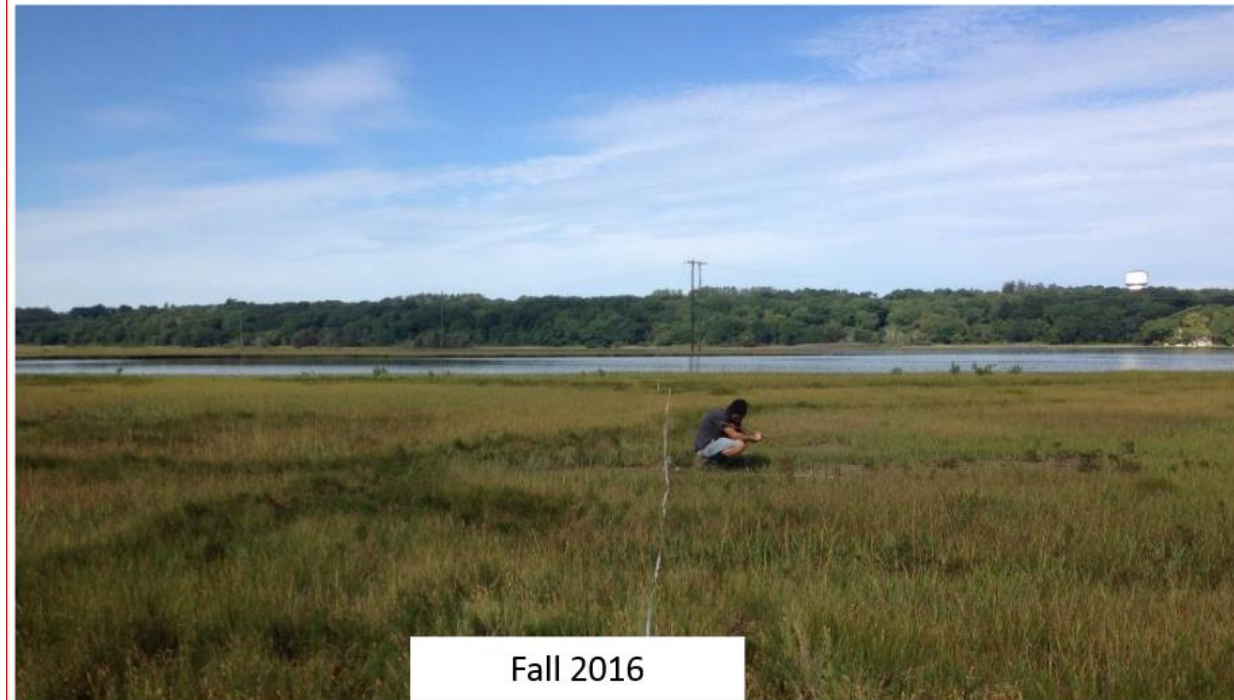
Narrow River, Narragansett, RI

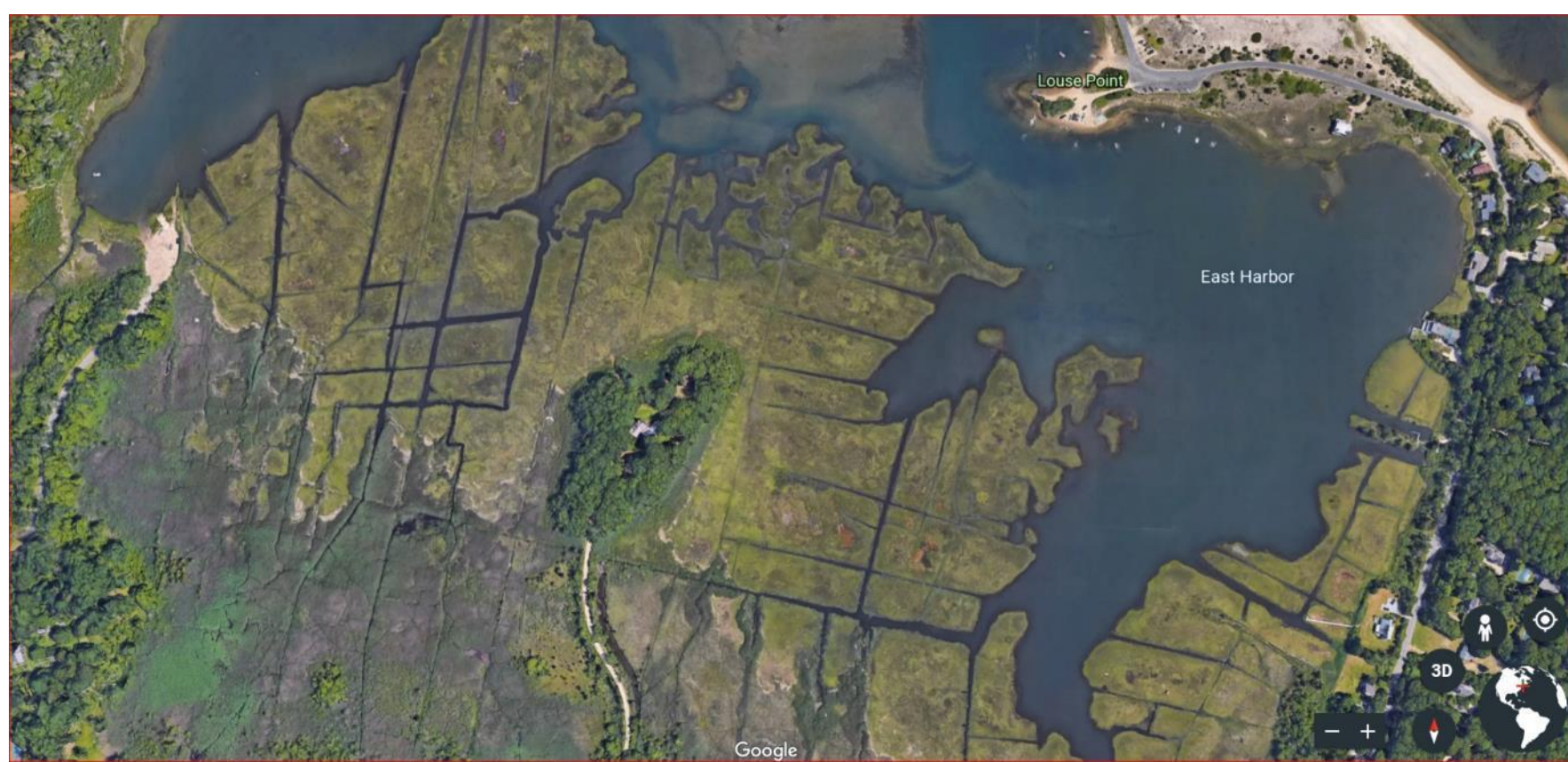
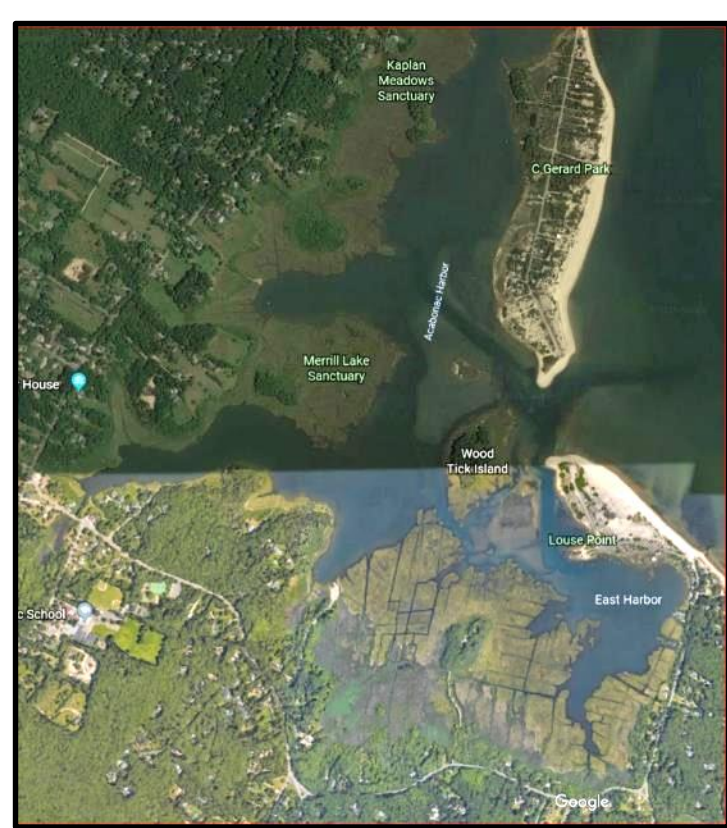


Runnels dug through ditch spoils



Photos and examples
shared by Wenley
Ferguson, STB-RI





A large flock of birds, including white and dark species, is captured in flight against a clear, bright blue sky. The birds are scattered across the upper half of the frame, with some in the foreground and others further back. Below the sky, a line of green trees and shrubs separates the field from the background. In the distance, a long bridge or overpass structure is visible on the left side, and some buildings can be seen in the center. The foreground is dominated by a lush, green field of tall grasses.

APPRECIATION OF THEIR VALUE



COASTAL WETLANDS AND FLOOD DAMAGE REDUCTION

Using Risk Industry-based Models
to Assess Natural Defenses in the Northeastern USA

October 2016



During Hurricane Sandy, wetlands prevented \$625M in flood damages: \$565M in NY & NJ.

Wetlands in front of properties reduce their annual flood losses by an average of 16%, and up to 70% in some locations.



www.lloyds.com/coastalresilience

Nov 11, 2012 aerials of coastal destruction caused by Hurricane Sandy storm surge along the New Jersey Shore. © Bridget Besaw



Image: Chris Bason, Delaware Center for the Inland Bays





Nicole Maher, PhD.
Senior Coastal Scientist
The Nature Conservancy, NY
nmaher@tnc.org