

# Effects of Interior Pond Creation on Sedimentation, Hydrology, and Elevation Changes of Salt Marshes

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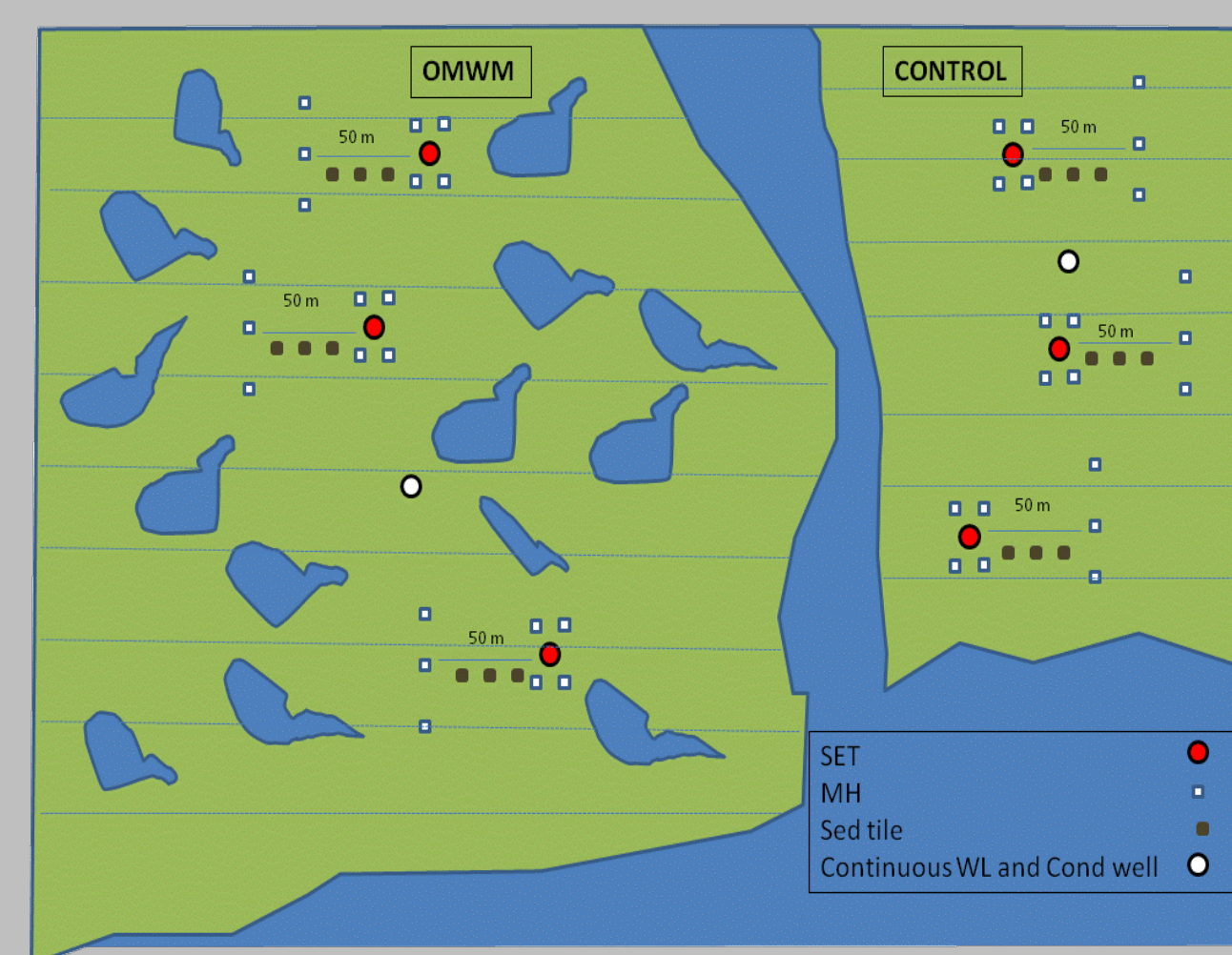
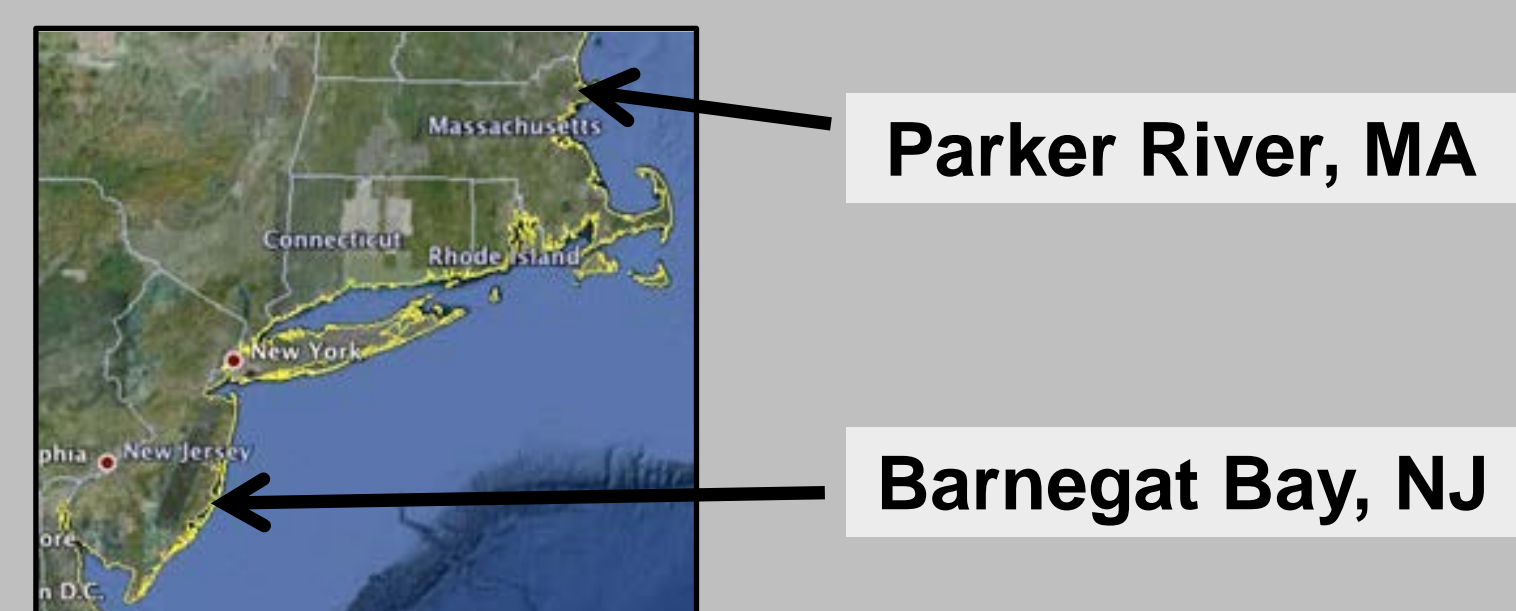
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Salt marshes managed for mosquito control can have historic grid ditches and more recently created ponds and connector ditches AKA Open Marsh Water Management (OMWM), which may alter the hydrologic regime and sediment availability in surrounding marsh areas. Despite the ongoing and widespread use of OMWM along the Atlantic coast of the United States, there is a limited amount of information about how it affects marsh accretion.

## Study Design

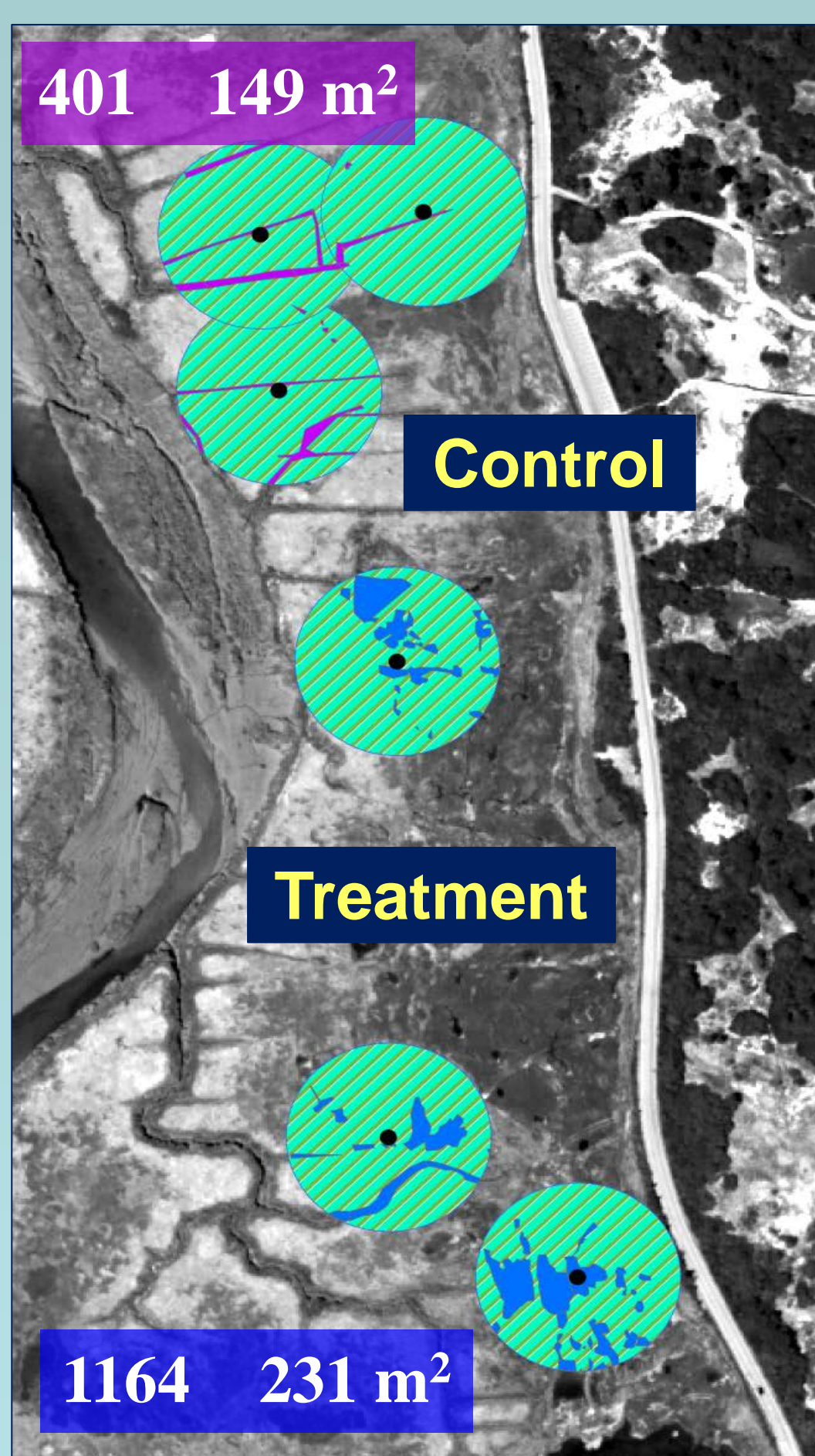
2 locations

- Elevation
- Water depth
- Surface elevation change
- Sedimentation
- Porewater chemistry

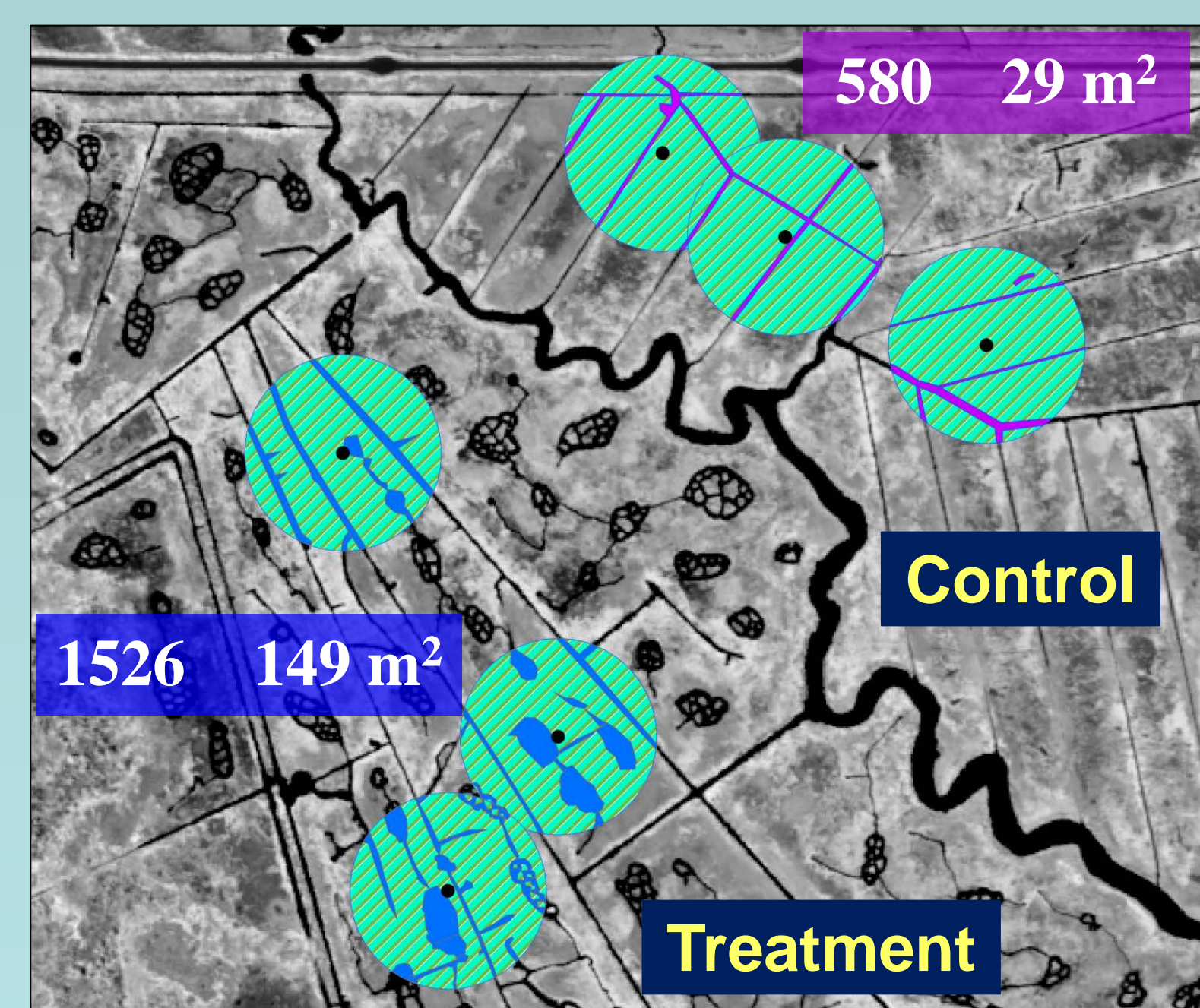


## GIS AND SURVEY DATA

Marsh areas with created ponds and grid ditches had over 2.5 times more area of open water than the control ditched areas in both MA and NJ locations.

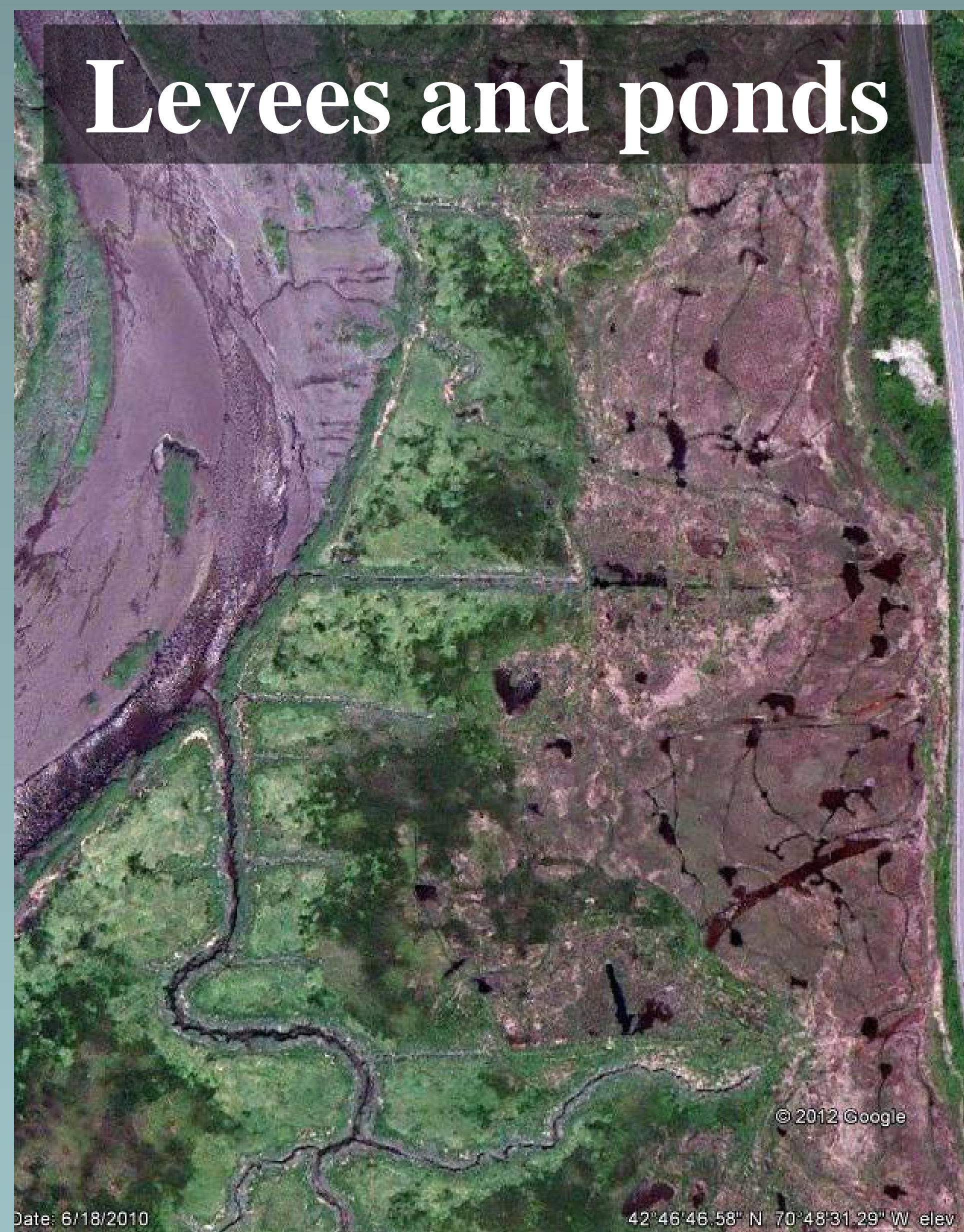


- SET
- SET Buffer (50m)
- Open Water (OMWM)
- Open Water (Control)



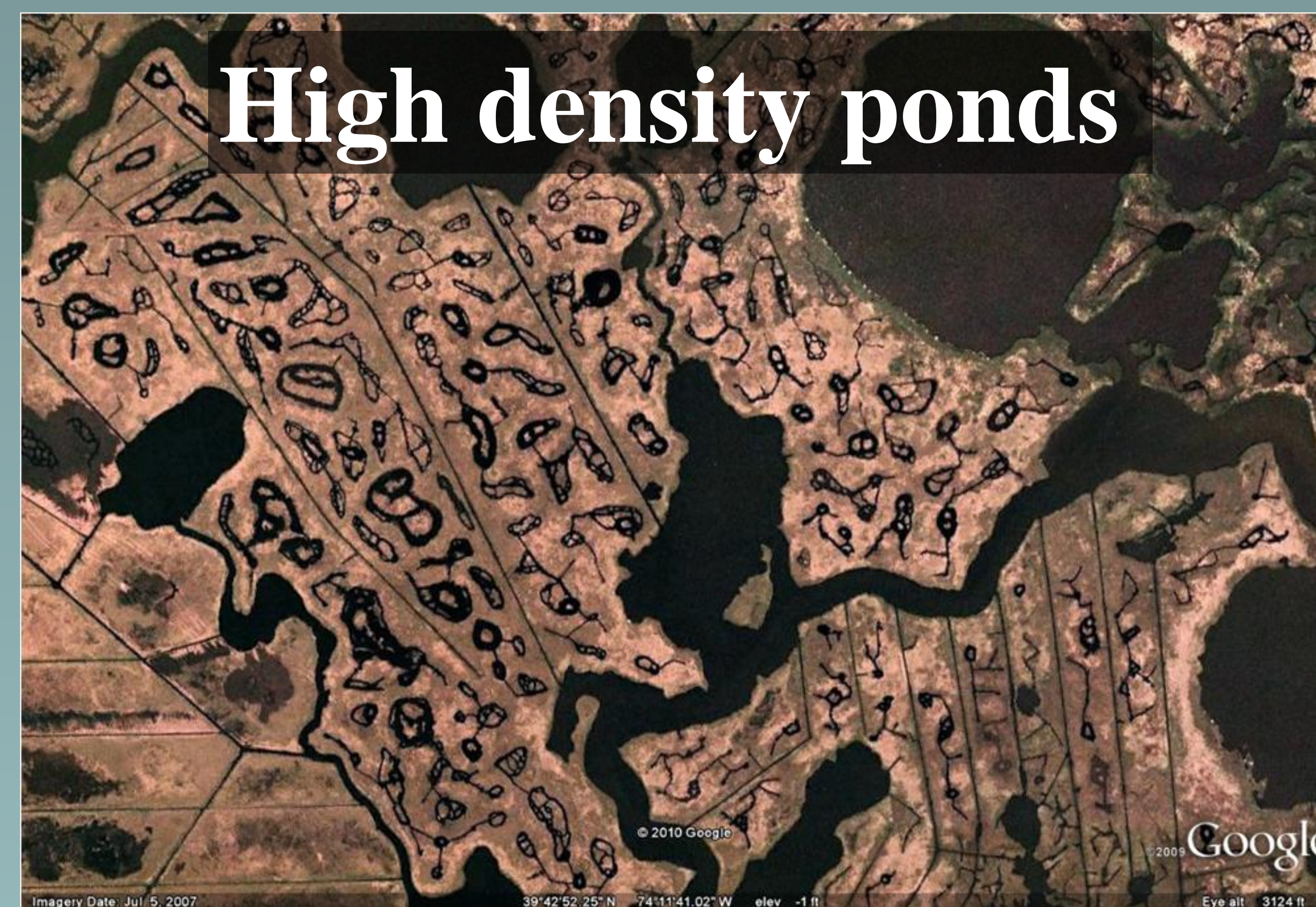
## Parker River, MA

### Levees and ponds



## Barnegat Bay, NJ

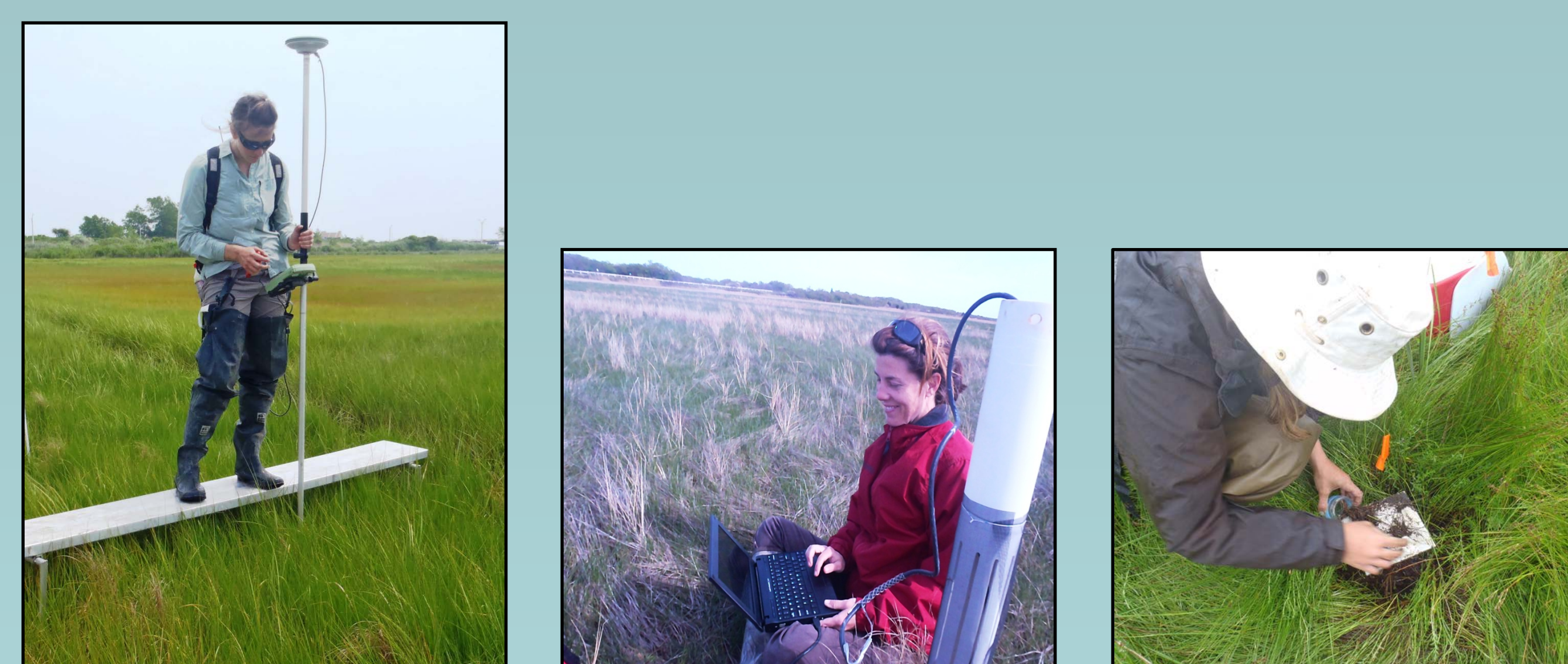
### High density ponds



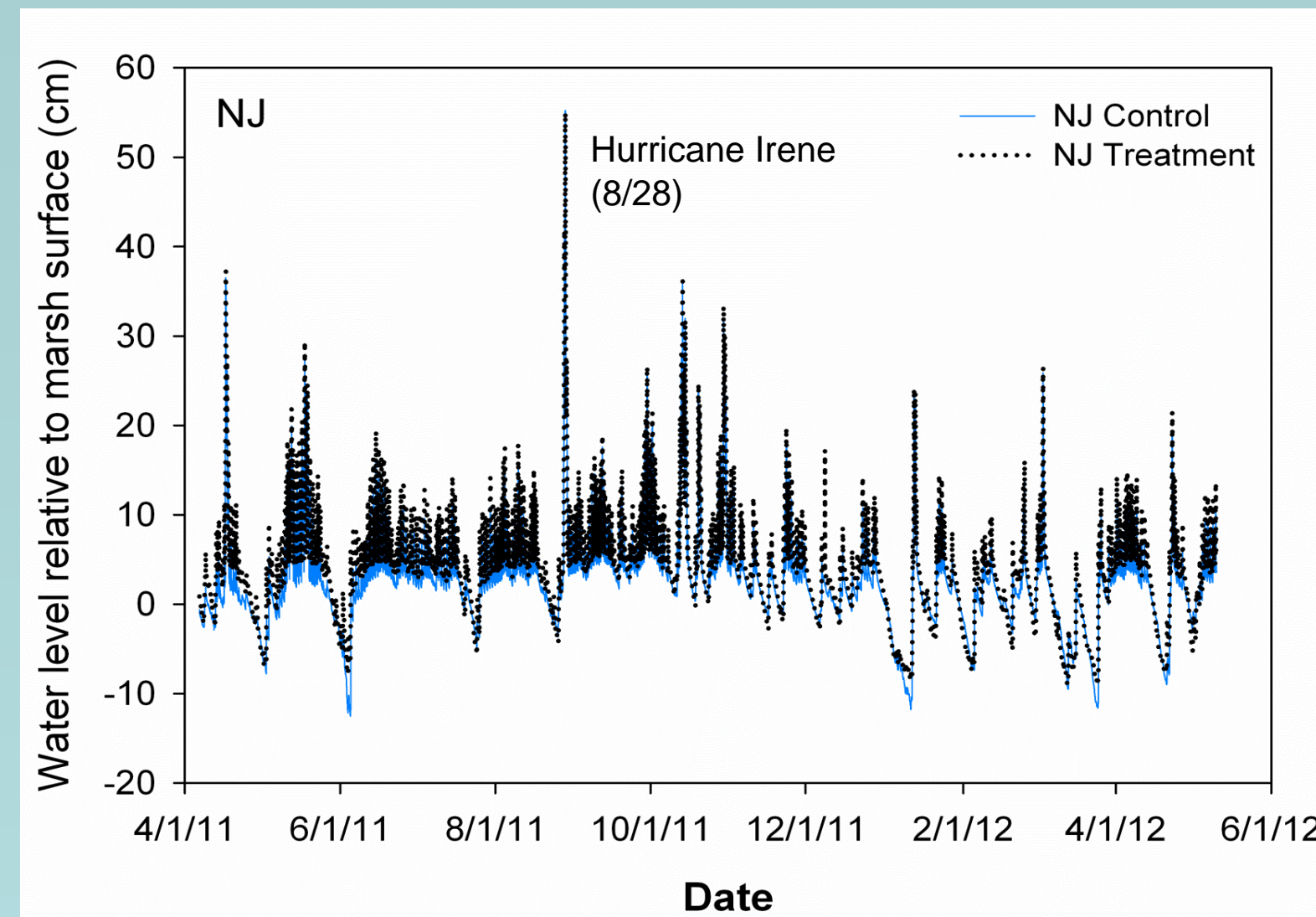
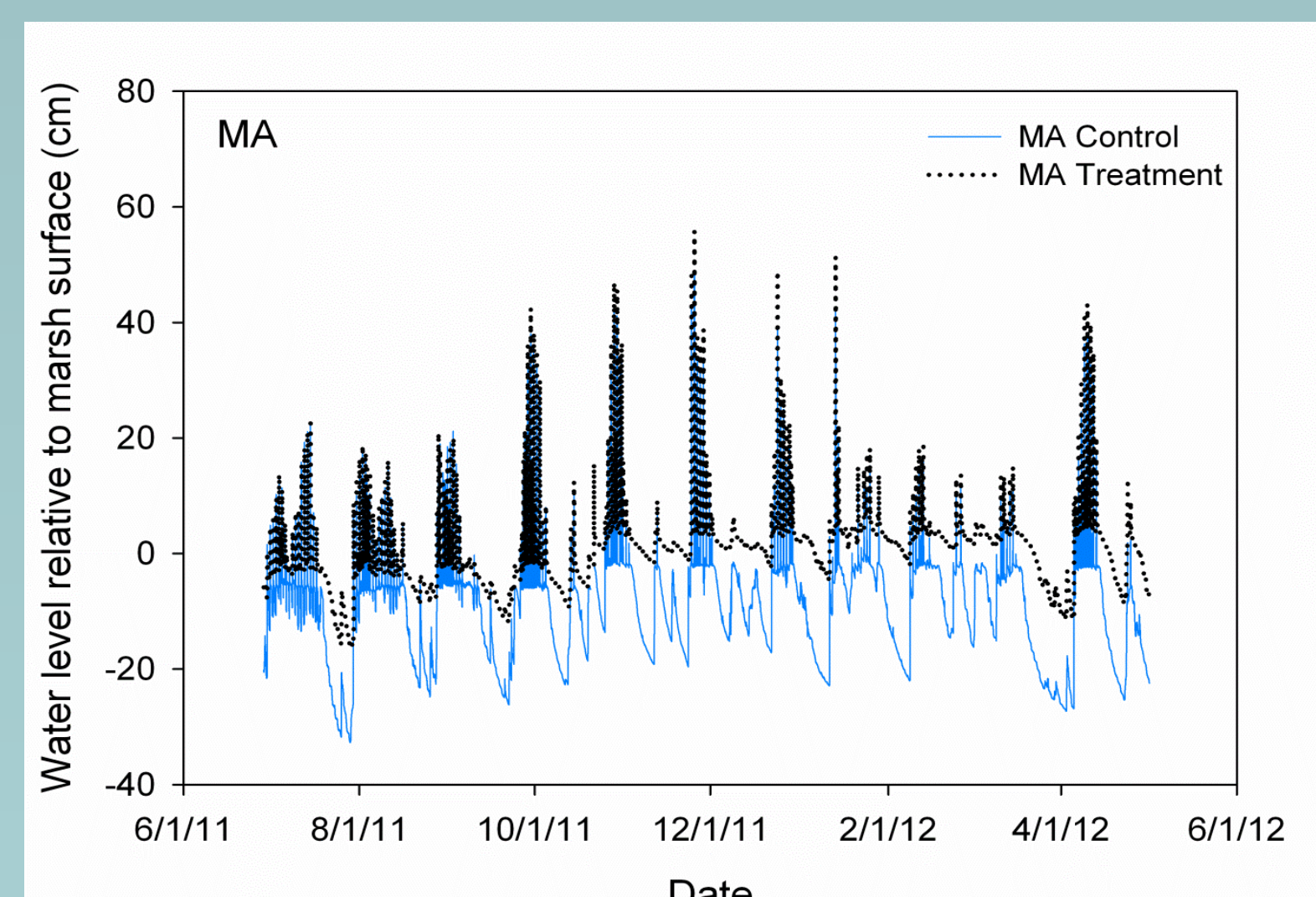
Since the 1970's Ocean County Mosquito has created over 9000 ponds across 12000 acres of salt marsh in Barnegat Bay, NJ.

## ELEVATION AND SEDIMENTATION

Sediment deposition was related to water level in MA and elevation in NJ. In MA water contained by the levees allowed for greater sedimentation. In NJ, higher elevations associated with dredge sediment application reduced sedimentation.



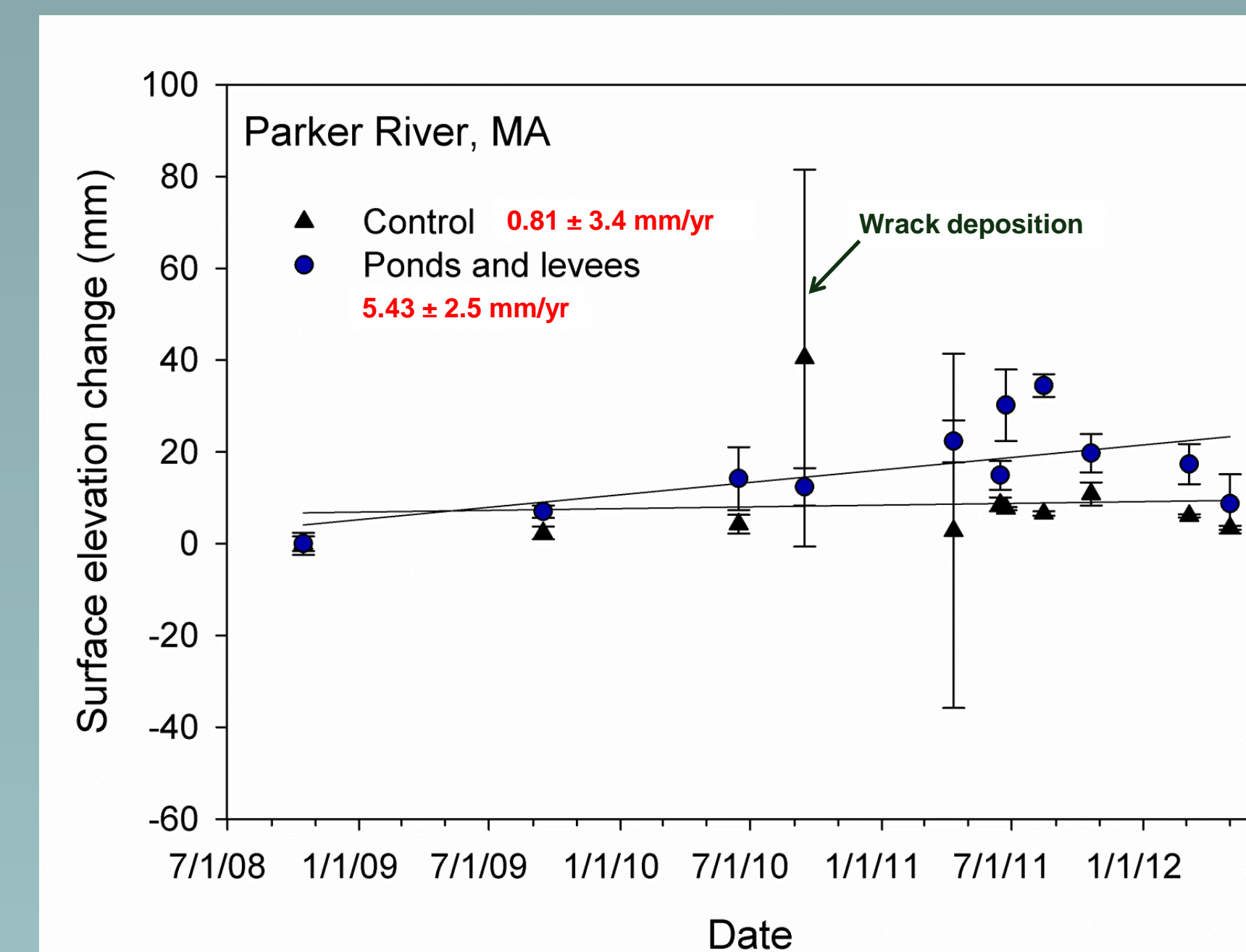
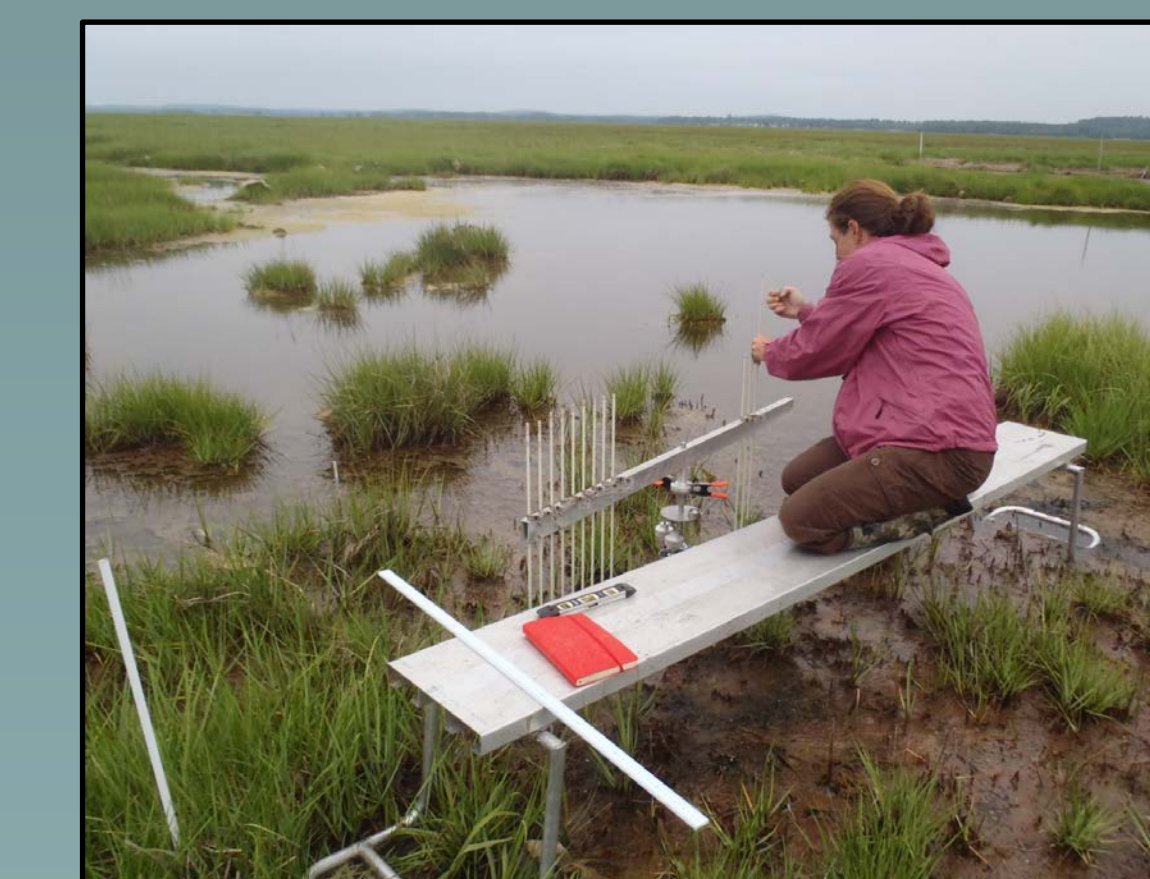
## WATER LEVEL



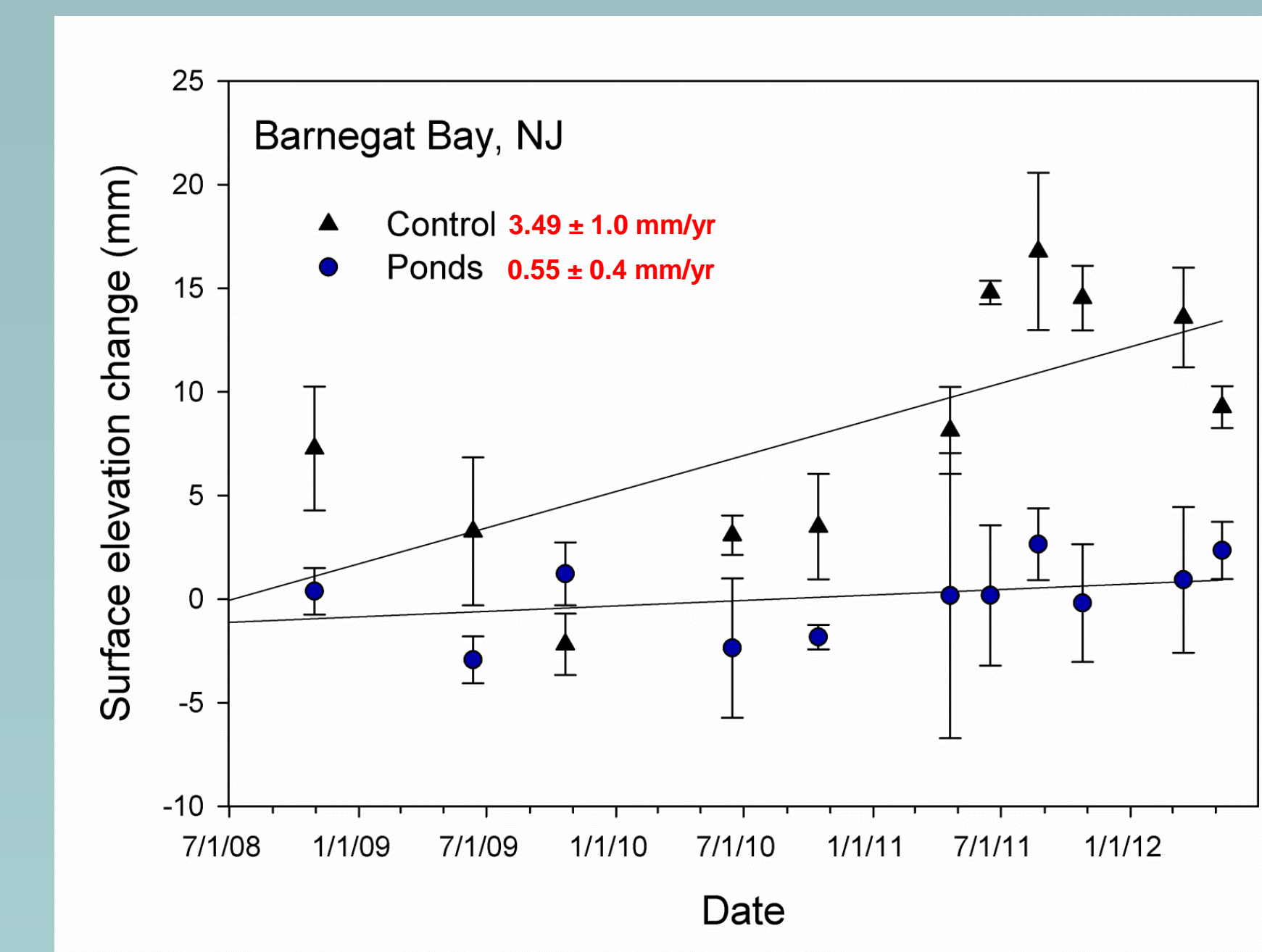
Water level relative to the marsh surface was generally higher at Treatment sites than Control sites.

## SURFACE ELEVATION CHANGE

Surface elevation increase was greater at the MA Treatment site when the variation of wrack deposition at the Control site was removed.



In NJ, surface elevation increased at the Control site and did not change at the Treatment site over four years.



## CONCLUSIONS

Creating ponds with levees in a salt marsh along a tidal river (MA) and a high density of ponds in a salt marsh along a coastal lagoon (NJ) changed the hydrology and sedimentation rate such that surface elevations are changing at rates that differ from adjacent control sites. This could have long term consequences of response to sea level rise.

Location	Treatment	Mean Elevation (m) (NAVD88)	Mean water level relative to marsh surface (cm)	Sedimentation rate (mg/cm <sup>2</sup> /mo)
MA	Control	1.44 0.01 <sup>a</sup>	- 14.0 0.09 <sup>a</sup>	34 8 <sup>a</sup>
	Treatment	1.51 0.01 <sup>b</sup>	- 0.6 0.05 <sup>b</sup>	110 20 <sup>b</sup>
NJ	Control	0.25 0.01 <sup>a</sup>	2.4 0.04 <sup>a</sup>	182 34 <sup>a</sup>
	Treatment	0.30 0.01 <sup>b</sup>	3.7 0.04 <sup>b</sup>	34 8 <sup>b</sup>

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