

# **Current Developmental Trends in the Tidal Wetlands of the Delaware Estuary**

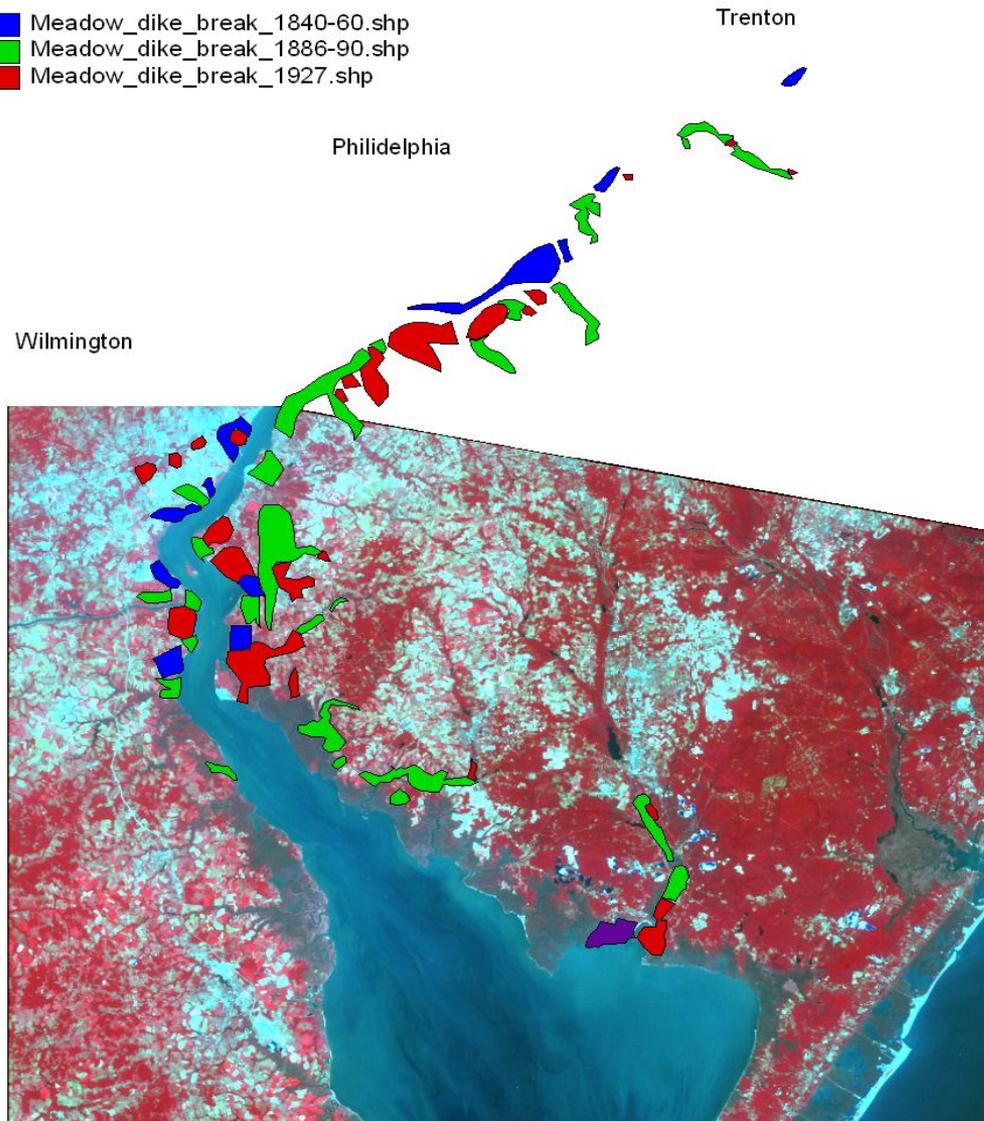
**Kurt R. Philipp<sup>1</sup>, Richard. T. Field<sup>2</sup>, Andrew Homsey<sup>2</sup>, and Young-Heon Jo<sup>2</sup>**

- 1. Wetland Research Services**
- 2. University of Delaware**

**Thanks to Oliver Weatherbee and Betsy Archer for significant contributions to this work.**

# Diked Meadow Failure Date

- Meadow\_dike\_break\_1840-60.shp
- Meadow\_dike\_break\_1886-90.shp
- Meadow\_dike\_break\_1927.shp



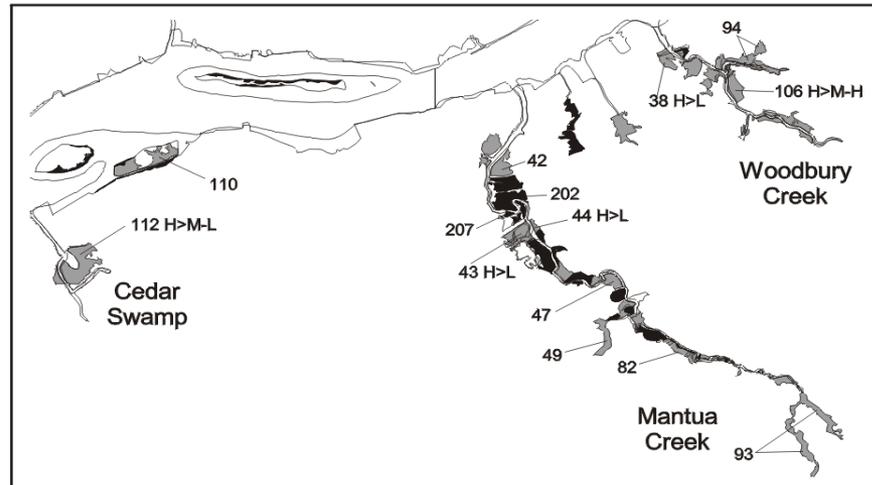
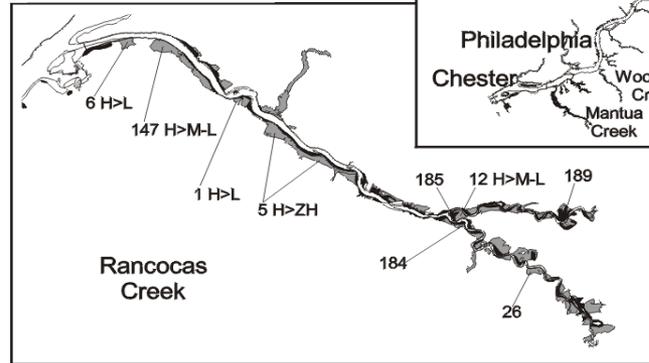
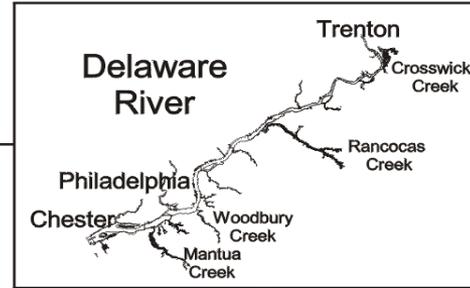
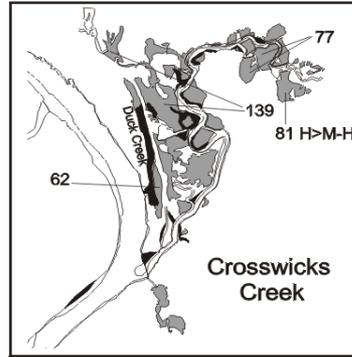


Examples of Catastrophic Marsh Loss

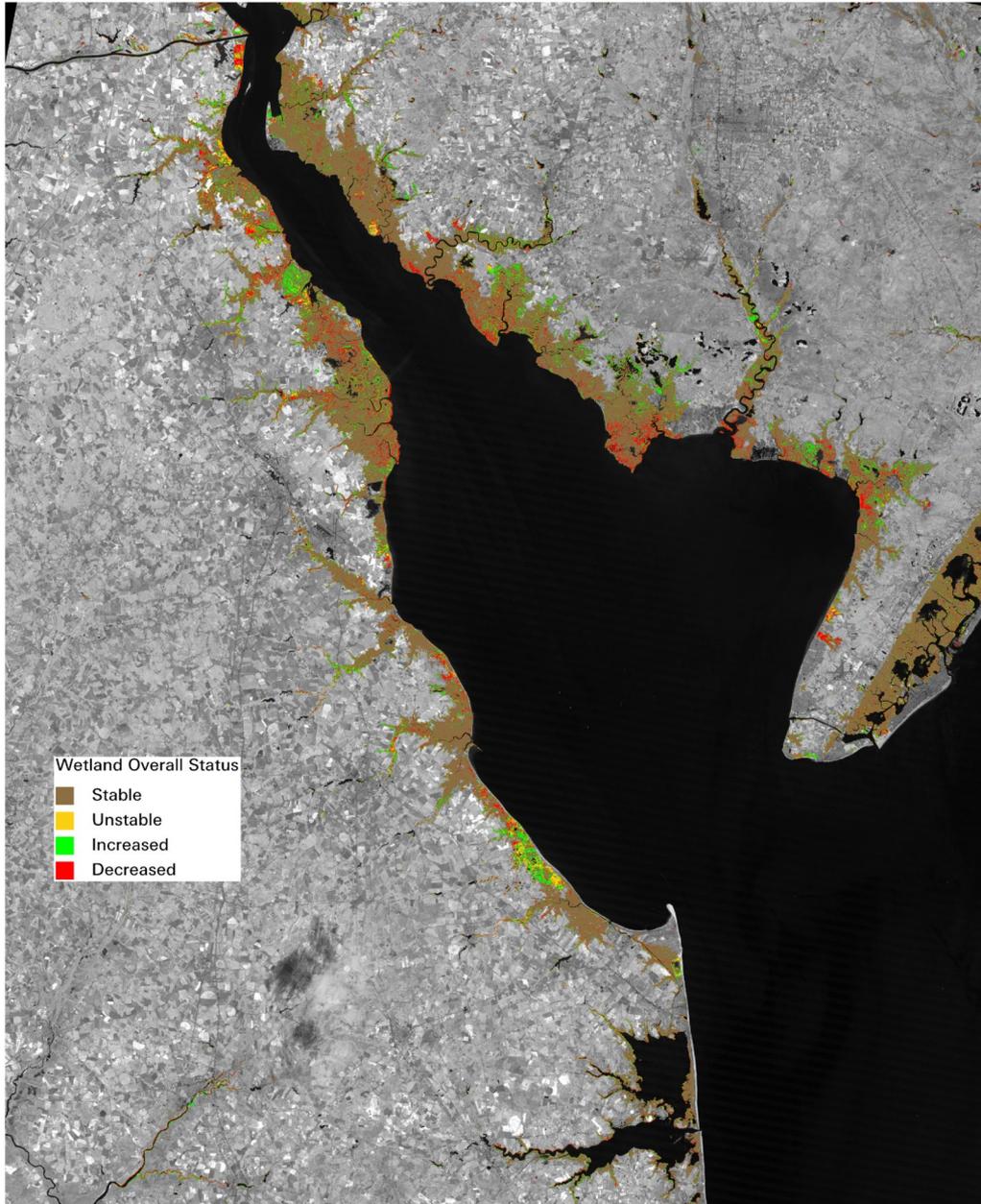
From 1978 to 1998, low marsh increased from 29% to 32% of all Delaware River fresh water marsh.

## Low and High Marsh Areas of Freshwater Tidal Marsh

for Selected Tributaries of the Delaware River



Delaware Bay Wetland Status (1984-1993)



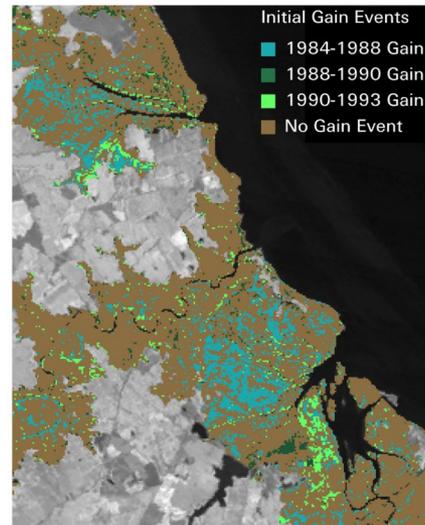
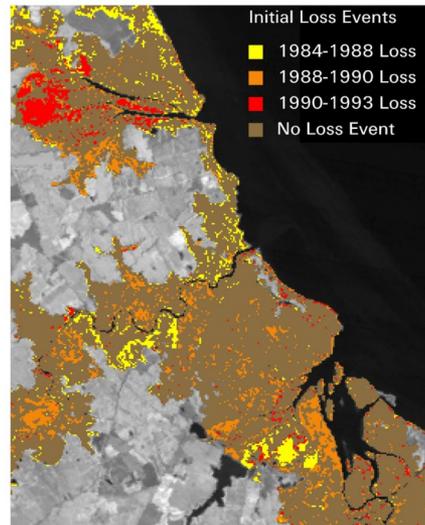
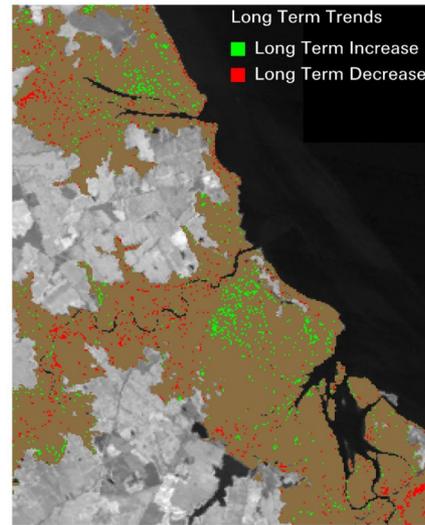
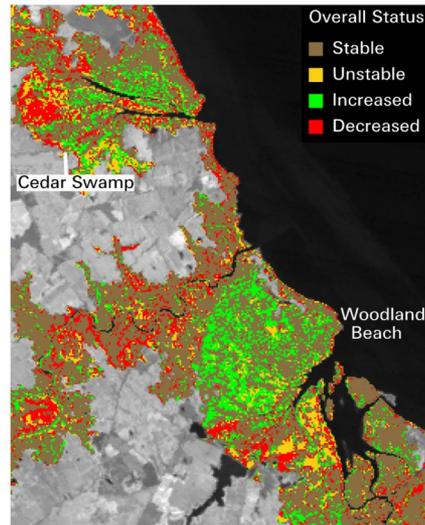
Inter-annual marsh vegetation variability shows local gains, losses, instability, and stability.

Cause of change differs by location. Examples include tidal inundation, Show Goose grazing, killing of Phragmites, expansion of Phragmites, expansion of *S. alterniflora*, and manipulation of water or vegetation by wetland managers.

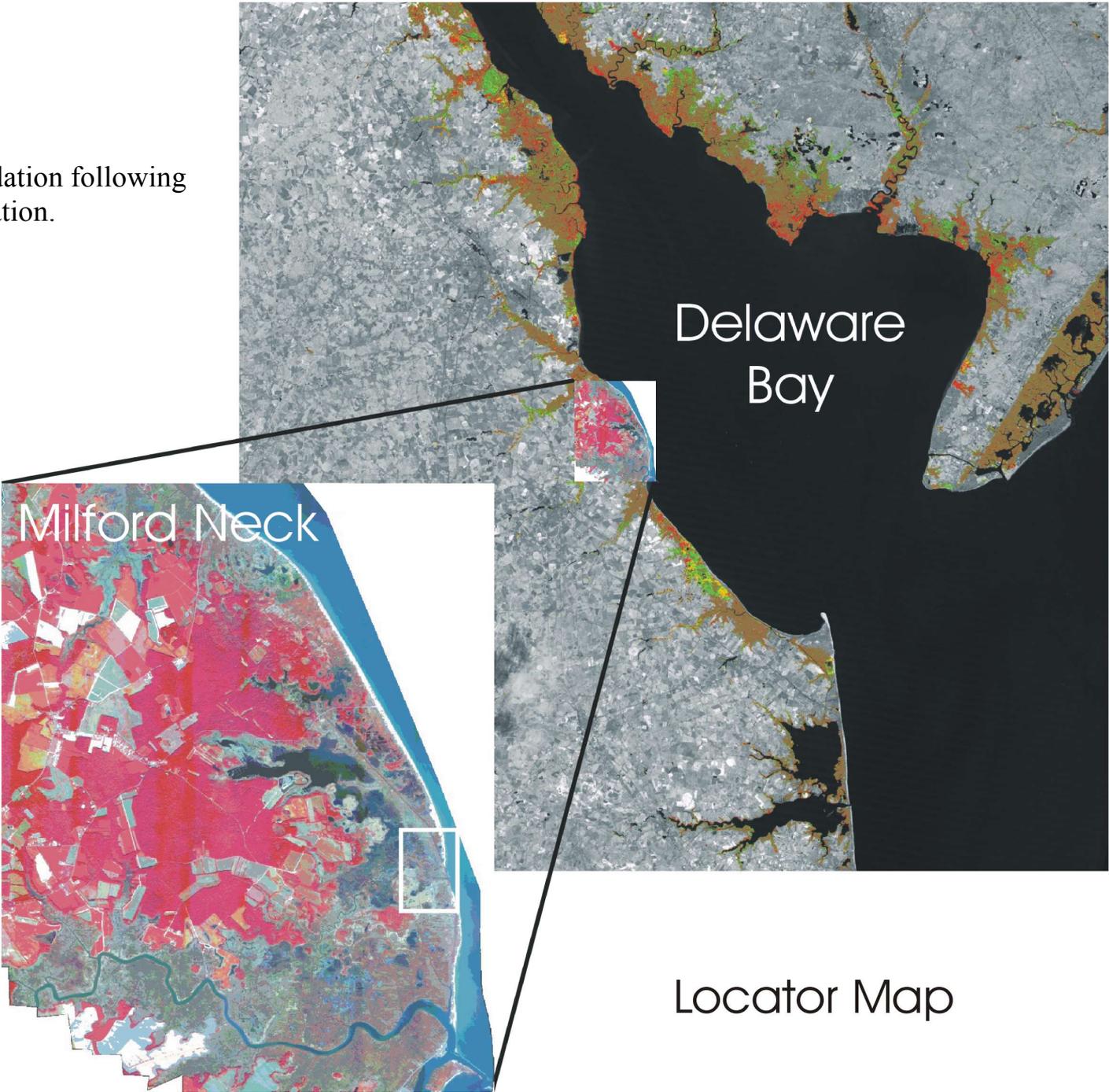
(Weatherbee, 2002)

### Cedar Swamp and Woodland Beach Area

Here changes are attributable to Phragmites management intervention.



A case of inundation following sediment starvation.



Delaware Bay

Milford Neck

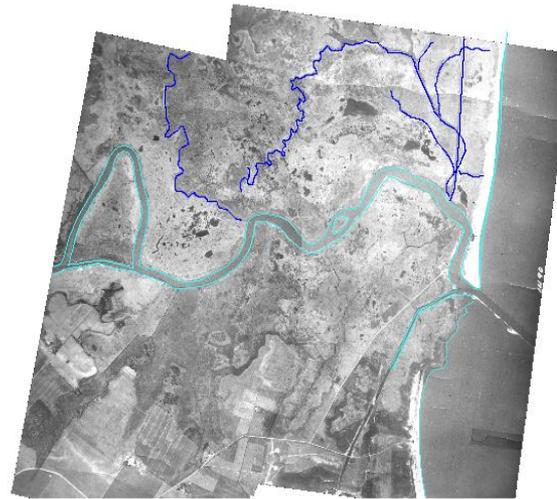
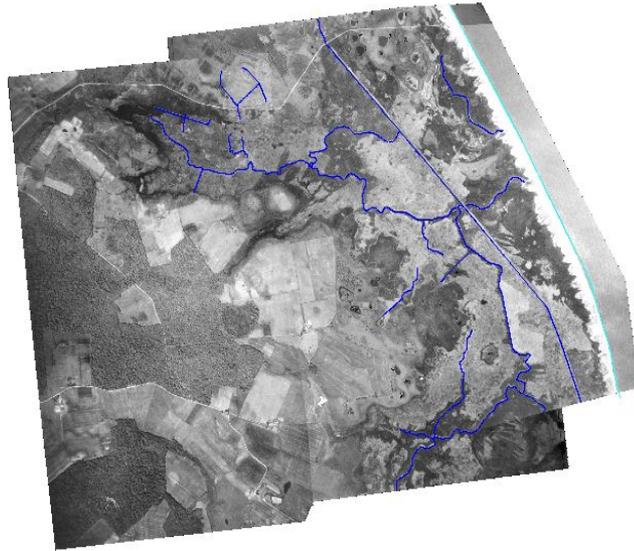
Locator Map

2007 Orthophoto showing sediment accumulation and obstruction at the breach.

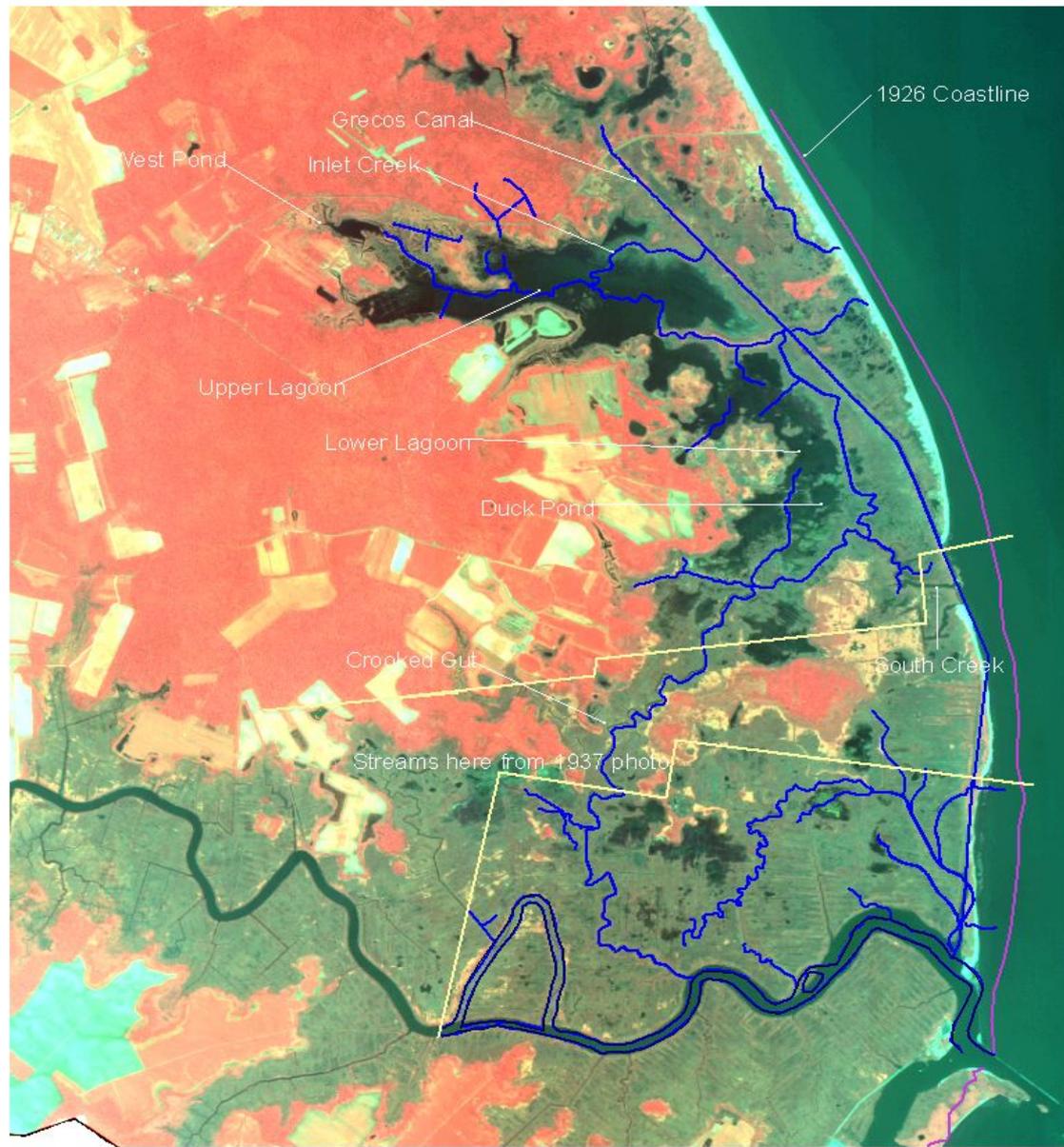


Note northern  
vz southern  
channels.

Construction of Grecos Canal  
reduced sediment nourishment  
of the marsh interior.



**Milford Neck  
Coastline and Water Courses  
in 1926  
Overlay on 1926 Aerial Photo**

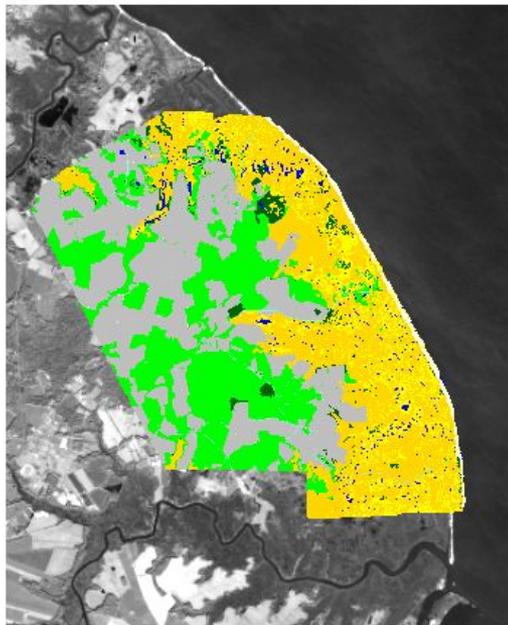


**Figure 1**  
 Milford Neck  
 1926 Coastline and Water Courses  
 Overlay on Enhanced 2004 IKONOS

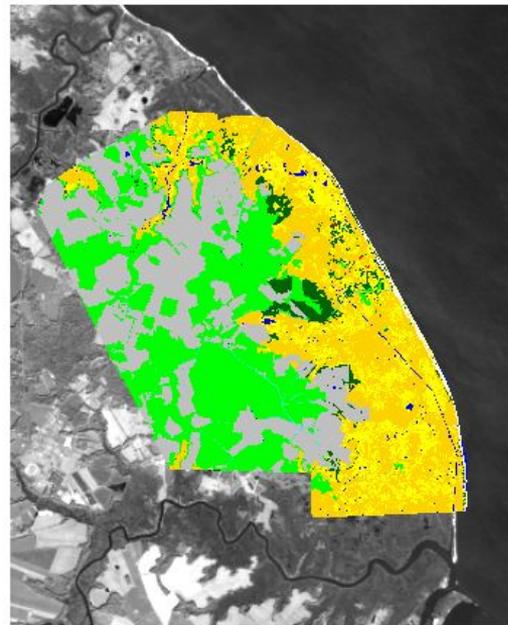
500 0 500 Meters



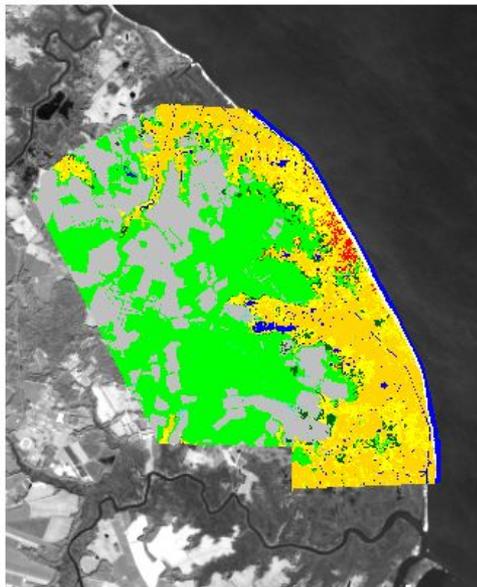
Vegetation trend shows drying after ditching, followed by gradual wetting, then inundation and Phragmites expansion.



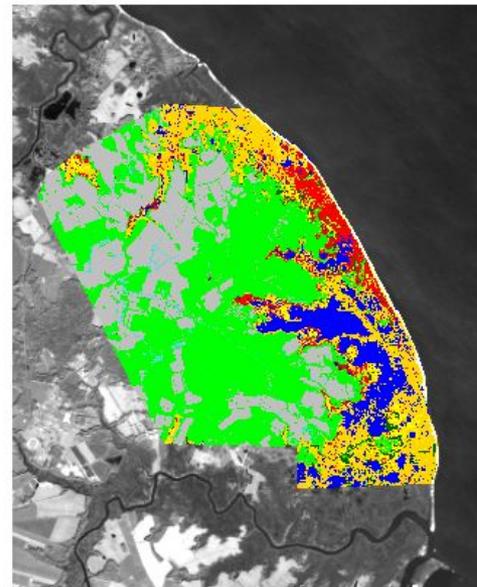
1937



1954



1973



1999

Milford Neck Cover Change 1937-1999  
Overlay on IKONOS 29 Oct 2000

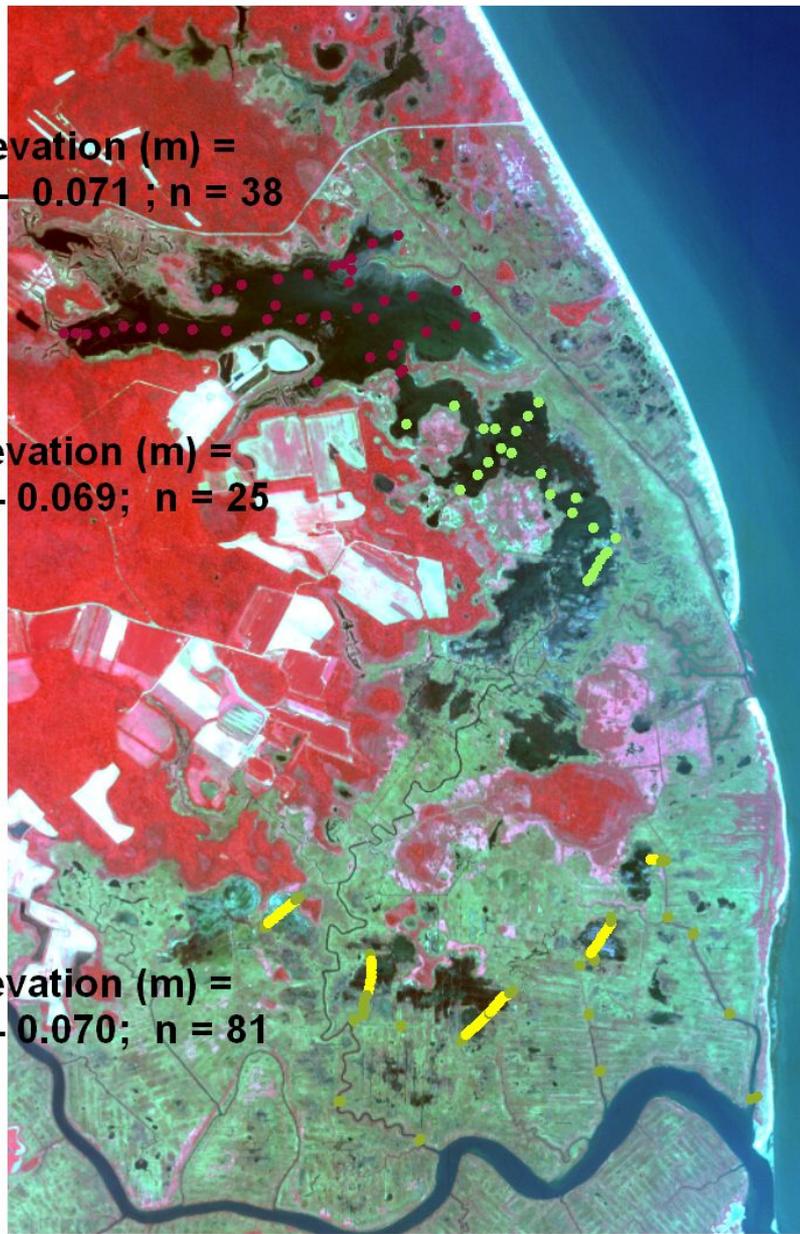
1 0 1 2 Miles



Mean elevation (m) =  
0.356 +/- 0.071 ; n = 38

Mean elevation (m) =  
0.335 +/- 0.069; n = 25

Mean elevation (m) =  
0.503 +/- 0.070; n = 81

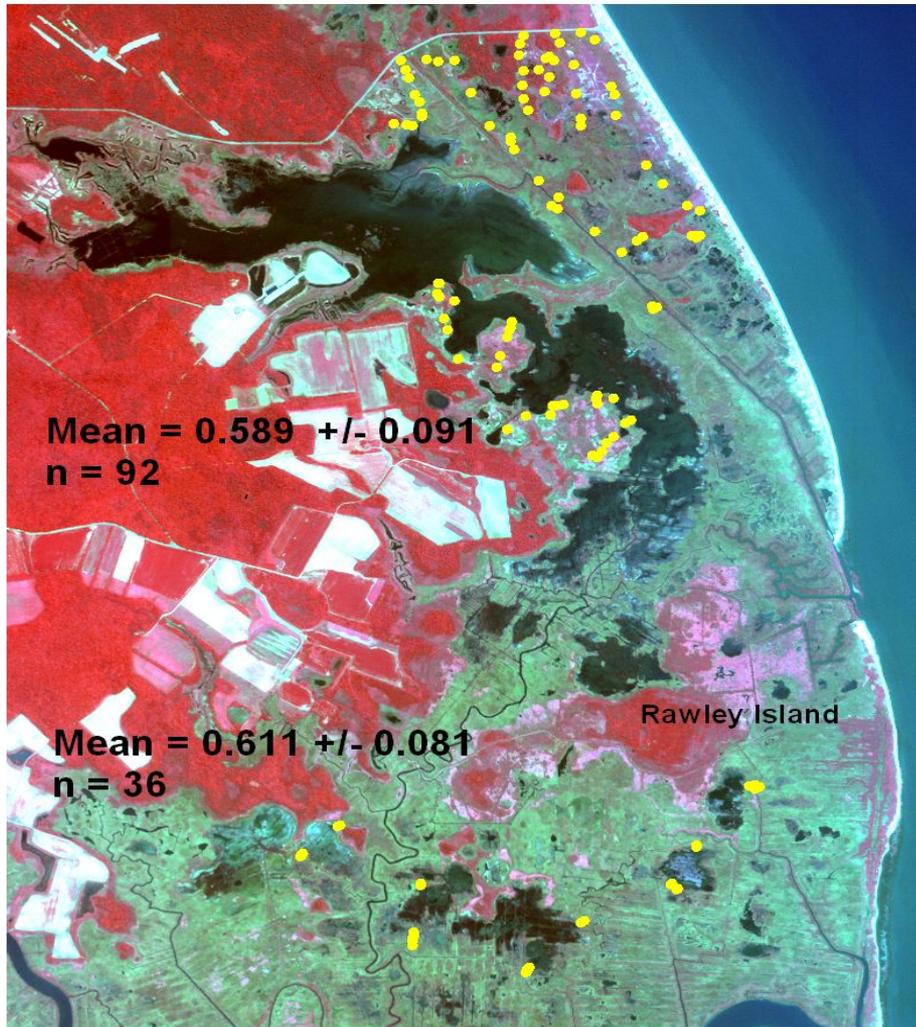


Open water  
bottom elevations

### Milford Neck, 2004

Elevation of Open Water Bottoms  
North and South of Rawley Island

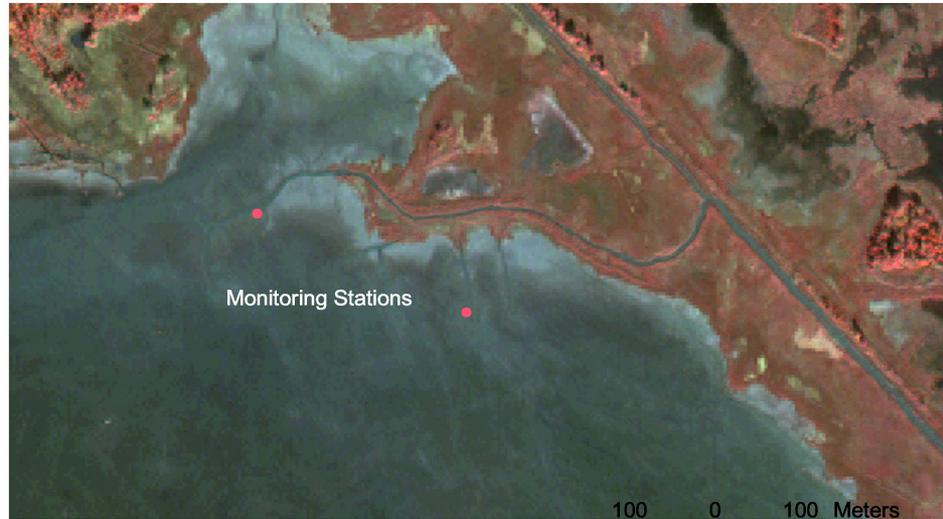
# Marsh plain elevations



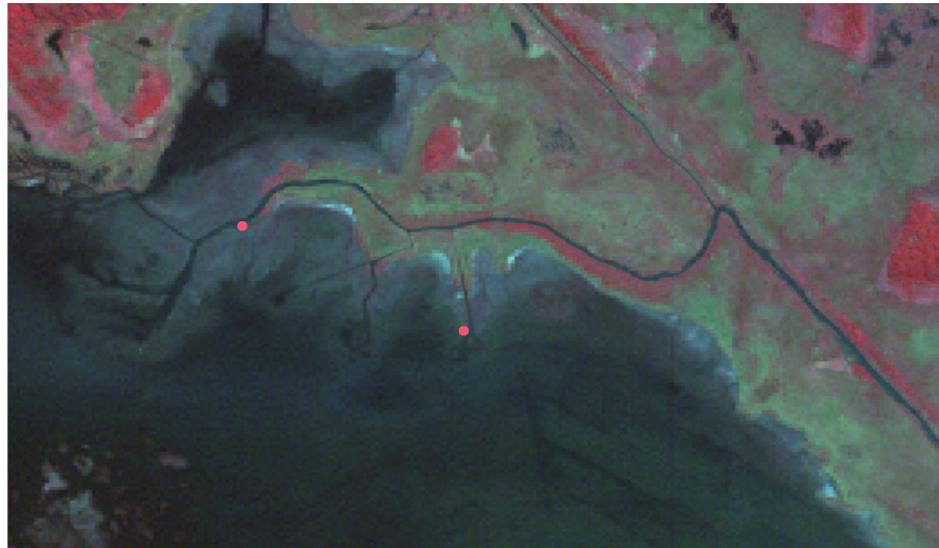
**Mean Elevation of Marsh Plane Vegetation  
North and South of Rawley Island in Meters**

Milford Neck Lagoon Change 2000 - 2004

Rebuilding  
Marsh;  
sediment  
accretion



Lagoon Inlet 29 Oct 2000

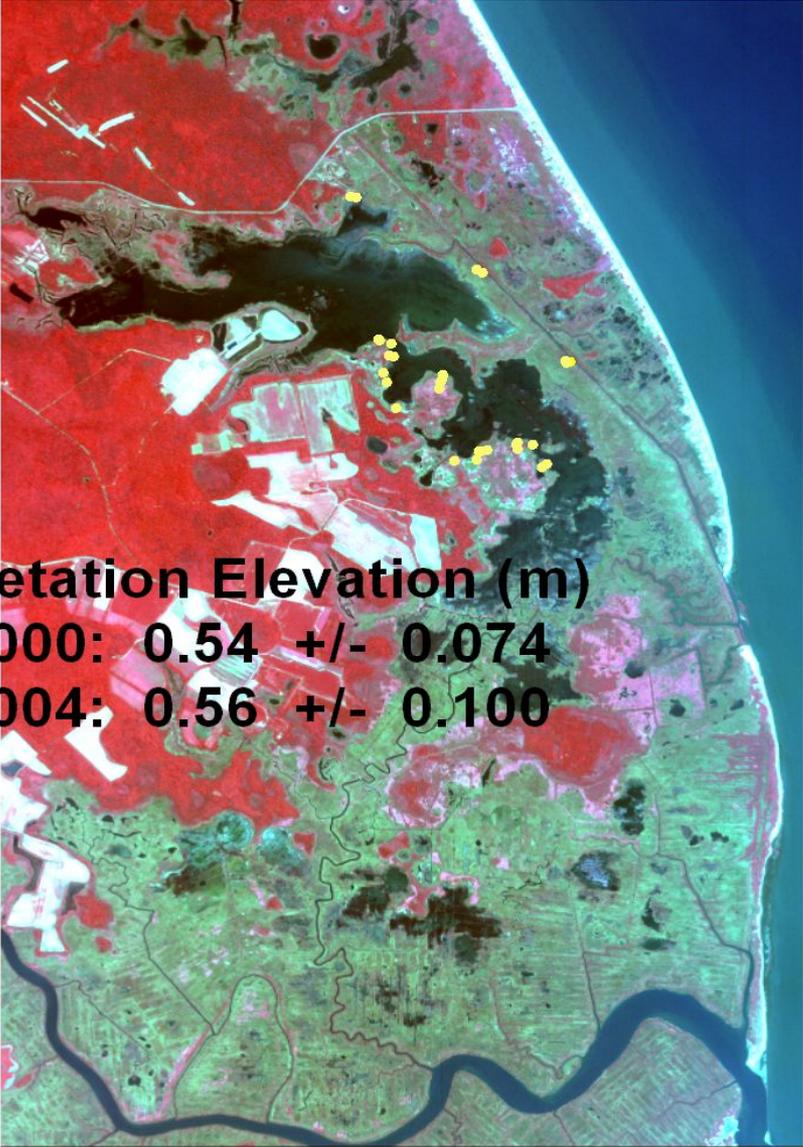


Lagoon Inlet 2 July 2004





Marsh plain  
elevation increase



**Vegetation Elevation (m)**  
**In 2000: 0.54 +/- 0.074**  
**In 2004: 0.56 +/- 0.100**

### **Milford Neck 2004**

**Elevation of revisited vegetation sites in  
2000 and 2004**

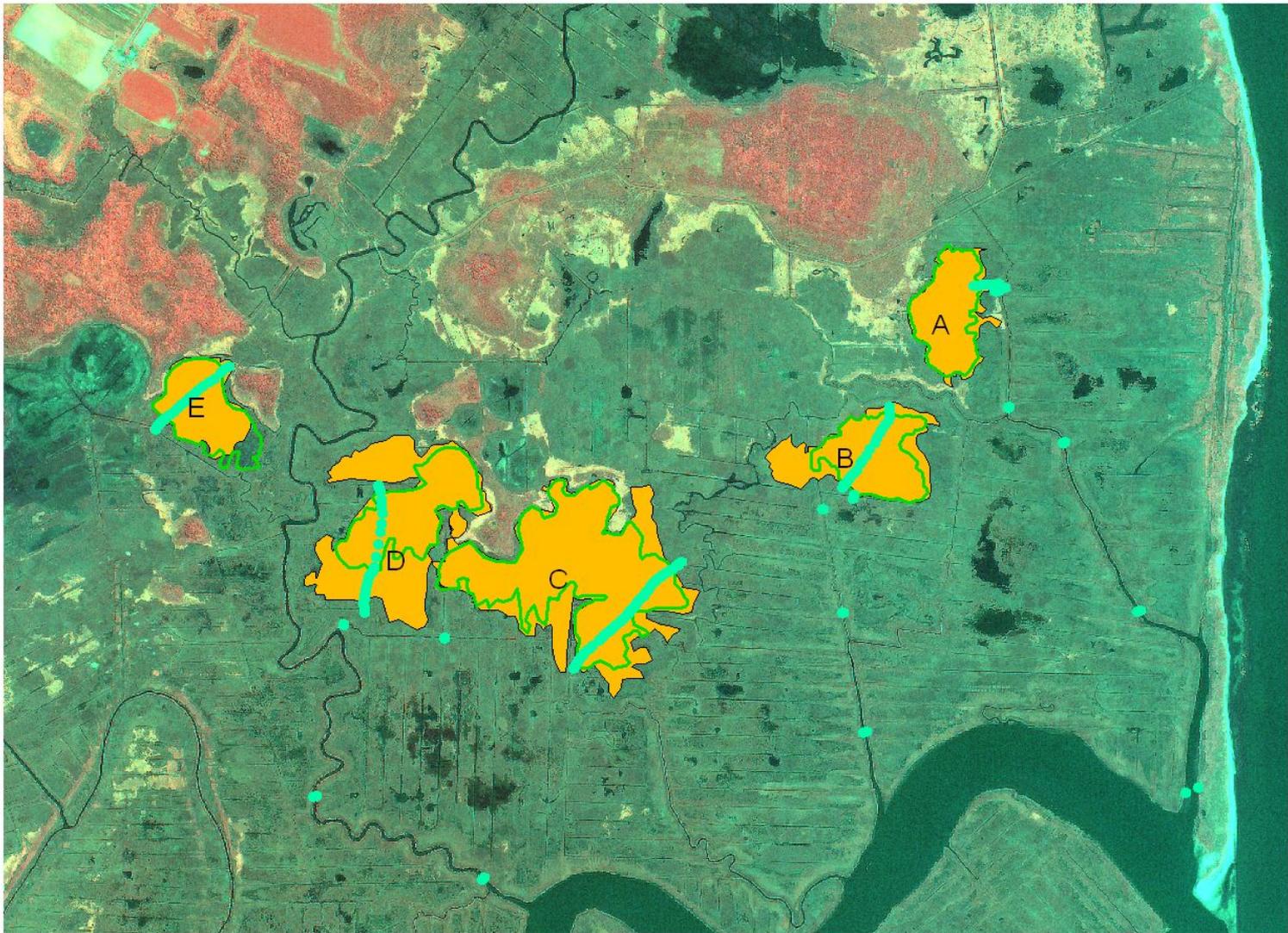


Figure 8. Five Sample Areas of Open Water and Mud Flat



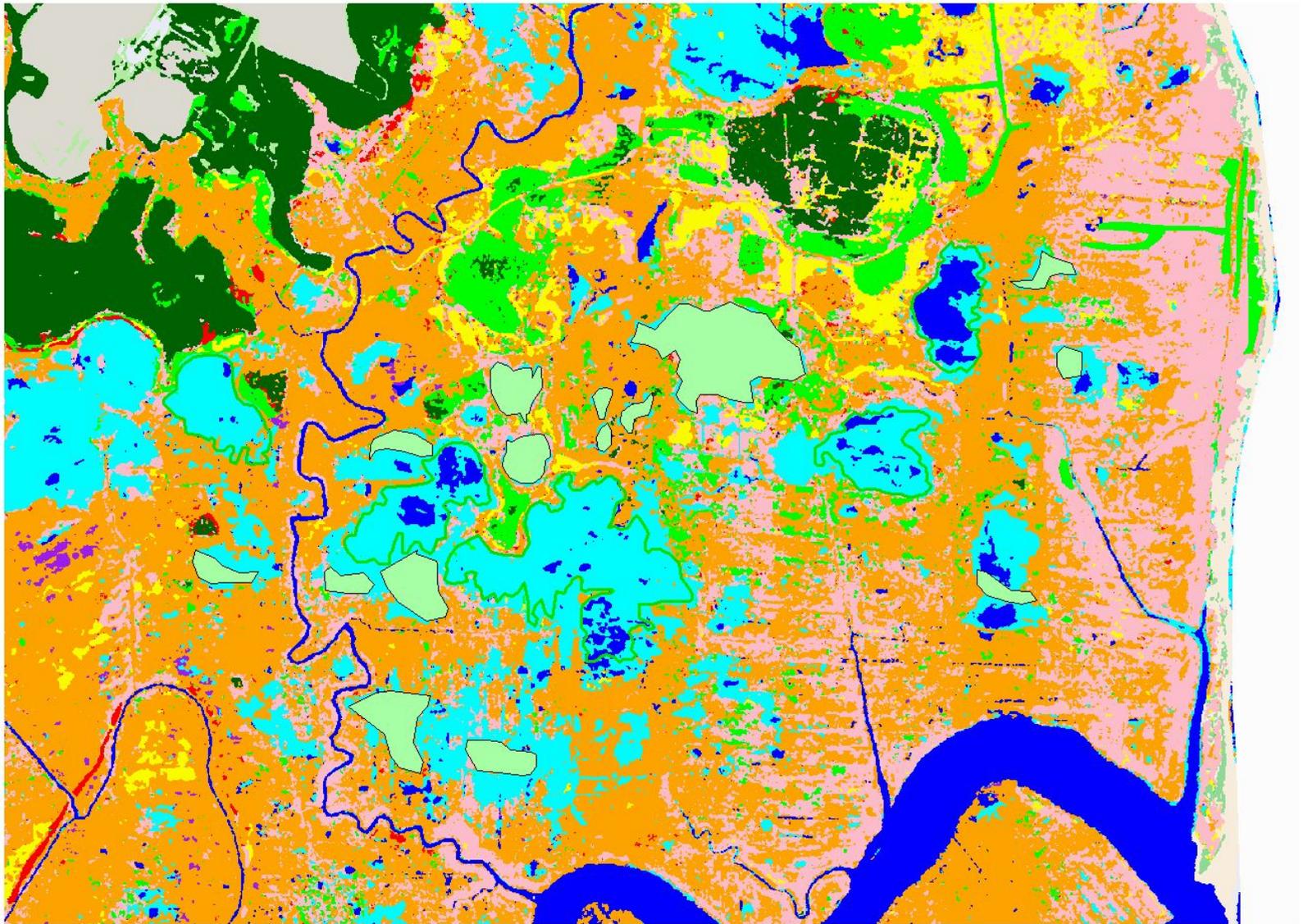
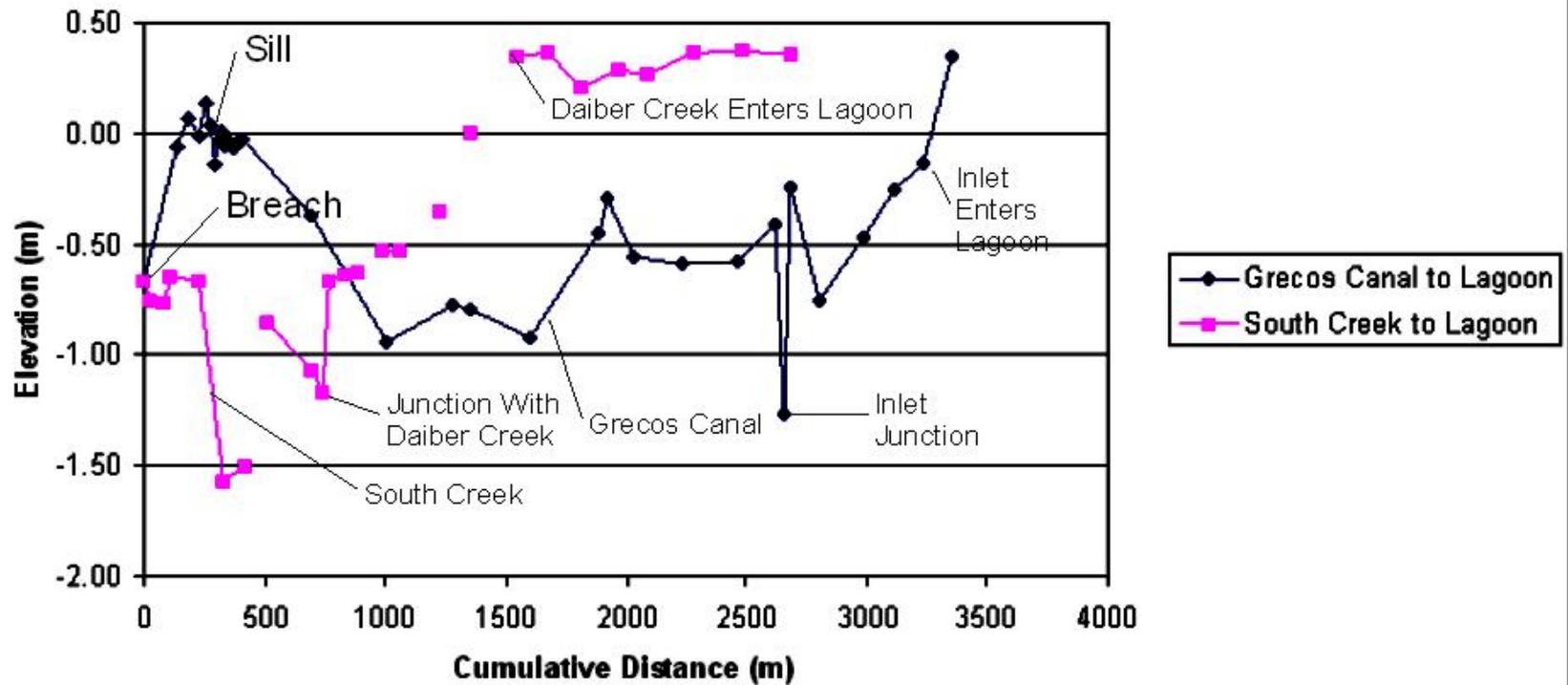


Figure 9 Areas of Apparently Reestablished Emergent Vegetation South of Rawley Island Overlaid on 1999 Classification of Open Water/Mudflat Areas

### Bottom Elevations of Grecos Canal And South Creek Channels





Placing sediment station in 2004

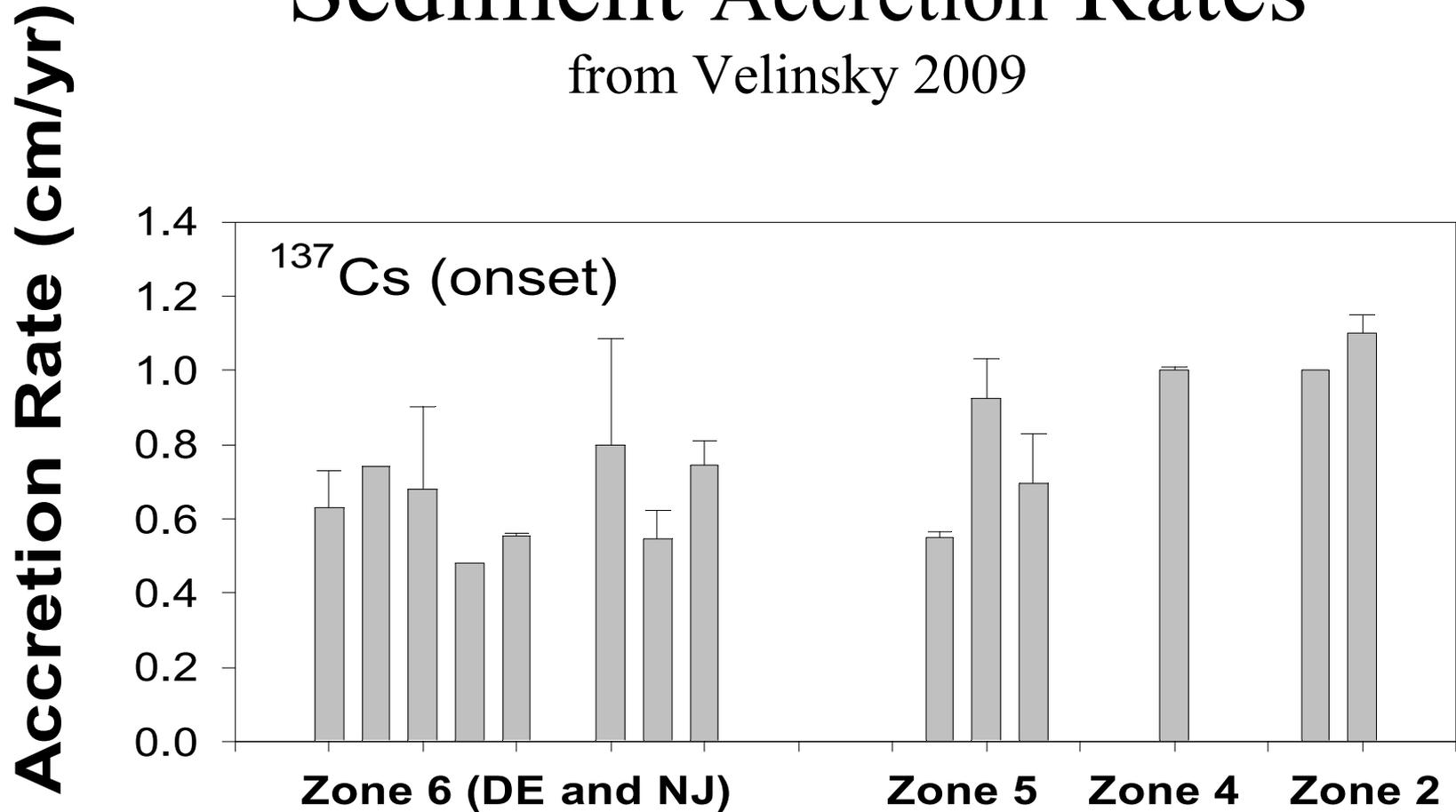
Nine months  
of change.



**Sediment Observations in cm/yr**  
**June 2004 - March 2005**  
**(271 days)**

# Sediment Accretion Rates

from Velinsky 2009



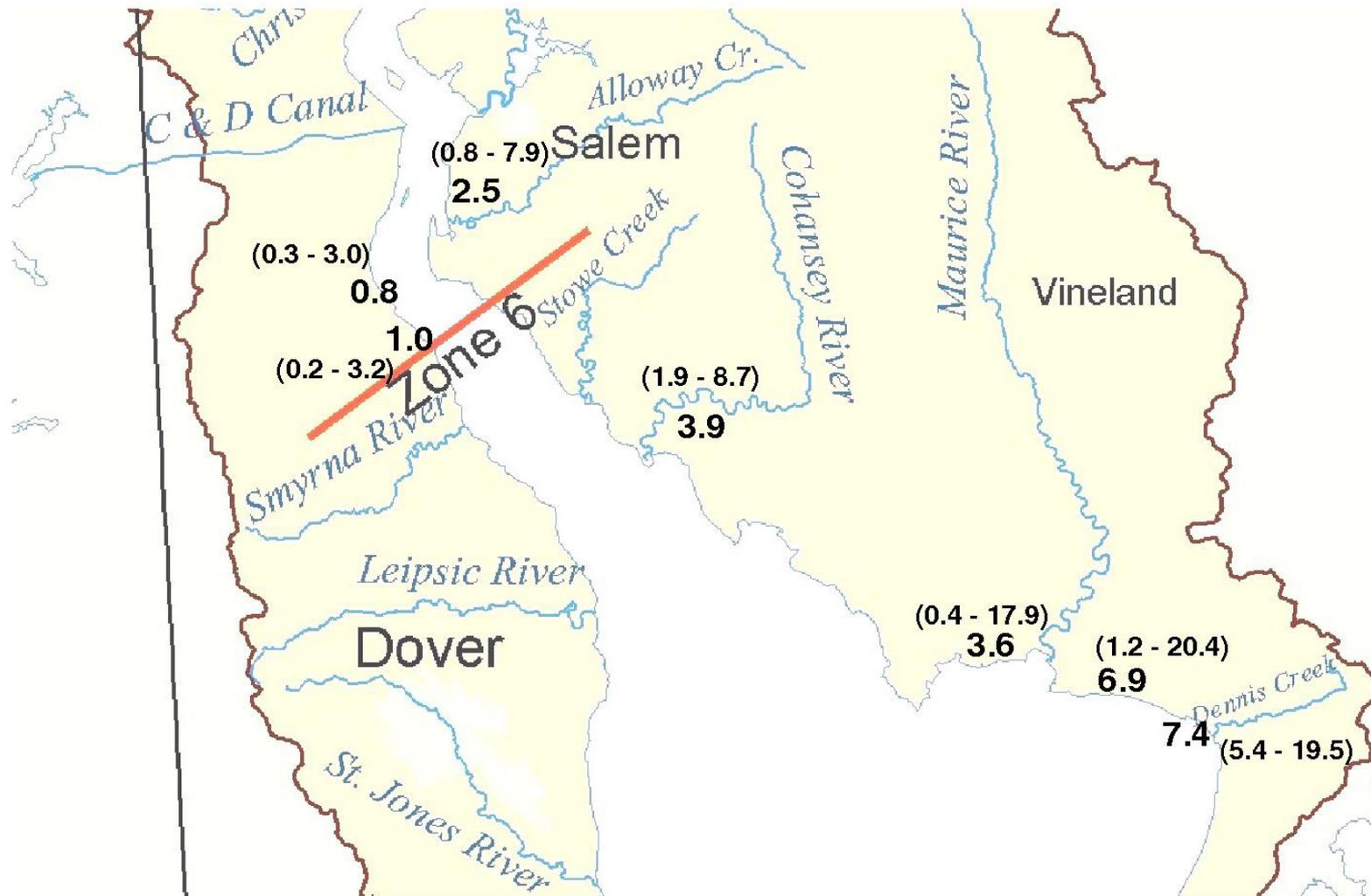
# New Jersey



**KEY**

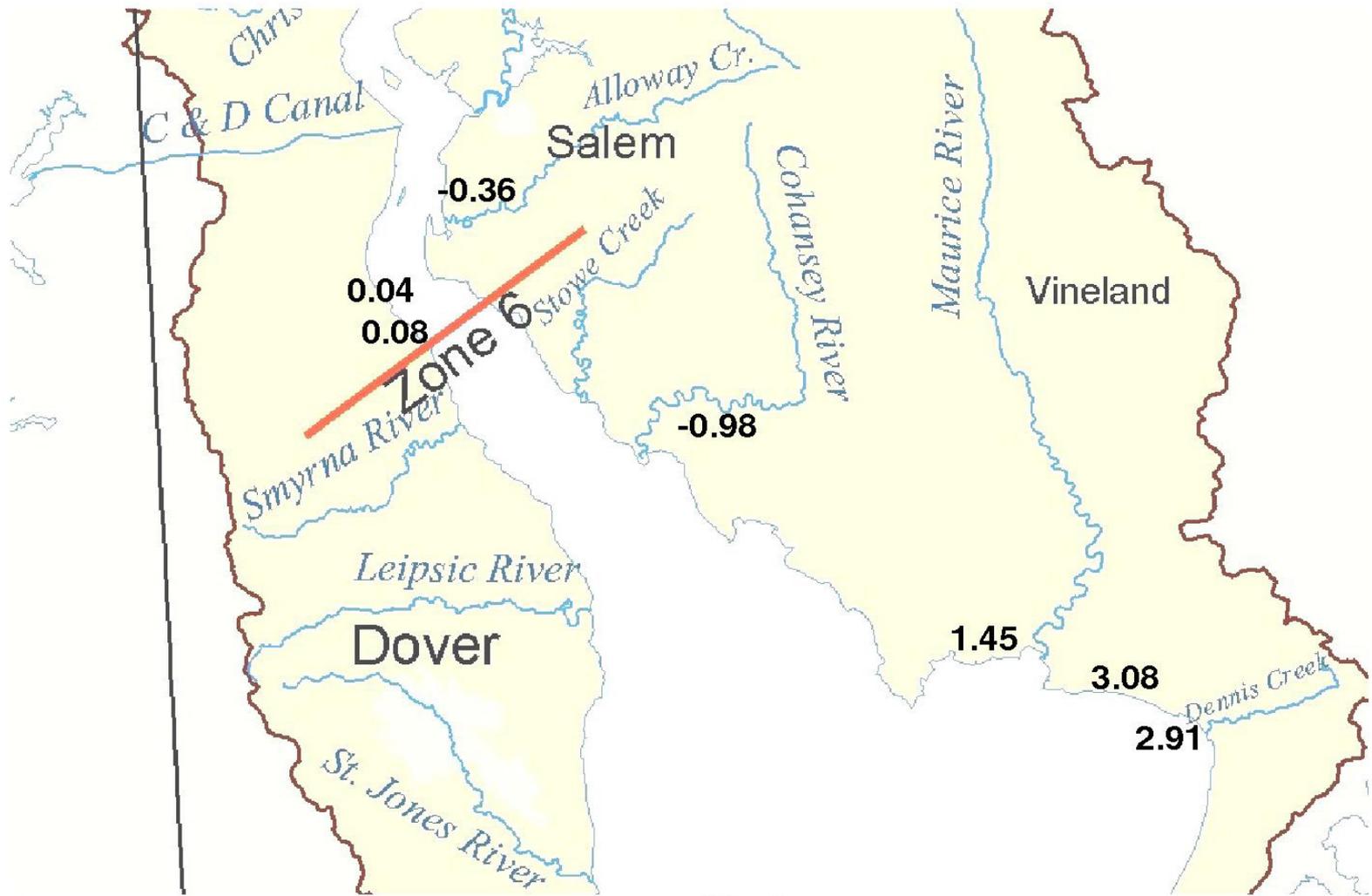
-  Preservation Sites
-  Diked Salt Hay Farm Wetland Restoration Sites
-  Phragmites & Other Impounded Wetland Restoration Sites

# Accretion Rate (CM/YR)



Site Average and (Range)

# Elevation Change Rate (CM/YR)

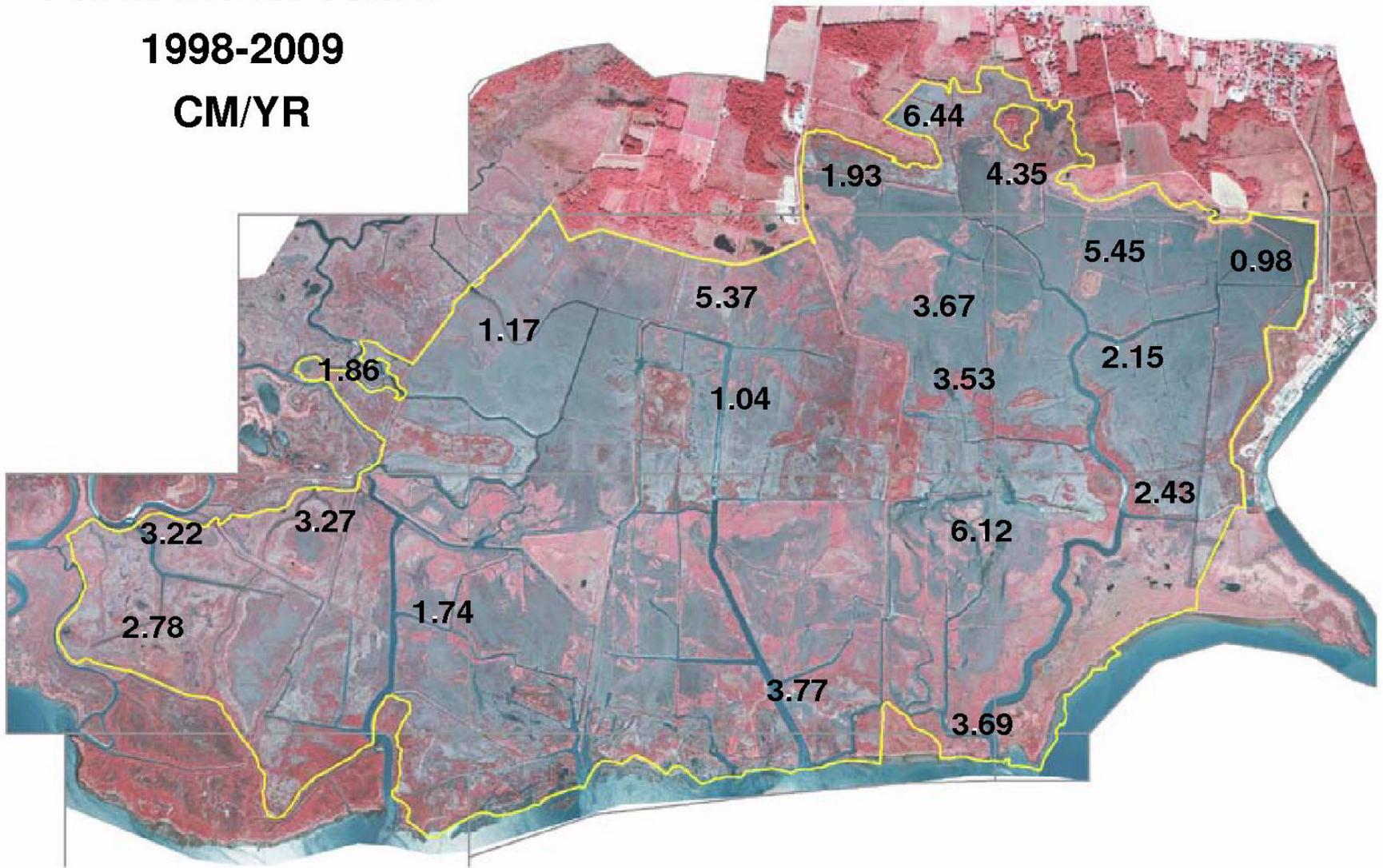


Site Average

# Accretion Rate

1998-2009

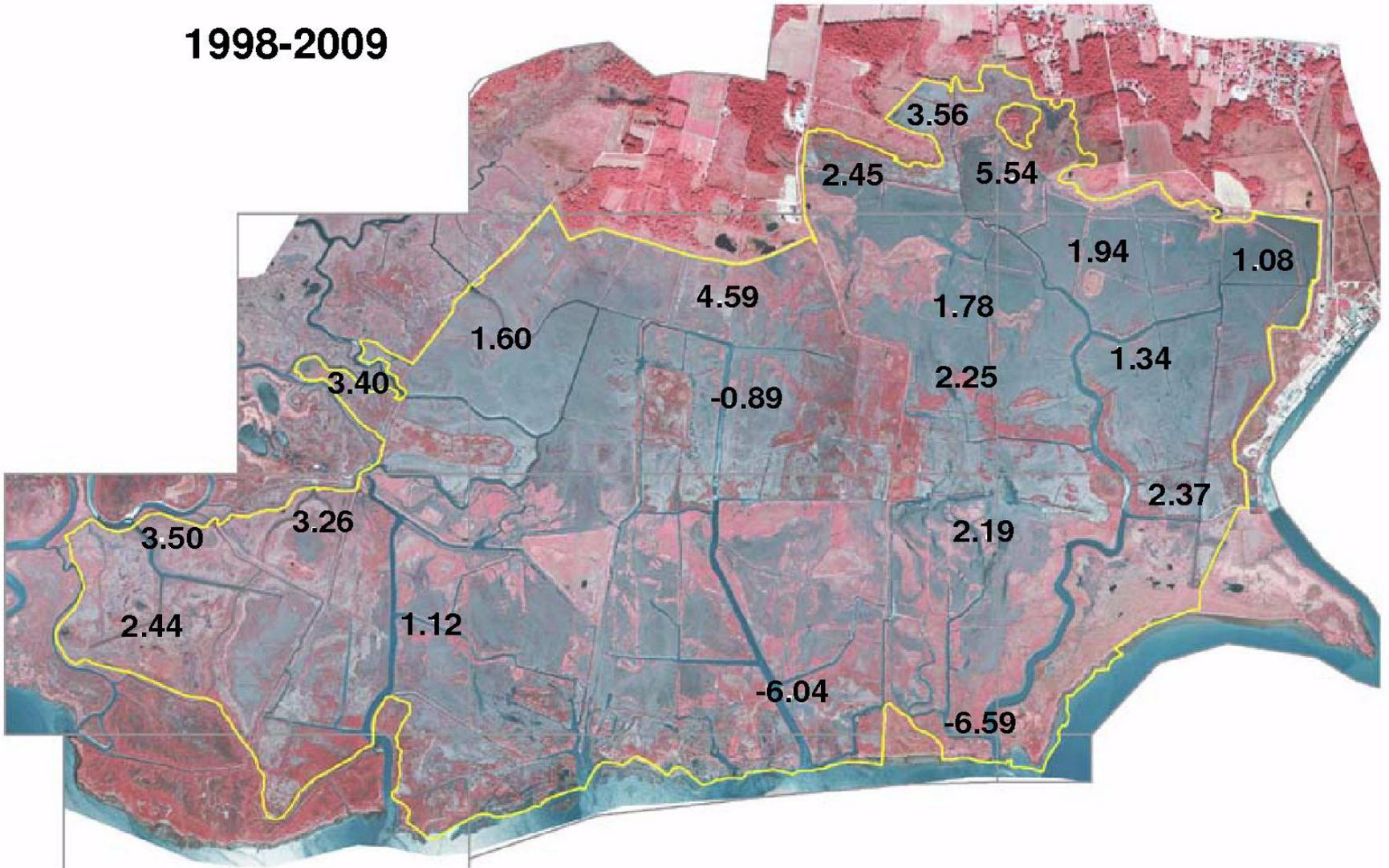
CM/YR



Commercial Twp Site

# Accretion / Subsidence

1998-2009

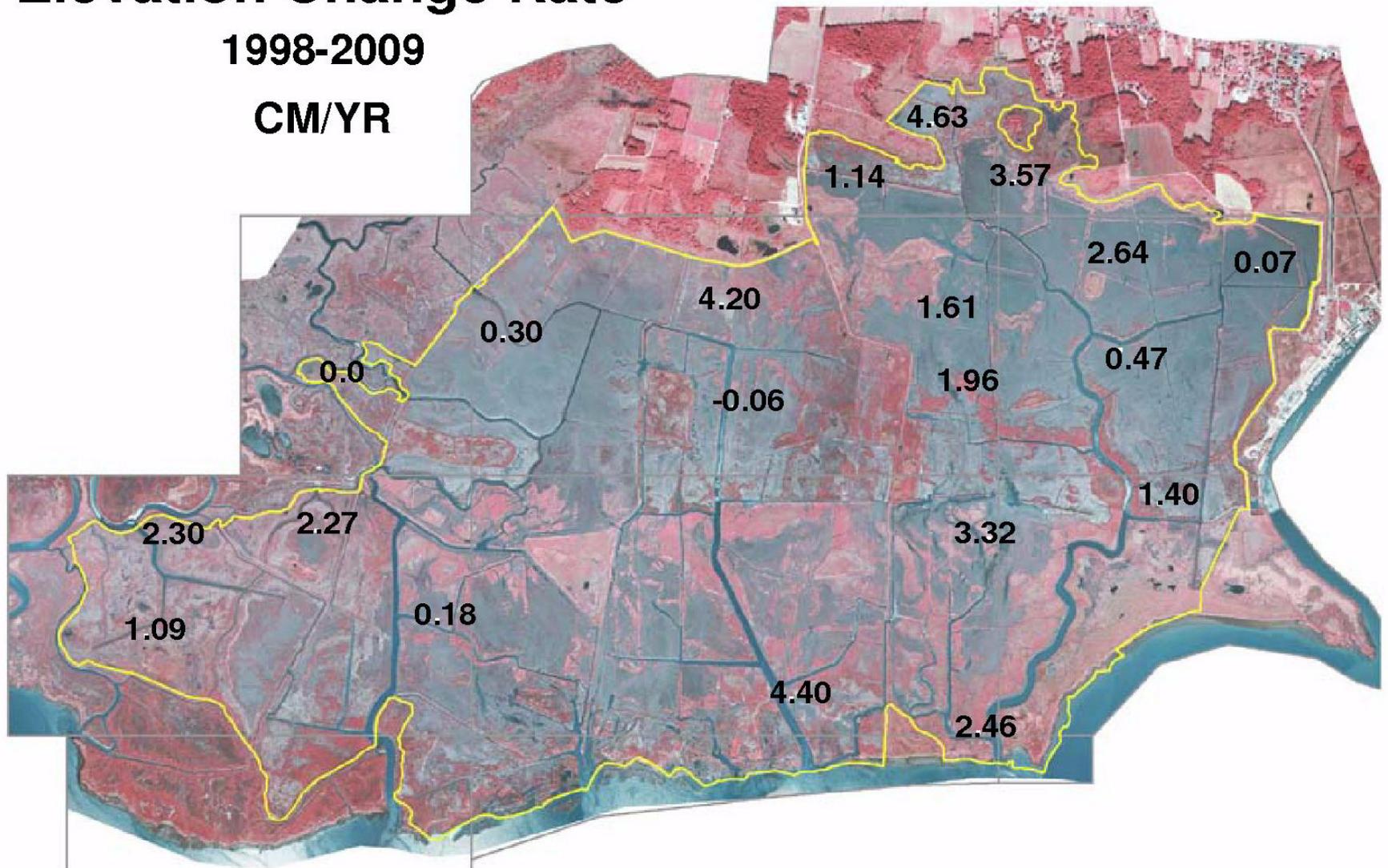


Commercial Twp Site

# Elevation Change Rate

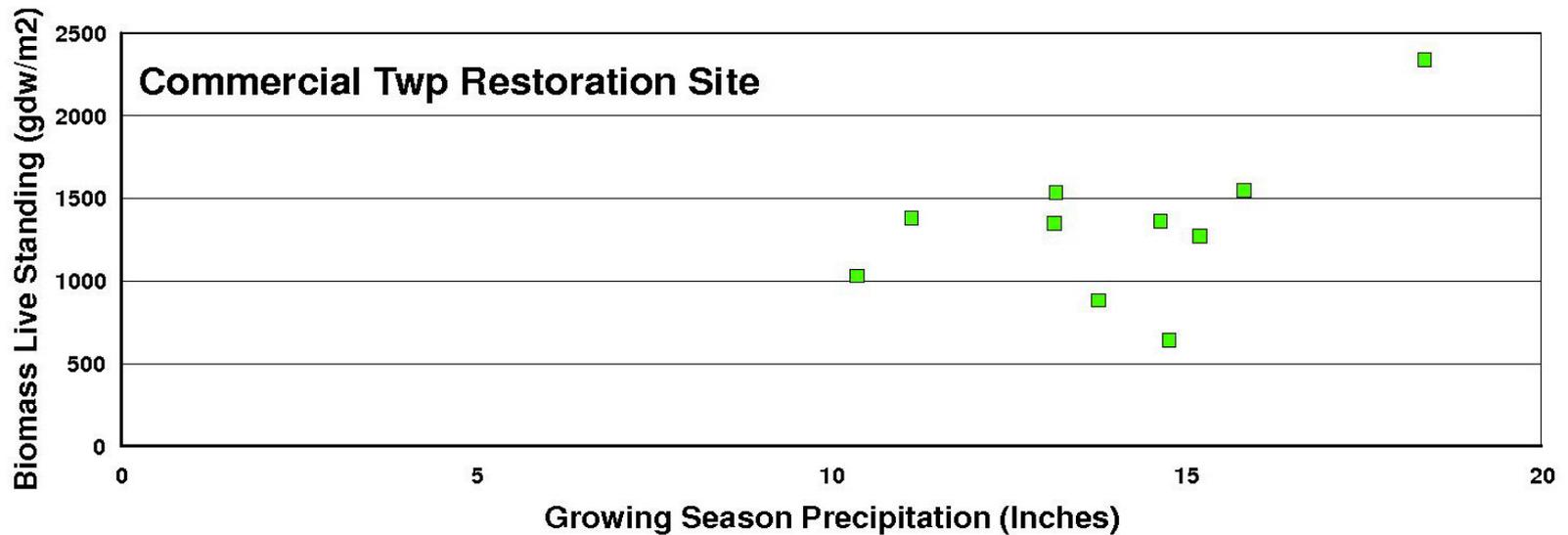
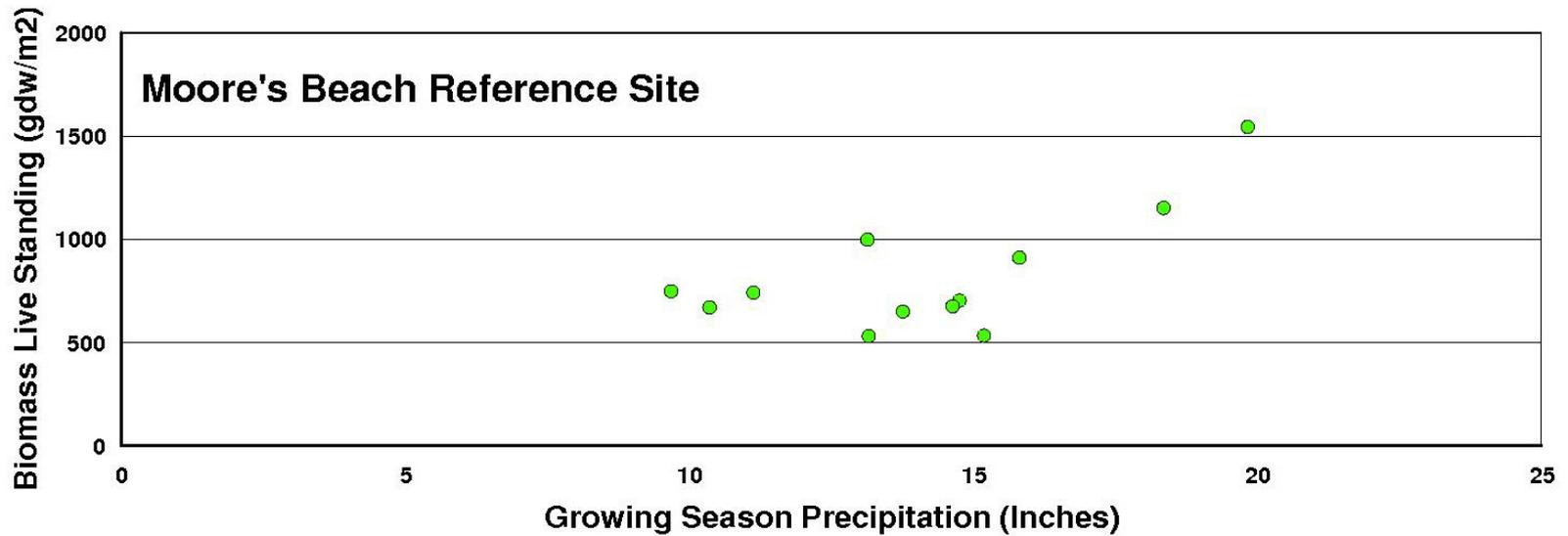
1998-2009

CM/YR



Commercial Twp Site

# Above Ground Biomass & Precipitation



## References

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