

## IMPACT OF MOSQUITO DITCHING ON THE SPATIAL DISTRIBUTION OF SALT MARSH VEGETATION



## Why are salt marshes important?

### Salt marsh ecosystem services

- Carbon sequestration
- Denitrification
- Wildlife habitat
- Shoreline protection
- Water quality maintenance



Paul Broadmeadow

## Dominant New England salt marsh plant species

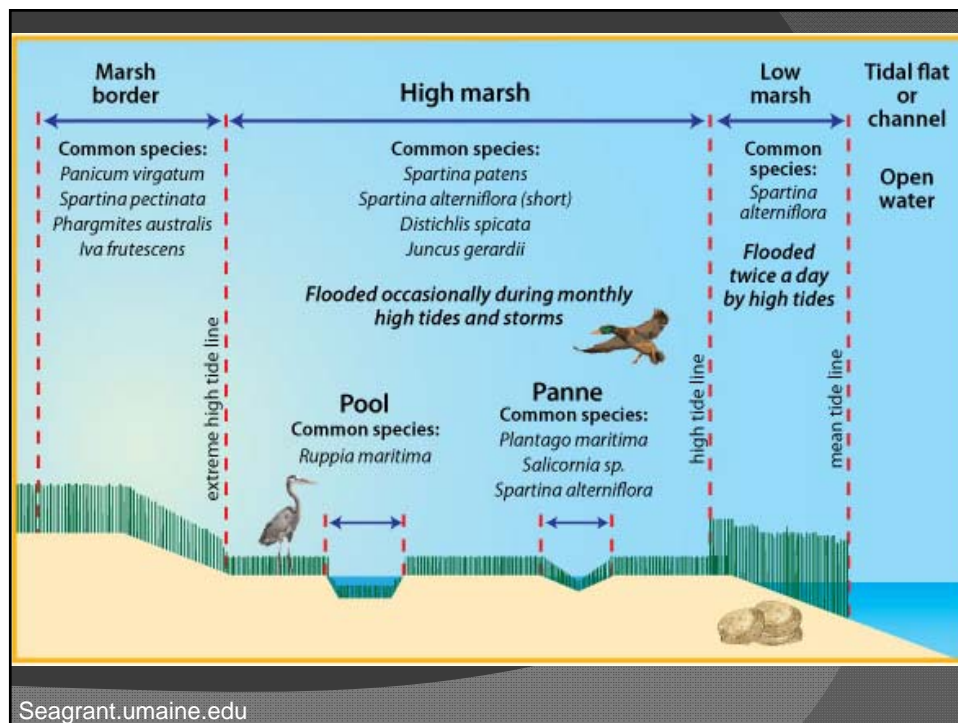


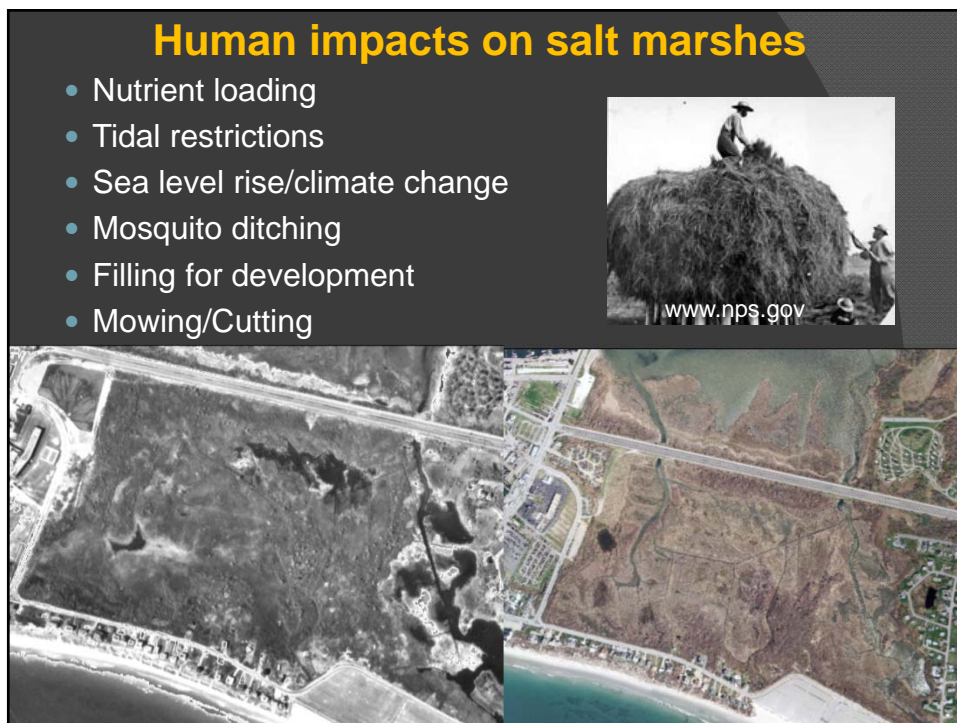
*Spartina patens* (salt marsh hay)



*Spartina alterniflora* (salt marsh cordgrass)

Gobotany.com



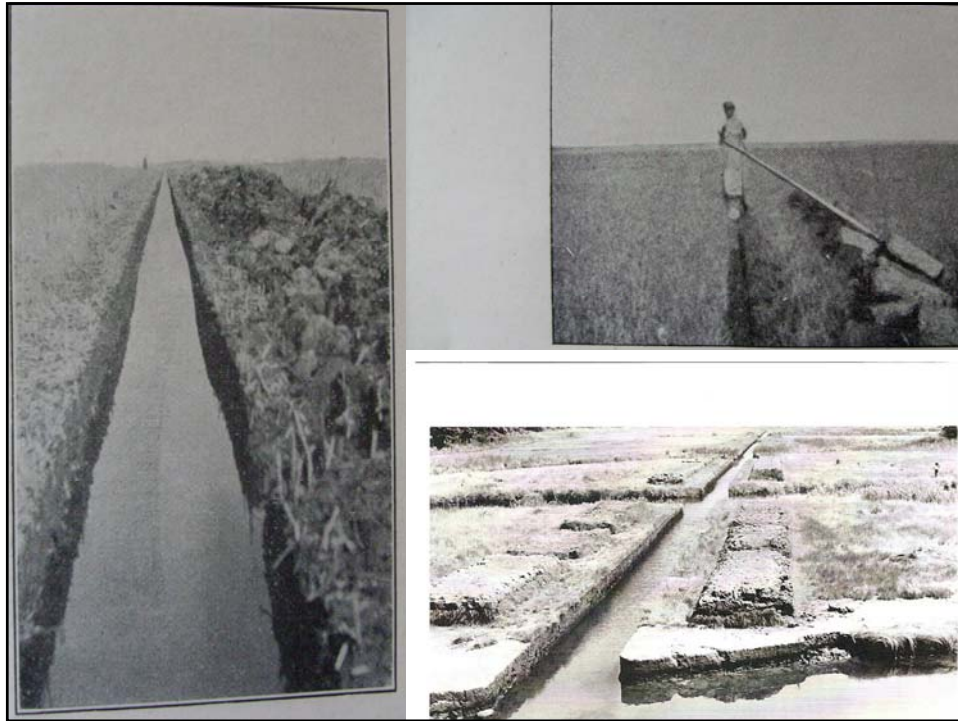




## Ditching: History

- Humans have been ditching marshes since colonial times to increase the productivity of salt marsh hay for cattle grazing (Ranwell 1967)
- During the 1930's 90% of the Atlantic coastal marshes were ditched to drain surface water for mosquito control and to increase the workforce during the great depression (Clarke et al. 1984)





## Ditching in Rhode Island



**Winnapaug Pond**  
Matunuck Soil Series  
0-30cm Oe (Peat)  
30+ 2Cg (Sand deposits)

**Narrow River**  
Pawcatuck Soil Series  
0-116cm Oe (Peat)  
116+ 2Cg (Sand deposits)



## 2012 Study

- **Purpose:** Determine the impact of ditching on salt marsh vegetation patterns in Narrow River, RI.
- **Hypothesis #1:** Mosquito ditches alter the salinity regimes within fringe salt marshes which determine vegetation composition
- **Hypothesis #2 :** Ditches increases the extent of pannes and pools because ditching alters the topography of the marsh

## Study Site

- Narrow River  
Rhode Island







## Methods

- Delineated marsh units using RI soil survey



## Methods

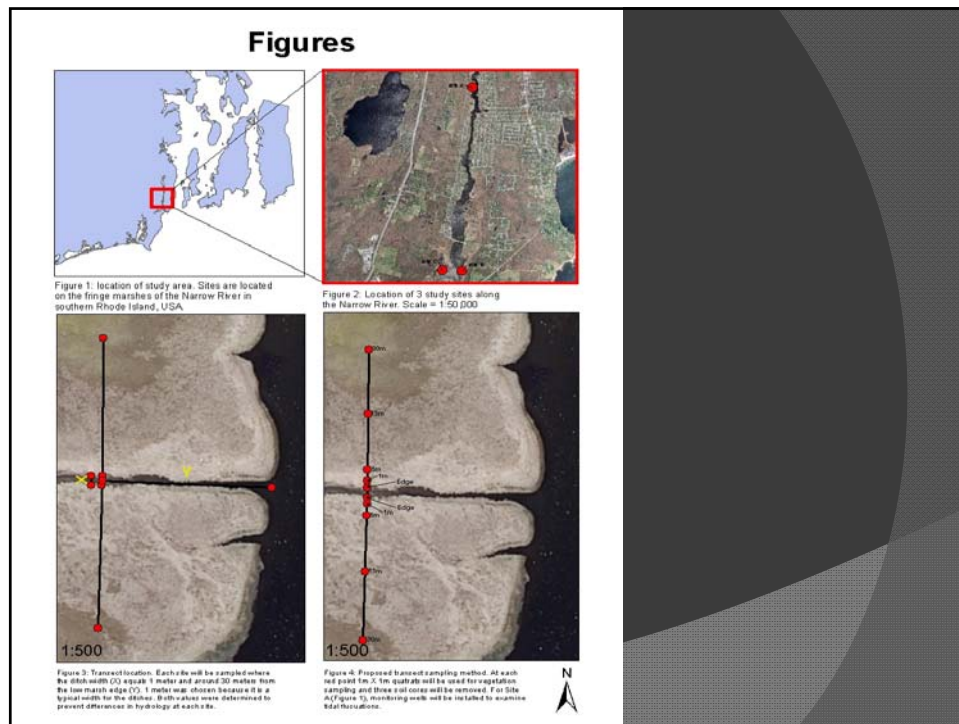
- Delineated ditches



## Methods: Vegetation Composition







## Methods: Vegetation Composition

- Sampled along 30m transects.  
Recorded vegetation composition
- Determined salinity of each sample  
using saturated paste method
- Determined extent of  
vegetation zones



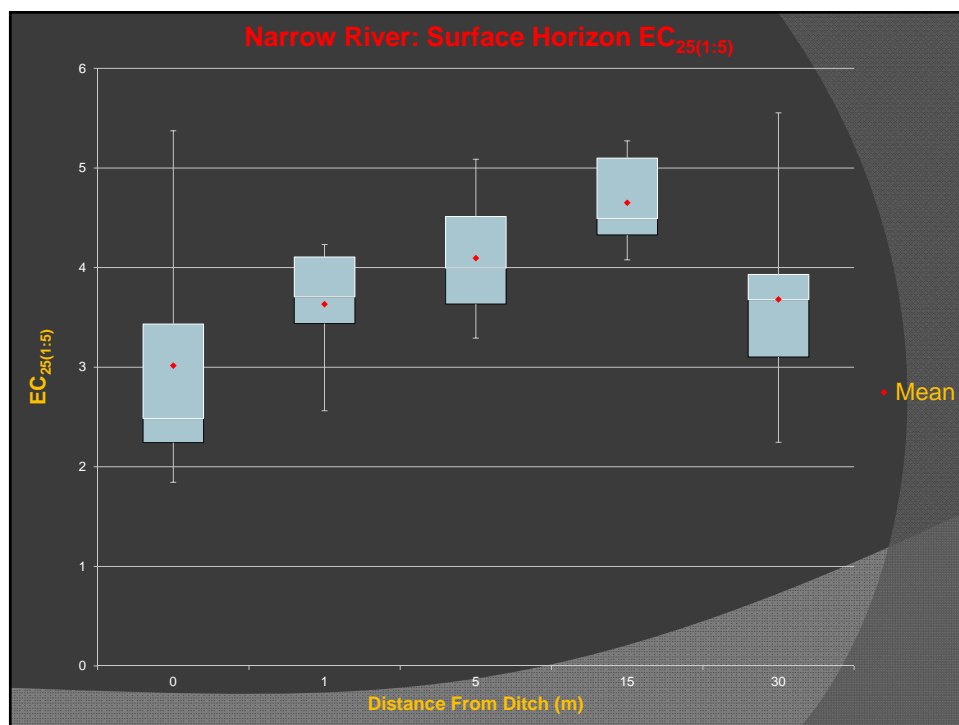
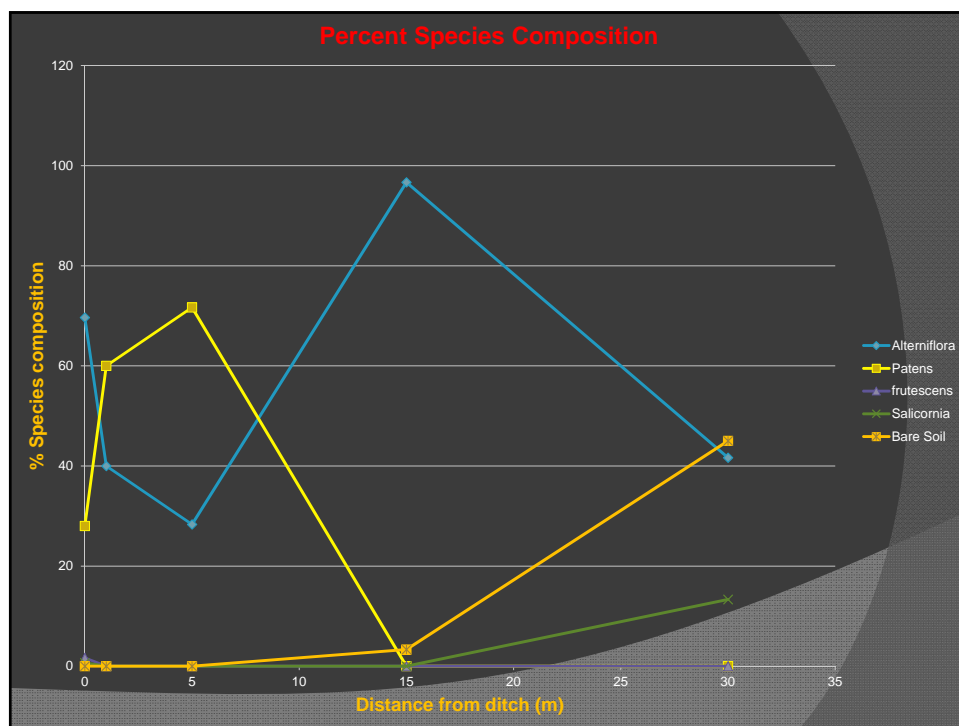
## Methods Extent of Pools

- ◉ Collected field data via kayak to document extent of pannes and pools
- ◉ Delineated pannes and pools within marsh units: total of 1500 polygons
- ◉ Determined relationship between % pool area and density of ditches

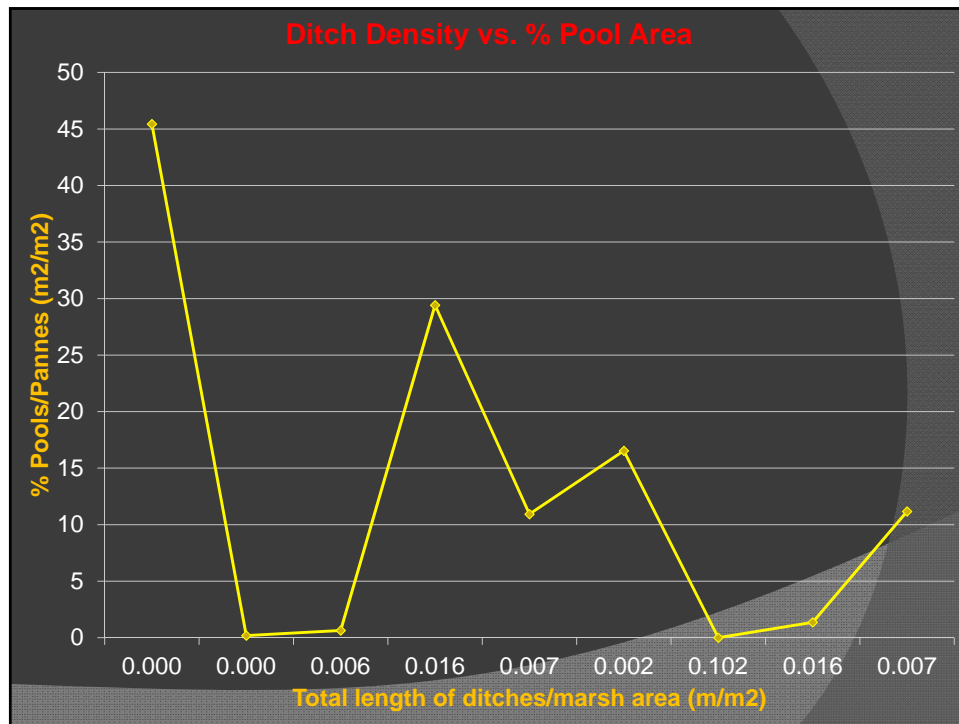


## Results

- ◉ Ditches
  - Total length = 5830.192 meters
  - Mean length = 30.4 meters
- ◉ Marsh units
  - Total area = 982950.0902 meters<sup>2</sup>
  - Mean area = 32765 meters<sup>2</sup>
- ◉ Pools/pannes
  - Total area = 120643 meters<sup>2</sup> (8%)
  - Mean area = 82.68884 meters<sup>2</sup>







## New Hypothesis

- Extent of pools has increased because of sea level rise
- Methods:** Delineated extent of pools using 1952 aerial photography and compared total area of pools with results from 2011



## Results

- 1952
  - Total pool area = 119670.2 m<sup>2</sup>
  - Mean pool area = 383.5583 m<sup>2</sup>
- 2011
  - Total pool area = 120643 m<sup>2</sup>
  - Mean pool area = 82.68884 m<sup>2</sup>
- % Change = +972.833 m<sup>2</sup>