Removing Legacy Effects of Ditching While Promoting Resilience to Climate Change at Parker River NWR

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Tidal Marsh Ditching

- Salt hay production  1600-1900
- Mosquito control  1930s-Present
  - Unintended consequences
    - loss of fish (mosquito predators)
    - spoil piles - paths for *Phragmites* invasion
    - Vegetation die-back in mini-impoundments (waffle and syrup pattern)
    - and . . .
Ditching leads to sediment oxidation and loss of elevation. Translates to: loss of resilience with sea level rise.
A PAIR OF PARADOXES

1. Salt marshes need salinity and sediments from tidal flooding – BUT increased flooding from SLR may be drowning them!

2. Salt marshes need to drain so their roots maintain energy balance and not ‘drown’- BUT draining of the underlying peat results in oxidation & subsidence, increasing susceptibility to drowning as sea level rises.
Study Site: The Great Marsh, Parker River NWR
Solution: Mend ditches from the bottom up
Design: project to mend half of ditches

Procedure:
1. Mow Grass
2. Roll into Ditch
3. Fix with Twine

Site 1 of 4: SW corner of Nelson Island
Monitoring: Elevation Profiles and Vegetation
Change in Depth of Ditches
2014-2017

Ditch Remediation

- Treated
- Untreated

Ditch Center Elevation (NAVD88 m)

Site

1  2  3  4  Average
Natural Re-Vegetation of Tall Form *Spartina alterniflora*

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**Ditch Center Vegetation**

**S. alterniflora**

- Treated
- Untreated

- F ratio: 1.84
- P value: 0.07

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2015 vs 2016:

**Stem count 0.25m²**

- 2015: Treated: 5, Untreated: 3
- 2016: Treated: 25, Untreated: 2

**Percent Cover (%)**

- 2015: Treated: 10, Untreated: 2
- 2016: Treated: 25, Untreated: 2
Two Treated Ditches

2014 PRE

2015 YEAR 1

2016 YEAR 2
Results . . . - and more Questions

Mending Technique:

Ditches do shallow up: 5-50 cm w/2 yrs trtmt
  Mean = 15.0 +/- 2 cm
Shallow ditches revegetate across their full widths with cordgrass

Will the high marsh between the ditches begin to store more peat?
Do ditches need to fill completely?
Where should we scale-up to stimulate sediment capture in the Great Marsh?