

MONITORING TIDAL RESTORATION OUTCOMES LONG MARSH, HARPSWELL 2013-2018

Casco Bay Monitoring Network Meeting
University of Southern Maine
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Casco Bay Estuary Partnership



ong Marsh, Doughty Cove, Harpswell

oto: 2016, D. Devereaux/Downstream, Inc.



Background



- ❑ DOT funded
- ❑ Mitigation project for Martins Pt. Bridge
- ❑ Culvert replacement beneath privately owned Long Reach Lane
- ❑ One season pre-project, five post
- ❑ 12 stations, including 1 D/S reference and 2 U/S of Project Area

Culvert Replacement (Jan. 2014)

PRE

POST (2018)



INLET

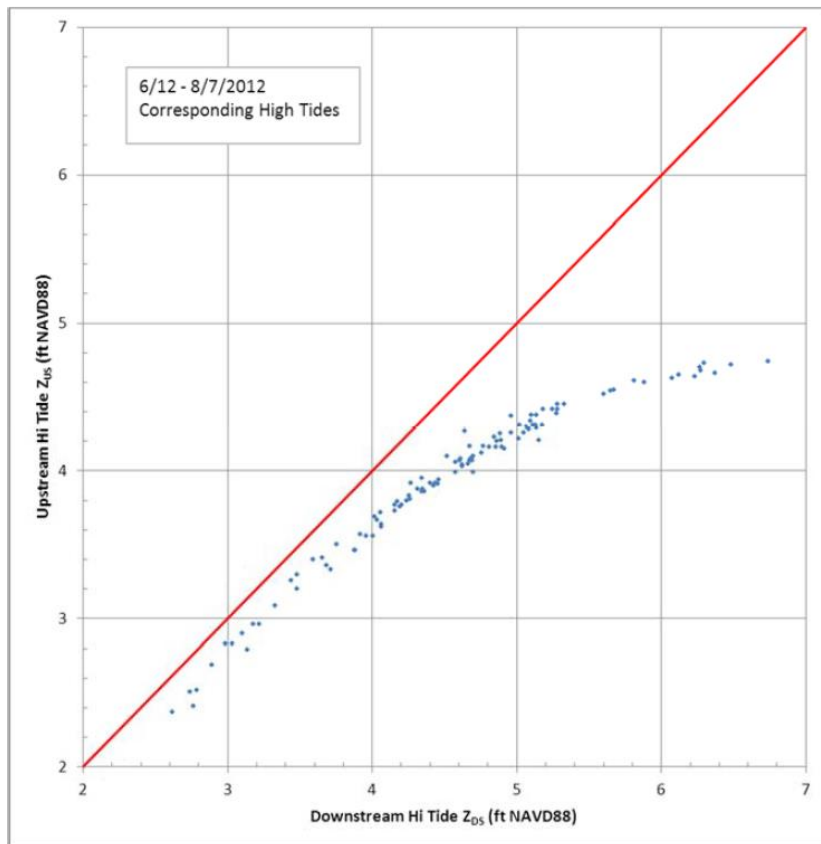


VIEW
U/S

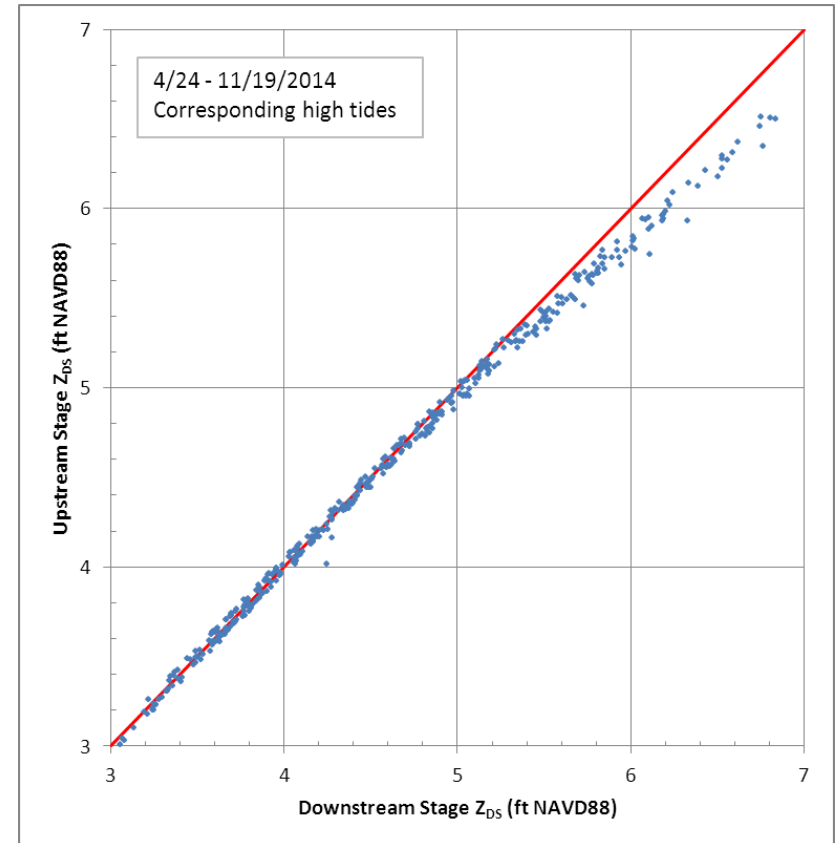


Corresponding high tide

PRE



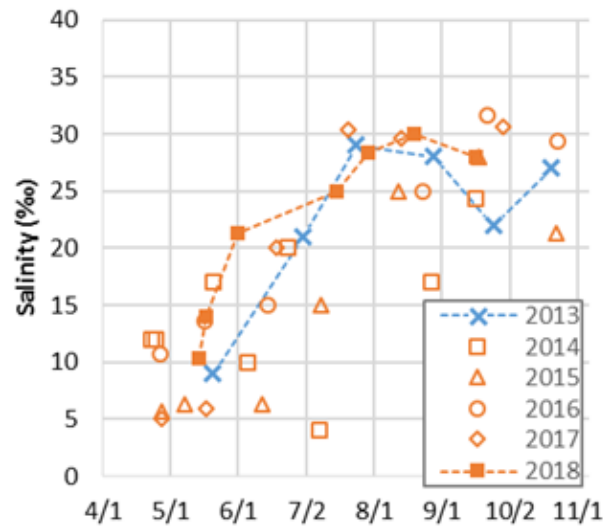
POST



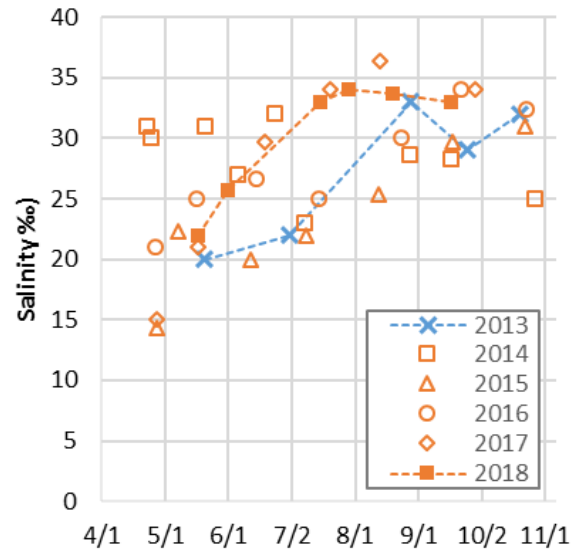
Source: MaineDOT

Pore water salinity

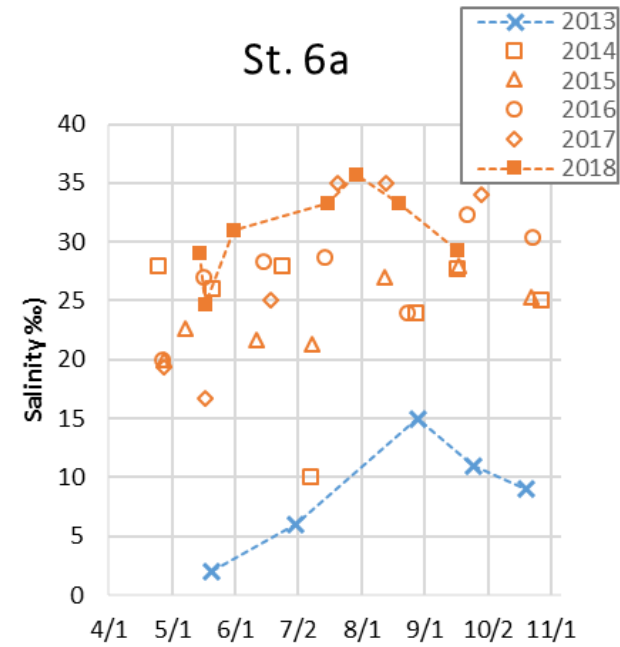
St. 1



St. 8

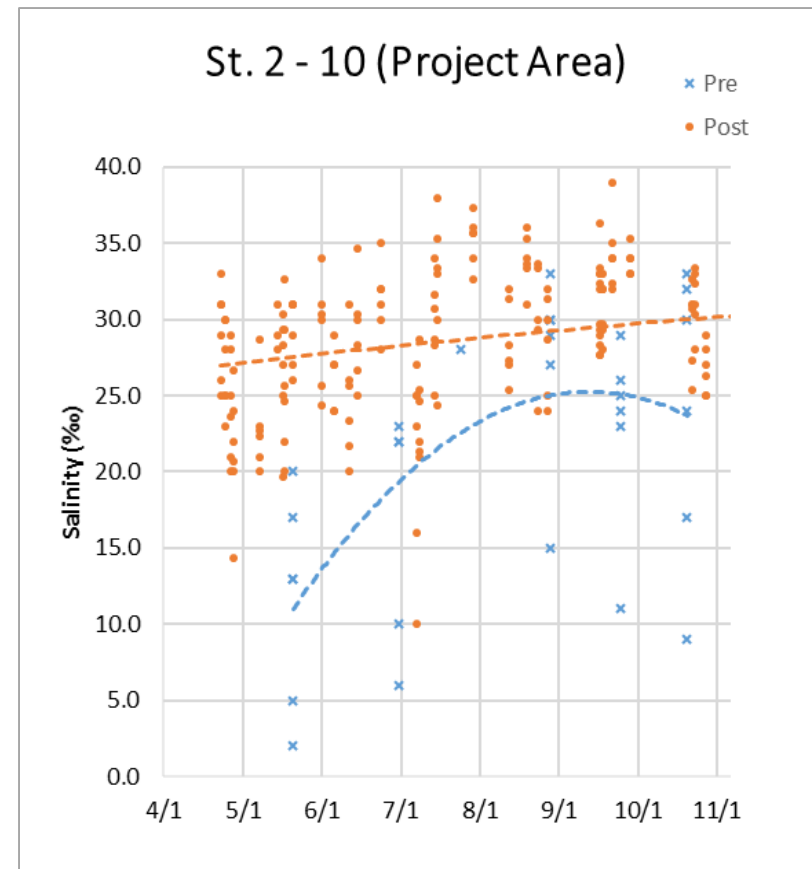
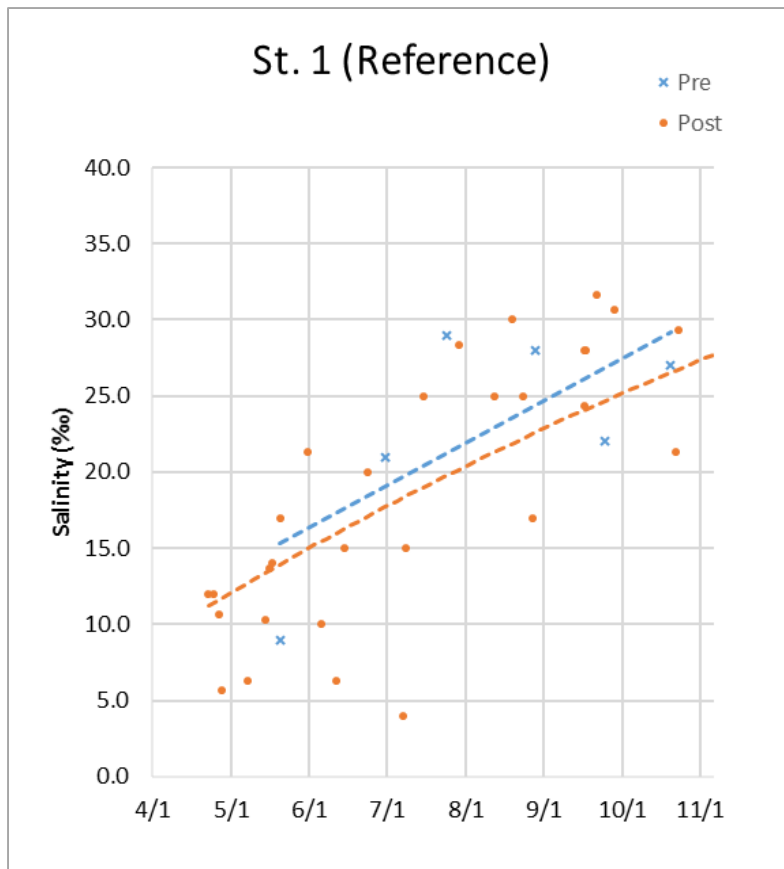


St. 6a



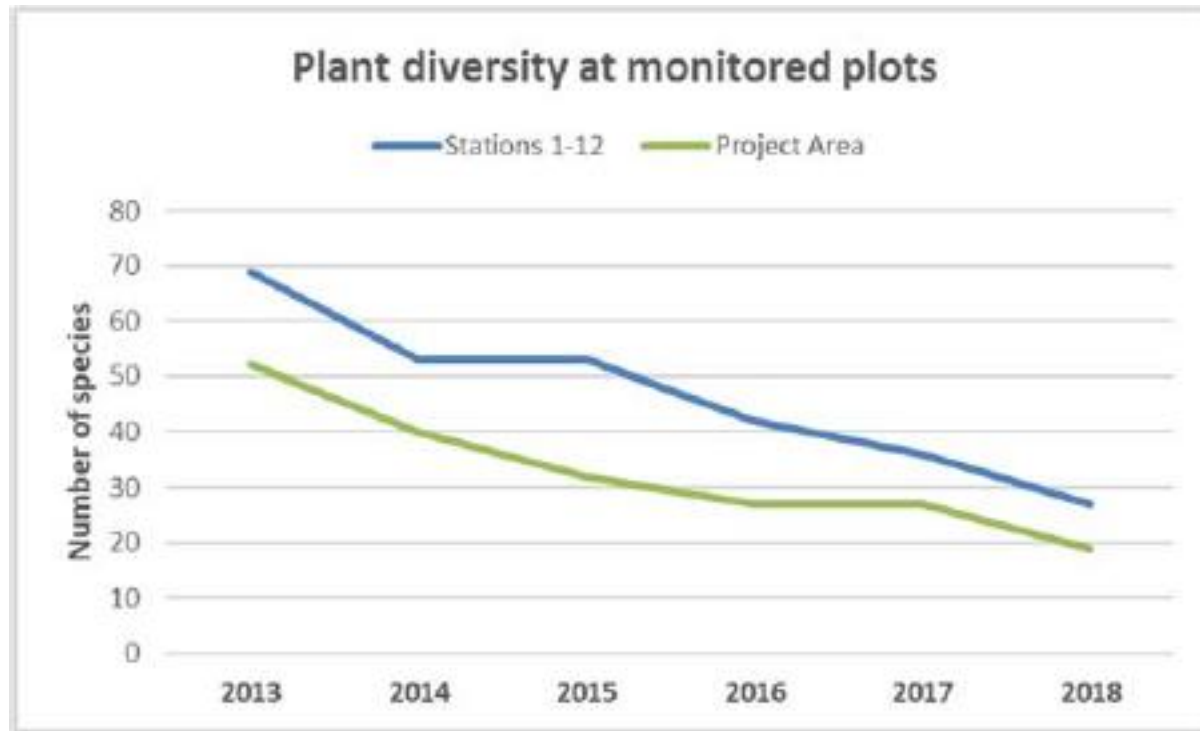
Greatest changes at sites further from the creek channel (laterally), as opposed to distance from culvert (ocean)

Pore water salinity



U/S marsh is now saltier overall, especially earlier in the spring (growing season) and later in the year

Vegetation - diversity

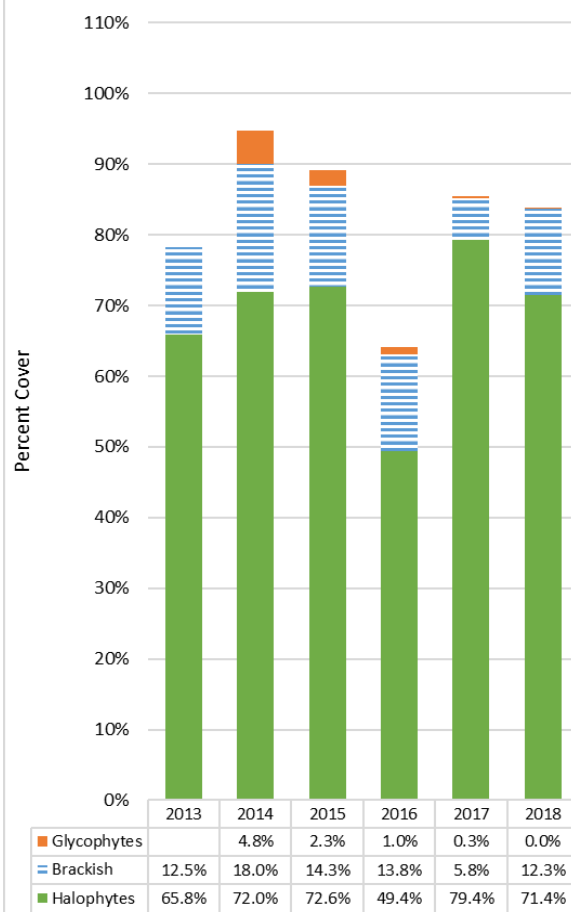


- Ongoing decline across all stations from 69 (2013) to 27 (2018)

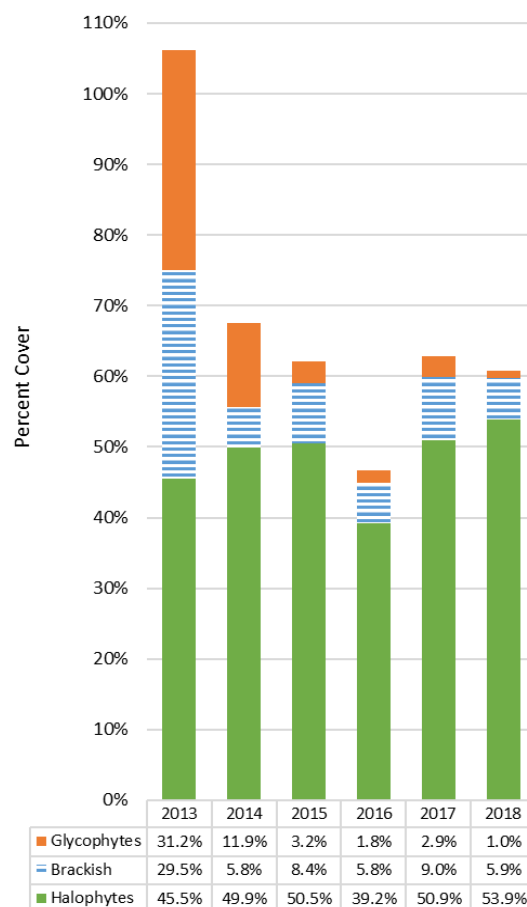
Vegetation – percent cover

Salinity index - Verrill & Bohlen 2017, unpublished thesis

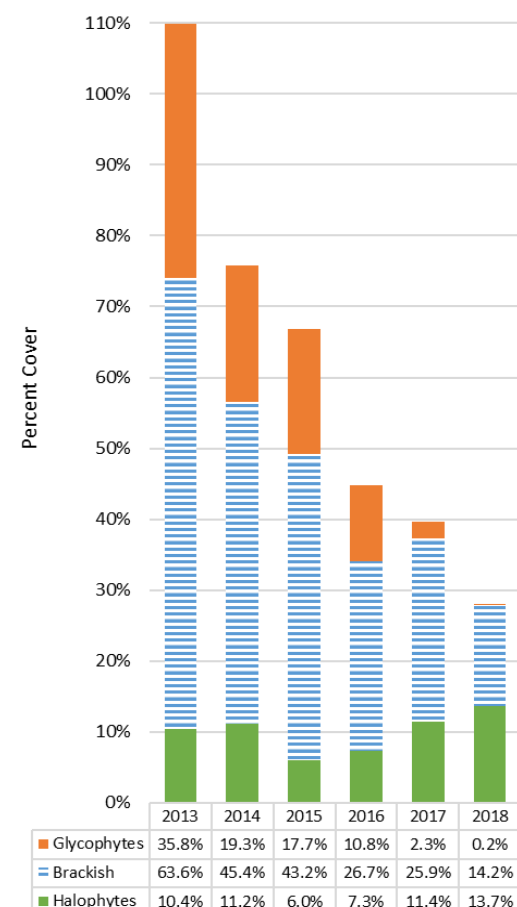
Cover class at Reference Site (St. 1)



Cover class at Project Area (St. 2 - 10)

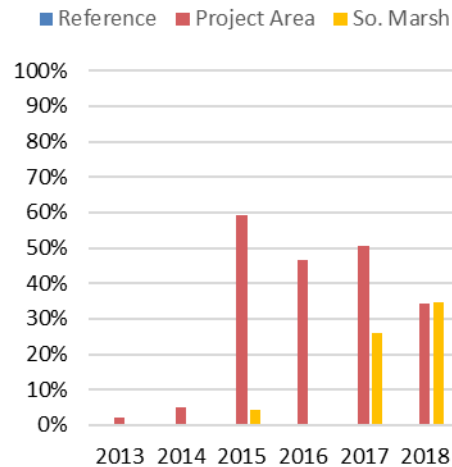


Cover class at South Marsh (St. 11-12)

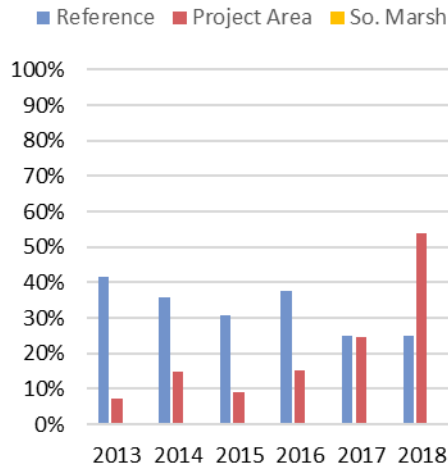


Distribution within plots

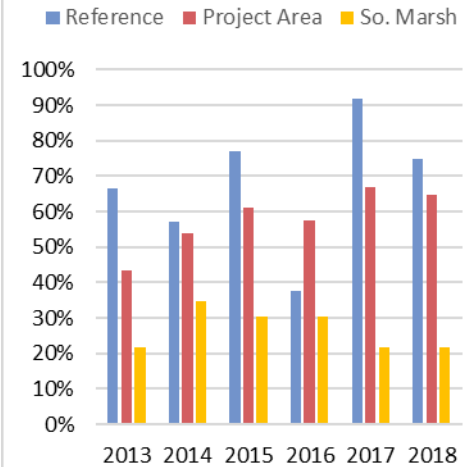
Salicornia depressa



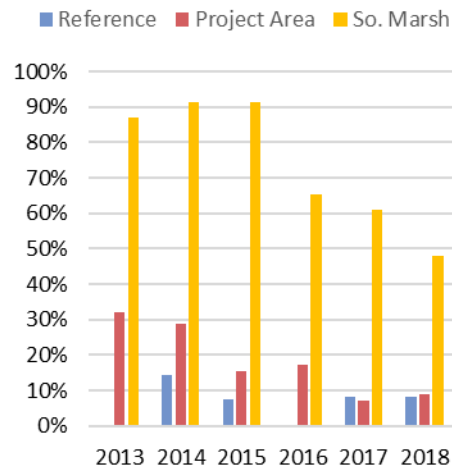
Spartina alterniflora



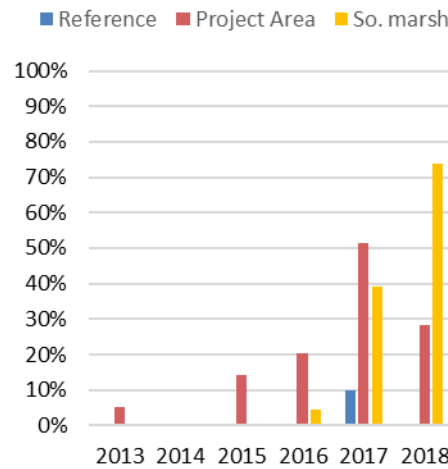
Spartina patens



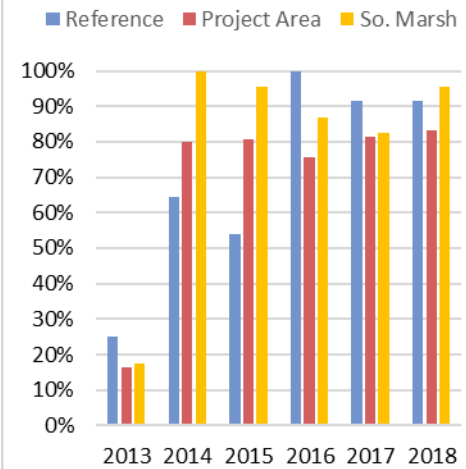
Typha spp.



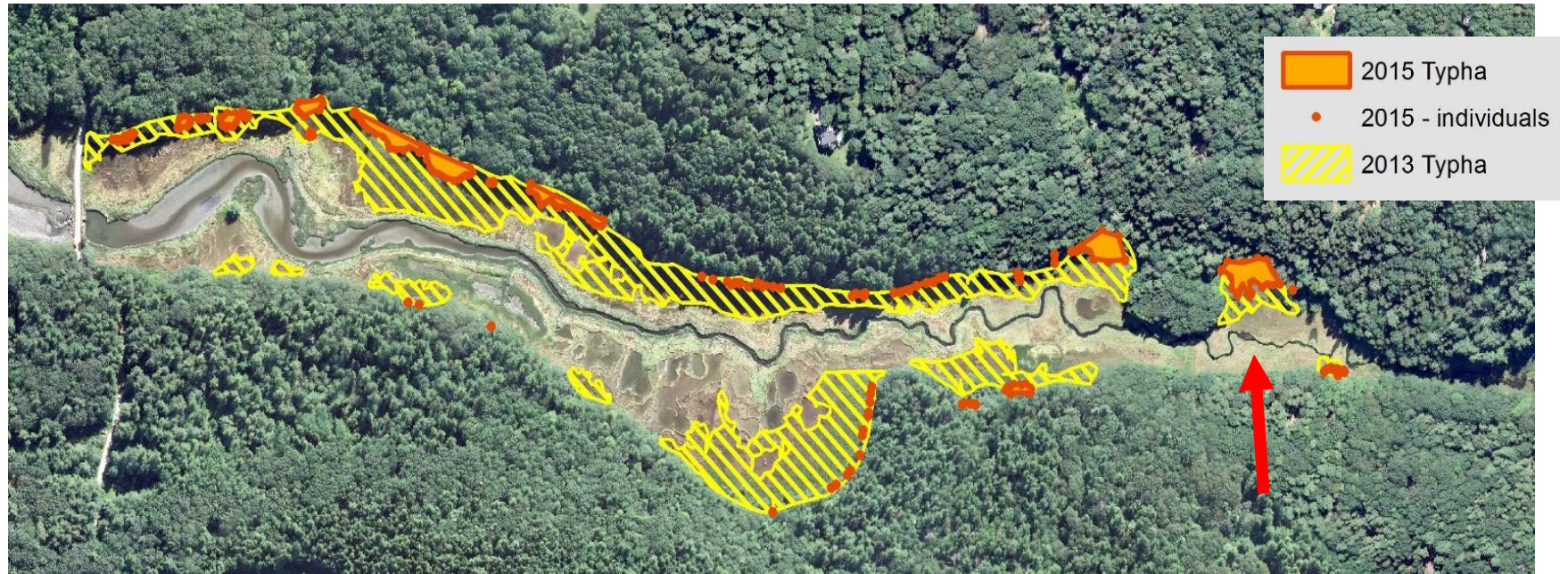
Standing water



Litter

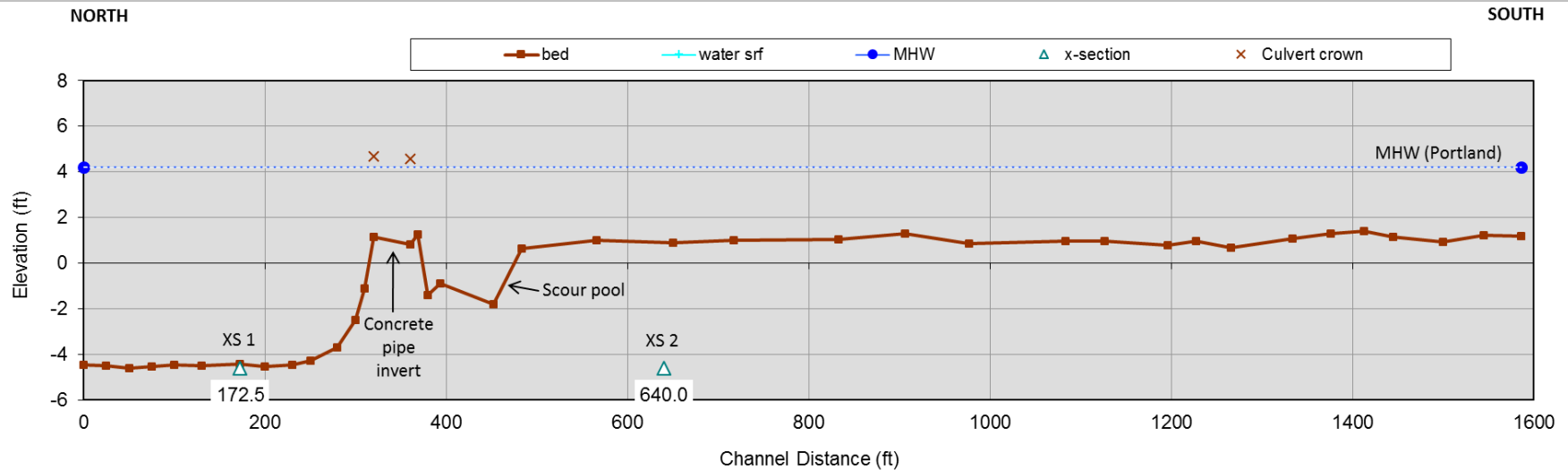


Typha spp.

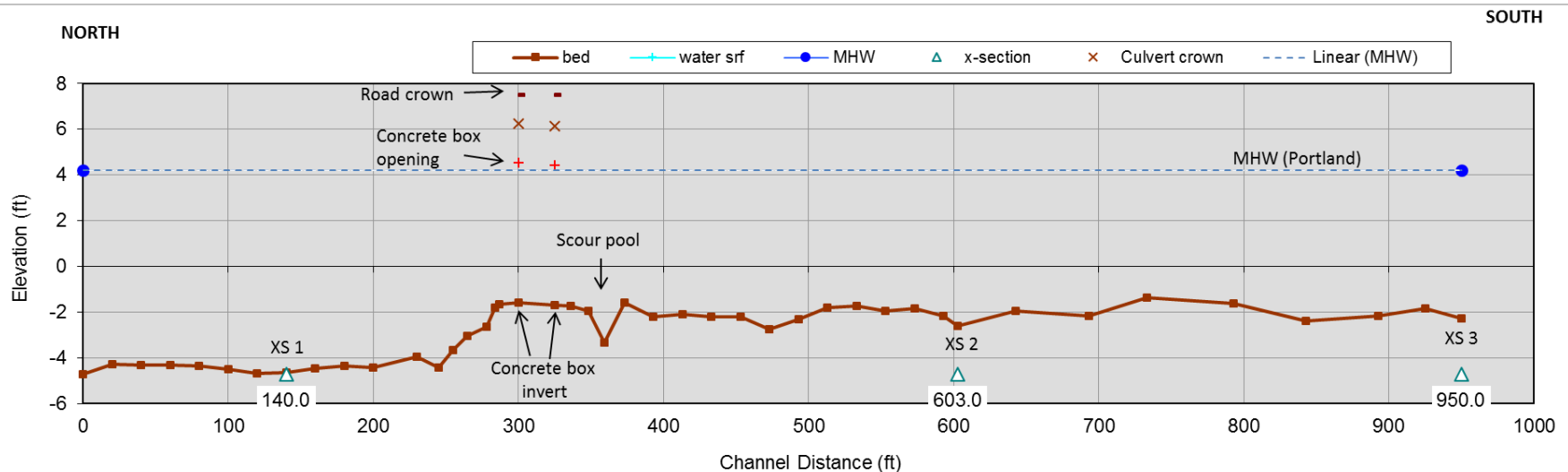


Channel morphology: longitudinal profile

PRE



2018

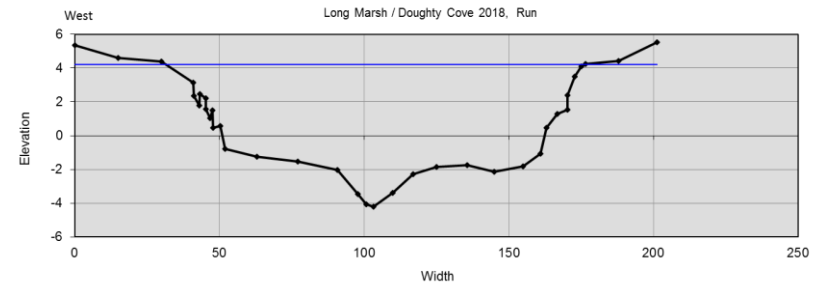
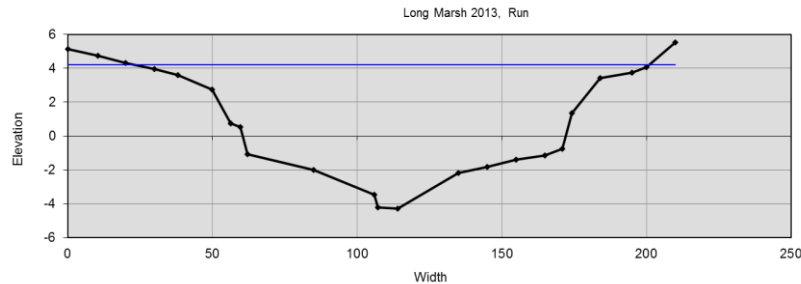


Channel morphology: cross sections

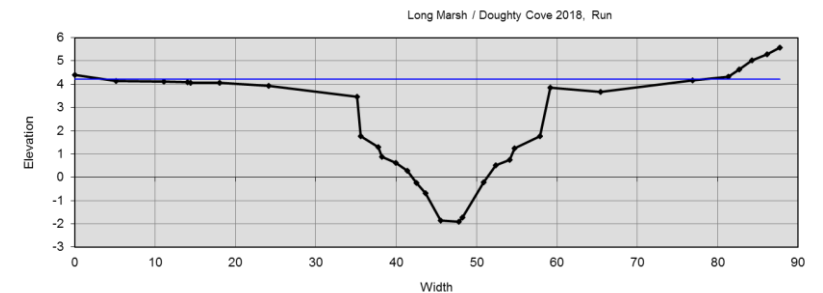
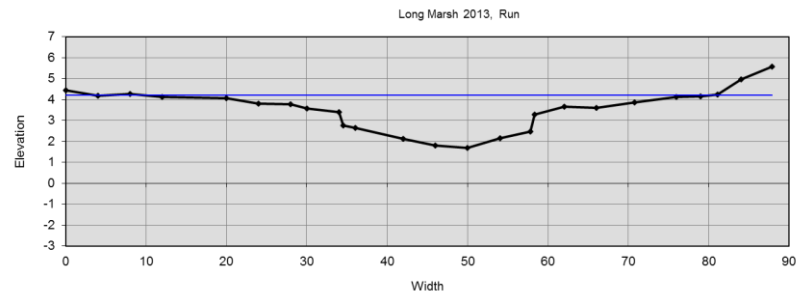
PRE

2018

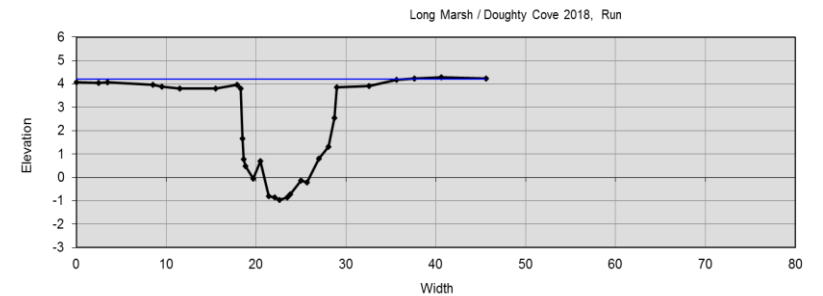
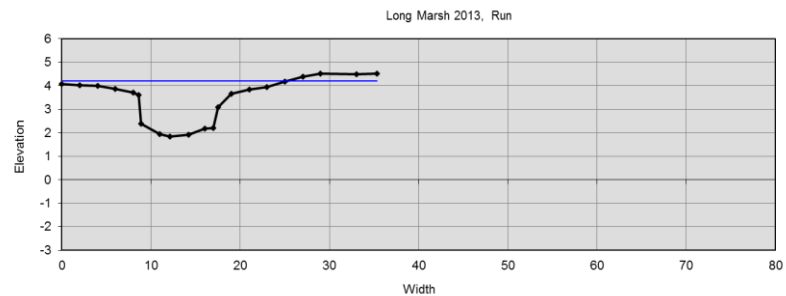
REF



ST. 4

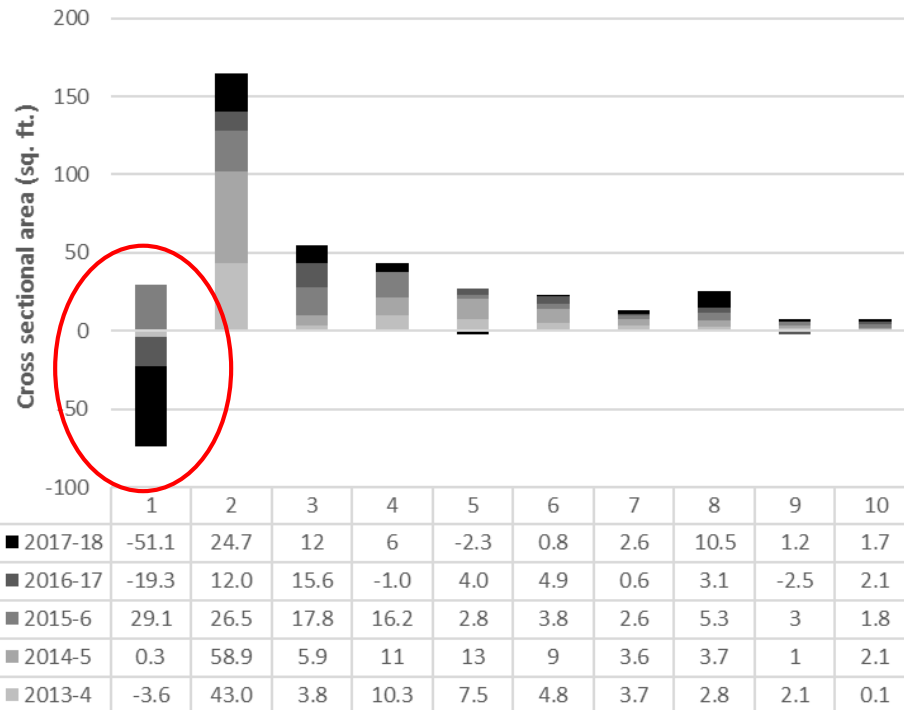


ST. 8

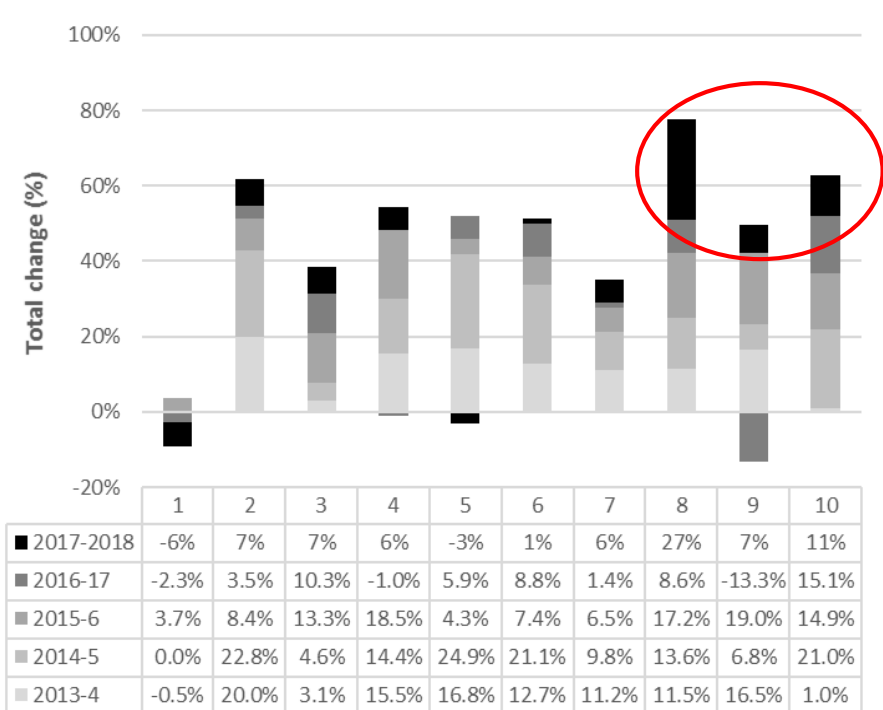


Channel morphology: cross sectional area

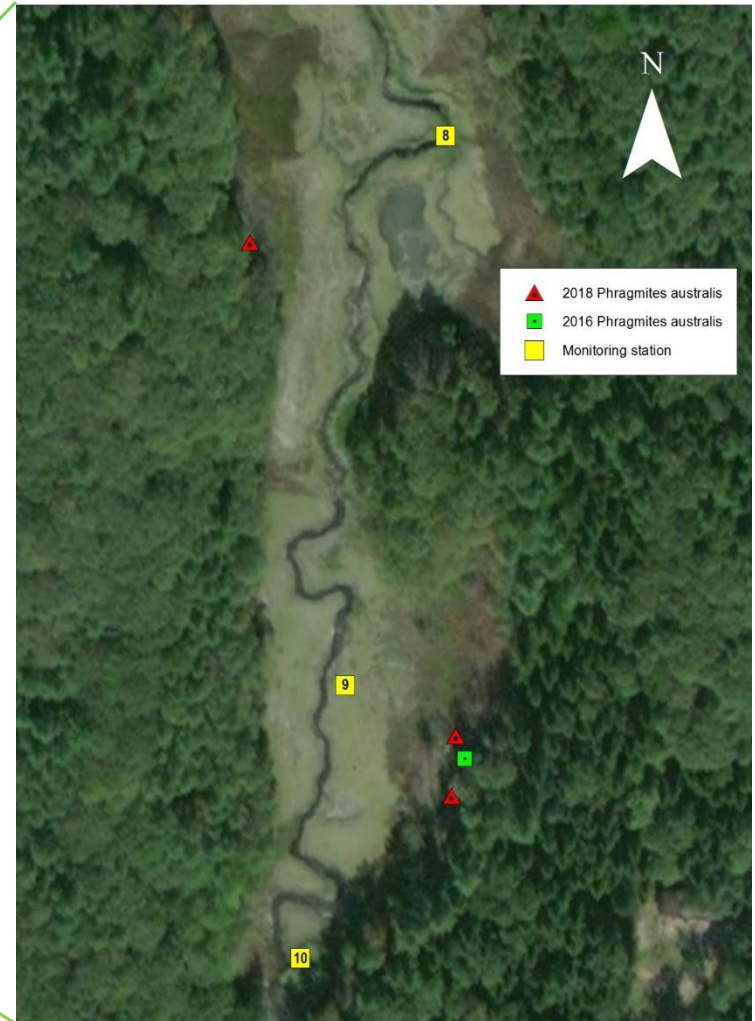
Year-to-year gross change in cross sectional area



Year-to-year % change in cross sectional area



Invasive plants – *Phragmites*



Learning...

- Will continue monitoring for *Phragmites australis*
- Periodic sampling for subset of parameters

Suggest:

- Extend vegetation transects further into upland
- 5 years enough?
- Sediment deposition – how to capture
- What did we miss by not monitoring birds, nekton, *Phragmites*, surface elevations, etc.
- Sentinel site / reference site

2019

- Year 5/5 post-project monitoring at Wallace Shore Road in Harpswell
- Assessment at prospective restoration sites in Phippsburg, Cape Elizabeth
- Continuous water level monitoring
 - Cousins River (6 instruments)
 - Mast Landing, Freeport (4 instruments)
- Living shorelines demonstration sites
 - Two in Maquoit Bay, and a 3rd at Lanes Island