

Long-term Monitoring of Salt Marsh Vegetation: A Twelve-Year Summary

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INTRODUCTION

- Salt marshes are important ecosystems that provide numerous ecosystem services such as flood protection, pollutant remediation and cultural value.
- The edges of salt marshes are hot spots for nekton movement and nutrient cycling.
- GTMNERR has been conducting monitoring of emergent intertidal vegetation throughout the reserve since 2012.
- The goal of this monitoring is to document ecological characteristics and discern the impacts of local and global environmental changes on the estuarine ecosystem.

METHODS

- Three marsh monitoring platforms are established at six sites within the reserve (Figure 1).
- 1-m² plots off each platform are placed 0, 6 and 10 m from tidal creek edges, totaling five plots per platform (Figure 2) and 15 plots per site.
- Percent cover and canopy height are measured for each species within each 1-m² plot.
- Stem density is measured using a 0.0625-m² subplot in two of the five plots at each marsh monitoring platform.
- Plots have been monitored biannually (fall and spring) between 2012-2022 and are now visited annually in the fall.

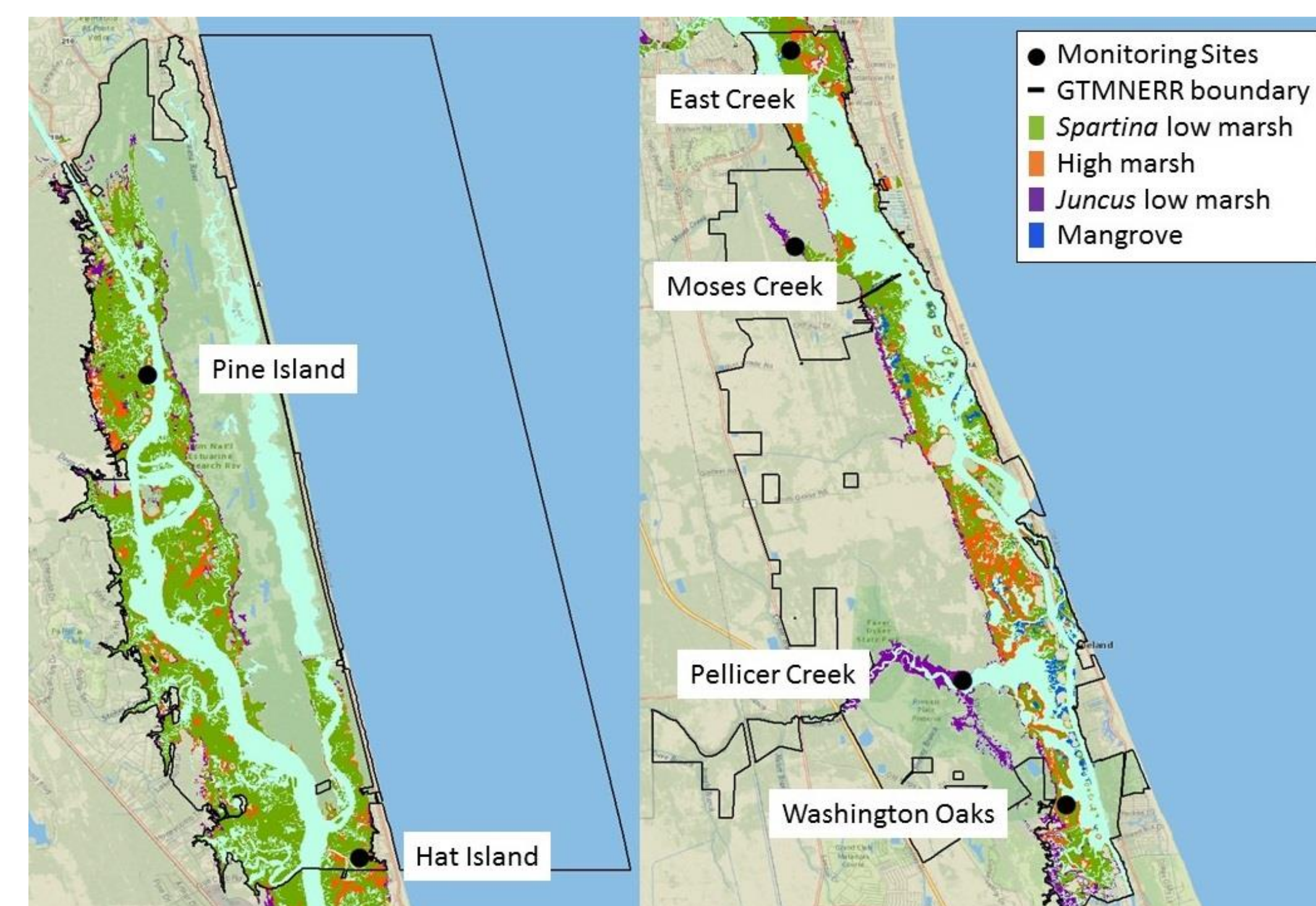


Figure 1: Locations of the marsh monitoring sites and dominant vegetation types within the GTM Research Reserve. Sites on the left panel are north of the sites on the right panel.

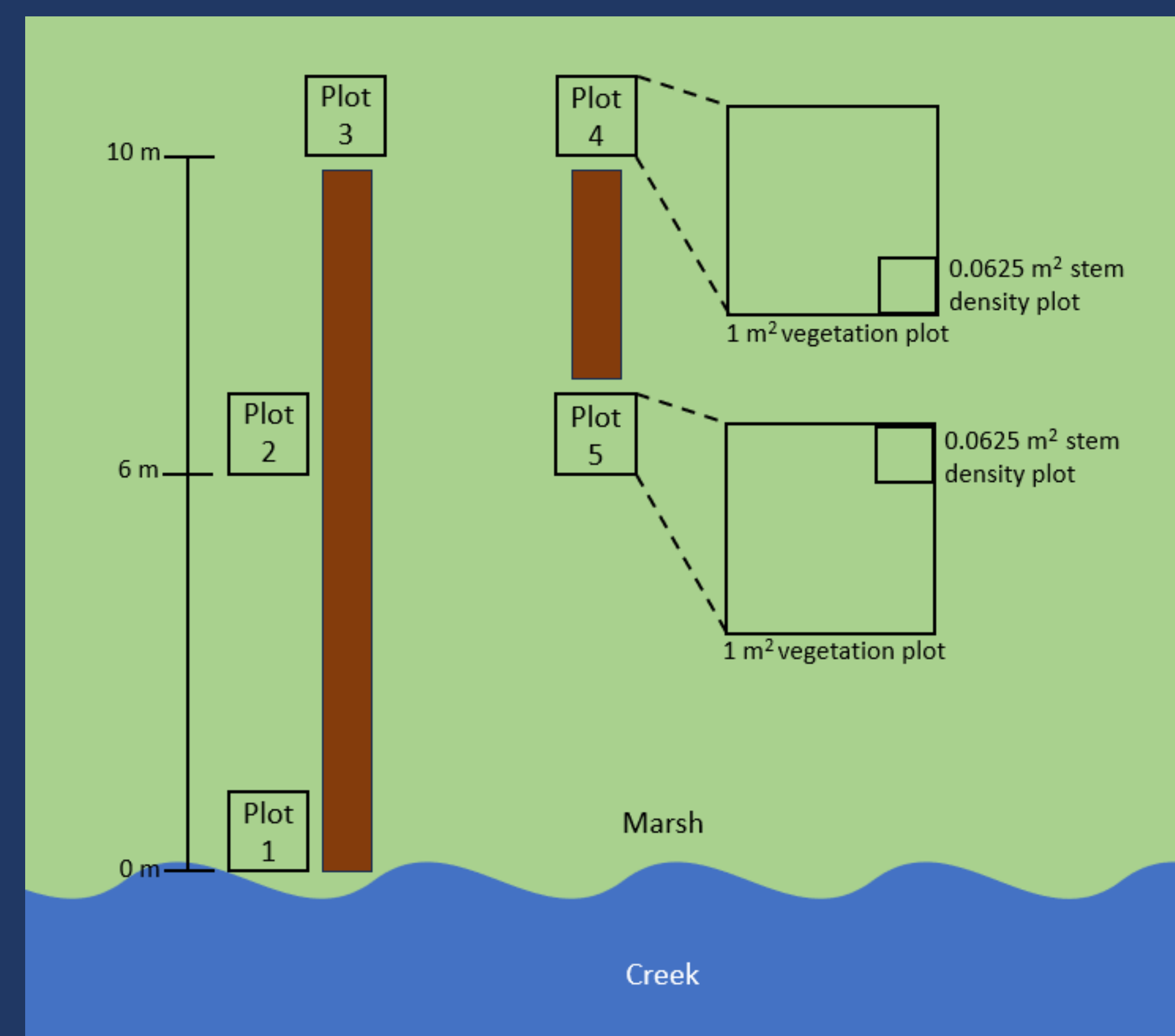


Figure 2: Diagram of a vegetation monitoring platform showing vegetation plots at 0, 6 and 10 m. Vegetation plots 4 and 5 contain 0.0625-m² subplots for stem density measurements.

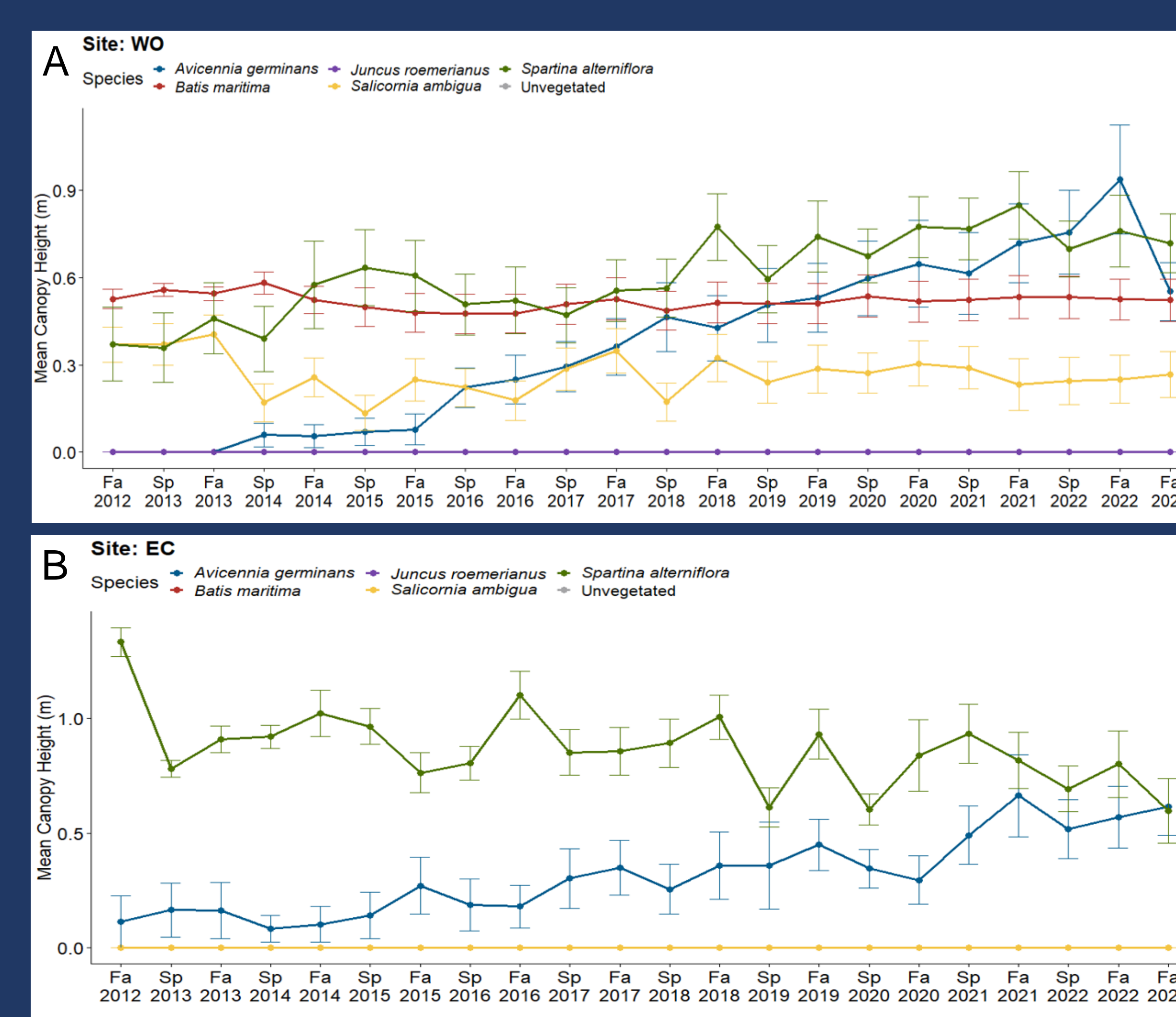


Figure 3: Mean canopy height of salt marsh vegetation species from 2012 - 2023 at A) Washington Oaks (WO) and B) East Creek (EC) sites.

A. germinans is increasing in cover and height at two sites, potentially outcompeting *S. alterniflora* at East Creek, but stimulating *S. alterniflora* growth at Washington Oaks.

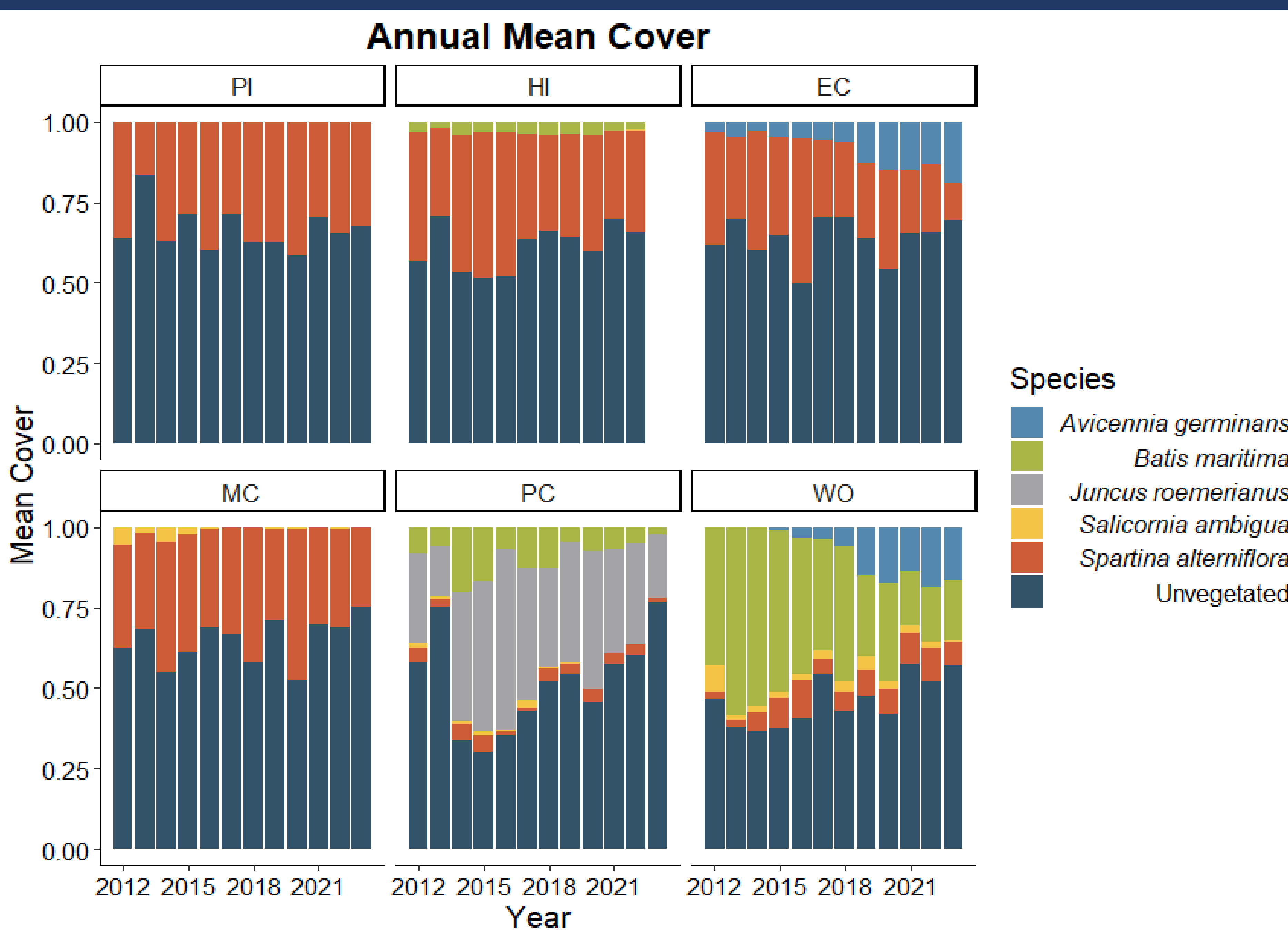


Figure 4: Annual mean proportion of cover for each plant species and unvegetated area from 2012-2023. Site abbreviations: PI = Pine Island, HI = Hat Island, EC = East Creek, MC = Moses Creek, PC = Pellicer Creek, and WO = Washington Oaks.

RESULTS

- Avicennia germinans* increased in mean canopy height by an average of 0.46 m (2014-2023) at WO (Figure 3A) and an average of 0.46 m (2012-2023) at EC (Figure 3B).
- Percent cover of *A. germinans* increased by an average of 16.3% (2014-2023) and 15.8% (2012-2023) at the WO and EC sites, respectively (Figure 4).
- Mean canopy height of *Spartina alterniflora* decreased by an average of 0.73 m at EC (Figure 3B) and increased by an average of 0.35 m at WO between 2012-2023 (Figure 3A).
- Percent cover of *S. alterniflora* has decreased by 24% at EC and increased by 4% at WO (Figure 4).
- Batis maritima* percent cover has decreased by 57% at WO (Figure 4).
- Salicornia ambigua* percent cover has decreased by 99% at MC (Figure 4).

WHAT CAN WE LEARN FROM THIS?

- Vegetation at the edges of marshes in the GTM estuary has been relatively stable over time, except where mangroves are establishing.
- Plant height and cover surrounding growing mangroves have changed in different directions at different sites.
- Establishing trends from long-term monitoring can help identify the needs for future restoration, research and management.
- Next steps include the incorporation of elevation data and further statistical analyses.



Vegetation plot from WO containing: *A. germinans*, *S. alterniflora* and *B. maritima*.



GTM Biologist Jacob Berna measuring canopy height.

