Characterizing biogeochemical shifts in two shrub encroached marshes under different historical disturbance regimes in the St. Johns River, FL

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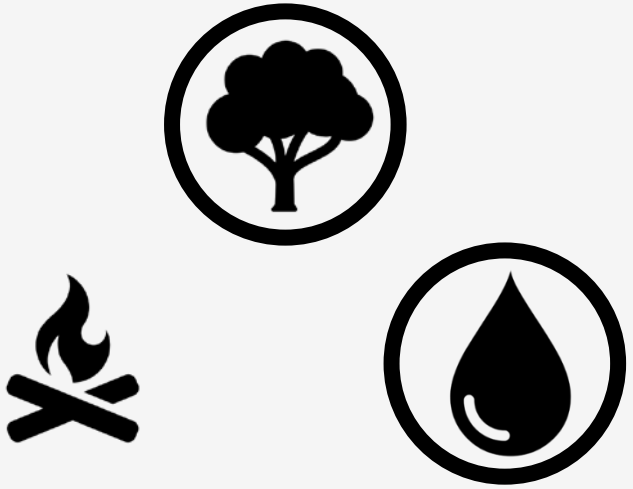
Wetlands act as valuable carbon (C) sinks.

Atmospheric CO_2 levels are rising.

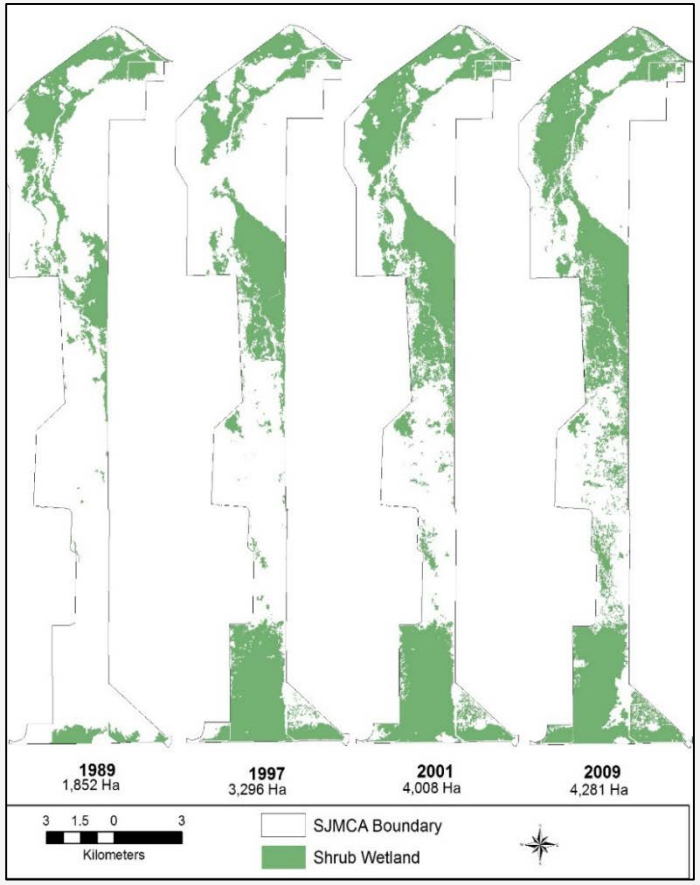
Wetlands store 1/3 of global soil C[1].



Wetland management may alter soil C storage.

[1] The Economics of Ecosystem and Biodiversity for Wetland Loss

Shrub Encroachment in the St. Johns River Watershed



- Coastal plain willow (*Salix caroliniana* Michx.)
- Willow management
  - Greater evapotranspiration rates
  - Altered habitats
  - Abiotic processes
- Knowledge gap on C storage


Do willow-encroached marshes store as much C as non-encroached marshes?
Litter C
Soil C

Study Design

- Stratified random design
  - 3 plot types
  - 5 of each plot type (n=5)

Study Regions* – Moccasin Island & Lake Apopka

Concurrently willow-shrub encroached since 1970s.

	Moccasin Island
Disturbance	Hydrological alterations
Current Vegetation	Sawgrass & willow shrub
Hydroperiod	Seasonal (Aug – Dec)

** No direct statistical comparisons were made between regions*

Methodology

Litter C storage

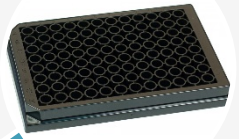
Litter bag experiment (4-month)

Δ mass, total C, and lignin

Soil C storage

Total C content

CO_2 & CH_4 production



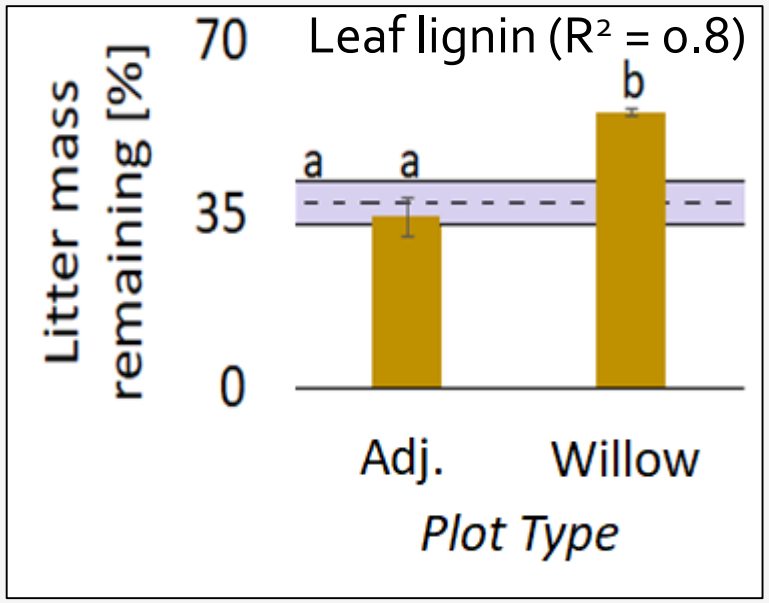
Enzyme activity

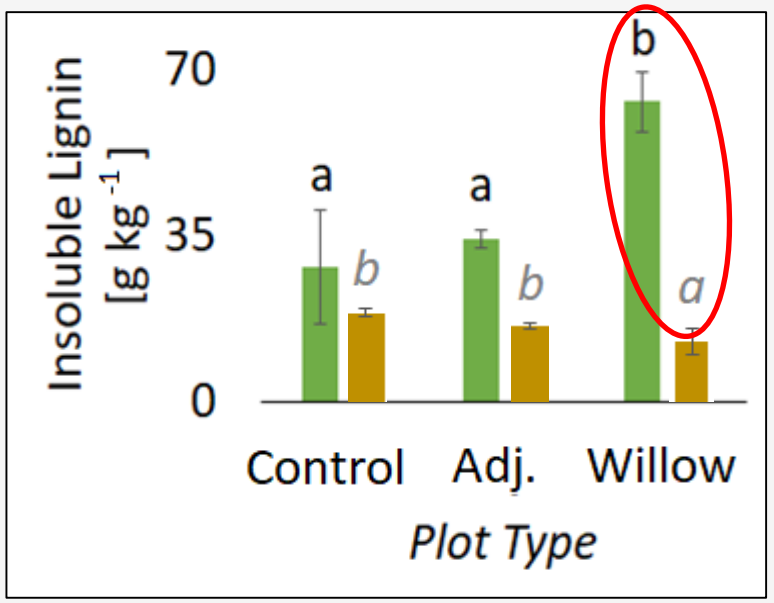
Statistical Analyses

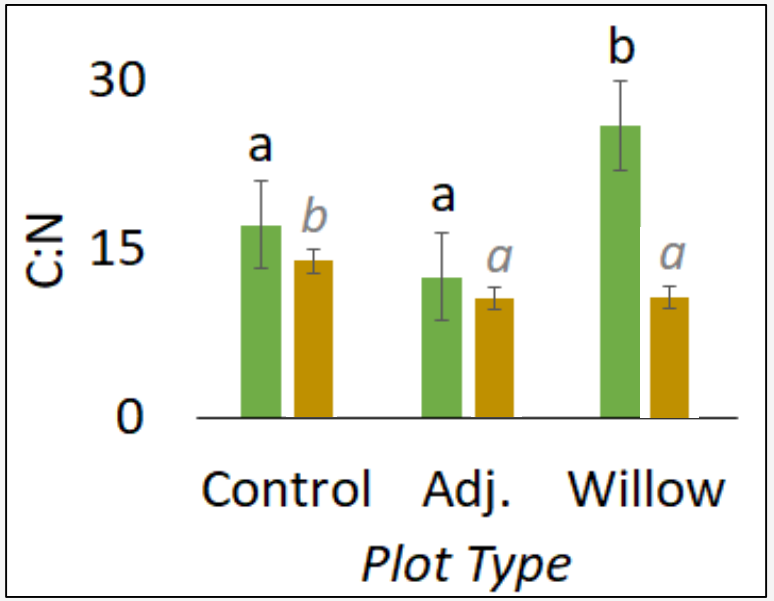
- Independently for each region
- One-way ANOVA (plot type)

Litter C Storage

4-month mass decay





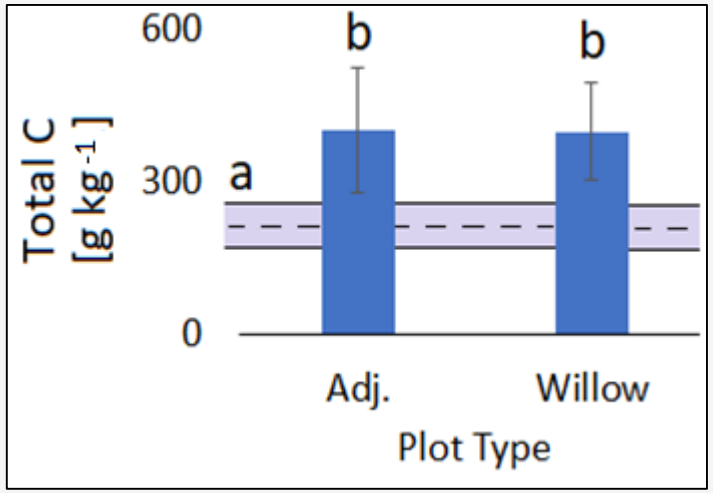


Initial Leaf Tissue 4-month Litter

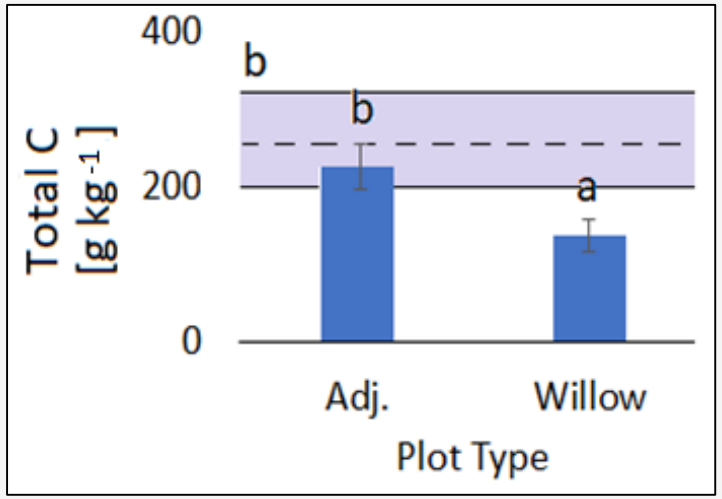
↑ *short-term litter C storage for <u>both</u> regions*

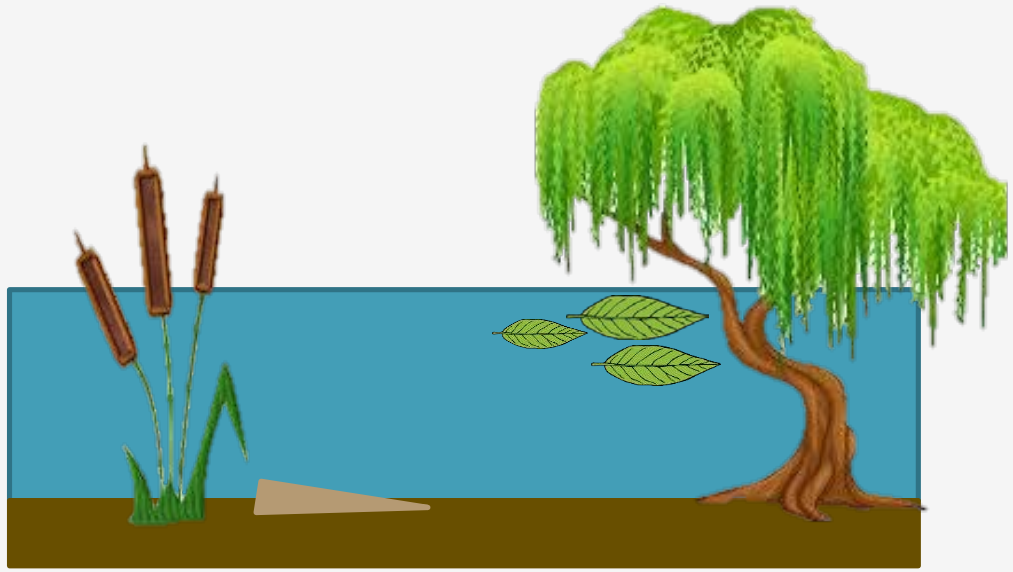
Soil C Results

Moccasin Island



Lake Apopka



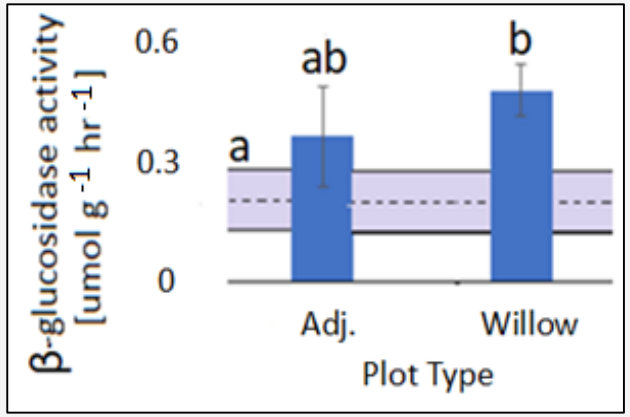


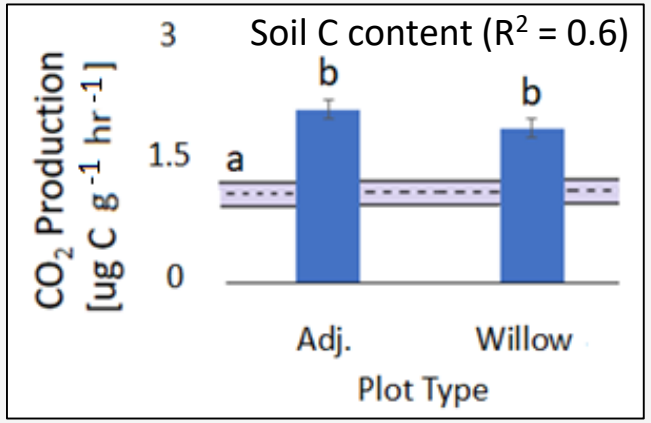
Adj. Willow

Hydrological differences between regions may alter soil C storage potential

Soil C Cycling

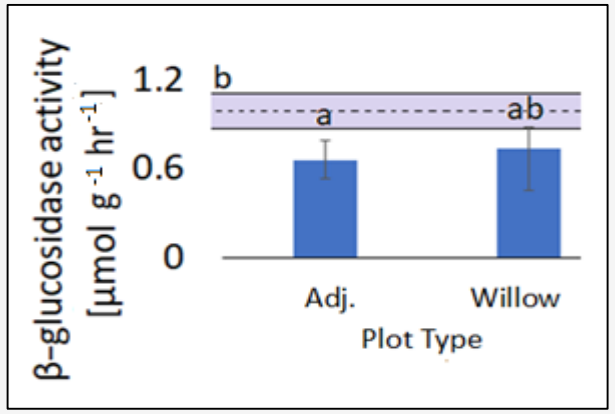
Moccasin Island

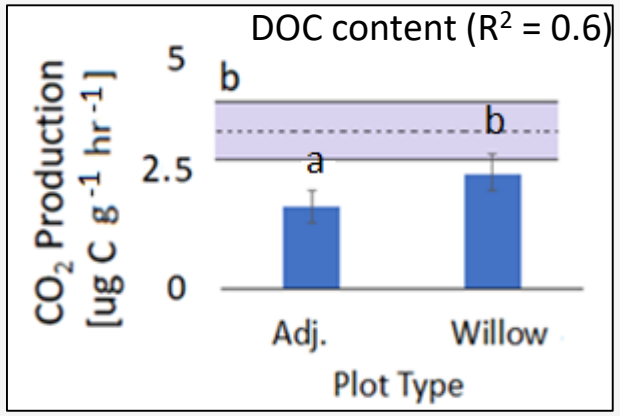




↑ soil C cycling in willow and/or adj. marsh plots

Lake Apopka





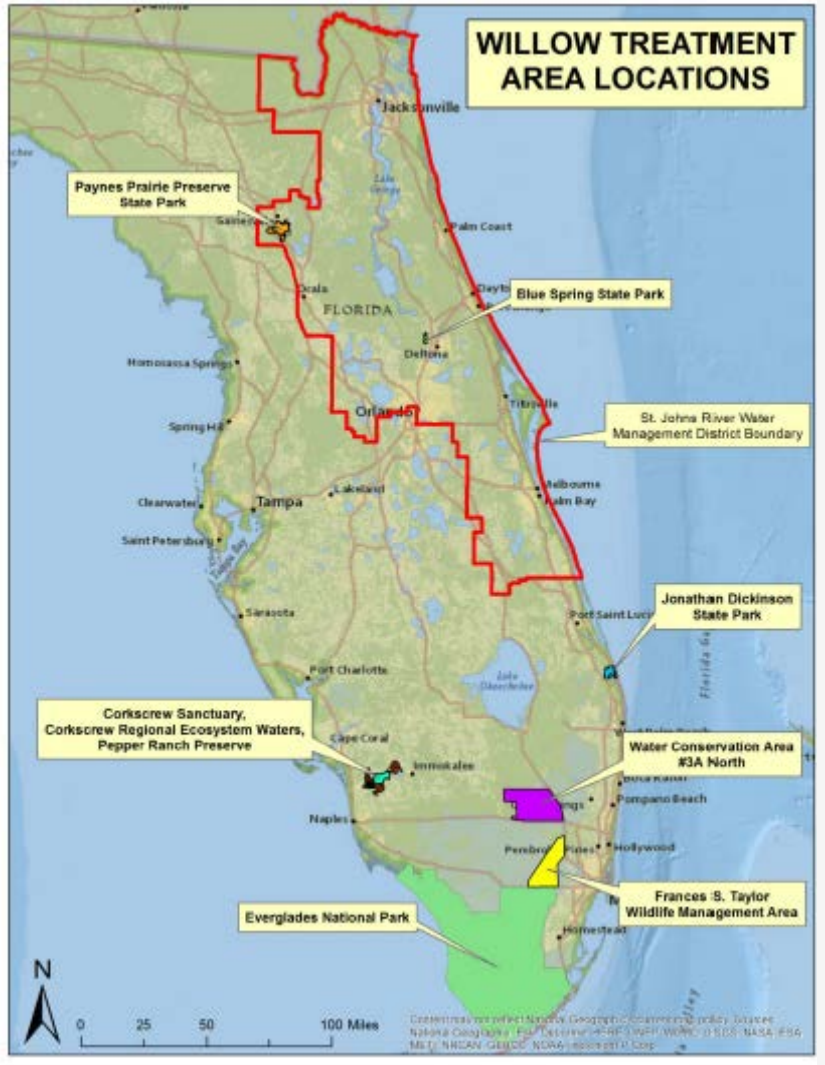
↓ soil C cycling in adj. marsh plots

Summary

- C storage differences in willow-encroached marshes
  - ↑ litter C storage in willow plots
  - Soil C storage dependent upon region
- Foundation for future studies
  - Litter transport
  - Long-term decomposition/mixed litter

Management Implications

- Better informed management decisions
- Currently investing resources into willow removal
- Management plans specific to desired functions



Acknowledgements

UCF COASTAL
NATIONAL CENTER FOR INTEGRATED COASTAL RESEARCH

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