VARIATION IN BELOWGROUND FUNCTIONAL TRAITS OF HERBACEOUS PLANT SPECIES ALONG THE MARL PRAIRIE-SLOUGH GRADIENT IN THE EVERGLADES

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BACKGROUND

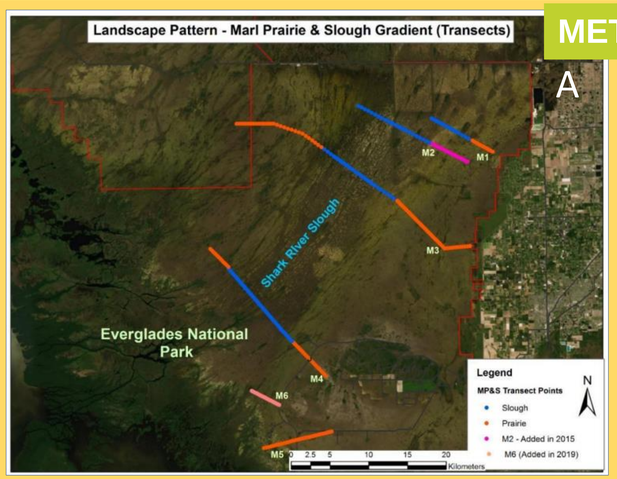
Functional plant traits have been used to characterize differences in resource use pattern among species within and across communities, and understand how environmental drivers and stressors restrict trait distributions across landscapes. Some of the expectations about the distribution of functional traits underpins the economic tradeoffs between traits associated with growth and stress tolerance. Although these tradeoffs are largely based on foliar and stem observations, a root economic spectrum (RES) is also expected to provide a framework explaining differences in belowground investment strategies among plant taxa. **Under the RES, the fine roots, which are responsible for absorbing nutrients and water and interacting with soil biota, usually follow a gradient in trait characteristics ranging from fast foraging with shorter lifespan (acquisitive strategy) to slow foraging with longer lifespan (conservative strategy)**. However, the majority of these trait relationships with the environment are based on relatively few species and most have not been replicated along environmental gradients and soil types.

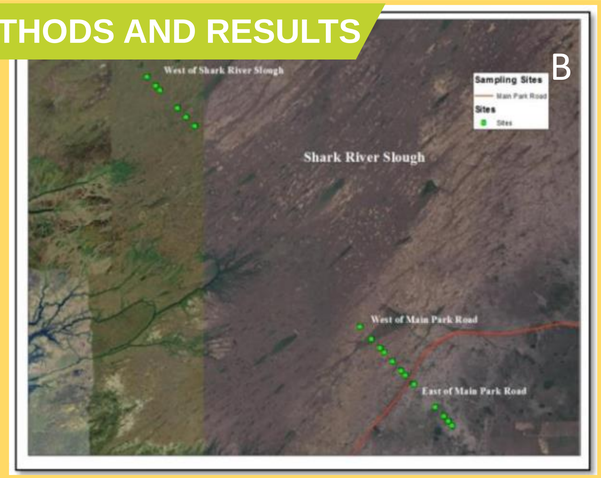
RESEARCH QUESTIONS & HYPOTHESIS

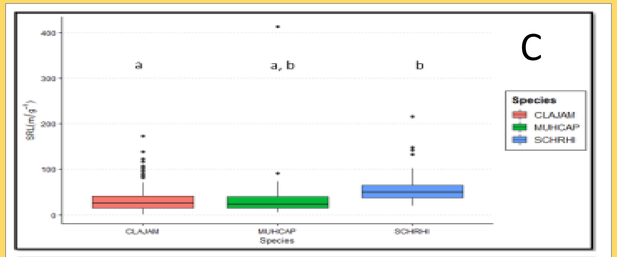
- **Do the root functional traits vary within and among the freshwater herbaceous species along hydrologic and soil gradients? If so, is there a trade-off in fine and transport root characteristics in these species along the gradients?**
  - In the relatively long hydroperiod portion of the gradient, ridge and slough plant communities will have root traits associated with high productivity and resource availability (i.e., high SRL, RLD, root N and P content, but low root diameter, C:N and lignin content). However, in the shorter hydroperiod portion of the gradient, where marl prairie plant communities are present, traits associated with resource conservation (i.e., low SRL, RLD, root N and P content, but high root diameter, C:N, lignin content) as a result of lower resource availability, will be more frequent.

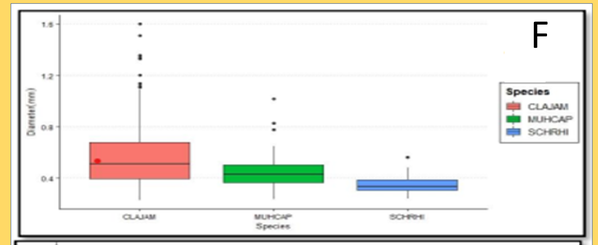
- **Do the fine and course root morphology and chemistry of freshwater herbaceous plant species vary with soil depth along the hydrologic gradients within and across the marl prairie and R&S landscapes?**
  - Roots from shallow soils will present a suite of FP attributes related with greater resource acquisition capabilities (e.g., high SRL, root nitrogen, and phosphorus, and low root diameter, carbon, and cellulose and lignin). In contrast, the roots in deep soils will have FP attributes more representative of conservative strategies.

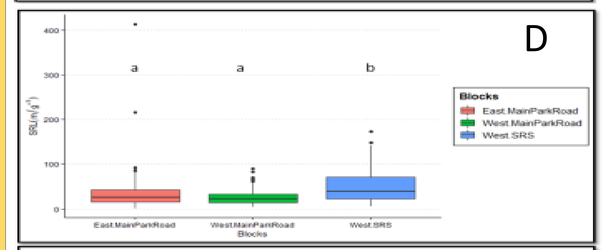
METHODS AND RESULTS

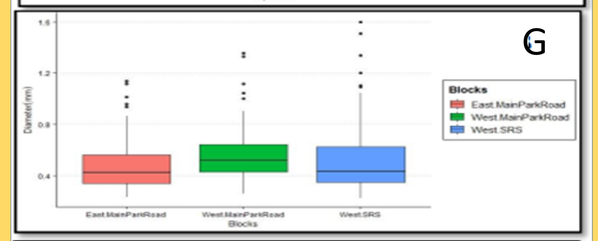


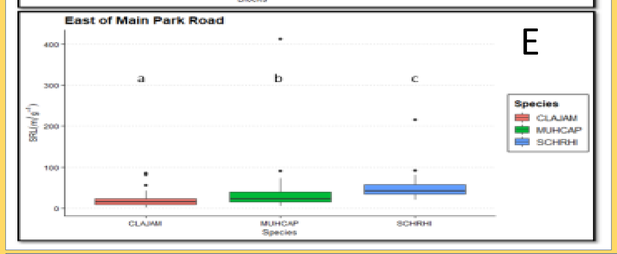


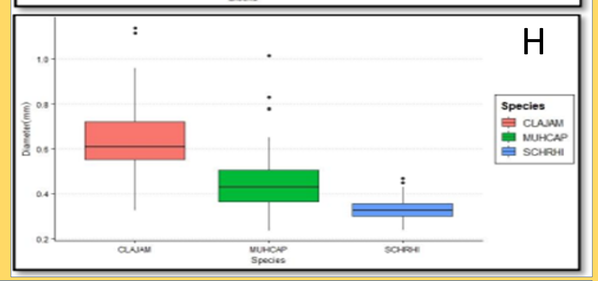












A) Marl prairie (MAP) & slough gradient, with all 6 transects; **B)** MAP transect 4 sites used for pilot study; **C)** Specific root length (**SRL**) among *Cladium jamaicense* (**CLAJAM**), *Muhlenbergia capillaris* (**MUHCAP**), *Schizachyrium rhizobium* (**SCHRHI**); D) **SRL** of all three species among hydrologic blocks; E) **SRL** of among all three species in east of Main Park Road; F) Diameter (**Dm**) among **CLAJAM, MUHCAP, SCHRHI**, G) **Dm** of all three species among hydrologic block; H) **Dm** of among all three species in east of Main Park Road

BROADER IMPACTS

The majority of studies conducted using the RES as a framework tend to be used to investigate root traits of woody plant species, and typically in temperate regions. Using the RES in a restoration scope to capture changes in root traits at the species and community level in a subtropical wetland would be a major advancement in ecology. In this connection, long term ecological monitoring program has been an essential tool in evaluating the results of restoration efforts in the field and in expanding our knowledge of how plant community changes influence wetland ecosystem processes. However, most of this research and monitoring has focused on aboveground plant traits, whereas it is becoming clear that root traits are also important indicators of changes in plants' morphological adaptations to the changes in local environment.

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