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A Baseline Study of Edaphic Characteristics, Vegetation Structure, and Recruitment of Native Baldcypress (Taxodium distichum (L). Rich. Var. distichum) in the Newly Restored Wetland of the VCU Rice Rivers Center

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Background and Introduction

In theory, the ideal of ecological restoration is to reestablish a completely functioning ecosystem, however restoration success is often elusive (Stanturf et al. 2001). There is a significant gap in the current research on the impacts of restoration management of restored wetlands on ecosystem functions, especially biogeochemical cycling (Bernal & Mitsch 2013). Furthermore, there are many questions about management techniques when it comes to ecological engineering versus self-design (Bernal & Mitsch, 2013). However, we do know that it is critical to understand the species' life history, habitat template, and spatio temporal scope when attempting to re-establish populations (Lake et al. 2007). Since resources for conservation and restoration of wetlands are limiting there is a great need to fully understand both the biogeochemical cycling and life history strategies of recruitment and population expansion of target wetland species in restored wetlands in order to have the best chance of restoration success (Mitsch & Gosselink 2007).

Objectives

- Gather baseline data to elucidate spatial variations in edaphic characteristics and vegetation community structure.
- Establish current population characteristics to understand the life history strategies (dispersal/expansion) of the target wetland species, baldcypress (*Taxodium distichum)* .

Methods

<u>Baldcypress Study</u>

- Georeferenced and flagged all baldcypress specimens
- Measured DBH (Diameter at Breast Height) and height of each specimen

<u>Soil and Vegetation Study</u>

- Established 51 permanent monitoring plots Fall 2014
- Conducted vegetation survey identifying each species with associated % coverage for each stratum (herbaceous, sapling-shrub, tree) in every plot
- Gathered a soil core sample in each plot and collected samples in Harris Creek wetland, and river-side of dam. Gathered pH, mV, temperature, color, and texture in the field

Results

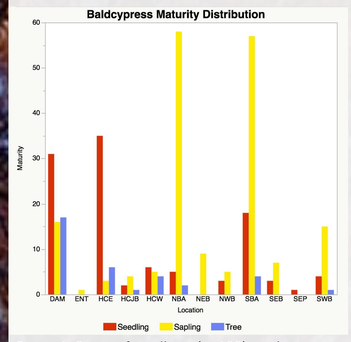


Figure 1. Count of seedlings (n=108), saplings (n=180), and trees (n=35) found within each region of the wetland. (N=323)

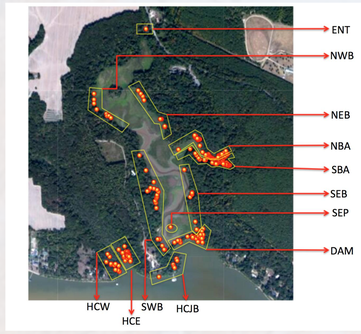


Figure 2. Locations of all individual baldcypress specimens with designated regions.

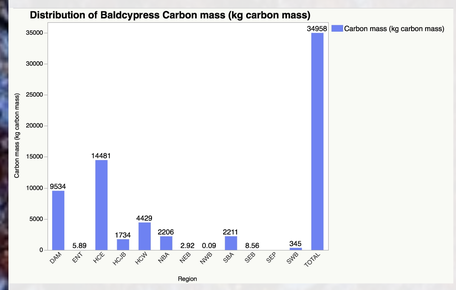


Figure 3. Above Ground Biomass of baldcypress.

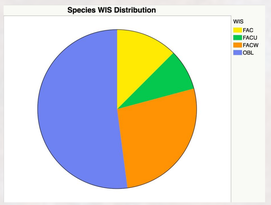
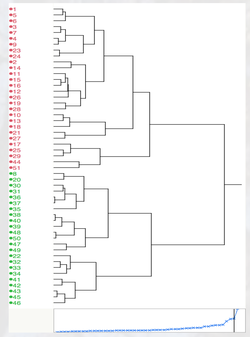


Figure 3. Distribution of total species Wetland Indicator Status (WIS). OBL= Obligate, FACW= Facultative wet, FAC= Facultative, FACU= Facultative upland



Conclusion

-All regions north of the arm contained fewer than 10 total specimens, potentially because the northern half of the wetland transitions from tidal to non-tidal, which would inhibit the baldcypress' ability to disperse seeds via hydochory.
The majority of seedlings found in HCE died before the end of the field season (August 2014), potentially due to over-flooding, underground competition with the heavy herbaceous layer, and lack of light for photosynthesis due to the lush canopy.
The seedling in SEP is important because it shows that this baldcypress population is capable of naturally inhabiting not only the perimeter of the wetland, but also within the central substrate of the wetland that was originally forested.

Future Work

This study serves as baseline data for the long-term research project monitoring the restoration progress. The soil samples collected in this study from the 51 monitoring plots will be analyzed for organic matter and carbon content and new samples will be collected on an annual basis. Vegetation surveys of the 51 plots will also continue to be conducted annually . This will allow for future studies to observe and measure not only spatial but temporal variations in: edaphic characteristics, carbon dynamics, vegetation community structure, growth and dispersal patterns of a target restoration species (baldcypress). This will also give a platform to observe the impacts of restoration management strategies, such as ecological engineering vs. self-design.

Acknowledgements

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