Ecological Site Description of Yellow Sand Xeric Uplands in Central Florida: Soil-Site models and Site concepts

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INTRODUCTION

First, we created a Soil-Ecological Site (ES) model of vegetation and succession on very deep, excessively drained sands in Central Florida. Second, we developed a State and Transition Model (STM) for one focal ES: the *Yellow Sands Xeric Uplands* of MLRA 154.

1) We modeled correlations of "Reference Site plant communities" with soil attributes. For this, we compared distributions and composition of natural communities as defined by the Florida Natural Areas Inventory (FNAI) with distribution of SSURGO map units.

2) We used ***existing site specific data*** to create an initial working soil-ES model for the Ocala National Forest (ONF)

3) We validated the model for xeric uplands of Central Florida via "integrated" field sampling (soils and vegetation) and field reconnaissance.

METHODS

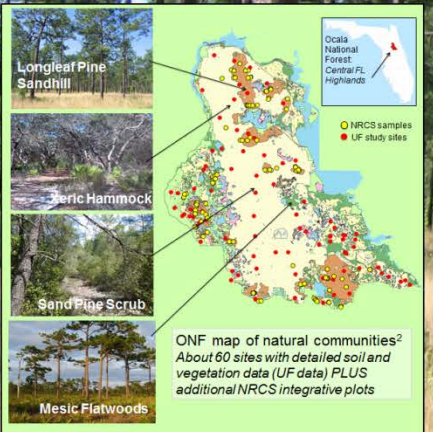
Focal area: Central Florida xeric communities of Ocala National Forest (ONF): *Longleaf Pine Sandhill*, *Sand Pine Scrub*, *Xeric Hammock*, *Scrubby* and *Mesic Flatwoods*.

Model of soil-ES relationships for ONF uplands:
Existing data: Forest Service vegetation maps, SSURGO data, ONF fire history, historical imagery

Used data from a site specific study of ONF soils and vegetation from the 1990's[1]. These included detailed soil pedon descriptions and soil physical and chemical properties.

Developed quantitative models of how ***natural vegetation*** is correlated to ***specific soil properties.***

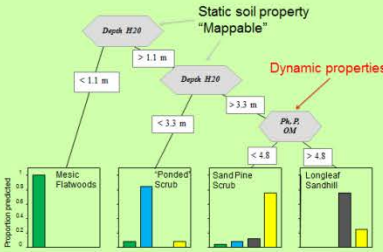
STUDY SITE: OCALA NATIONAL FOREST



ONF map of natural communities[2]
About 60 sites with detailed soil and vegetation data (UF data) PLUS additional NRCS integrative plots

RESULTS

ONF: Soil-ES model with site specific soil attribute data



Numerical models:

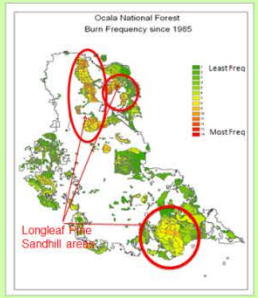
Selected the "best" soil attribute predictors of natural community occurrence

The ***soil property*** "depth to water table" best segregated the flatwoods and "ponded scrubs" (on spodosols) from Sandhill and Sand pine scrub: a "mapped" soil property

However, ***dynamic soil properties*** distinguished Sandhill from Sand Pine Scrub

Two very different natural communities occur on the SAME soil series in ONF:
Astatula Sand

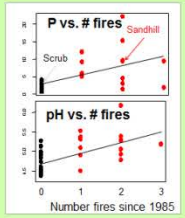
ONLY differ in Dynamic soil properties *(Ex. Organic matter. Each phase has OM and surface colors within the defined series range).*



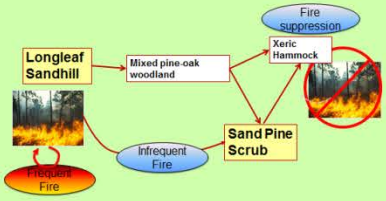
We examined recent ONF fire history data:

Longleaf Pine Sandhills are frequently burned (circled)

Sand Pine Scrub areas are not



DYNAMIC soil properties that distinguish *SANDHILL* from *SCRUB* are correlated with *FIRE* frequency

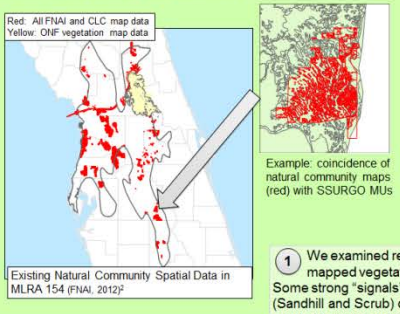


From our investigations, we verified the Natural Succession Model for ONF xeric uplands:

Fire and **Historical biogeography** are primary drivers of natural community distribution (NOT static soil properties)

Corroborated what the literature reported [3,4]

Our next question: Does the ONF Xeric Uplands ES concept apply to excessively drained sands throughout MLRA 154?

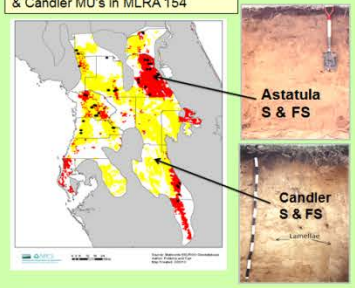


Example: coincidence of natural community maps (red) with SSURGO MUs

Number acres mapped Nat Comm by MU: MLRA 154

1 We examined relationships between MU's and mapped vegetation:
Some strong "signals", e.g. Xeric Upland communities (Sandhill and Scrub) on excessively drained yellow sands (Astatula and Candler series)

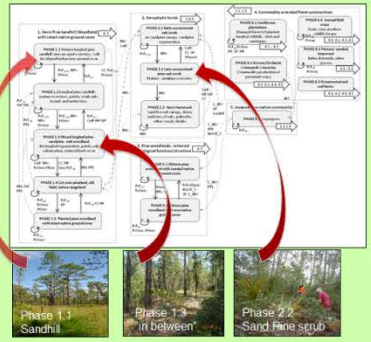
NRCS ESI Sample locations: Astatula & Candler MU's in MLRA 154



2 We hypothesized that the ONF Xeric Upland ES concept and successional model extended to other excessively drained yellow sands in MLRA 154

CANDLER map units: most of the Central FL Ridges

We found that CANDLER and ASTATULA map units can support **Sandhill** AND **Scrub** communities by validating soil series and natural communities



3 Finally, we assembled the FULL State and Transition model for the Yellow Sands Xeric Uplands of MLRA 154, with data to support the "reference site" conditions (Sandhill and Scrub), AND non-reference site phases

We identified the primary drivers of natural succession: e.g. *Fire*, *Grazing*, *Storm disturbances*

Through analysis of existing data, plus interdisciplinary field investigation, we identified a Ecological Site and STM which extends to a very large area in Central Florida (Draft version)

Acknowledgements:

USDA Forest Service, Ocala National Forest, Umatilla FL
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University of Florida-Soil and Water Sciences, Gainesville FL
USDA-Natural Resources Conservation Service, Gainesville FL

Literature Cited:

[1] Heuberger, D.C., R.J. Kuehl, M.E. Collins, B.H. Herring. 1997. Ecological Inventory of the Ocala National Forest: Summary Report Submitted to USDA-Forest Service. Unpublished Report, Soil and Water Science Department, University of Florida, Gainesville FL

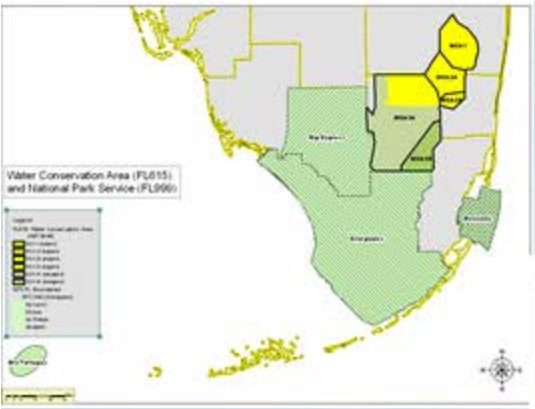
[2] Florida Natural Areas Inventory. 2010. Cooperative Land Cover Map, Florida's Wildlife Legacy Initiative Project 08009. Tallahassee, FL

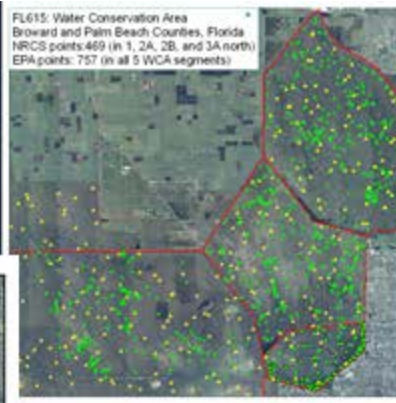
[3] Myers, R.L. 1985. Fire and the Dynamic Relationship between Florida Sandhill and Sand Pine Scrub Vegetation. Bull. Of the Torrey Botanical Club

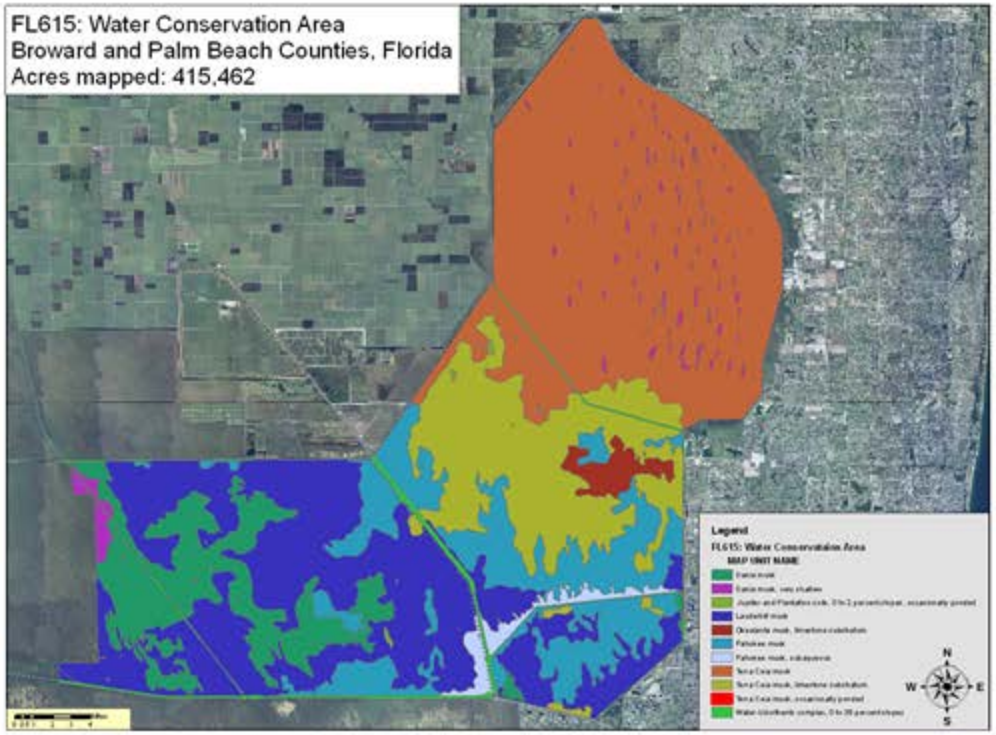
[4] Kalisz, P.J. and E.L. Stone. 1984. The Longleaf Pine Islands of the Ocala National Forest, Florida: A Soil Study. Ecology, 65: 1743-1754

Mapping the Northern Everglades: Water Conservation Areas 1, 2A, 2B, and 3A north

An initial soil mapping project on State lands administered by the South Florida Water Management District, it is also a cooperative effort between the SSRO-7 Regional Office, Florida State Office, and the University of Florida.







Mapping protocols:

- Establish sample point locations in the office using ortho-imagery and spectoral landform analysis.
- Use existing Environmental Protection Agency soil data points.
- Array investigative data points to fill in EPA data gaps.
- Investigate pre-defined sample points by navigating via airboat to each individual point.
- Collect pedon information at each point and correlate to the nearest series.
- Conduct in-office correlation and array the results in ArcGIS.
- Utilize ortho-imagery and point data to establish soil polygons.

NRCS Natural Resources Conservation Service

2013 National Cooperative Soil Survey