# Research Methods in Plant Evolutionary Biology: From Field to Museum to Molecular Lab

BOT 4935

University of Florida

Pam and Doug Soltis

# BOT 4935

***New Course Announcement ***

Research Methods in Plant Evolutionary Biology:
From Field to Museum to Molecular Lab

BOT 4935

*2 credits*

# Stimuli for the Class

- AIM-UP! Project
- Open Tree of Life Project
- iDigBio Project

# Building the Tree of Life

- Rough draft tree in 1 year for all 1.8 million described species
- Then becomes a community exercise
- Tools (incentives) to allow researchers to edit (annotate) portions of the tree
- Include fossils—"tree of life and death"
- Wikipedia-like, but many trees possible for a clade

Poster **Location:** Battelle South **Date:** Monday, July 9th, 2012 **Number:** PSY001 **Abstract ID:***1065*

OPEN Tree of Life
A community-assembledToL

# Digitizing all US Museum Collections

>1 billion specimens in US museums

>1600 collections in US

Label data, images, metadata

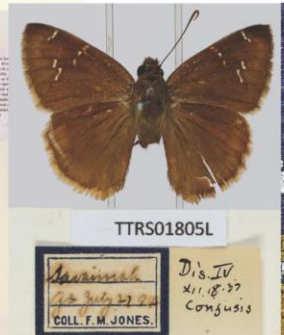
Integrated Digitized Biodiversity Collections:

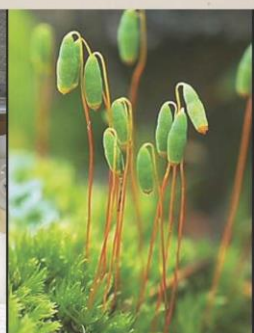
UF & FSU – national database

iDigBio

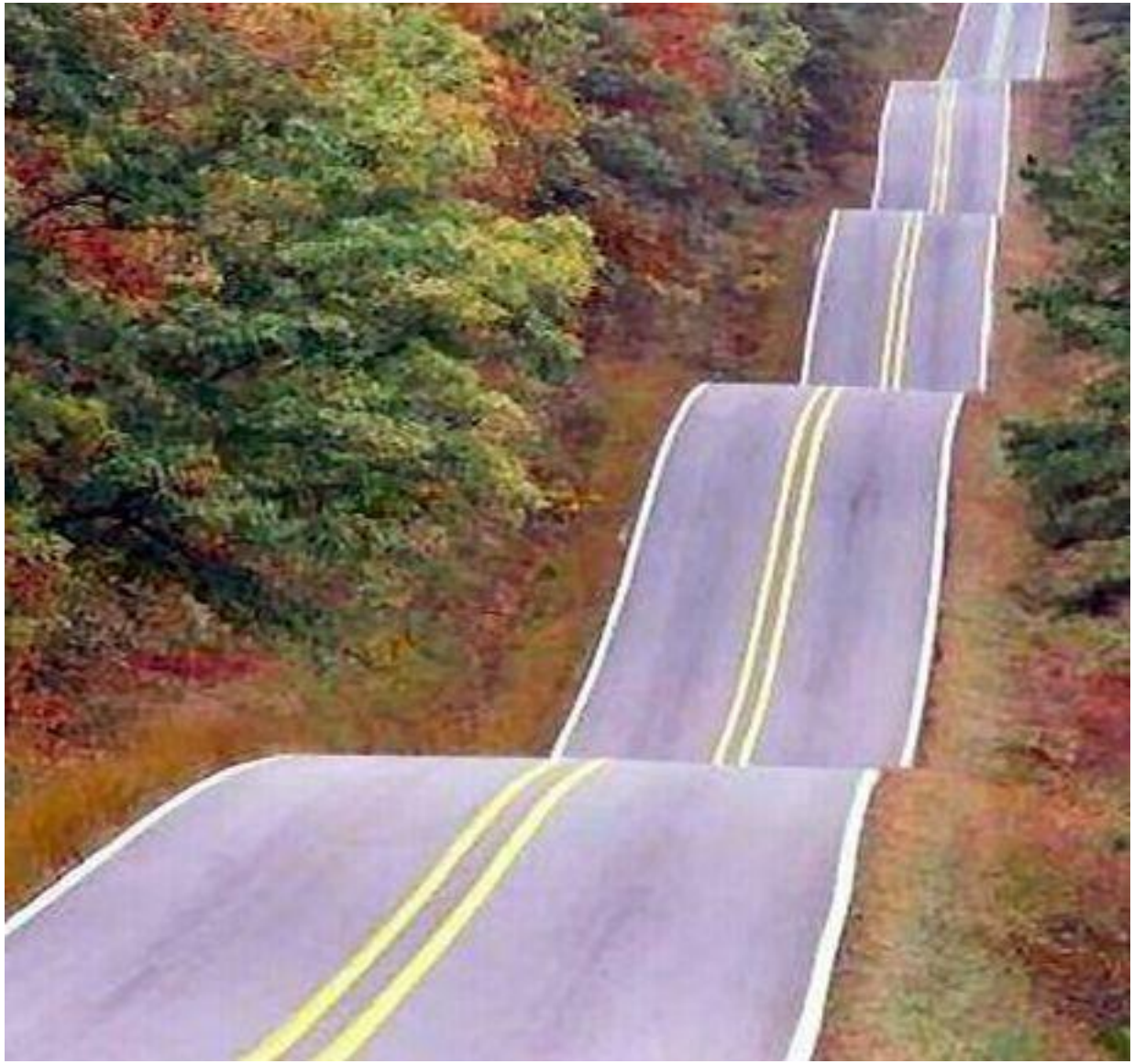
Integrated Digitized Biocollections

www.idigbio.org

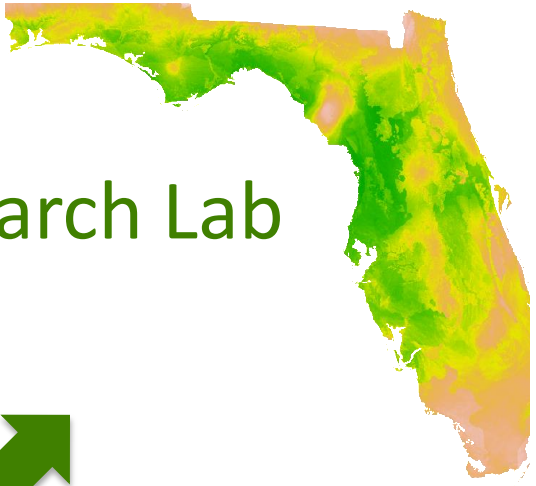



# May be some bumps in the road

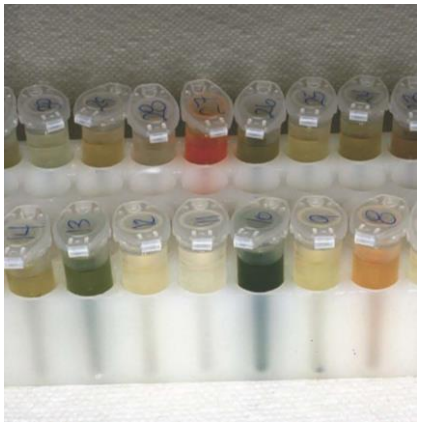


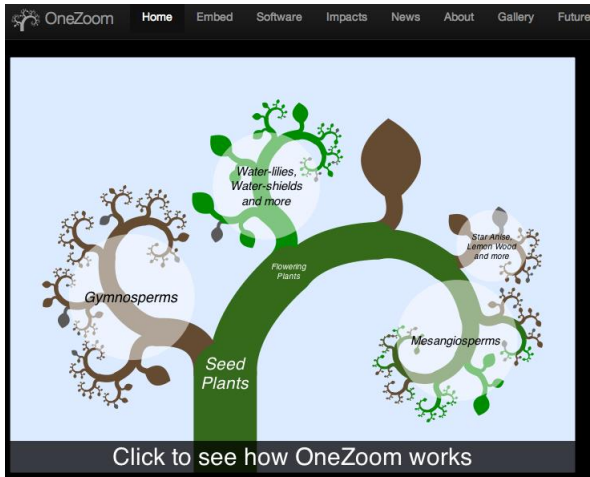
Field



Research Lab


Museum

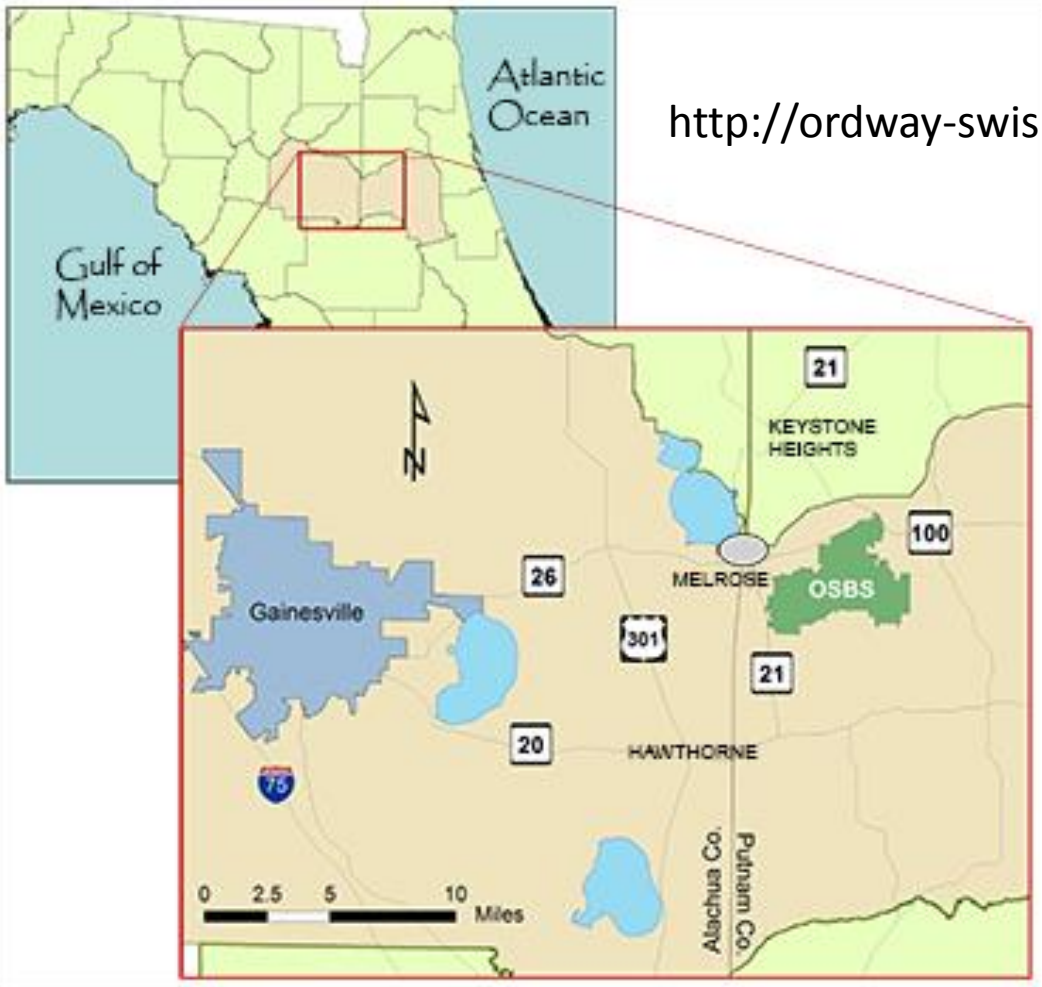




# Weekly Syllabus

| Week of: | Topic |
|---|---|
| Jan. 6 | Intro to course; field trip |
| Jan. 13 | Specimen preparation |
| Jan. 20 | Specimen databases |
| Jan. 27 | Uses of specimen data in current biology |
| Feb. 3 | Georeferencing herbarium specimens |
| Feb. 10 | Ecological niche modeling |
| Feb. 17 | Ecological niche modeling |
| Feb. 24 | Presentations on ENM |
| Mar. 3 | Spring Break |
| Mar. 10 | DNA extraction |
| Mar. 17 | PCR |
| Mar. 24 | DNA Sequencing |
| Mar. 31 | Molecular databases |
| Apr. 7 | Molecular databases |
| Apr. 14 | Phylogenetic analysis |
| Apr. 21 | Phylogenetic analysis |

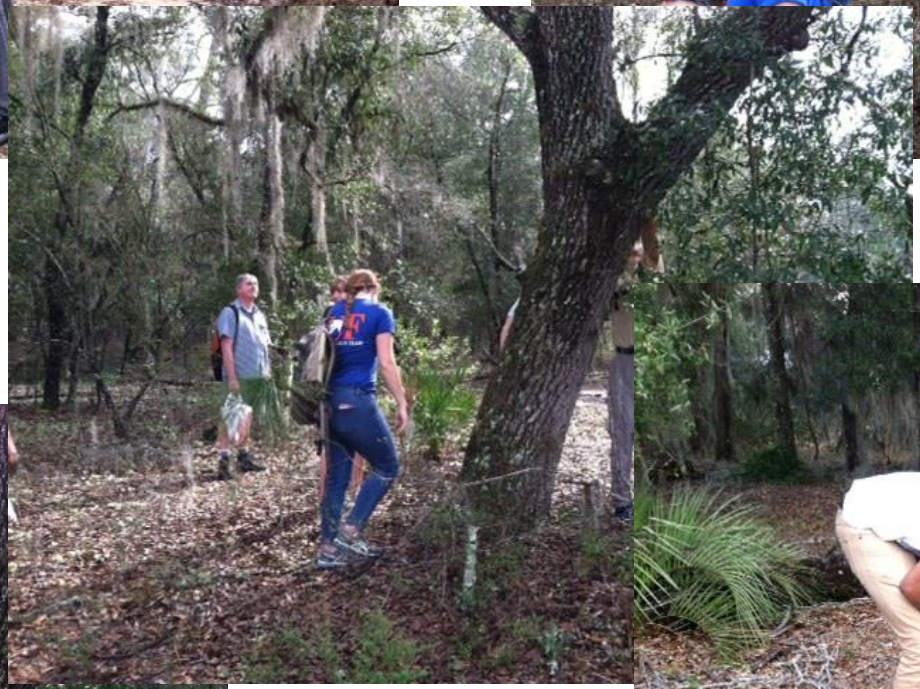
# First Class—Field Trip: Ordway-Swisher Biological Station

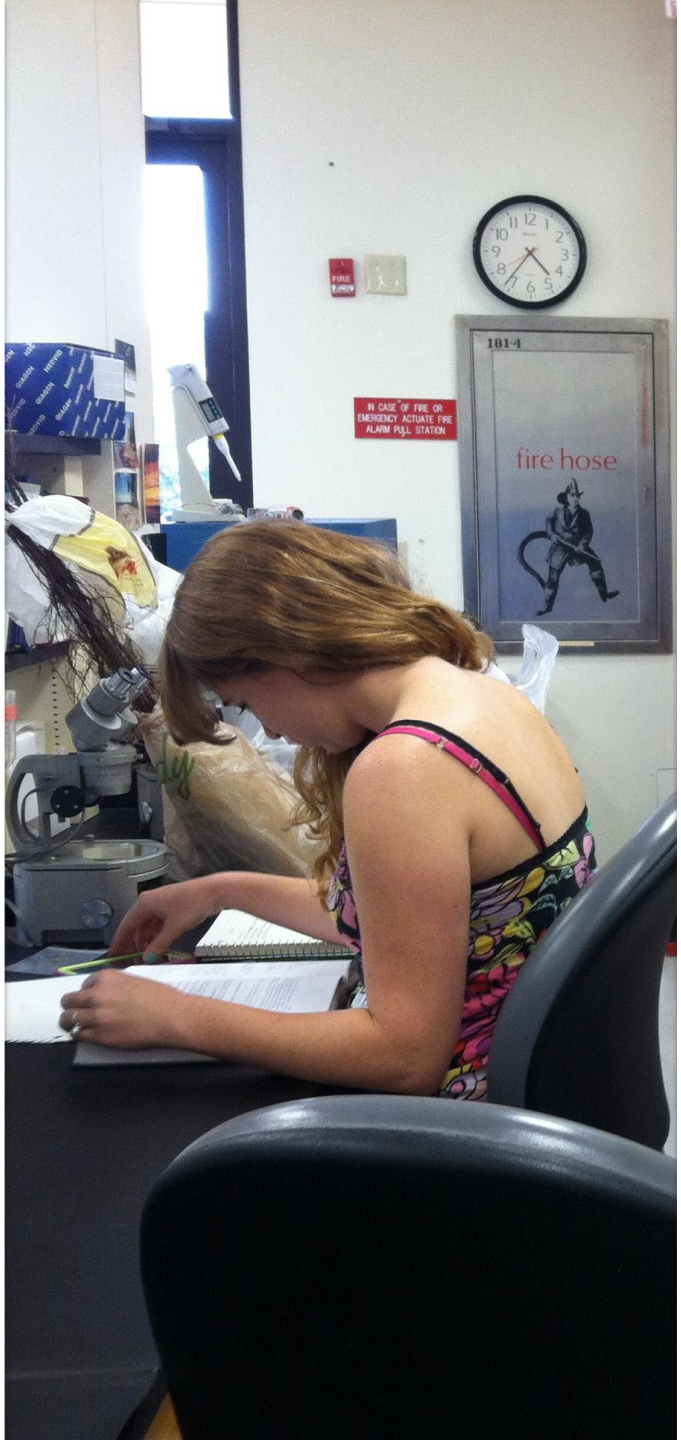



http://ordway-swisher.ufl.edu/about.htm

# First Class—Field Trip: Ordway-Swisher Biological Station/NEON


332
UNIVERSITY OF
FLORIDA
Florida Museum
Research and
Collections




181-4
IN CASE OF FIRE OR EMERGENCY ACTUATE FIRE ALARM PULL STATION
fire hose


PARAFILM

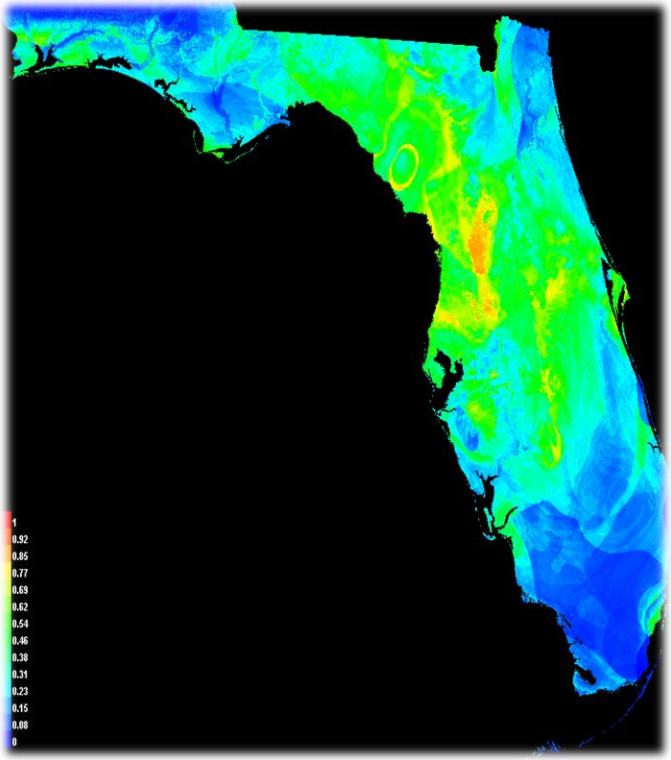
# BOT 4935
# Ecological Niche Modeling Symposium

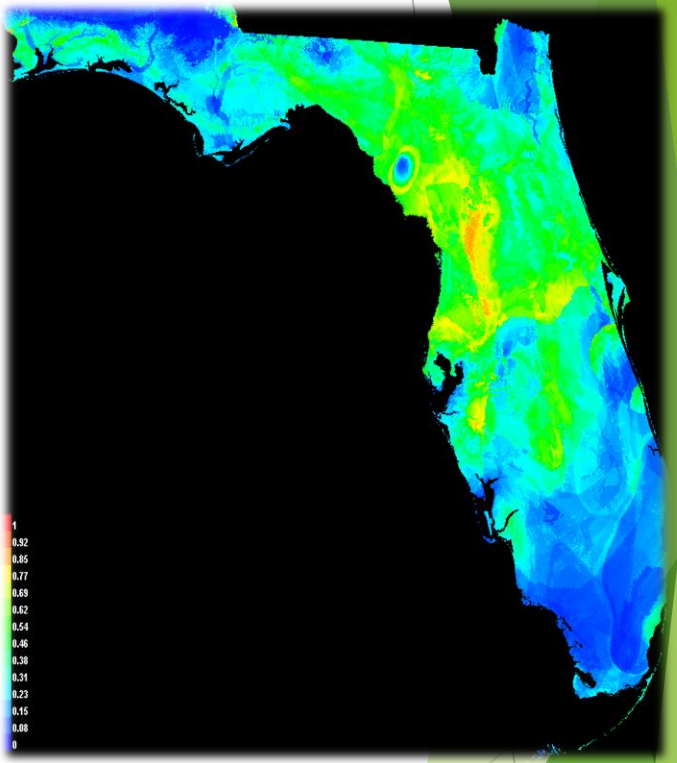
February 24, 2014

# Introduction

- Cactaceae
- Eastern Pricklypear/Devil's-tongue
- Perennial Eudicot
- Native Range
- Soil
- Community associate (Florida, *Y. aloifolia*)

# Niche Modeling- Present/Future




- Layers (Bio6-Min Cold Month/Bio6&9-

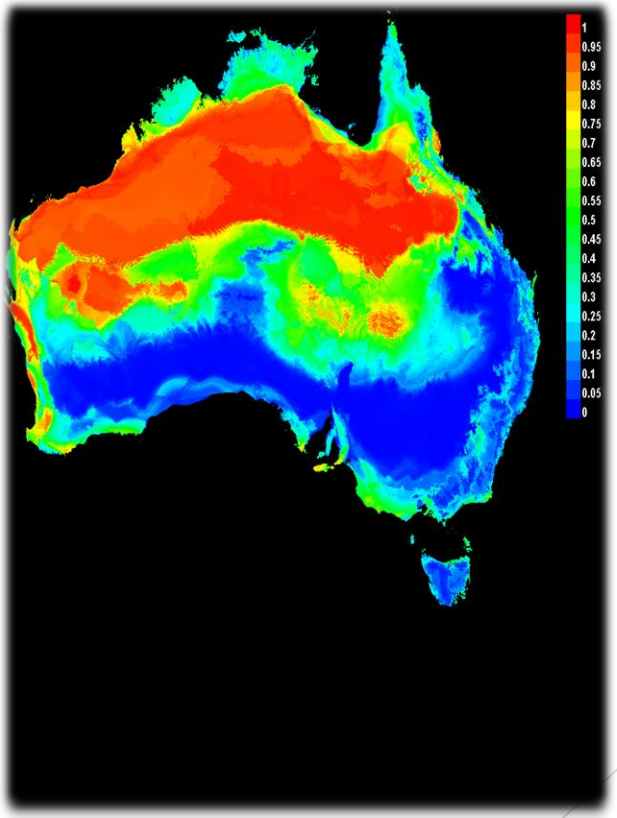
  Mean Temp Driest Quart)

- Goal

# Projection- Australia

- Environment
- Latitude
- Soil- Spodosols

  (Sandy, Al, Fe)
- Shallow

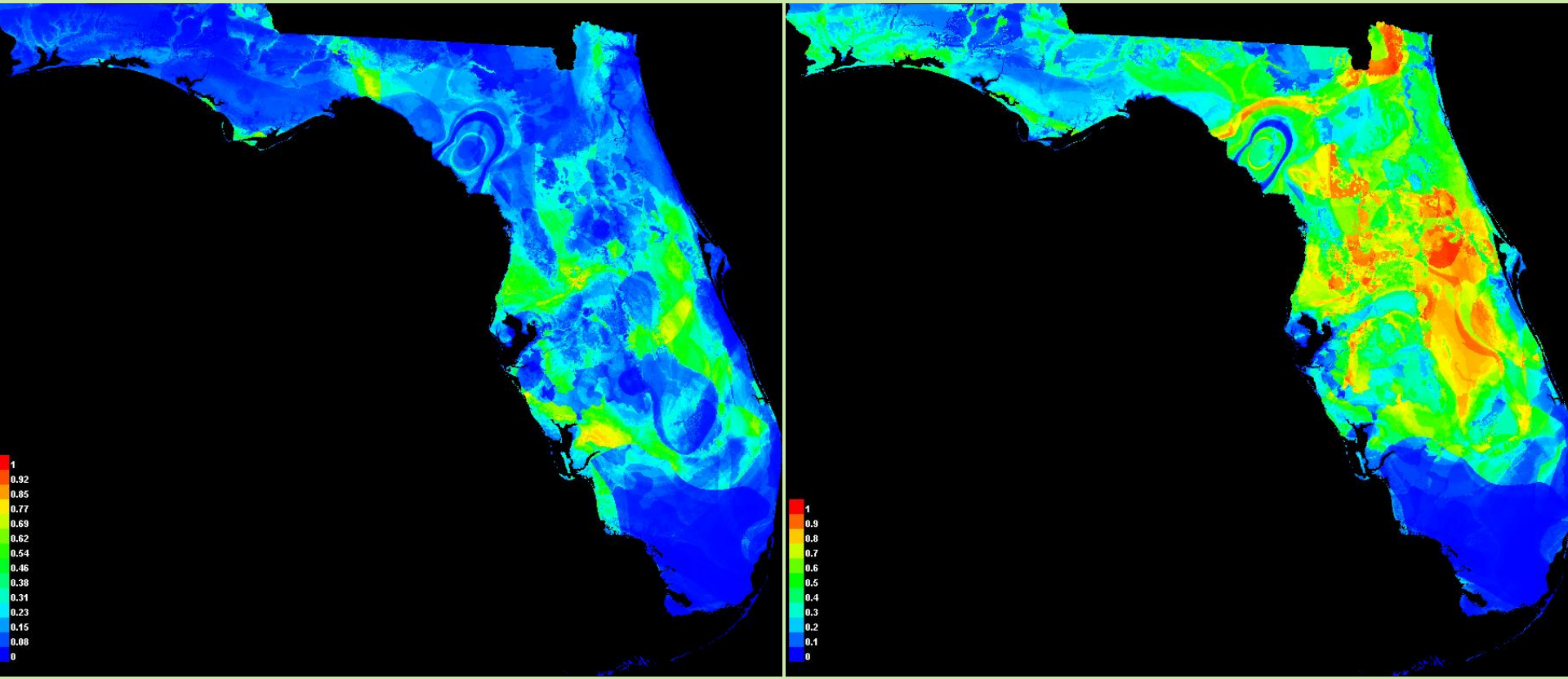



ericum fasciculatum
ark St. John's-Wort
by Amy Richard
right 2006, Univ. of Florida

# *Hypericum fasciculatum* distribution

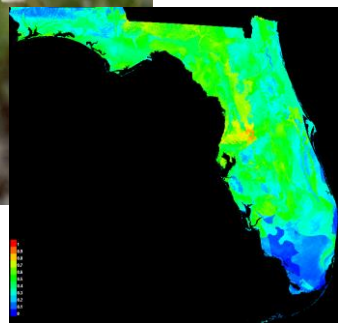
Present (2014)

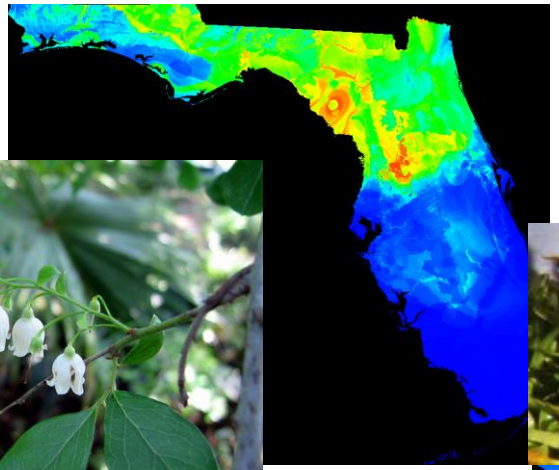
Future (2050)

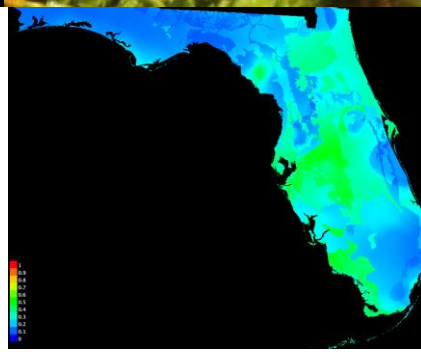


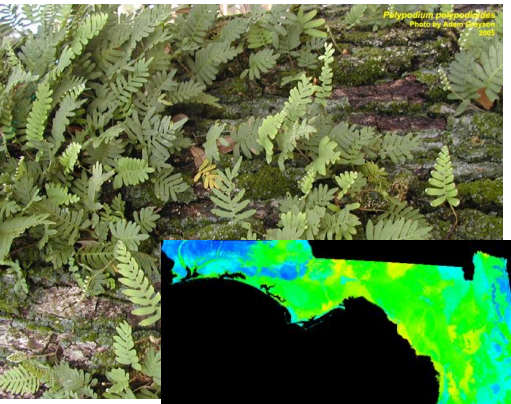

Biological variables:

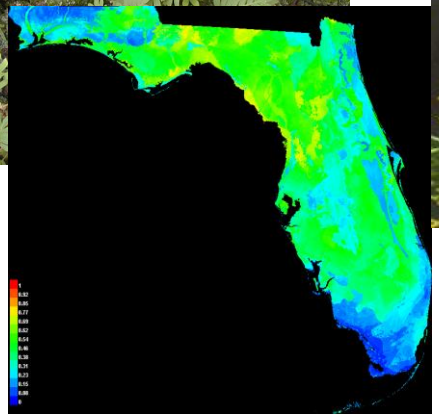
- The min. temperature of coldest month
- precipitation of wettest month
- geography and annual precipitation were the most important factors in its distribution.

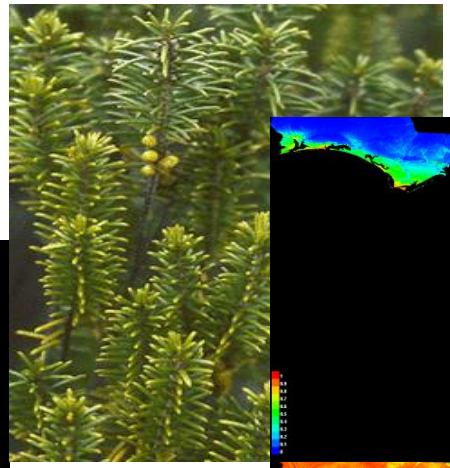


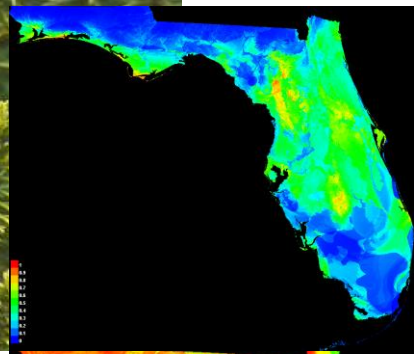


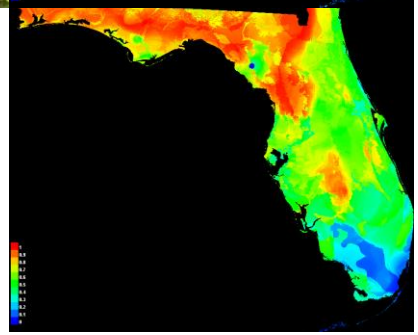


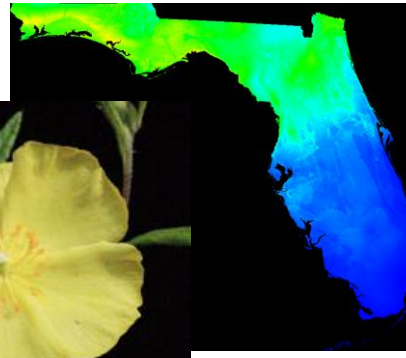

Polypodium polypodioides
Photo by Allen Dayson
2005











# What Have the Students Learned So Far?

- How to collect, prepare, digitize, and database herbarium specimens
- Many uses of museum specimens
- Basic georeferencing and niche modeling
- How to integrate knowledge from courses into research applications

# What Have We Learned So Far?

- Students are really smart and enthusiastic!
- We don’t challenge them enough in traditional courses
- Experiential courses are way more fun!
- Filtering students important for obtaining a successful group

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THANKS TO AIM-UP! FOR THE INCENTIVE!