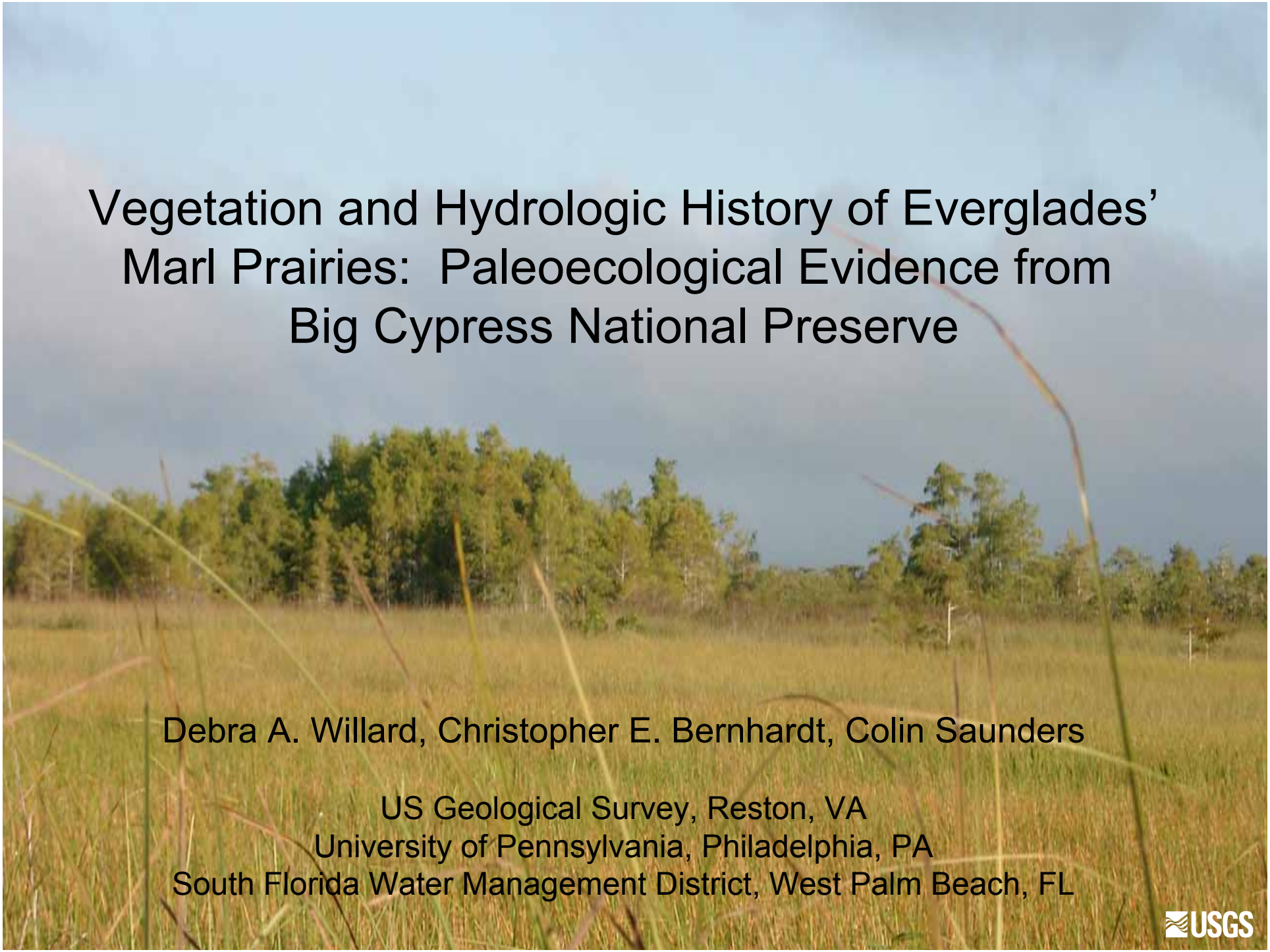


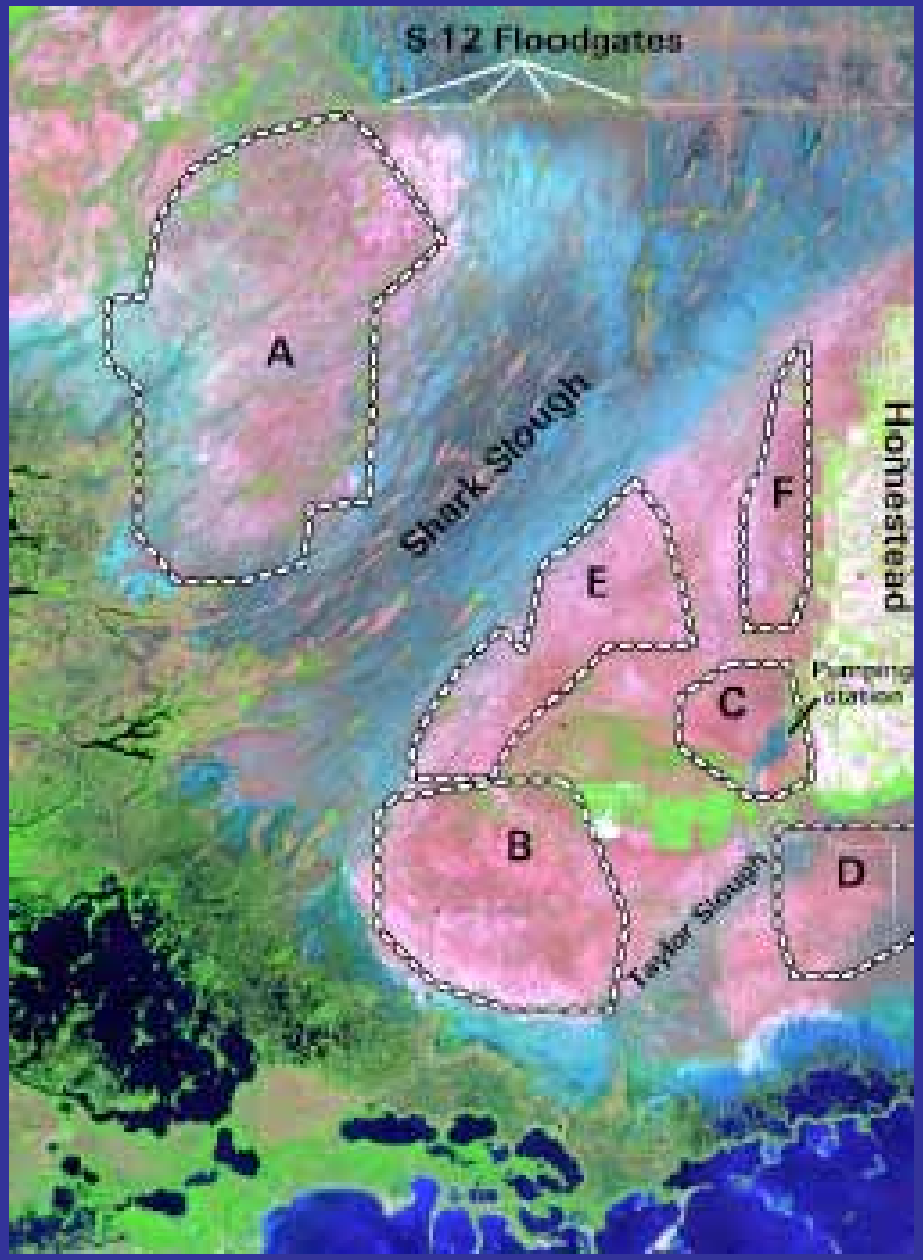
Vegetation and Hydrologic History of Everglades' Marl Prairies: Paleoecological Evidence from Big Cypress National Preserve

Debra A. Willard, Christopher E. Bernhardt, Colin Saunders

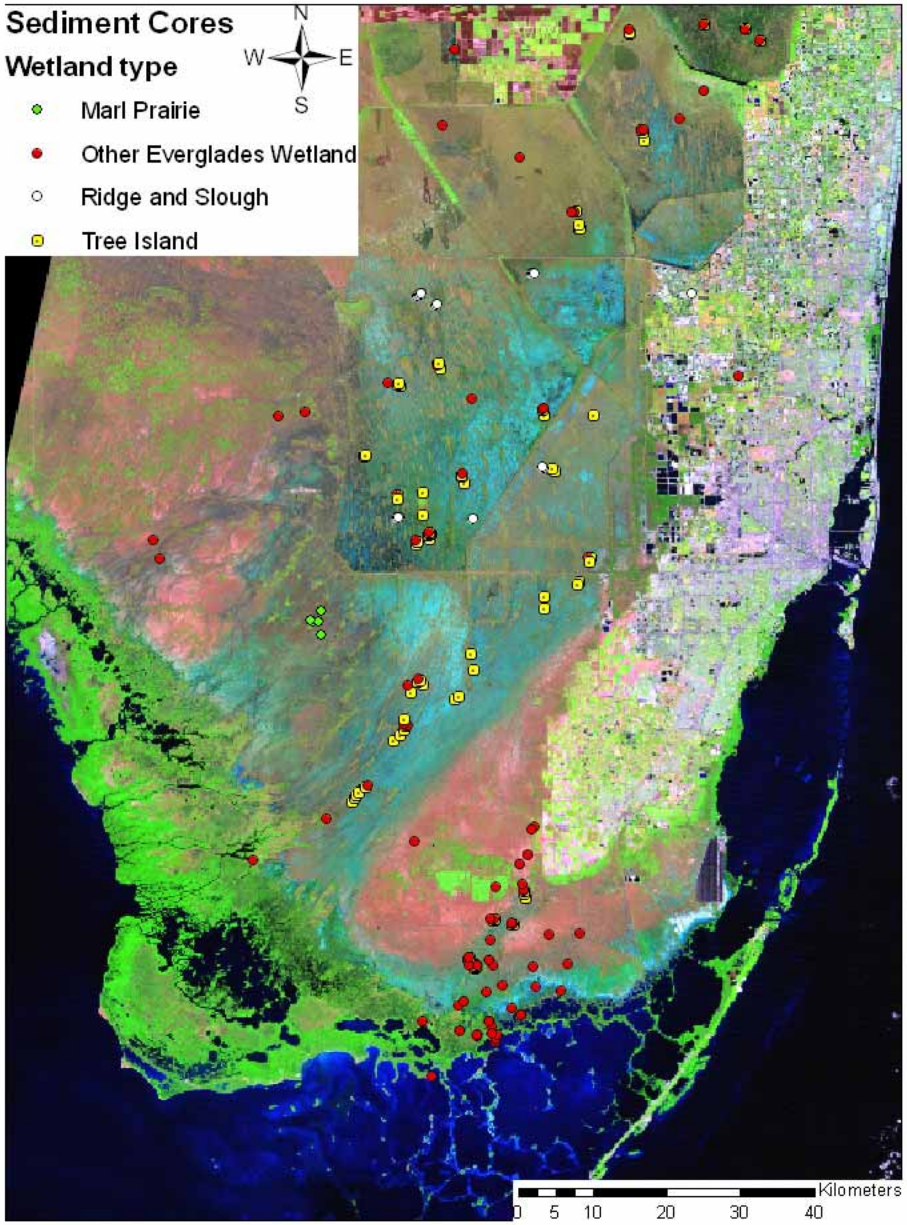
US Geological Survey, Reston, VA
University of Pennsylvania, Philadelphia, PA
South Florida Water Management District, West Palm Beach, FL

USGS

Marl Prairie Distribution



USGS



Objectives: Marl Prairie Paleoecological Research

Assess stability of marl-prairie habitat over the last few centuries – longevity of current distribution

Document impacts of natural climate fluctuations and human alteration of hydrology on marl prairie plant communities

Reconstruct trends in past plant communities, hydroperiod, and substrate at marl prairies

Determine timing of marl prairie development in current sites

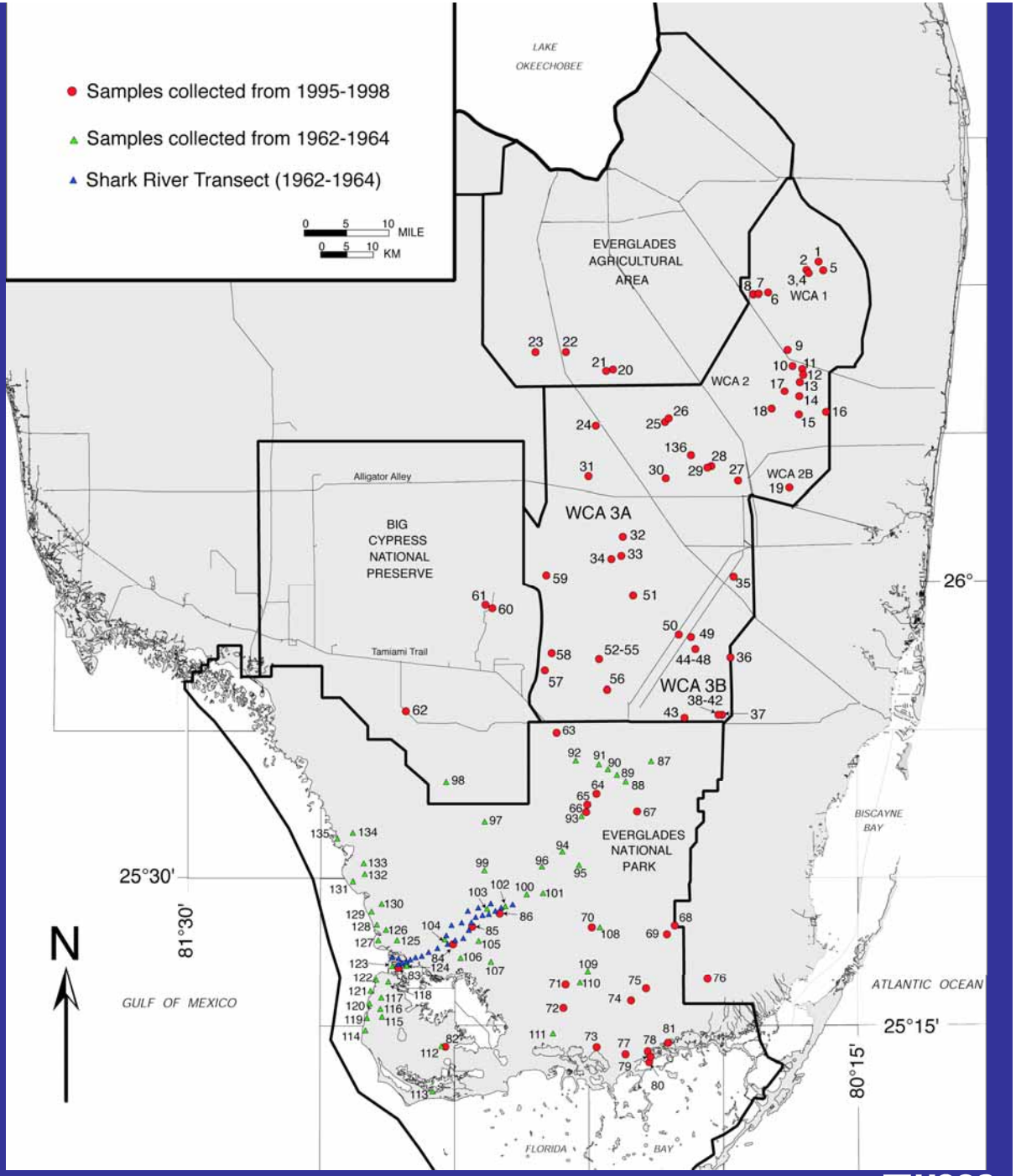
USGS

Methodology

- Collection of surface samples
- Collection of sediment cores
- Geochronology
- Core description
- Analysis of downcore pollen assemblages and calibration with modern analogs

USGS
science for a changing world

Location of Everglades Surface Samples



Willard, Weimer, and Riegel, 2001

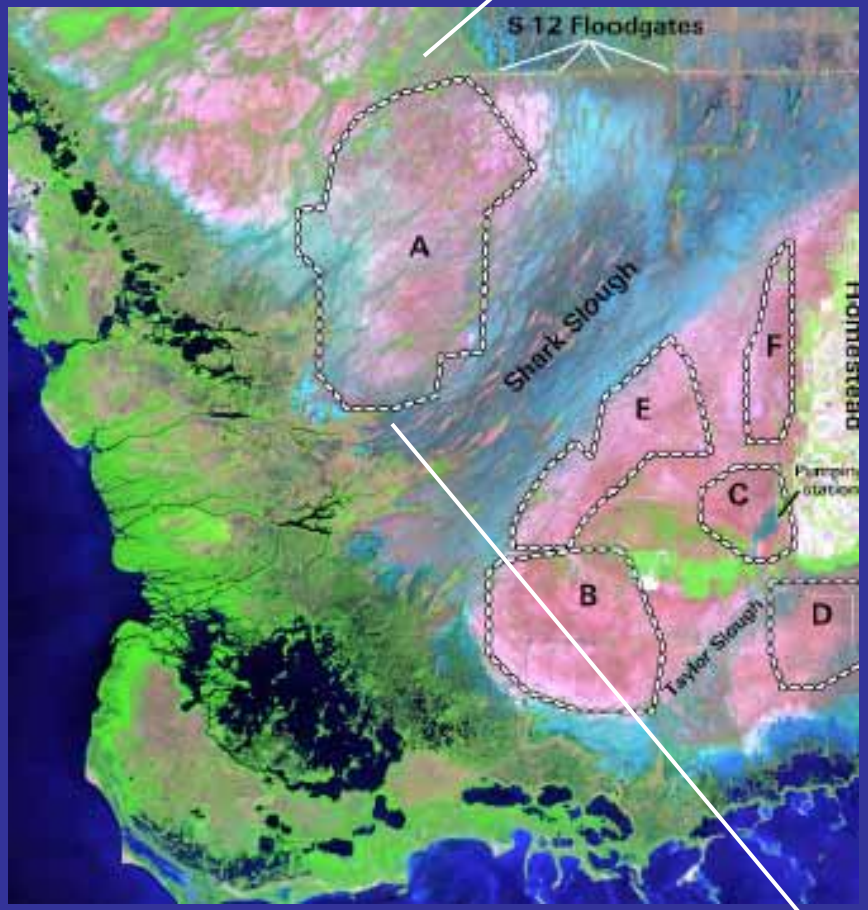
USGS

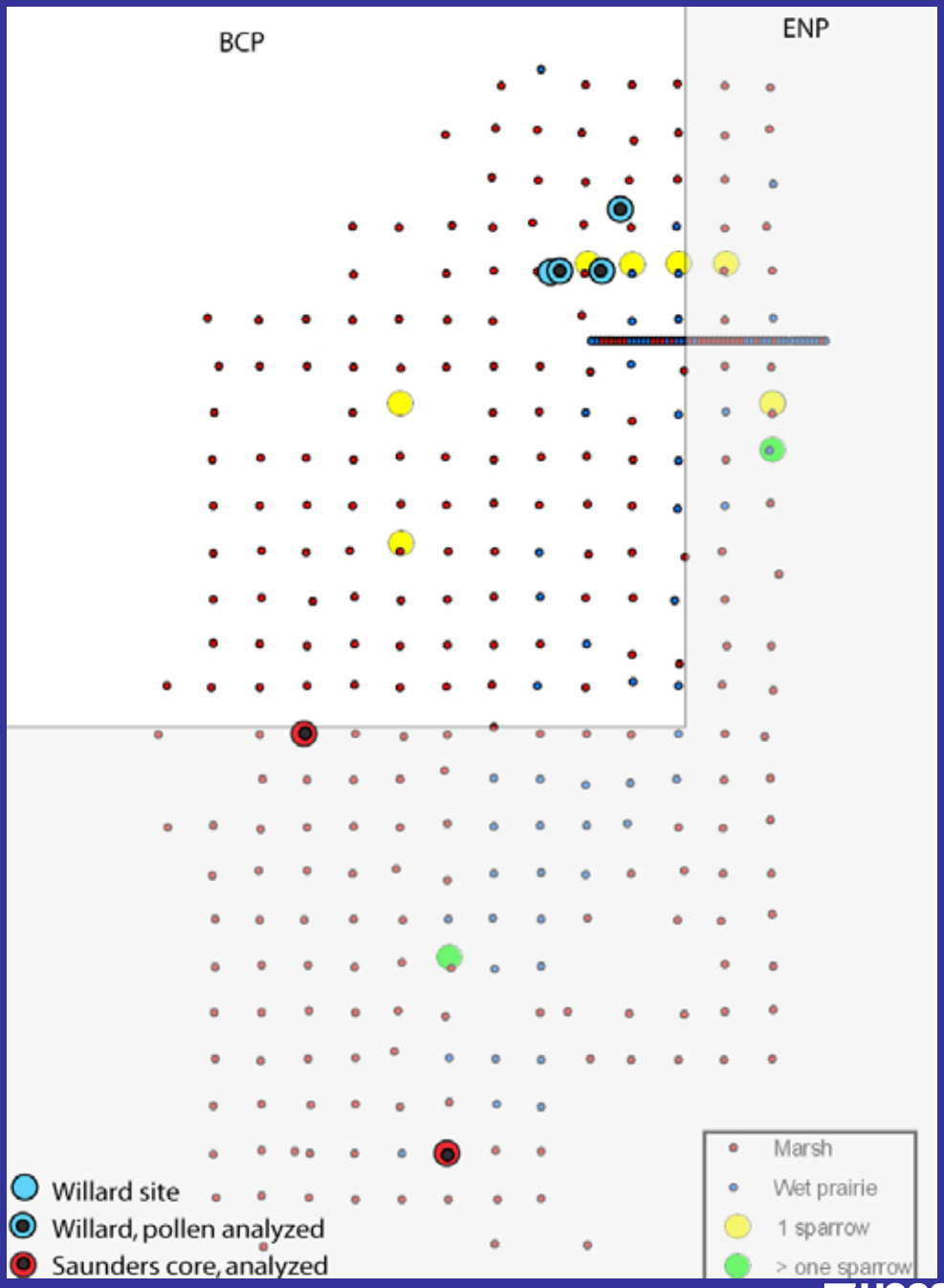
Age Model Development for Marl Prairie Cores

^{14}C	Modern “bomb” carbon (post-1950) and Late Holocene dates
^{137}Cs	Produced by atmospheric testing of thermonuclear devices in late 1950’s and early 1960’s; peak in US is 1962-1963
Pollen biostratigraphy	First occurrence of *Casuarina* pollen in early 20th century

USGS

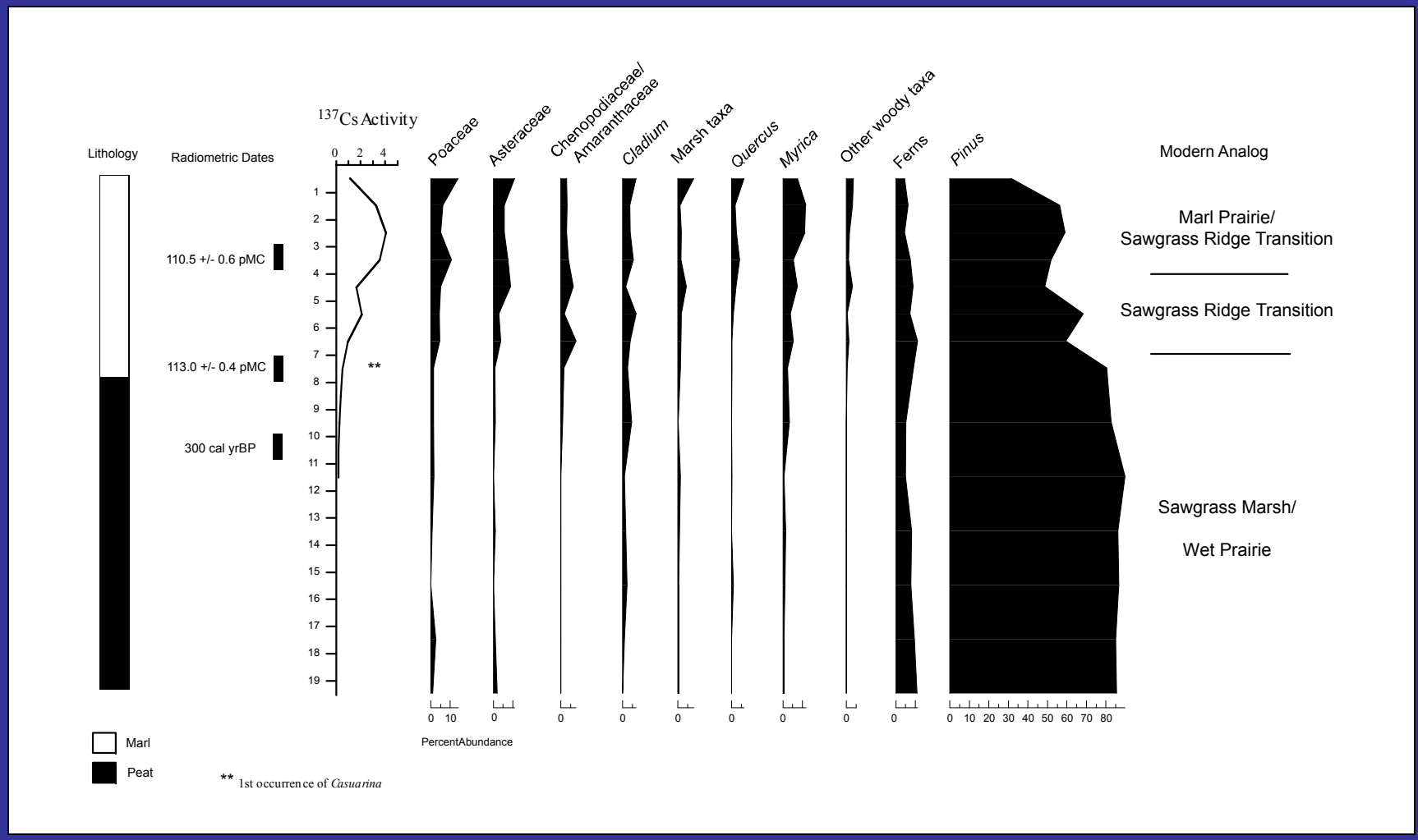
Vegetation Distribution and Existing Cores in CSSS Population A



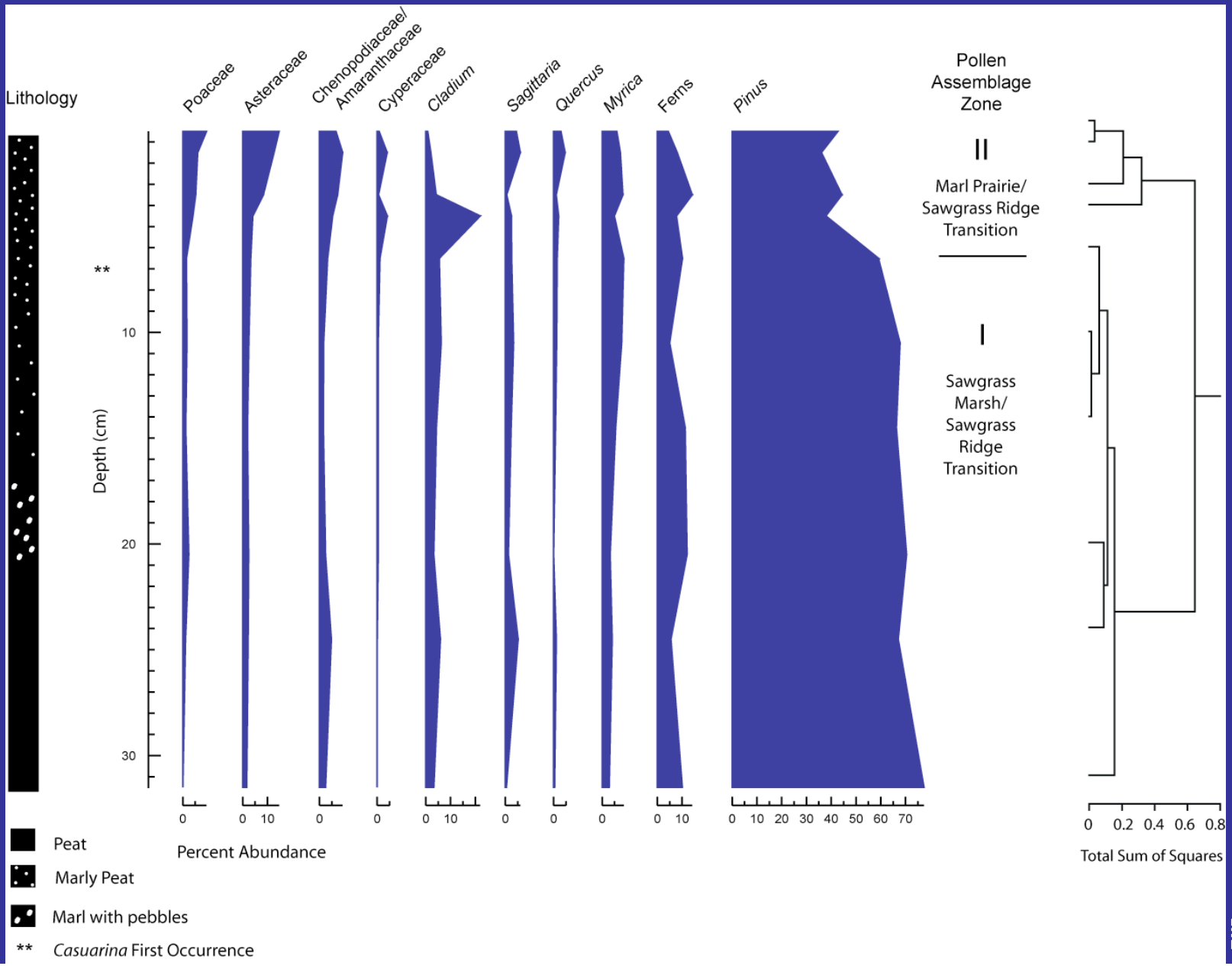


USGS

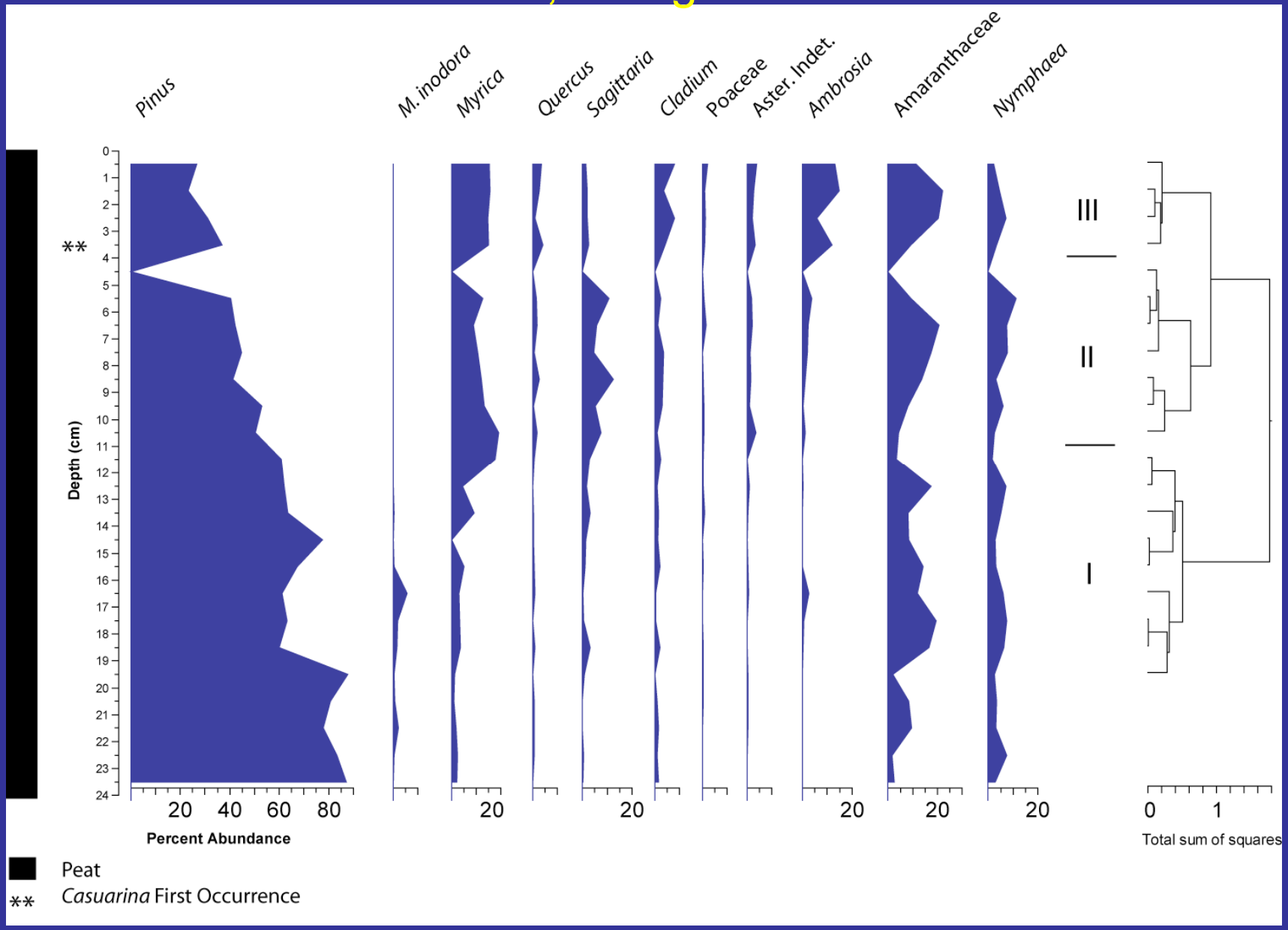
Percent Abundance of Pollen of Major Plant Taxa, Core 03-9-16-6, Big Cypress National Preserve



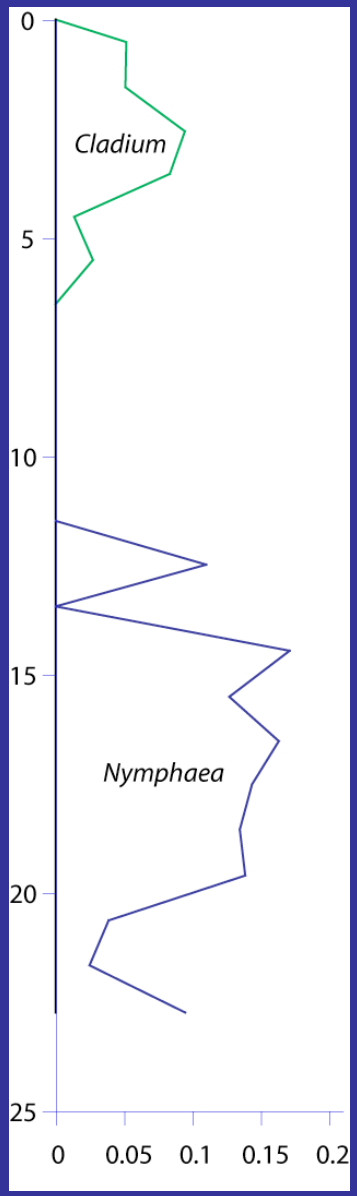
Percent Abundance of Pollen of Major Plant Taxa, Core 03-9-16-3, Big Cypress National Preserve



Percent Abundance of Pollen of Major Plant Taxa, Core C0115, Everglades National Park



Seed Abundance, Core C0024, Slough, Southwestern Everglades National Park

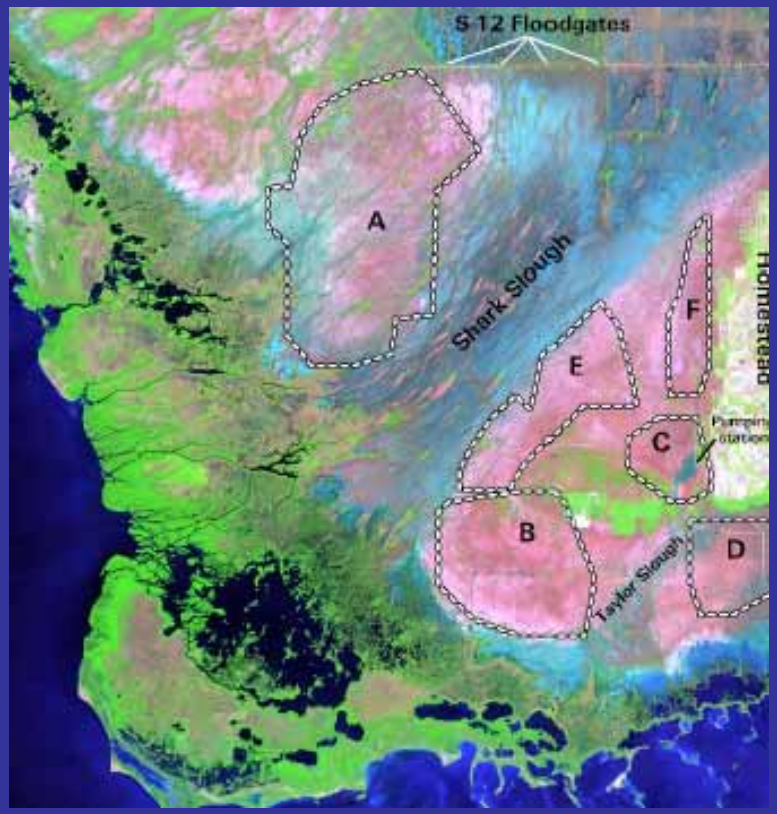


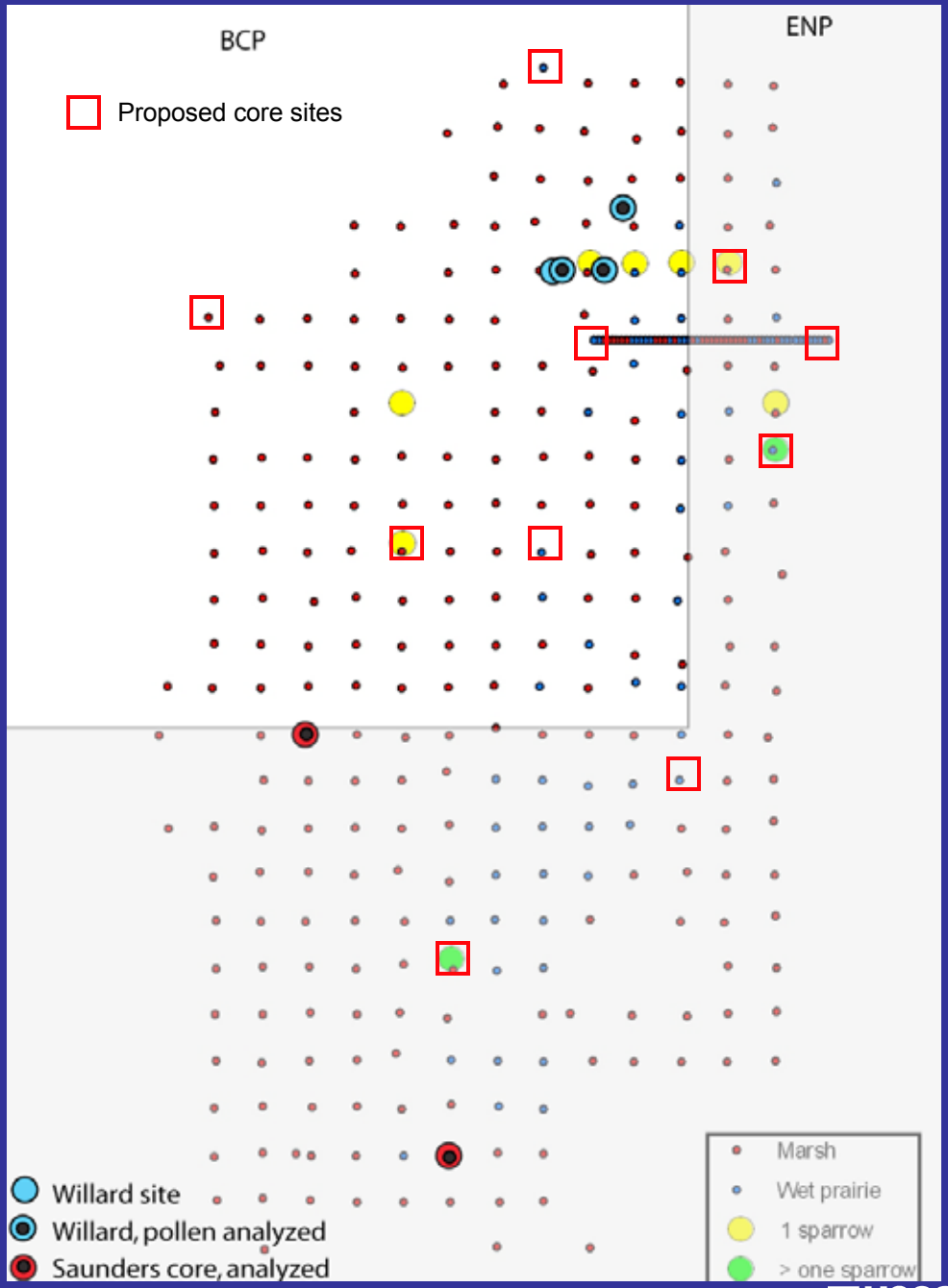
Seeds isolated from sediment cores collected in sloughs and *Eleocharis* flats in population A indicate a shift toward drier conditions in the upper intervals of the cores.

Drier seed assemblages consist of *Cladium* (in this core) or other sedge seeds.

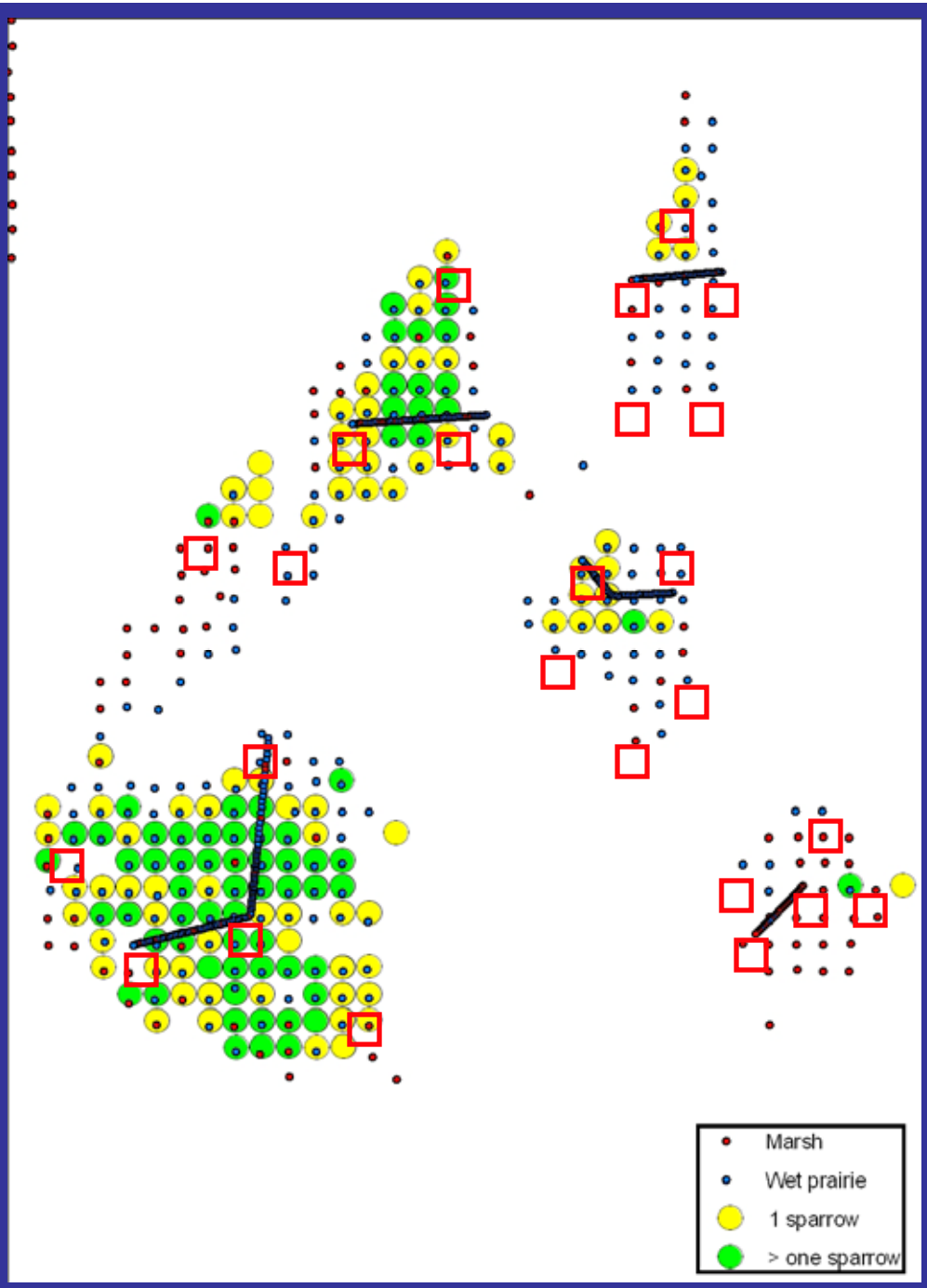
USGS

Ongoing Paleoecological Research, CSSS Population A





USGS



Sampling Scheme to Reconstruct Vegetation and Hydrologic History of CSSS Populations B-F, Everglades National Park

USGS

CONCLUSIONS

Diversion of water during the 20th century shortened hydroperiods in the study sites in population A significantly, resulting in a shift from peat to marl accumulation in at least some sites now occupied by marl prairies.

Changes in plant communities accompany the shift in sediment type. Pollen of grasses and sedges are more abundant in the marls, as are pollen of trees and shrubs.

There appears to have been a two-step shift in hydroperiod during the 20th century. Plant communities characteristic of shorter hydroperiods first appear early in the 20th century, but peat accumulation continued. After ~1960, further drying is indicated by a shift to modern marl prairie vegetation and accumulation of marl rather than peat.

Further analyses of sediment cores from other marl prairie sites are underway to determine whether the timing of marl prairie formation was uniform throughout the system.

USGS

ACKNOWLEDGEMENTS

Funding provided by:

USGS Greater Everglades Priority Ecosystem Studies
Everglades National Park CESI Program

Field support and guidance:

Big Cypress National Preserve
Everglades National Park
Jimi Sadle, David Hallac, Bob Sobczak

USGS