

# Climate and vegetation history of current and former Cape Sable Seaside Sparrow wetland habitat, Florida Everglades

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# Acknowledgements

- USGS Greater Everglades Priority Ecosystems Science Program
- Everglades National Park
- Big Cypress National Preserve
- Jimi Saddle, ENP

# Findings

- Impacts of climate variability and sea level change noticeable in pollen record from current and former CSSS habitat
- There are distinct changes to pollen assemblages and microscopic charcoal during the 20<sup>th</sup> century in both current and former CSSS habitat

# The Cape Sable Seaside Sparrow (CSSS)

<http://www.nps.gov/ever/parknews/status-of-cape-sable-seaside-sparrow-2007-survey-report.htm>



CSSS listed as T&E in 1967 due to limited distribution and threats to its habitat by land-use changes

Nesting bird, occupies marl prairies with short hydroperiods and sparse vegetation

# What is a Marl Prairie?



Short hydroperiod (3-7 months)

Calcareous soil

Dominated by grasses and sedges



## Neighboring Communities

Wet Prairie

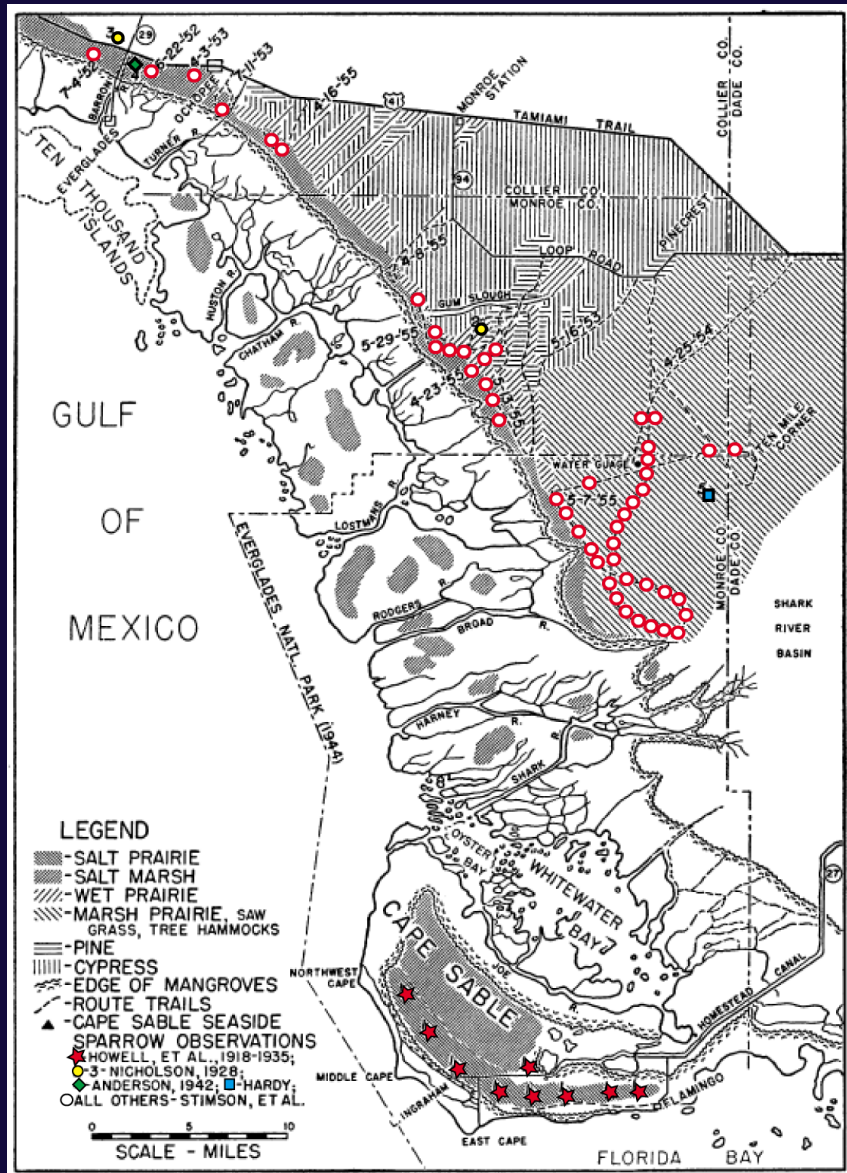
Fresh Water Marsh

Sawgrass Marsh

Big Cypress Slough

Cypress Strand

# Historic Cape Sable Seaside Sparrow Distribution: 1918-1956

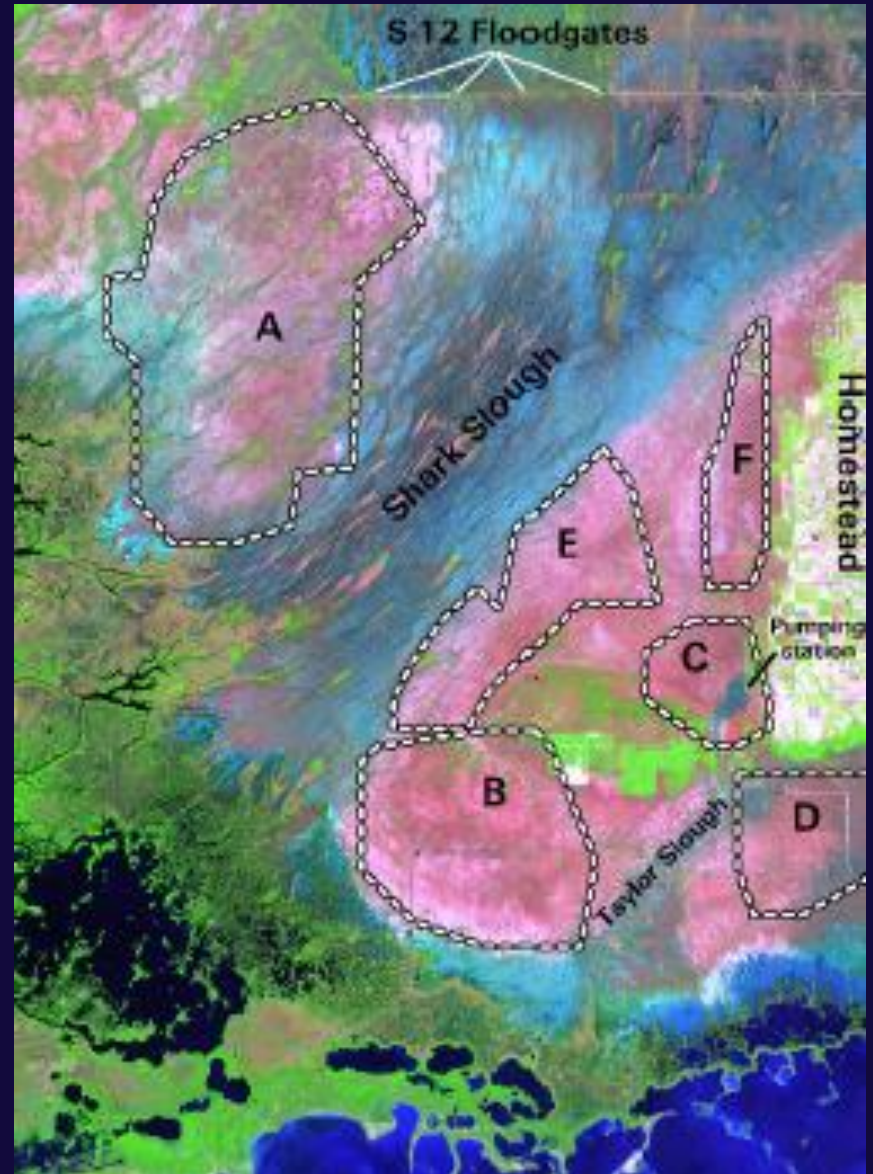
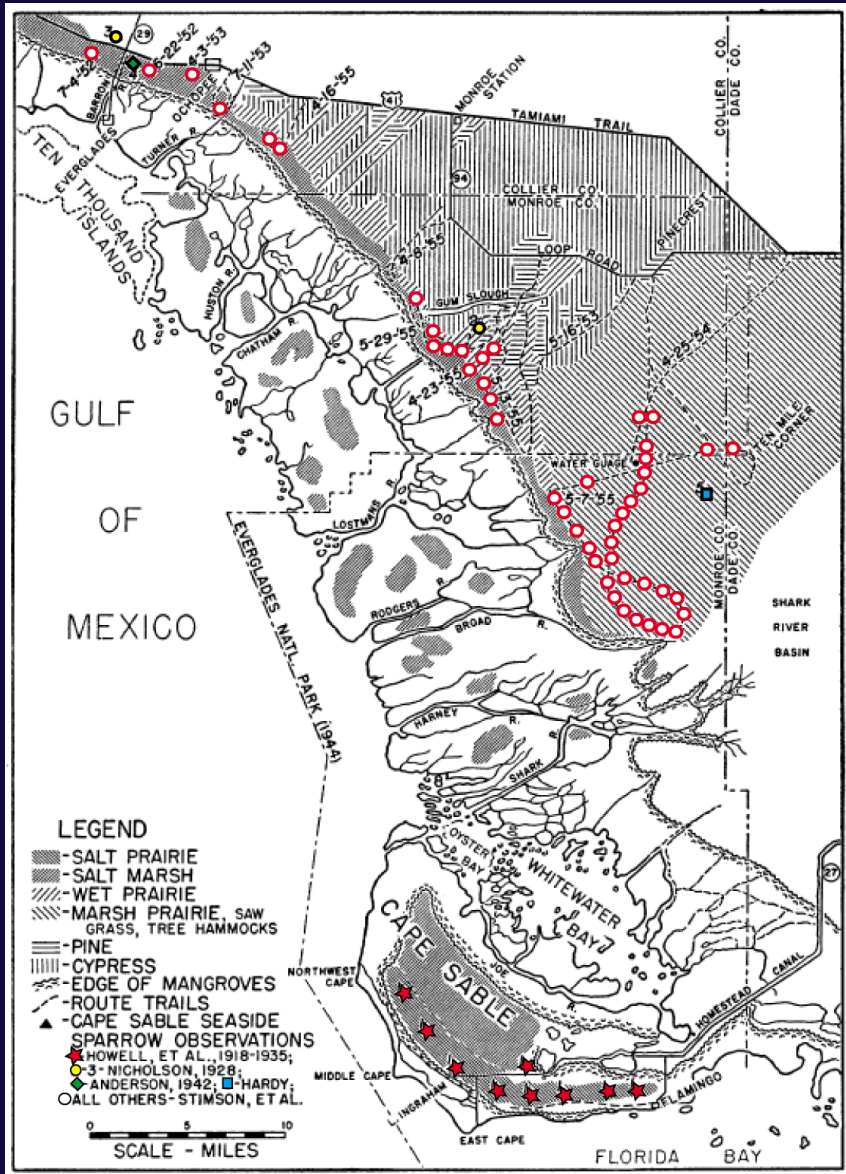


1918-1935: *Spartina* marshes on Cape Sable

1928-1942: *Spartina* marshes inland of mangroves

Post-1940: marshes inland of mangroves and initial expansion into Big Cypress

# Cape Sable Seaside Sparrow Distribution: Early vs. Late 20<sup>th</sup> Century



# External forcing of vegetation change in the Everglades

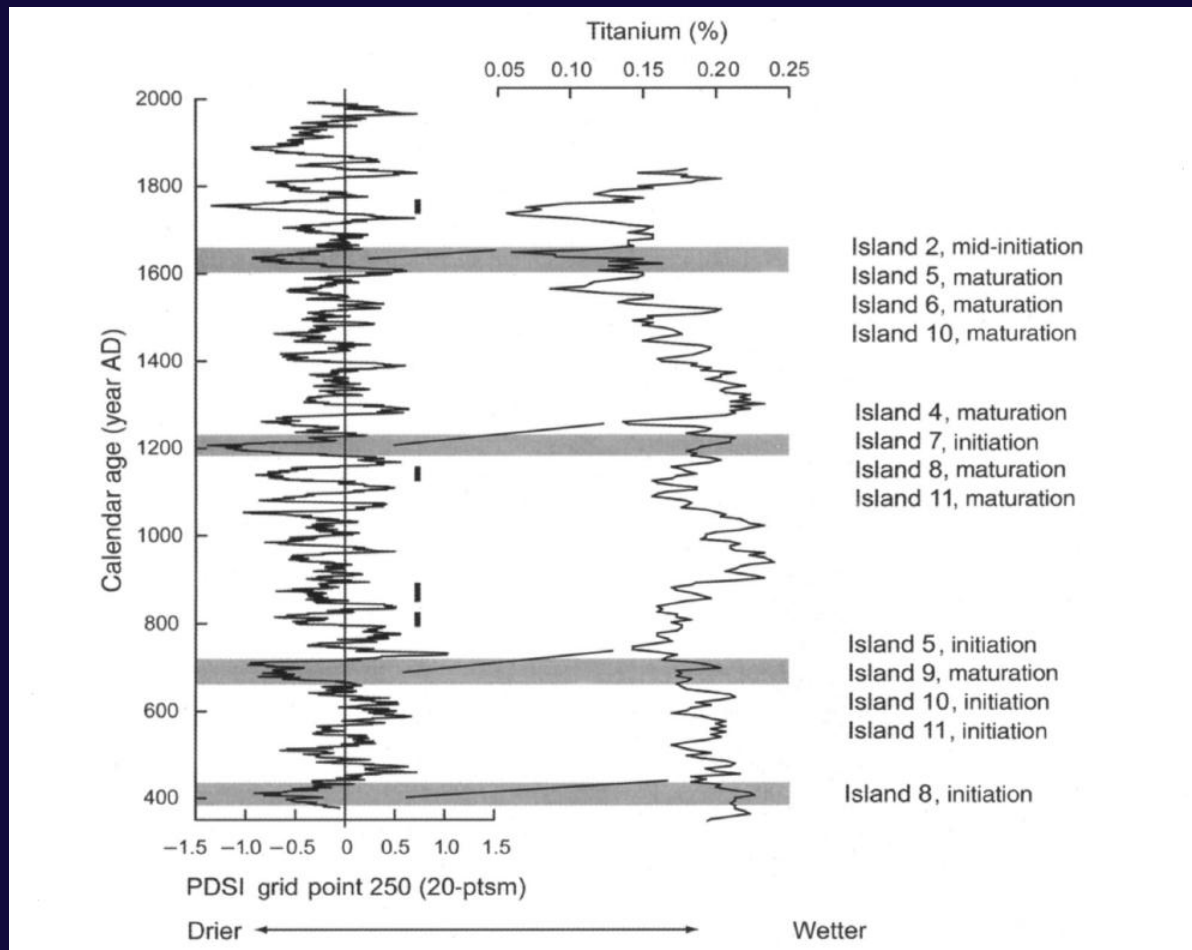
- Natural climate variability
  - Medieval Warm Period (AD ~800-1300)
  - Little Ice Age (AD ~1400-1800)
- Change in sea level
- Water management



# Natural Climate Variability

LIA

MWP



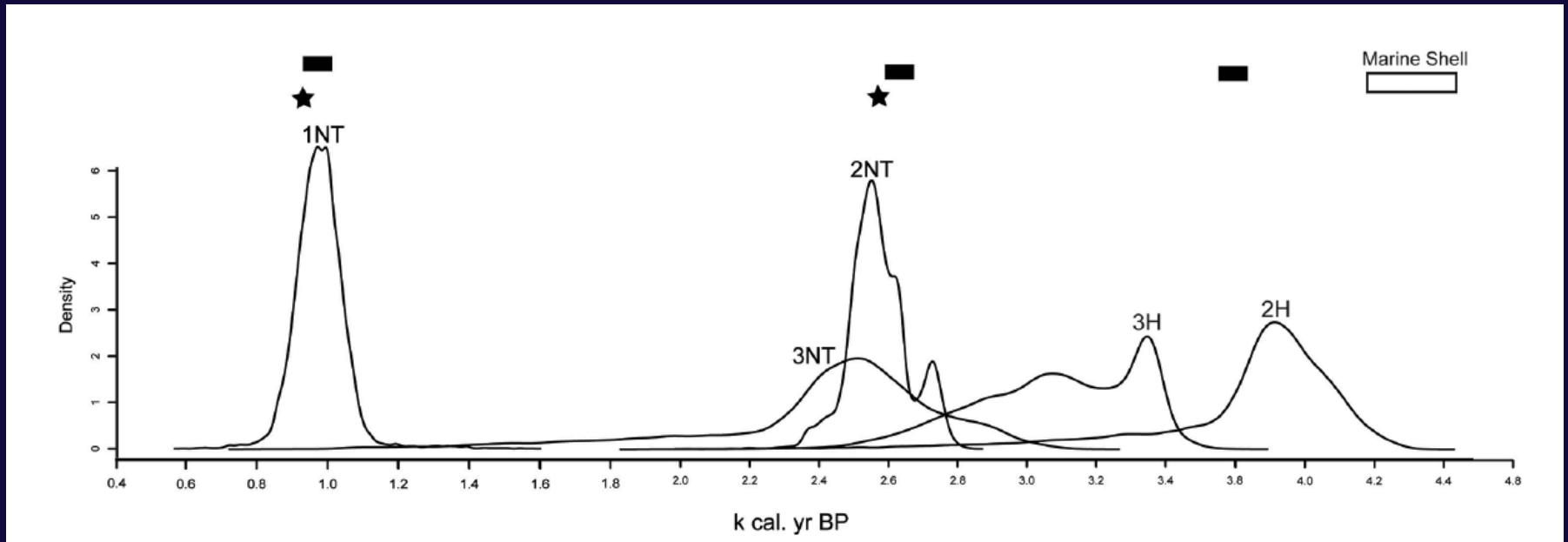
Willard, Bernhardt et al. 2005

# Natural Climate Variability

Climate and tree island initiation

MWP

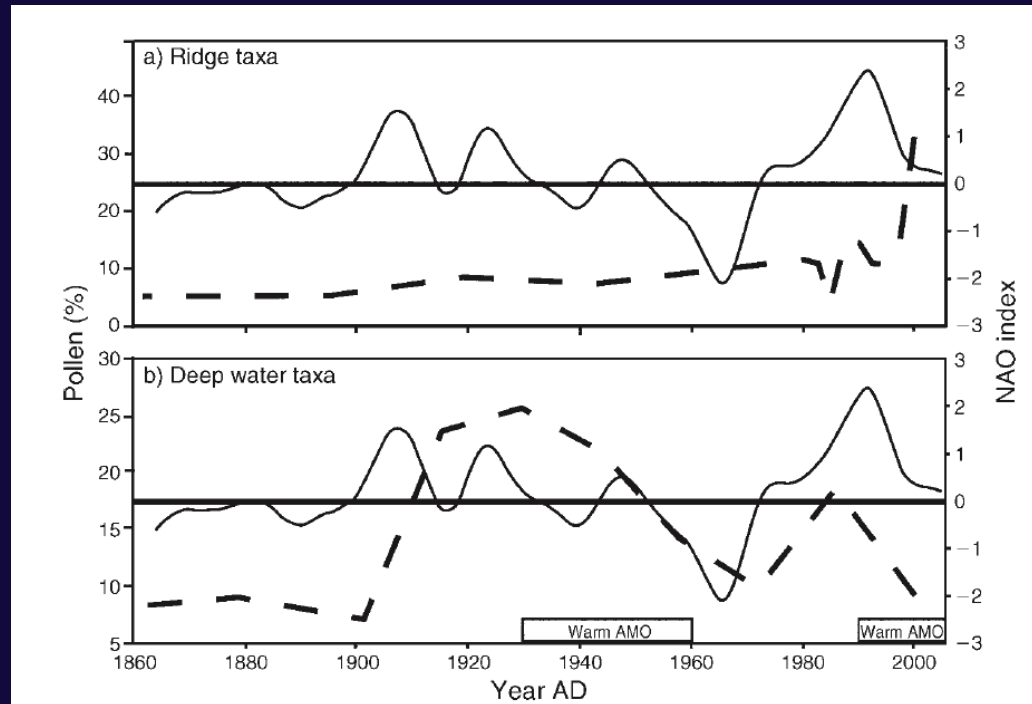
Other drought events



Bernhardt 2011

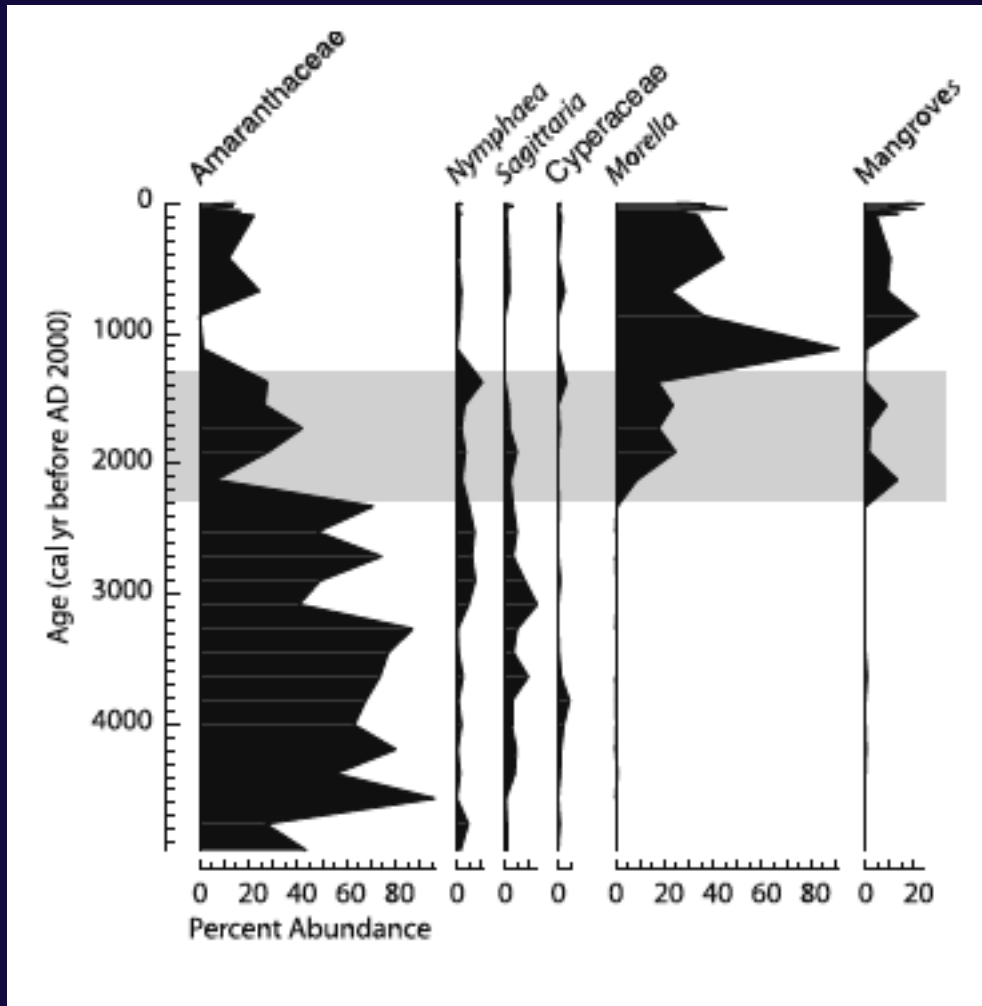
# Natural Climate Variability

## Multidecadal scale climate



Bernhardt and Willard 2009

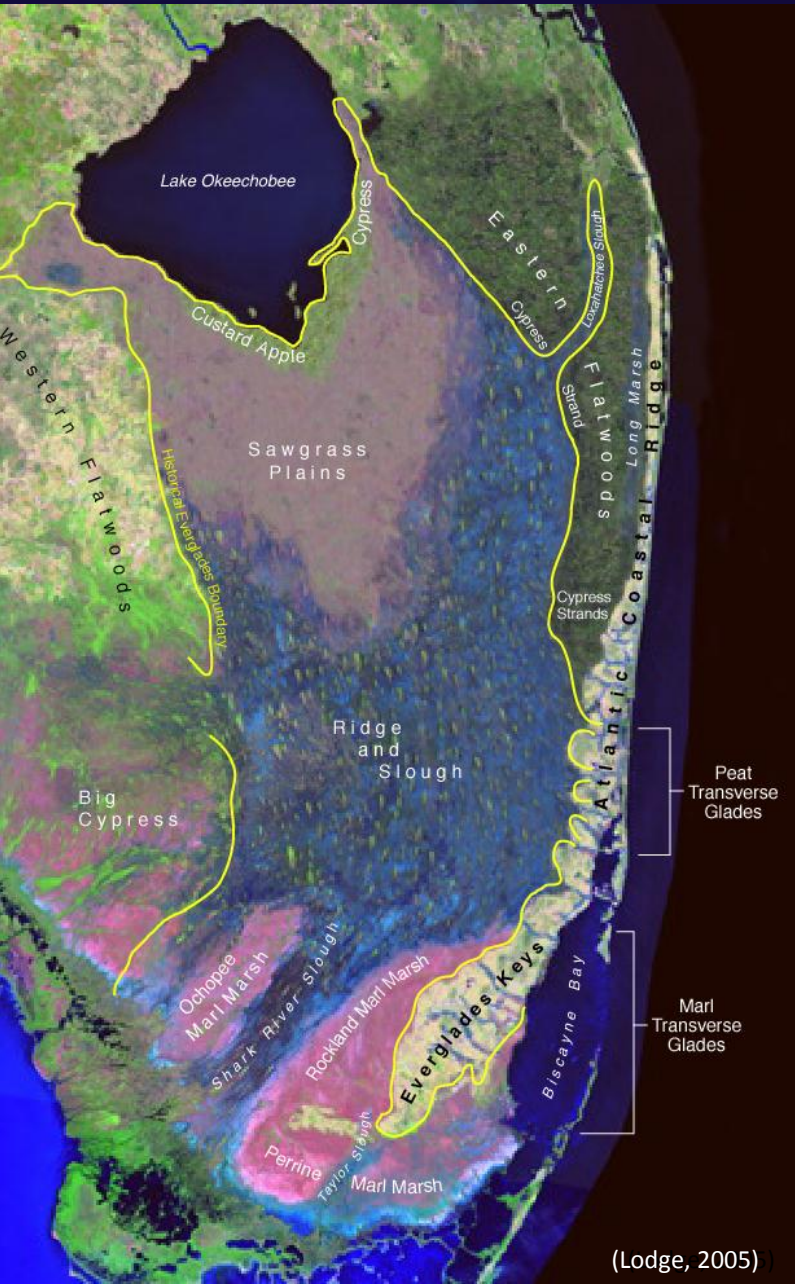
# Sea level



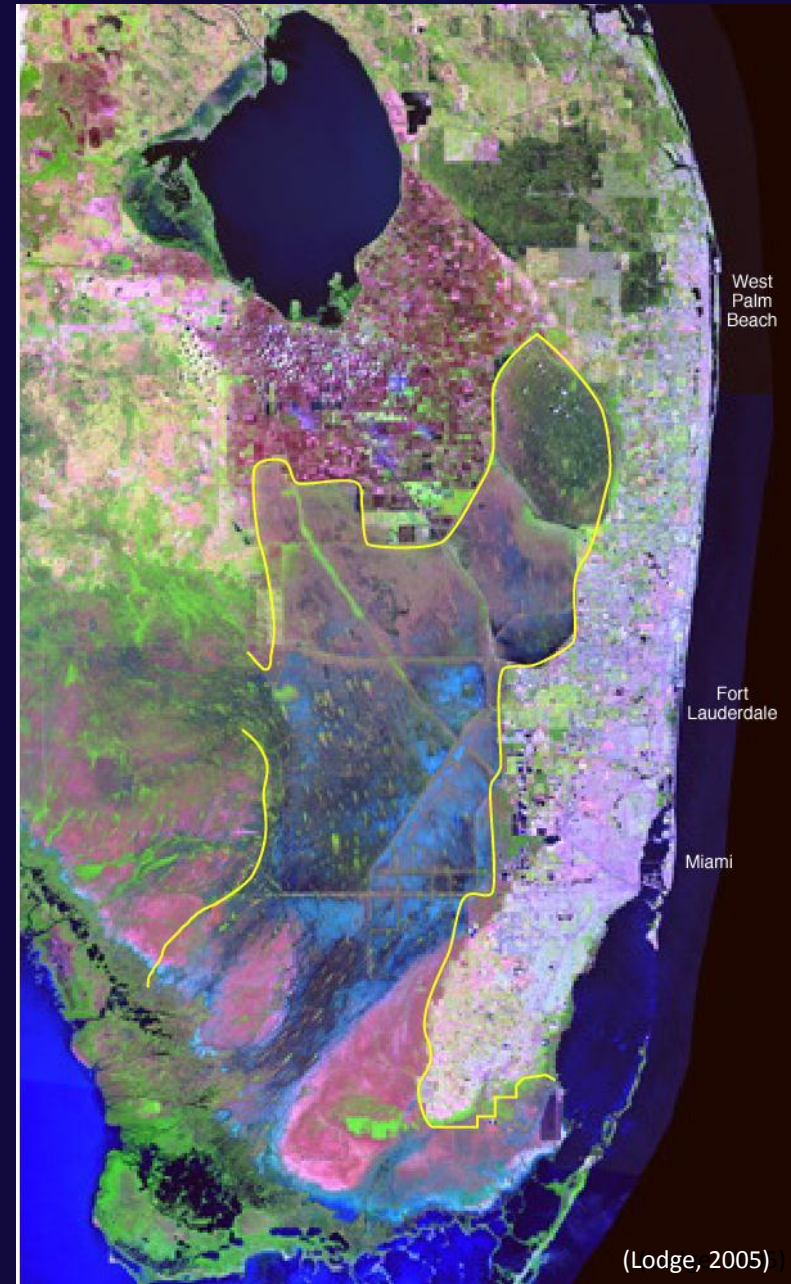
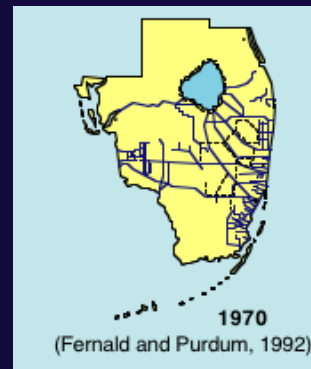
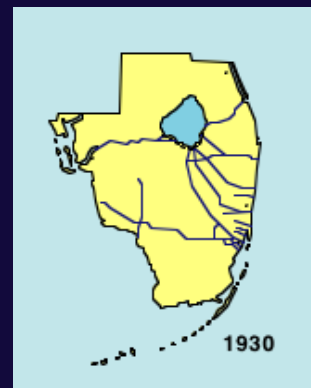
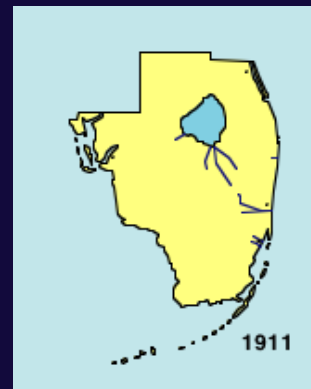
Willard and Bernhardt 2011

# Water Management

“Historic”/Pre-drainage



Present



(Lodge, 2005)

(Lodge, 2005)

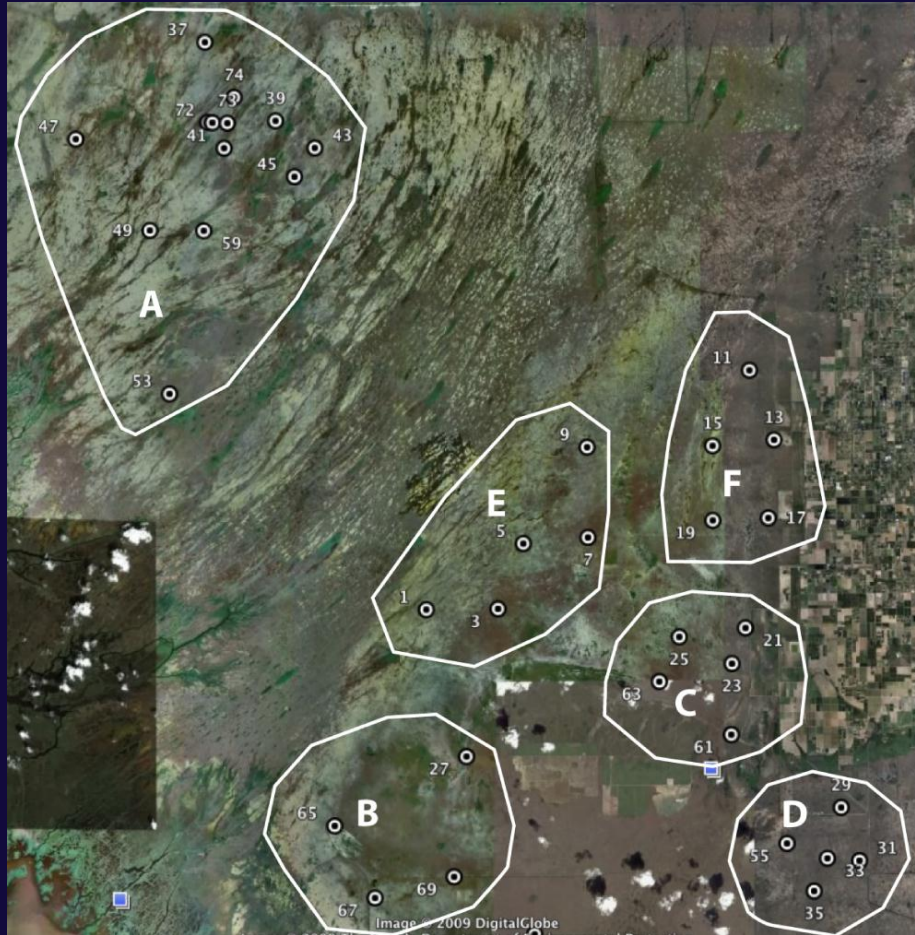
# Methodology

Collection of sediment cores



# Methodology

Current CSSS habitat

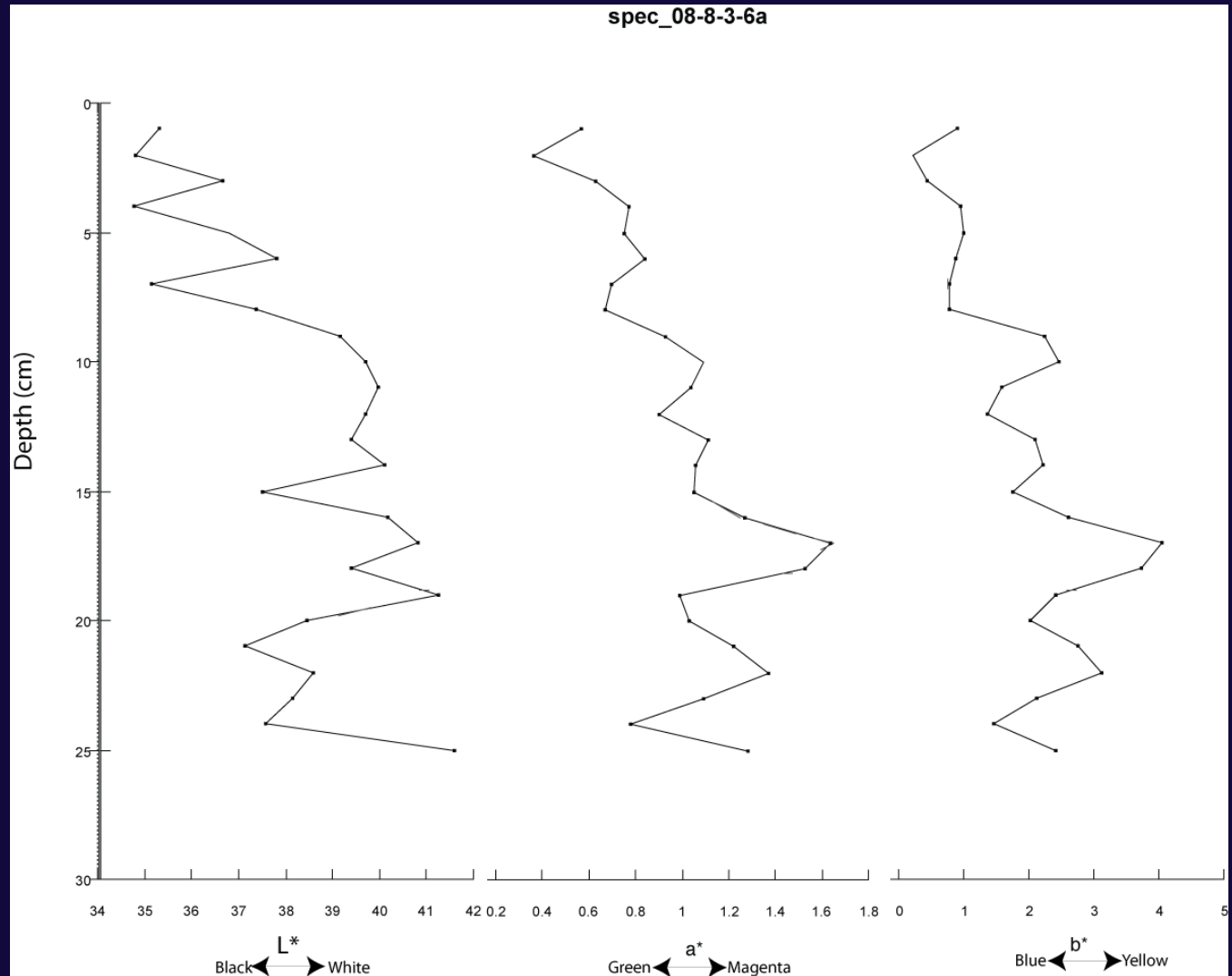


Former CSSS habitat



# Methodology

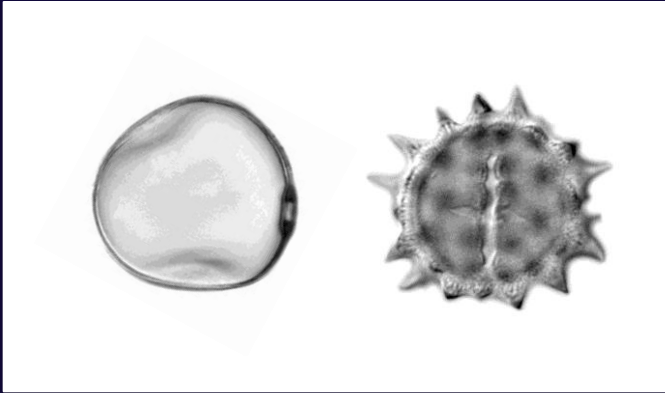
- Core/sediment description (sediment type, color)
- Biostratigraphy, Carbon-14 dating and Lead-210 dating



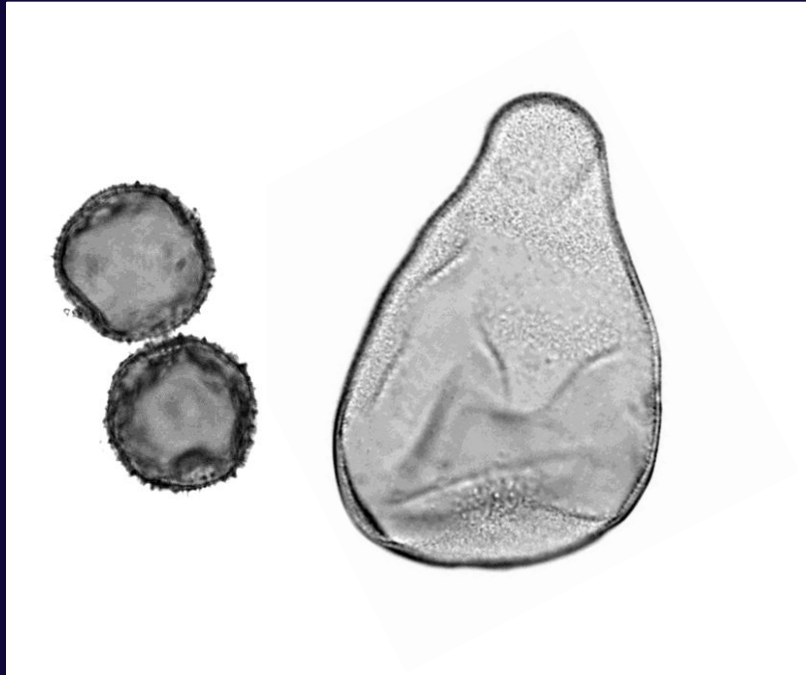


# Methodology

Analysis of downcore pollen assemblages and calibration with modern analogs



Marl prairie



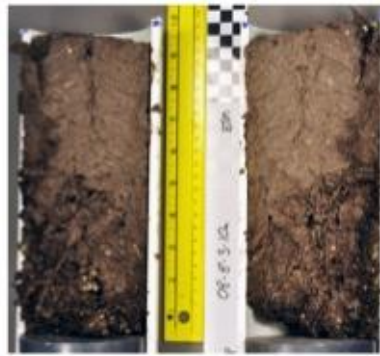
Sawgrass marsh

# Variability of downcore sediment profiles within Modern CSSS Subpopulations

Marl over peat



Marl



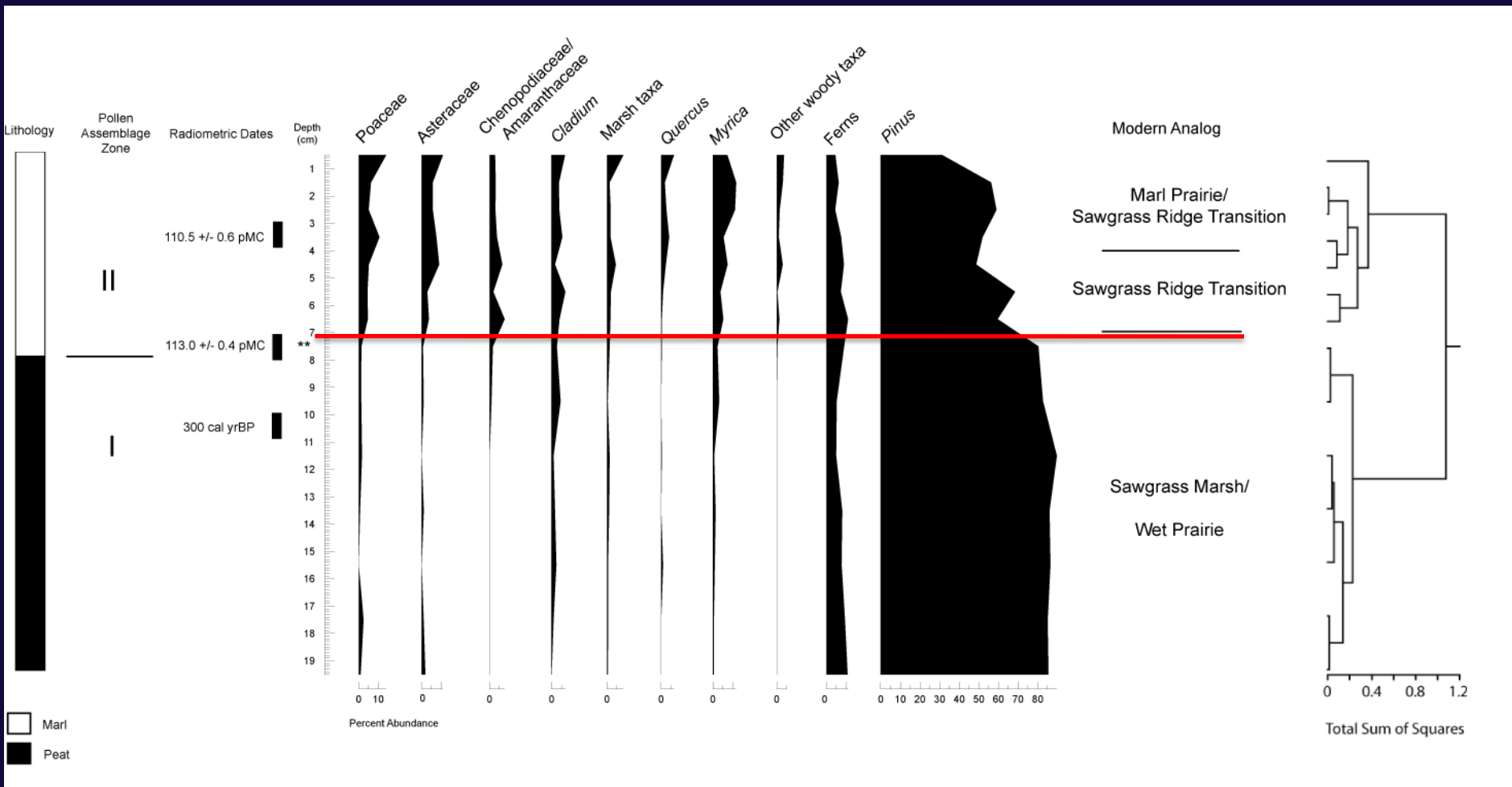
Organic rich marl



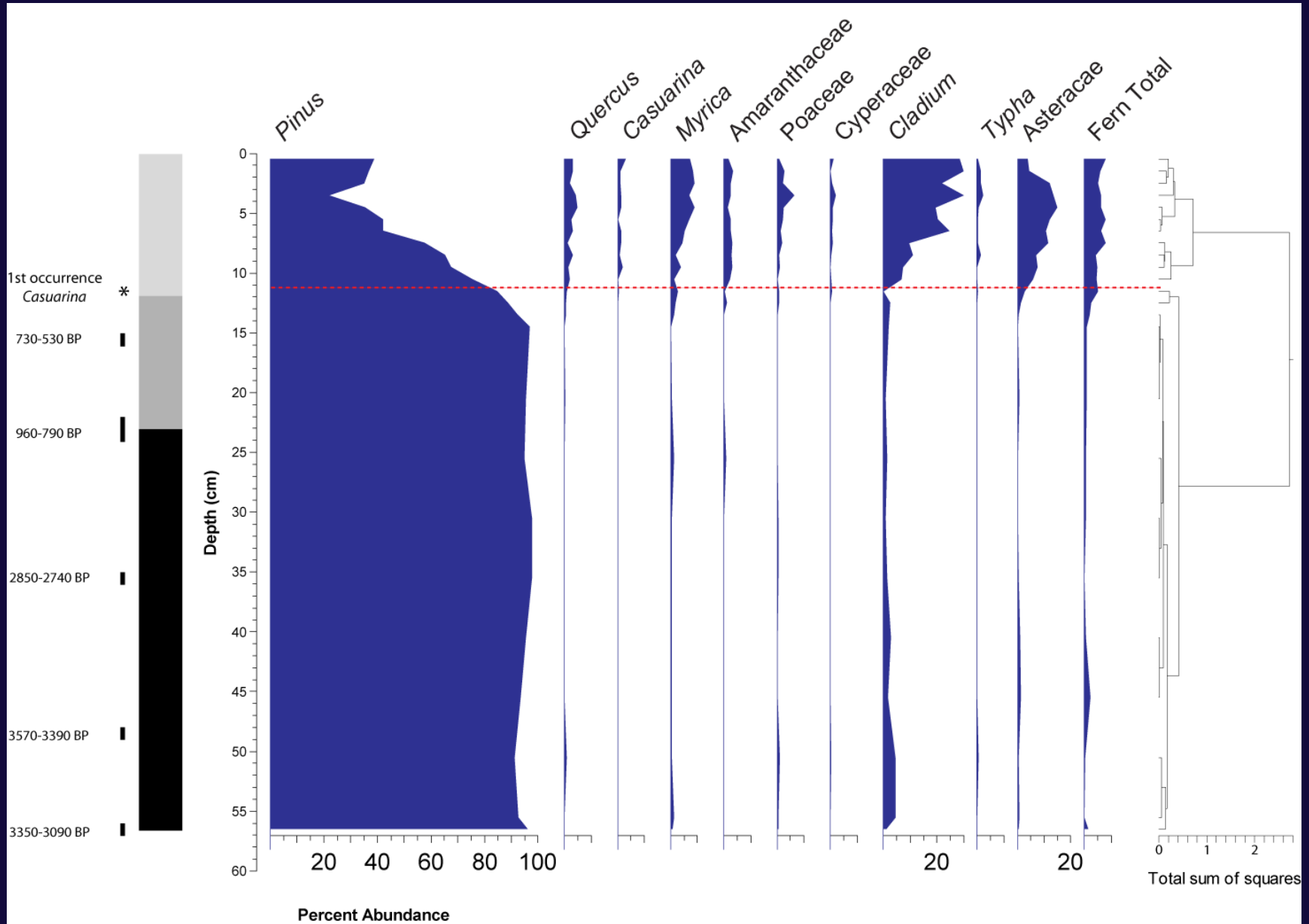
Peat over marl



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

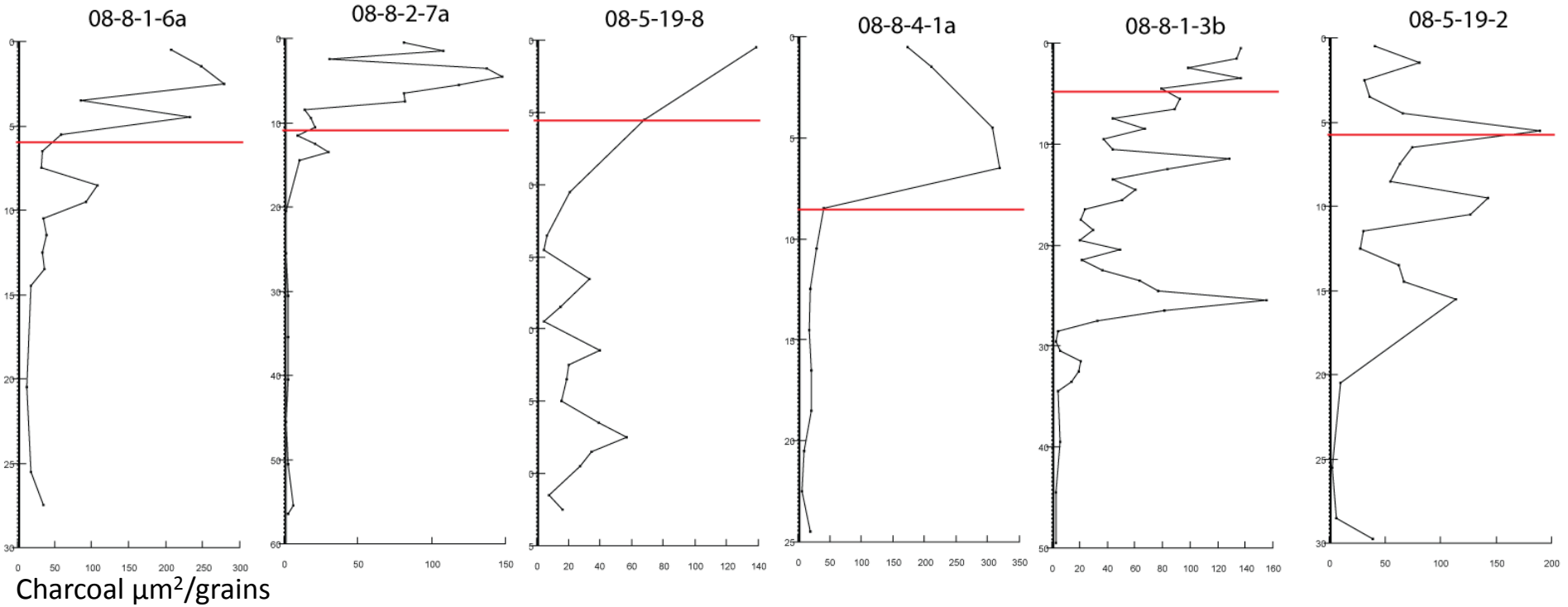


# Percent Abundance of Pollen of Major Plant Taxa, Core 08-8-7-2a, CSSS Population D, Everglades National Park



# Marl Prairie Fire History

## Microscopic charcoal results



Population F

Population D

Population B

Population D

Population E

Population C





# Conclusions

- Current CSSS habitat, marl prairies, experience changes in vegetation during 20<sup>th</sup> century
  - Trend toward shorter hydroperiods
- Former CSSS habitat, appear to have more grasses at the before the onset of the 20<sup>th</sup> century
- Fire history appears tied to shorter hydroperiod systems
- Longer term climate variability and sea level effects appear in the pollen record
- 20<sup>th</sup> century changes perhaps linked with water management and land use change