

GEER 2025

Tuesday, April 22, 2025

When Peter Pays Paul (Session 2)

Pre-drainage tree island ecology: what historical observations, archaeology and current science tell us

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Assessment



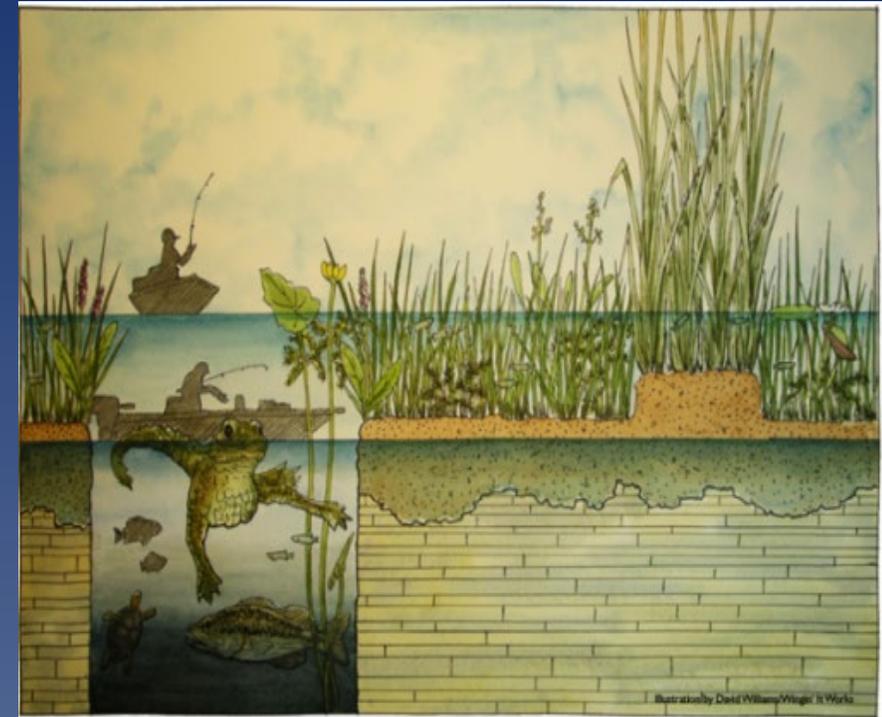
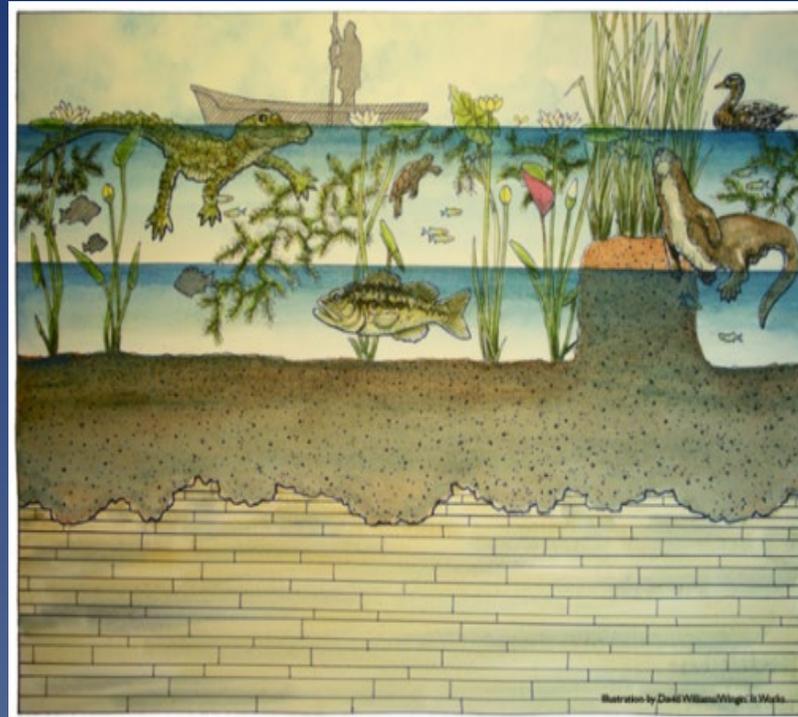
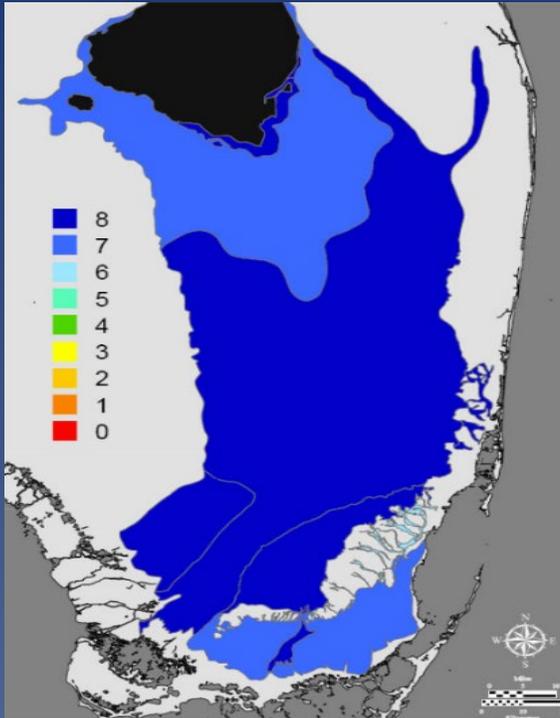
Presentation structure:

- Pose three questions important to answer for an understanding of “pre-drainage” tree island ecology in the central Everglades
- Provide what answers we can from historical observations, zooarchaeology and current science
- Place these answers within an Everglades restoration and historical context to help develop consensus on what this information could mean for trade offs between tree islands, ridge and sloughs and wading birds

Sources of information

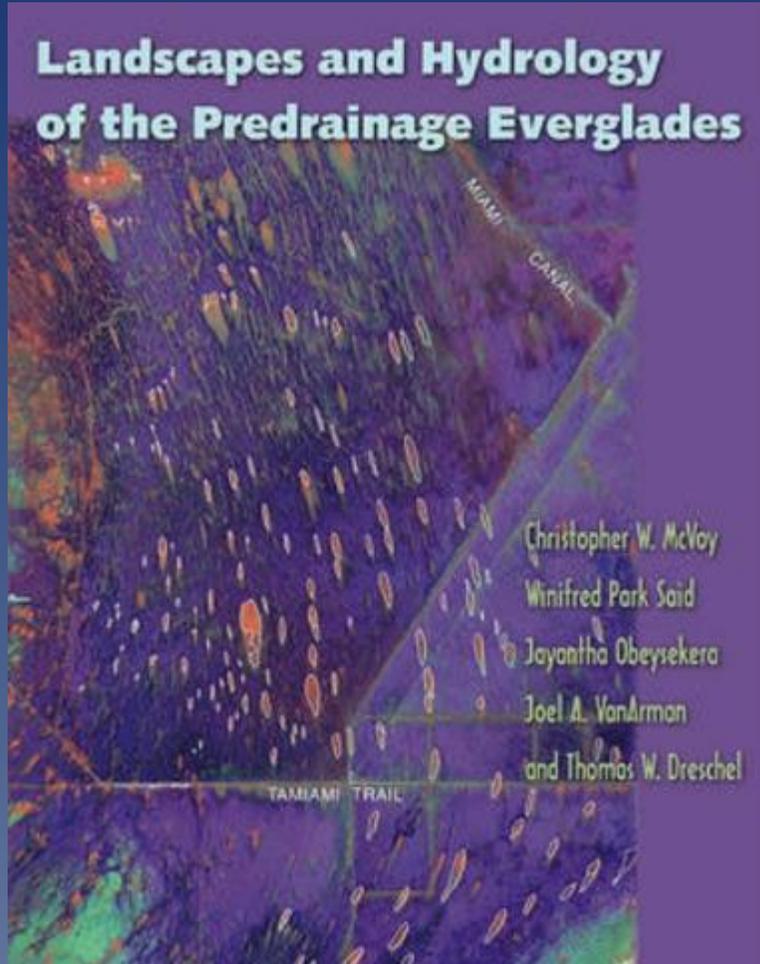
Citation	Type	Year	Location	Depth/Implication
Harney*	Observational	1840	Northern ENP	
Ingraham*	Observational	1892	Central WCA-3A	
Times Democrat*	Observational	1883	Central/Western WCA-3A	
Marshall	Paleoecology	2014	ENP	
Steves, Fradkin, Arden	Zooarchaeology	2018, 2004, 2016	Eastern EPA (transverse glades)	
Johnson*	Observational	1974	EPA	
Bozas	Modeling/Research	2024	Western/Central WCA-3A	
Buckman	Modeling/Research	2024	WCA-3A/3B	

Question #1. What were pre-drainage water depths in the ridge and slough system in the central Everglades



- *The water was deeper prior to drainage – historical (McVoy et al. 2011) and paleoecology/current science (Marshall et al. 2014)*

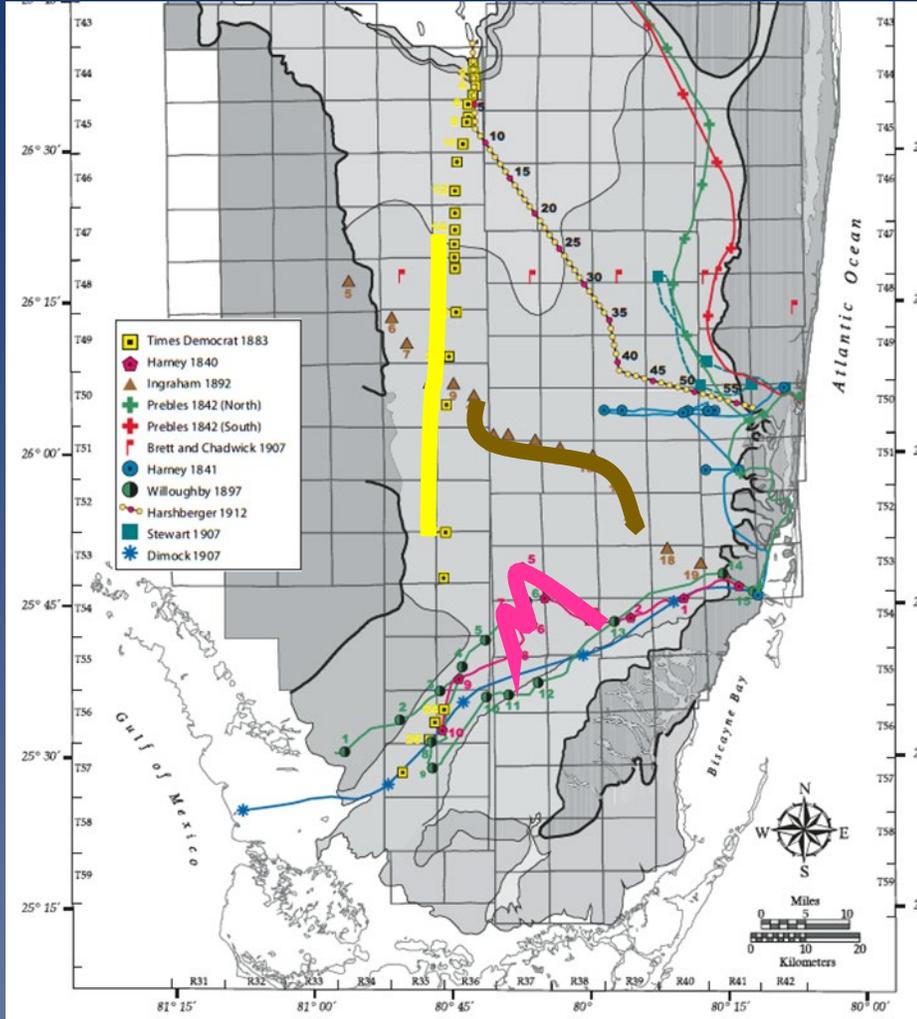
Landscapes and Hydrology of the Predrainage Everglades 2011



"Represents a landmark in the study of historical ecology in South Florida..."--William F. Loftus, retired, Department of Interior

...provides detailed descriptions of the pre-drainage Everglades, gleaned from a plethora of historic sources, including notes from explorers' expeditions and surveyors who traveled and worked in the Everglades during the early-to mid-nineteenth century.

Question #1. What were pre-drainage water depths in the ridge and slough system in the central Everglades – historical observations



Harney 1840

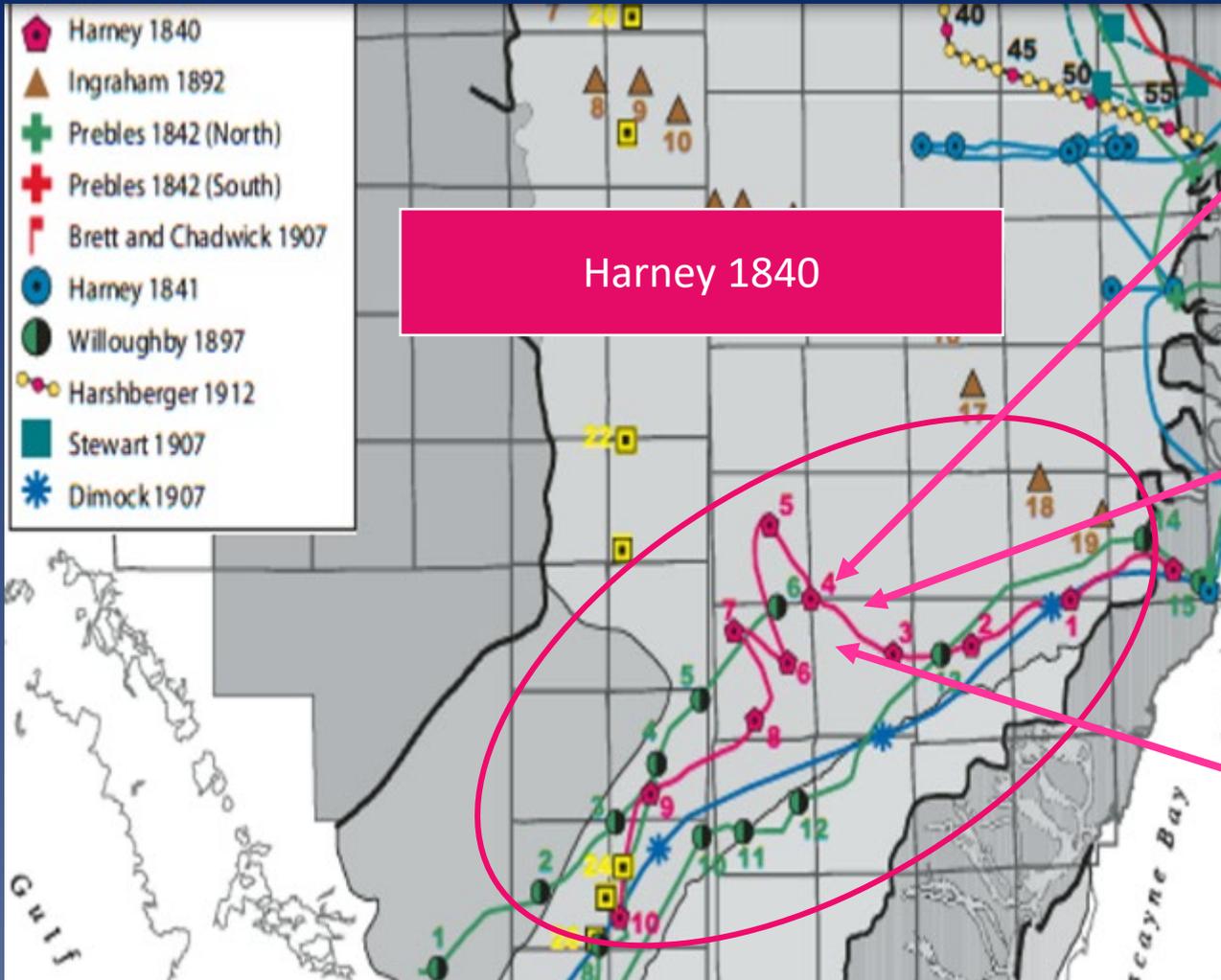
- December, well into dry season
- Not abnormally wet year
- General Harney to Buckingham Smith “2.5 feet (water in slough) was low estimate”

Ingraham 1892

- “They crossed at a very dry time”
- March 26 – April 2
- Slough depths as high as “about 2.5 feet on the average; sometimes 4 feet”

Times 1883

- November 10 – December 6
- Soon after drainage began
- “water about 3 feet”

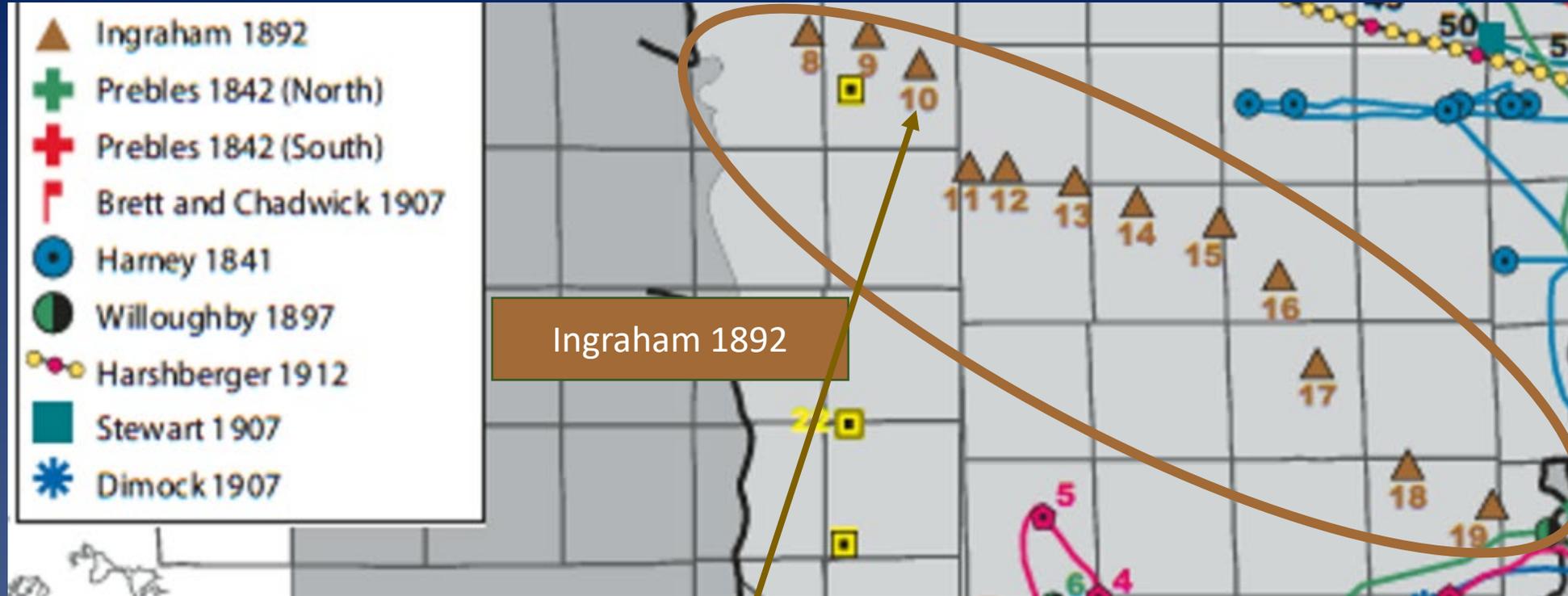


“[To reach the island] we had to wade through mud and water three or four hundred yards, up to our waists, before we gained dry land.”

“We have plenty of water at present and go along with a great deal of ease.”

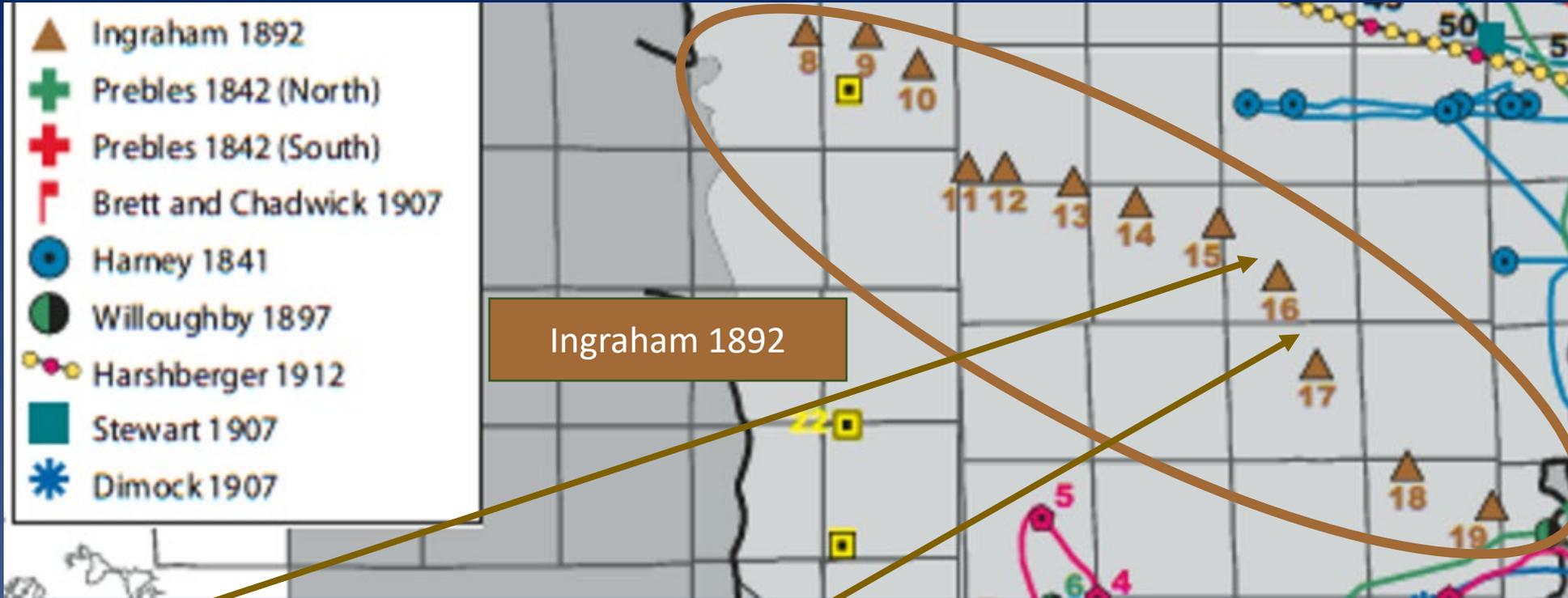
“...in a few channels or where there are small ponds of water with sand bottom from 3 to 5 feet deep.”

...water in the sloughs was likely as much as 2 to 3 feet deep... (McVoy et al. 2011)



...rainfall data were available for 1891–1892, both of these years were substantially below average, particularly the year immediately preceding the March–April trip (McVoy et al. 2011).

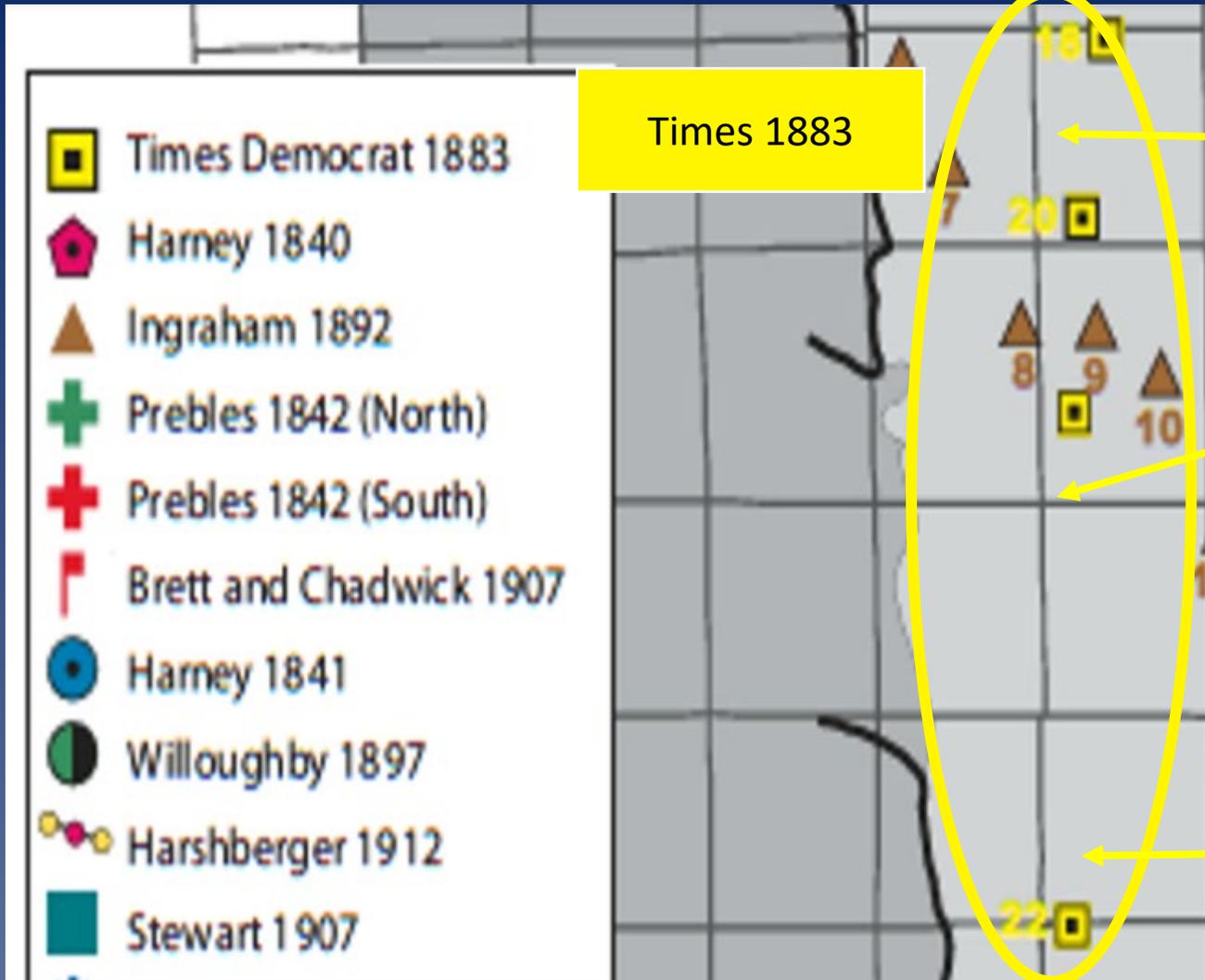
“Flying about this island we noticed a cloud of birds, found it was a bird roost . . . hundreds of young birds in the nests . . . it was a very disagreeable place to camp, the odor being of sufficed strength to down a tolerably strong man.”



“Found glades to be bearing east of south with plenty of water all day”

“[Slough depths] About 2.5 feet on the average; sometimes 4 feet”

“nests of ants.. about 18 to 24 inches above present water level”



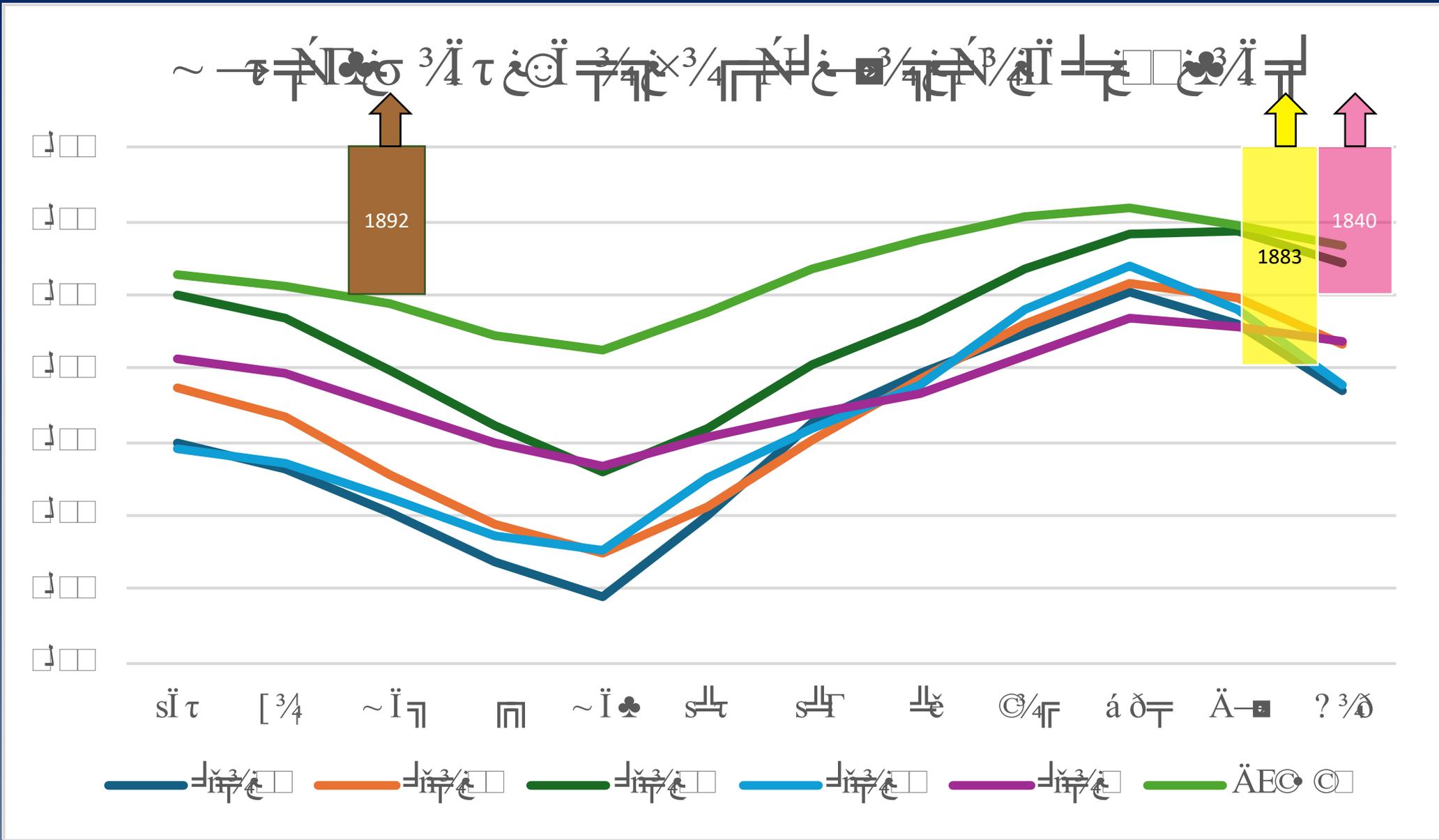
Times 1883

“first time in many days we are able to use our oars.”

“We pass a number of islands, none over two acres in extent, and if any high land is upon them, not more than a few yards in the centre.”

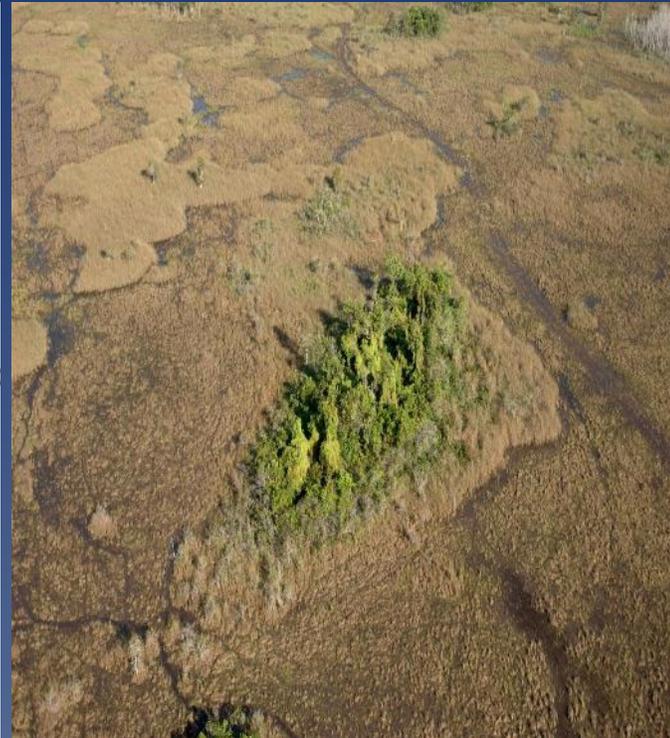
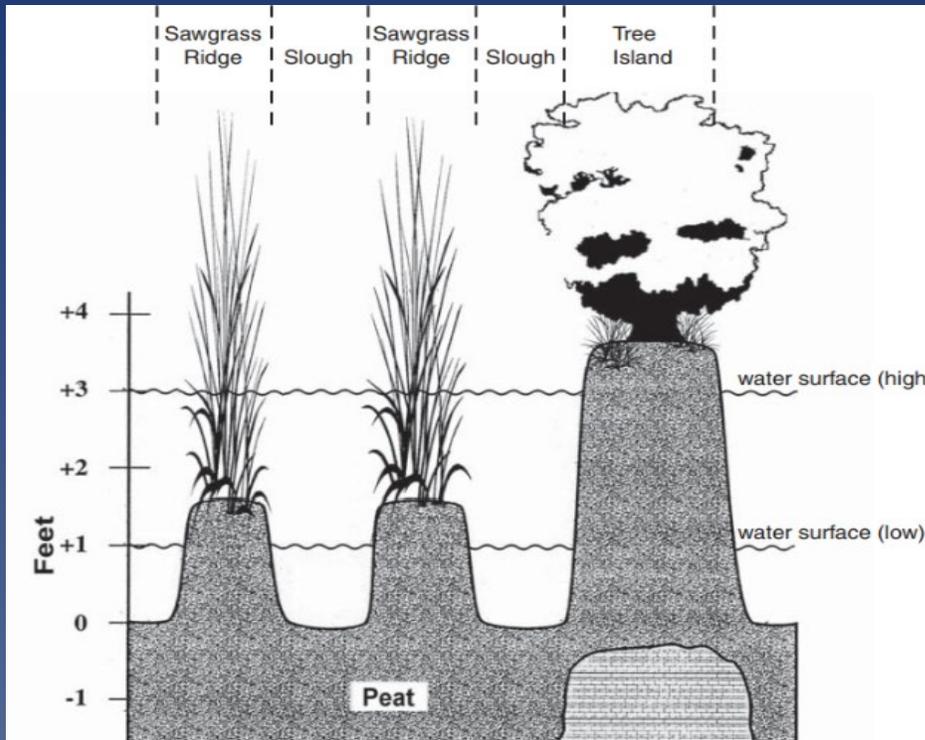
“water about 3 feet with rocky bottom. Our course lies between numerous islands, all of which are under water.”

2 to 3 feet (McVoy et al. 2011)



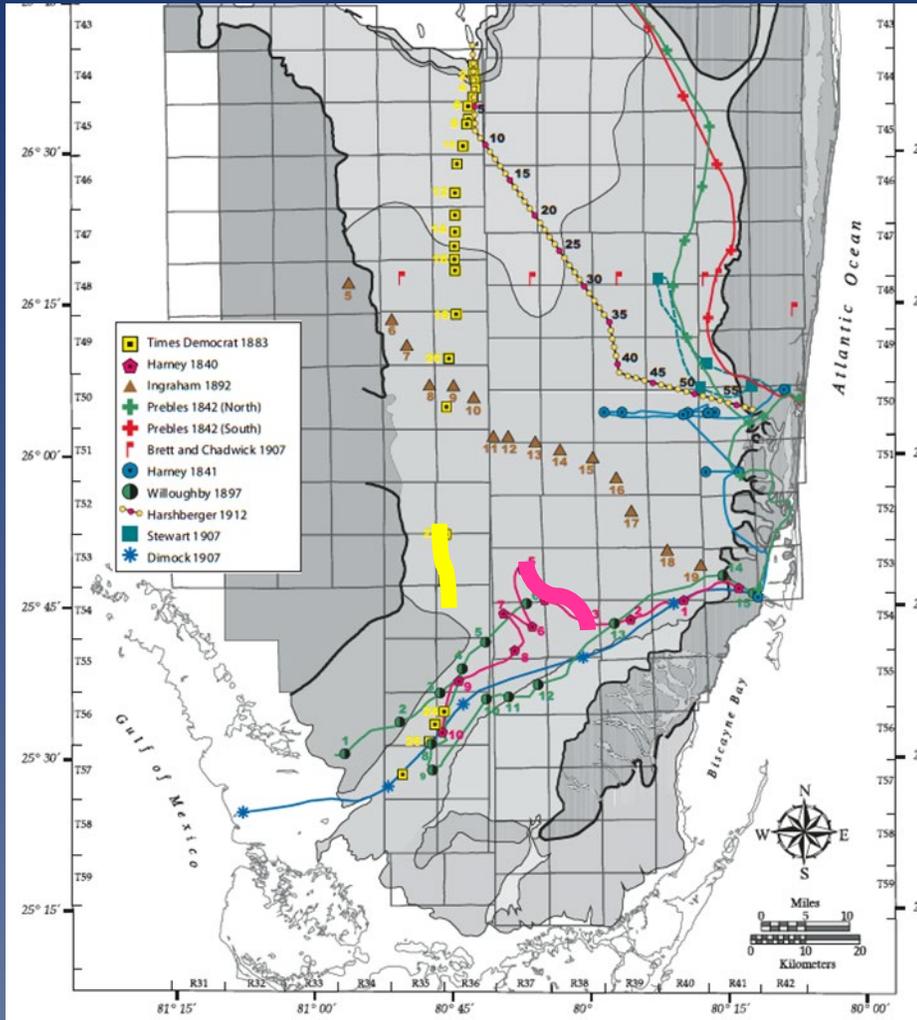
★ Locations of gauges

Question #2. How did those pre-drainage depths relate to historic tree island flooding/hydroperiod



- Pre-drainage, tree islands were wet even during drier years – historical (McVoy et al. 2011)

Question #2. How did those depths relate to tree island flooding/hydroperiod



Harney 1840
December

- strand tree islands... at least 1 foot above the water level... 3 to 4 feet above the bottom of the sloughs (McVoy et al. 2011).
- smaller tree islands as overflowed but flourishing suggests this was a common condition for these willow-head or bayhead islands (McVoy et al 2011).
- “we halted to the leeward of an island which was entirely overflowed . . .” Harney

Times 1883
November

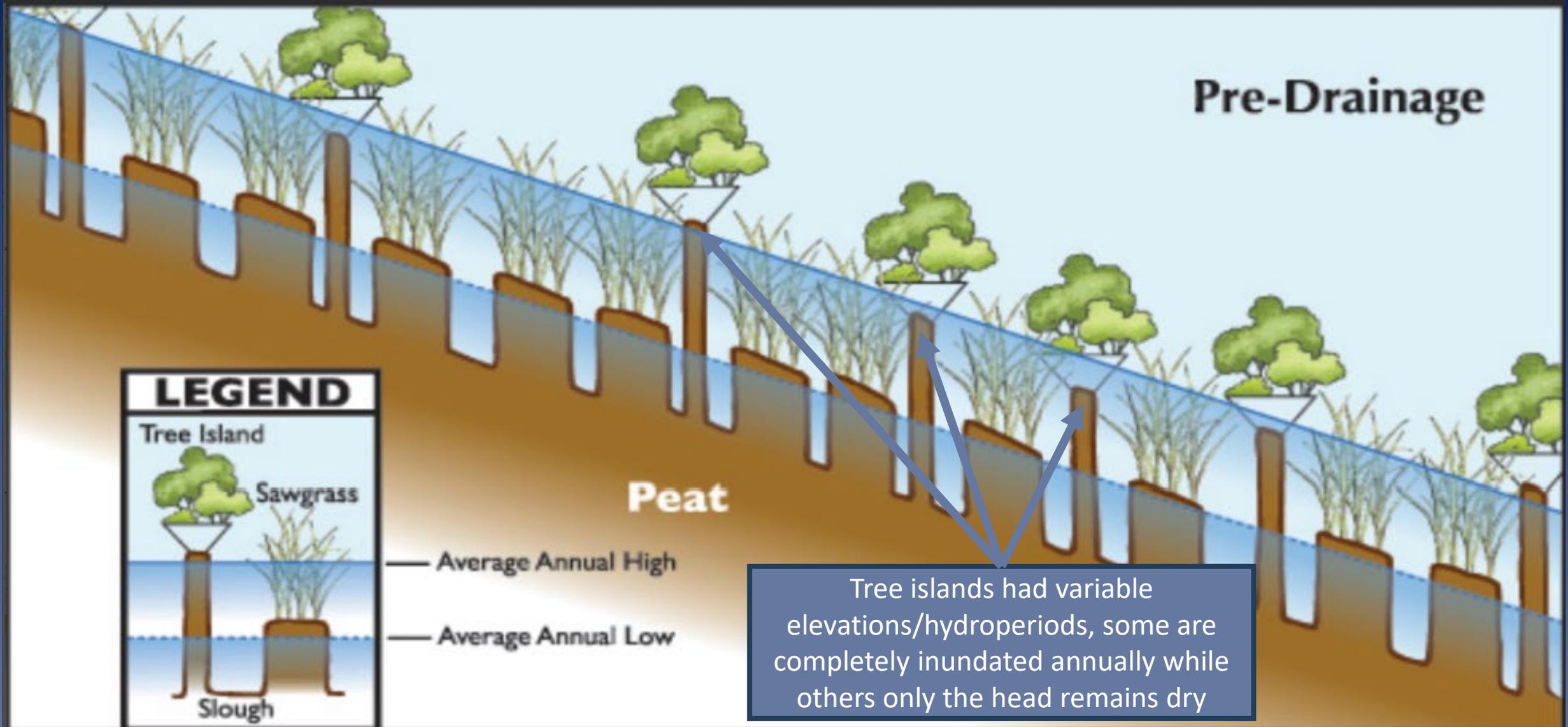
- “the island which is three acres in extent.. The men soon cut.. till they reach the dry ground, which is about twenty feet square” Hopkins
- “We are now in the midst of innumerable islands. These islands are generally low and subject to overflow.” Hopkins
- Cabbage Island: “water about 3 feet with rocky bottom. Our course lies between numerous islands, all of which are under water.” “...three cabbage trees, and dry land enough for a part of us to spread our blankets” Williams

Physical dimensions of subcomponents of the pre-drainage Ridge and Slough landscape (McVoy et al. 2011)

<u>Landscape Element</u>	<u>Height estimate</u>	<u>Description</u>
Strand Tree Island	2-4 feet	Height of the center of the elevated north end of the island above average bottom surface of the surrounding sloughs
Bayhead Island	2-4 feet	Height of the center of the island above average bottom surface of the surrounding slough
Slough	1 foot; 3 feet	the average annual low and high water depths in the slough

Tree island heads were above surrounding water levels most of the year, but *not much above the long term annual maximum water elevation.*

The vegetation and peat microtopography of the pre-drainage Everglades were in equilibrium with, or closely "tuned to" the original hydrologic driving forces.

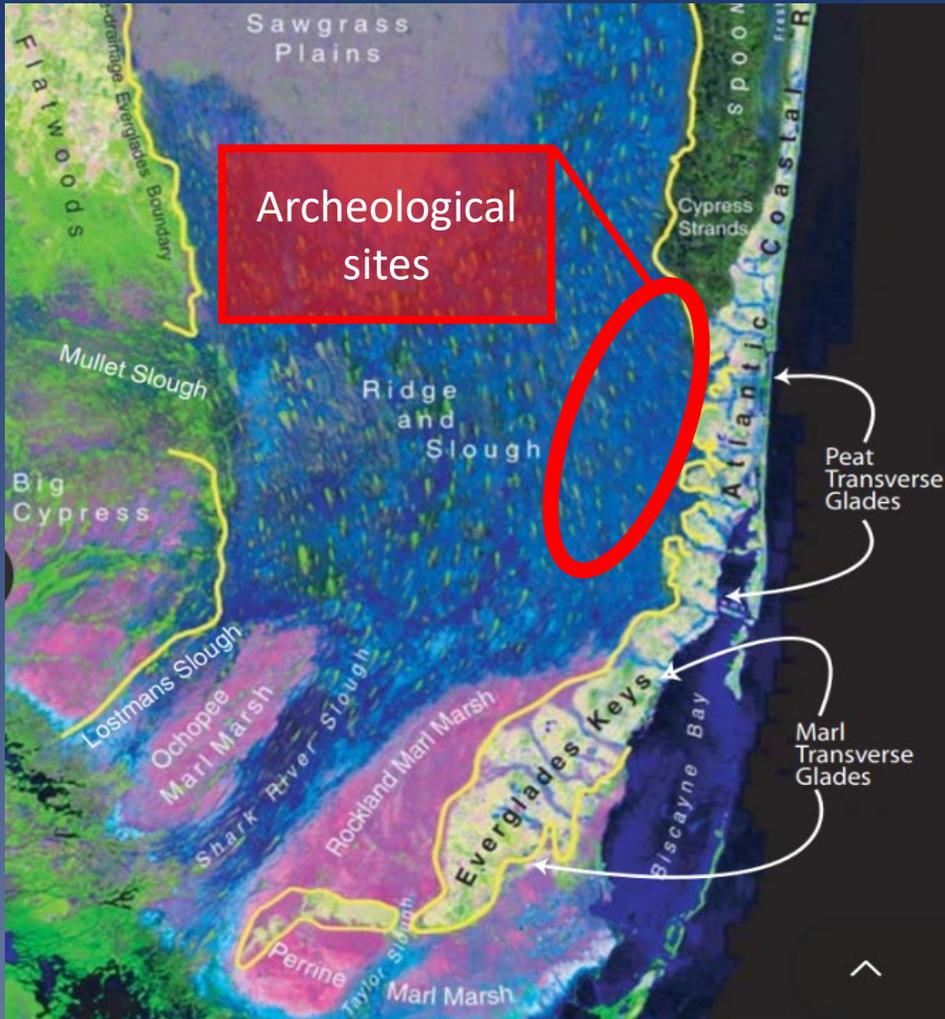


Question #3. How did pre-drainage tree island hydrology relate to the characteristic fauna of the central Everglades



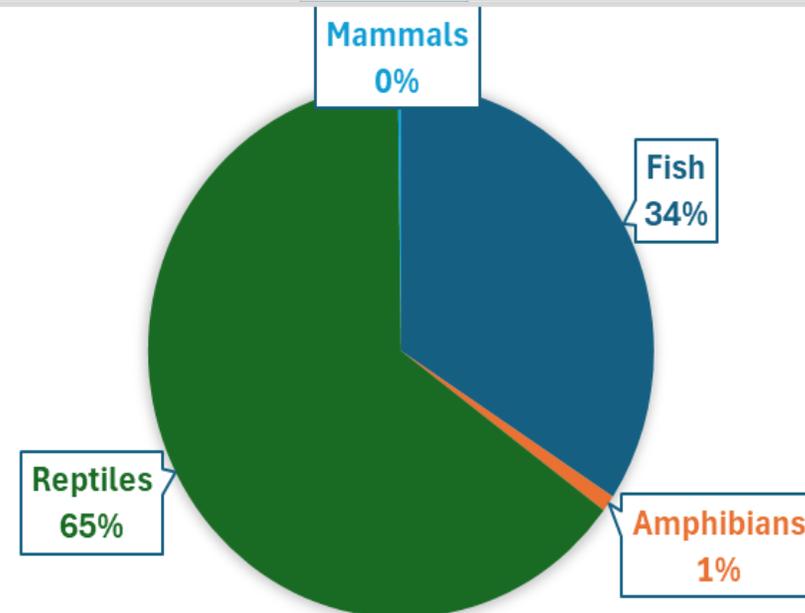
- The fauna of the historic central Everglades was mainly aquatic with few terrestrial mammals – historical (McVoy et al. 2011), current monitoring and zooarchaeology

Zooarchaeology, the ancient past to 1500 CE

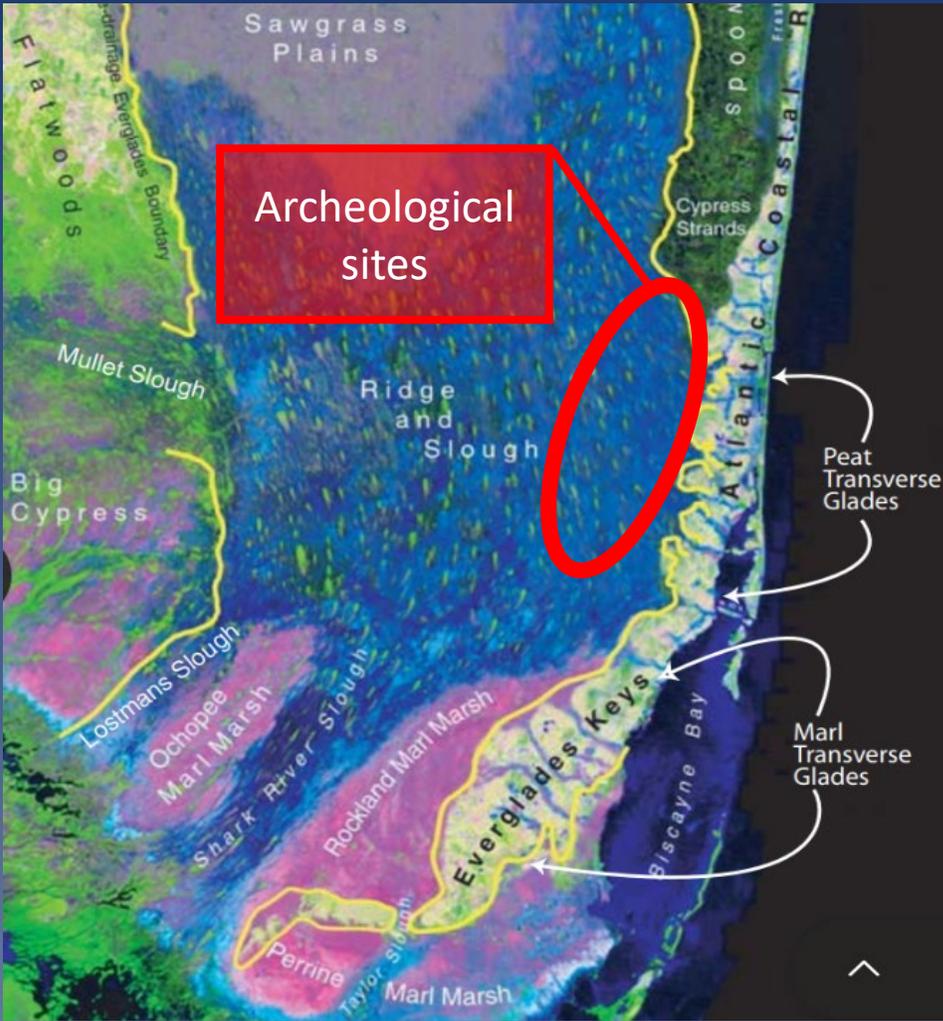


Fradkin, Arlene. "Snake Consumption among Early Inhabitants of the River of Grass, South Florida, USA." 2004

- Occupation approximately 5,000 to 2,000 BCE, and 1200-1513 CE
- The most common snakes represented at both sites were water snakes, 28% and 39%

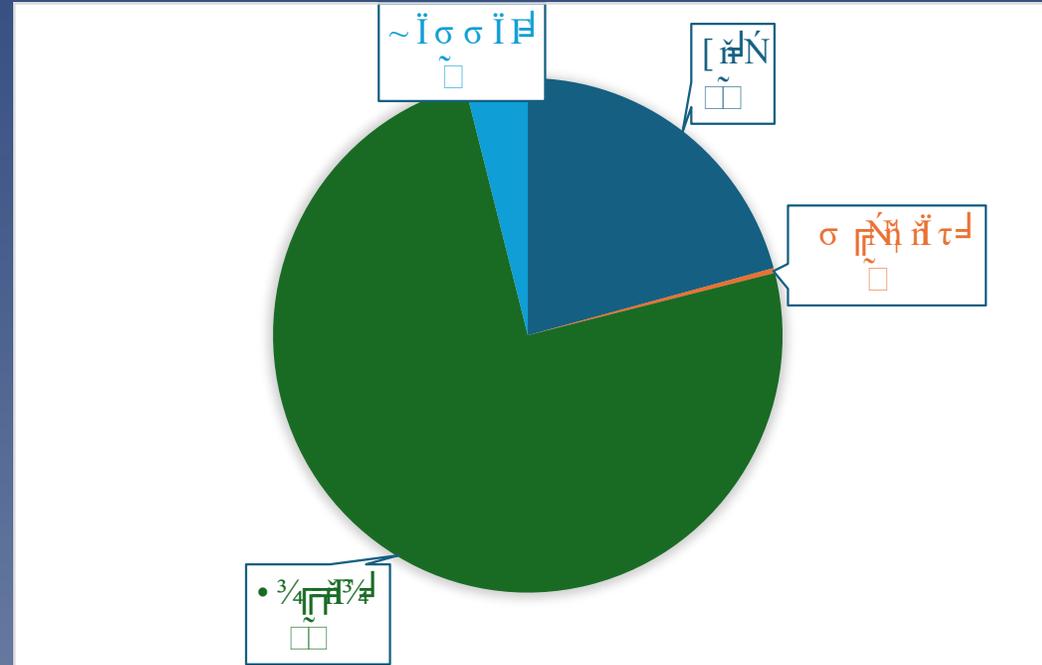


Zooarchaeology, the ancient past to 1500 CE



Ardren, Traci. "Prehistoric human impact on tree island lifecycles in the Florida Everglades" 2016

- habitation of the site from 650–750 CE to 1400–1513 CE
- snake and turtle remains were the most common
- mammals, amphibians, and bird remains were the least common



How did pre-drainage tree island hydrology relate to the fauna characteristic of central Everglades tree islands: McVoy et al. 2011

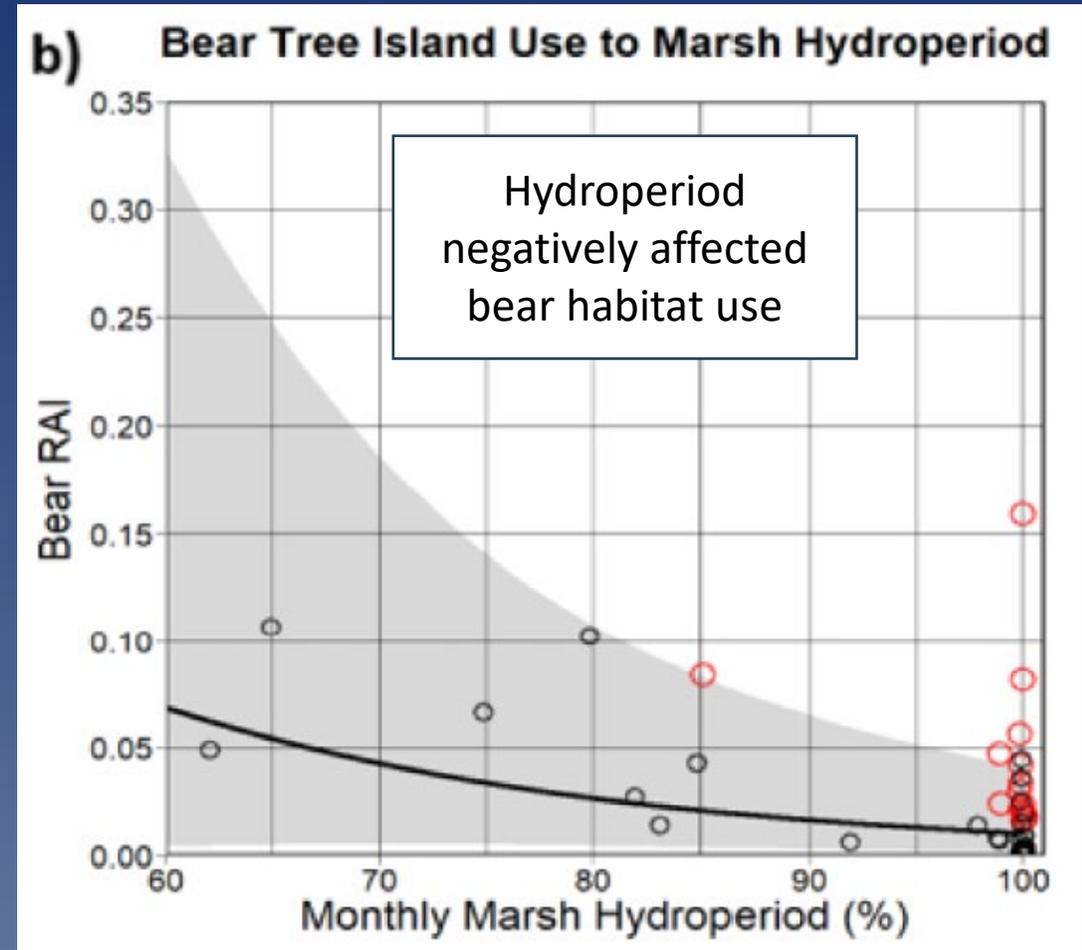
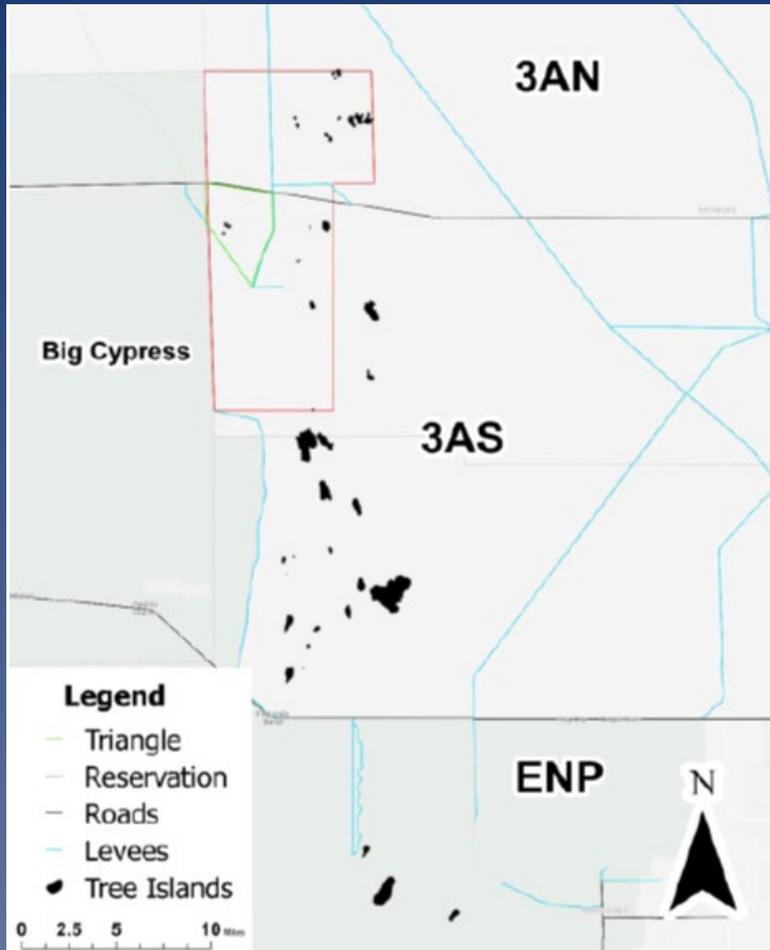
“.. traded for both alligator hides and otter pelts, which were the mainstays of the Seminole economy... The Seminoles realized good money from otter pelts, but otter also became scarce after the Everglades water table was lowered.” (Kersey 1975)

“Few remember that the slough and sawgrass Everglades is not the natural habitat of the deer.. The deer only went into the deep Everglades as a result of the press of civilization and increased hunting. I know from personal observation that there were no deer in the deep Everglades [i.e., away from the drained edges] forty-five or fifty years ago [1925–1930].” (Johnson 1974)

Hillsboro Lakes/Loxahatchee National Wildlife Refuge area during 1920s and 1930s: “We giggered all the ducks we wanted by blinding them with the lights as they roosted on the sloughs by the thousands. In summers we ate Florida mallards and wood ducks which were abundant in those days.” (Lamb 1975)

“Before the Everglades were drained, they furnished a home for thousands of Florida Ducks, herons, egrets, Limpkins, and Everglade Kites, most of which have been compelled to leave the region entirely.” (Howell 1932)

Spatiotemporal Patterns of Mammalian Use of Everglades Tree Islands (Session 47)



Sources of information

Citation	Type	Year	Location	Depth/Implication
Harney*	Observational	1840	Northern ENP	Ave. slough depth 2.5 feet
Ingraham*	Observational	1892	Central WCA-3A	Sloughs are wet in dry season
Times Democrat*	Observational	1883	Central/Western WCA-3A	Islands are wet in early dry season
Marshall	Paleoecology	2014	ENP	Depths ~1900 CE were deeper in ENP
Zooarchaeology**	Historic	2018, 2004, 2016	Eastern EPA (transverse glades)	Early faunal assemblage was mainly aquatic
Johnson*	Observational	1959	EPA	No deer in 1920's
Bozas	Modeling/Research	2024	Western/Central WCA-3A	Hydroperiod changes bear usage
Buckman	Modeling/Research	2024	WCA-3A/3B	Bobcats > in WCA-3AN

Everglades restoration and historical context.. for a few slices of the pie : Implications

- depths in the predrainage Everglades were more consistent with the landscape
- generally “wetter” conditions supported tree islands with variable heights (fine tuned) across the landscape.
- the faunal community of those islands was primarily aquatic.

The Everglades is a wetland that has experienced a variable hydrology for thousands of years (*the whole pie*).

Combining historical notes, archeology and current research is an attempt to fuse multiple lines of evidence together to figure out *the ingredients of the pie* just prior to drainage.

What is *the recipe to create a new pie* desirable for all the components of Everglades ecology?

