

The Pre-drainage Lake Okeechobee–Everglades Hydrologic Interface

-- Reconstruction from Historical Sources

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Overview

Lowering of Lake Okeechobee began 1882; despite absence of pre-1882 hydrologic measurements, considerable pre-1882 ecological and historical information is available from which to estimate pre-lowering conditions.

Original hydrologic connection between Lake and Everglades was strong.

Outline

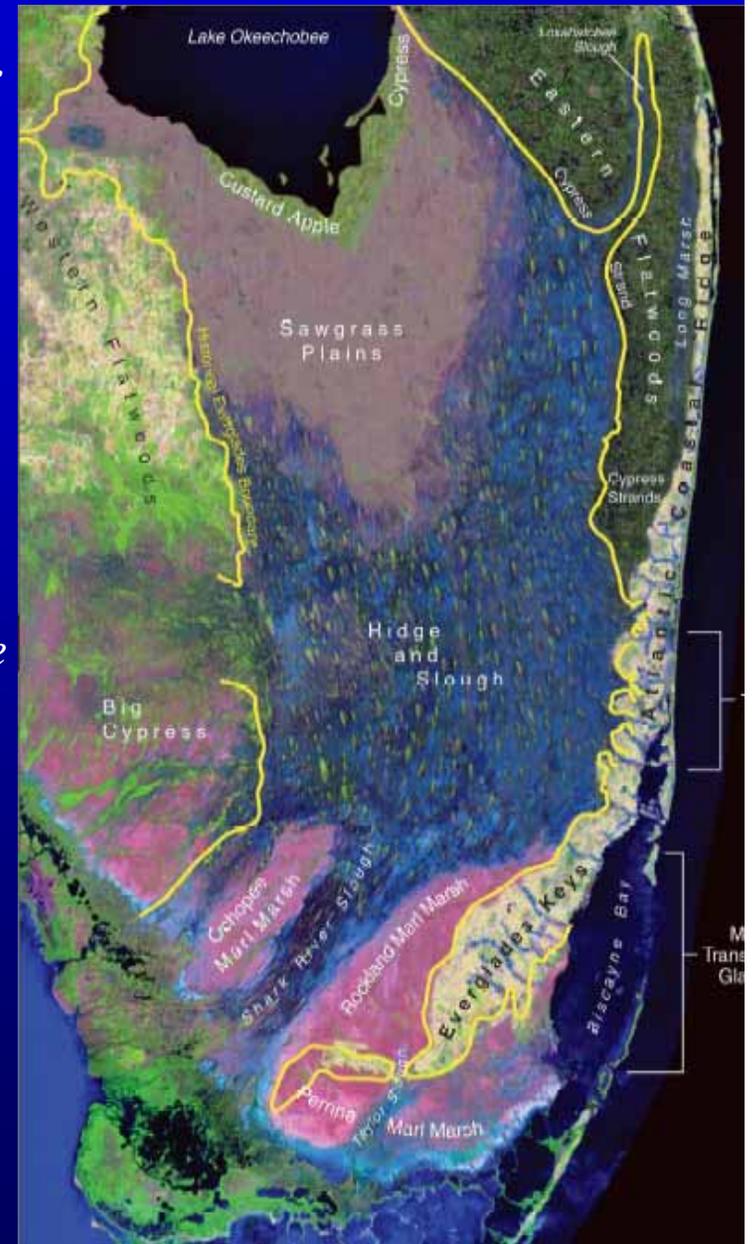
Outflows
Shoreline
Size of Lake
Littoral Zone
Lake Stage
Conclusions

Lake Okeechobee and the Everglades

“[Lake Okeechobee] has no regular outlet to the ocean or Gulf, but looms south, gradually losing its borders amidst the saw-grass marshes of the Everglades, and is thereby proved to be an important auxiliary in keeping them constantly overflowed.” (U.S. Surveyor A. H. Jones, 1847, p. 61)

“...the water of the saw-grass country [Okeechobee Marsh] is in large part an oozing out product derived from the lake [Okeechobee], just as the waters of the more southern Everglades represent a similar outflow from Lake Okeechobee.” (A. Heilprin, 1887, p. 406)

“The Everglades are supplied with water, in my opinion, from two sources: First, the rains that fall in it; second, from Lake Okeechobee, lying on its northern extremity and separated from it by a very narrow strip of grass swamp.” (Col. William Harney, 1848, p. 57)



Pre-1882 Outflows

Was A. H. Jones (1847) right? (“no regular outlet to the ocean or Gulf”)



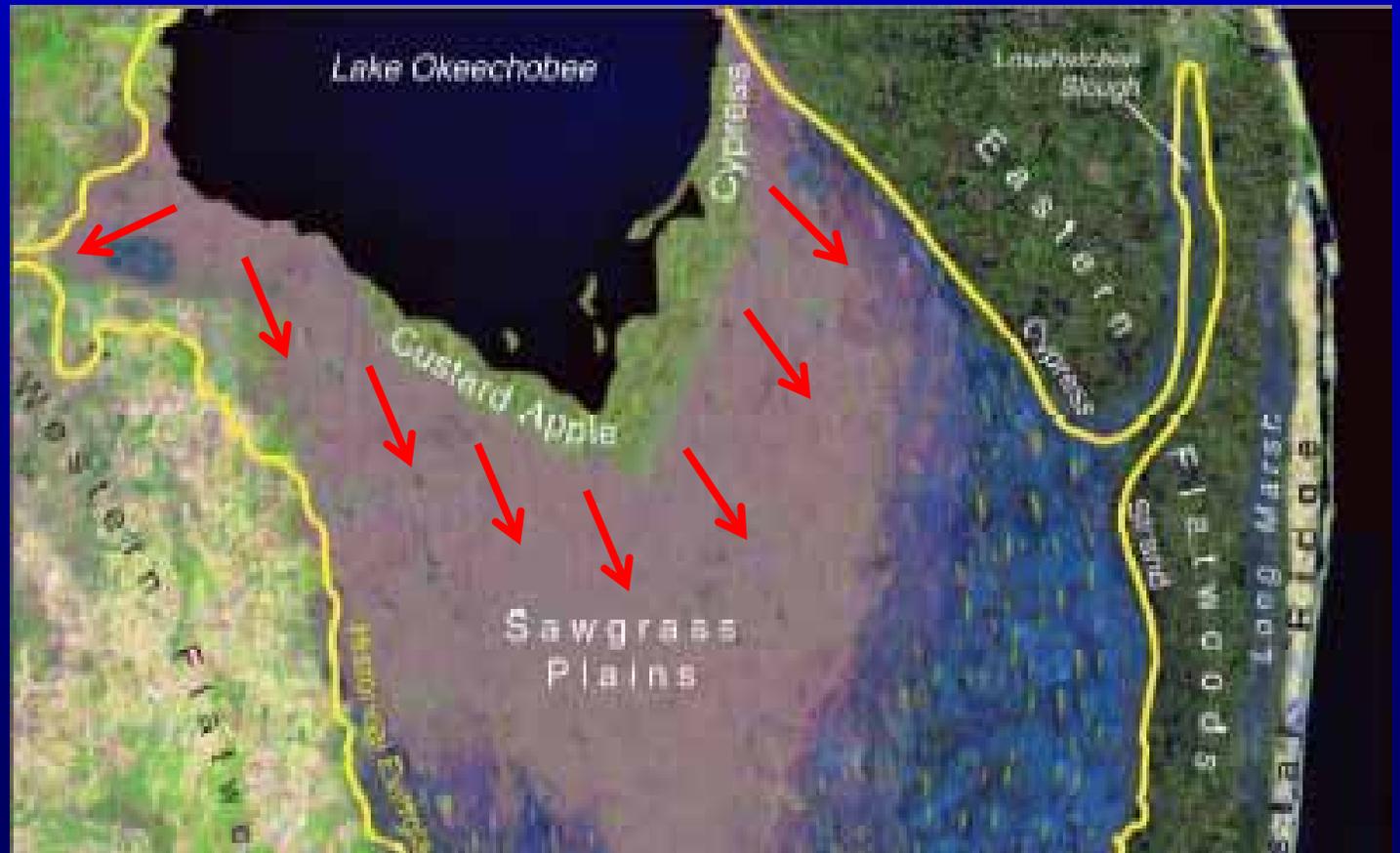
Yes – No connection to St. Lucie Inlet

Yes – No direct connection to Caloosahatchee River

Origami

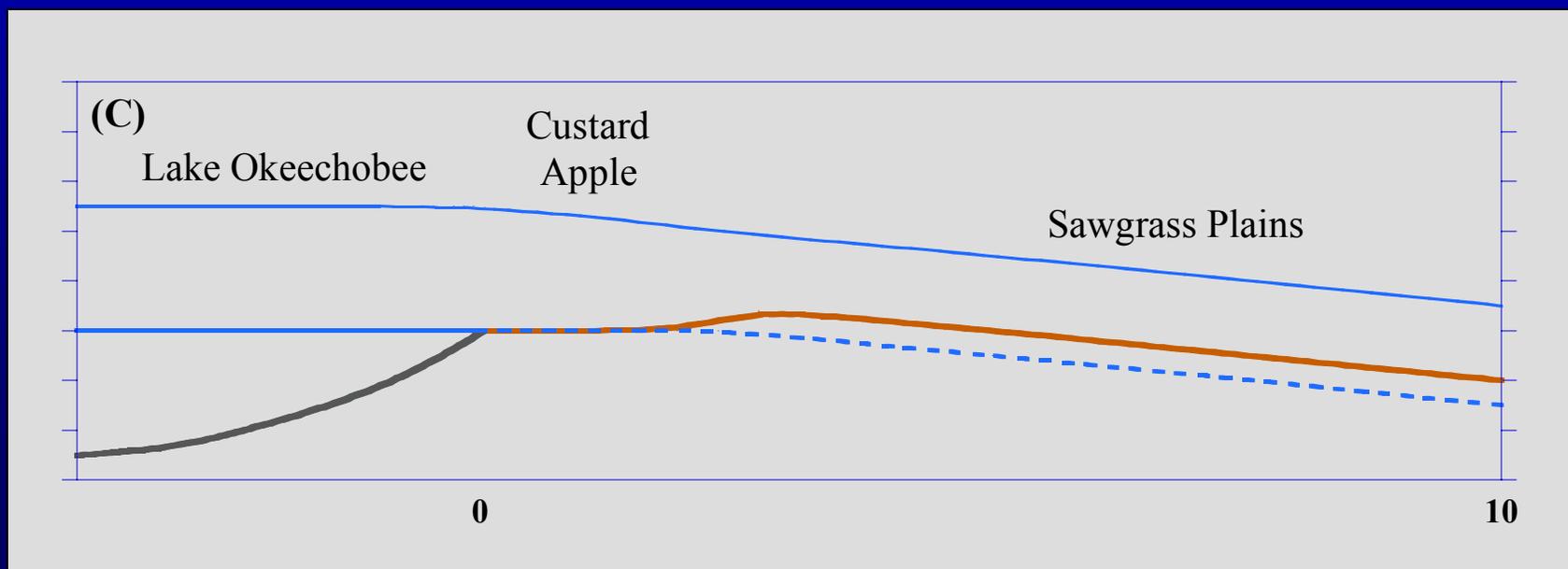
The Southern Shoreline – (“no regular outlet”)

- Formed by accumulated peat soil(s)
- The “natural dam” creating the lake (Gleason, Stone et al)
- Vegetation: Sawgrass Plains or Custard Apple Swamp (i.e., two parallel paths)
- Within 3-4 miles (5-7 km) of shore, no channels; uniform vegetation and water depths



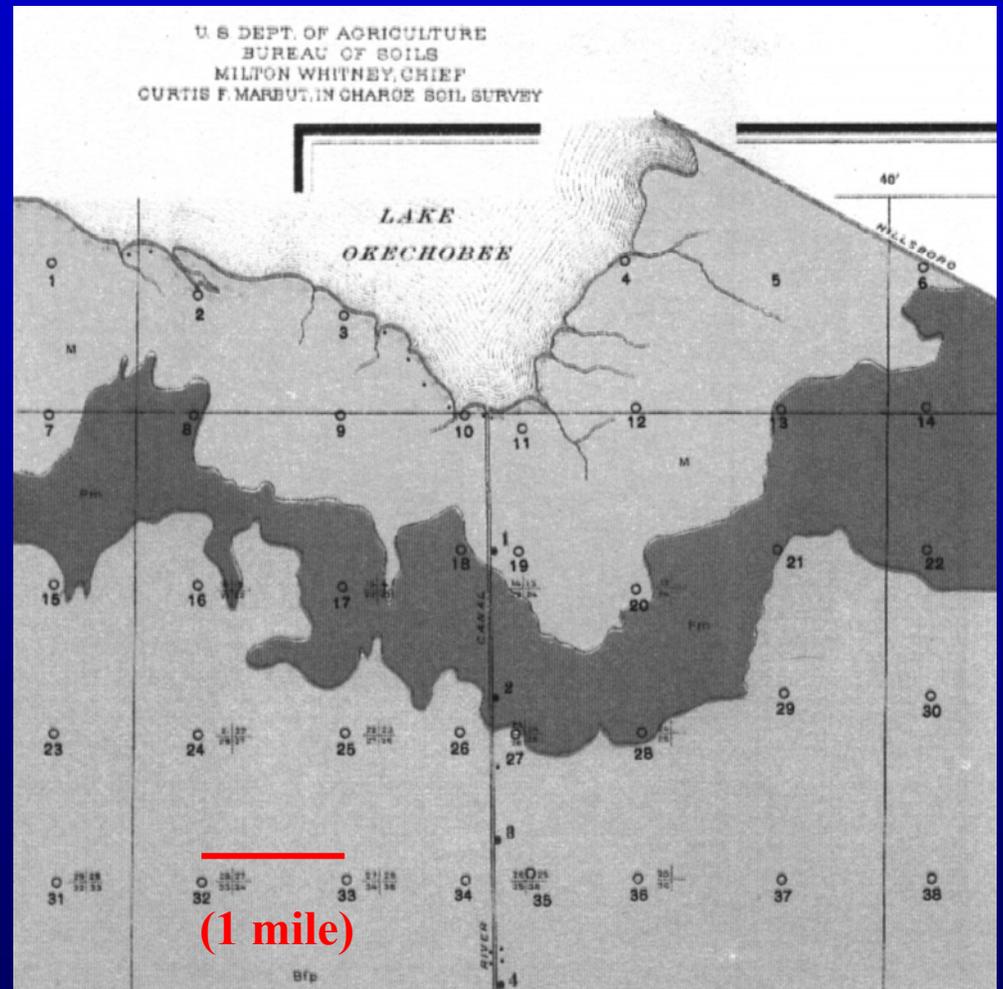
Custard Apple Shoreline

- Strong sources for mapping (Twp surveys, soil survey)
- Less extensive than mapped by Harshberger (1917) or Davis (1943)
- Lower than Sawgrass Plains
- Rim a post-drainage phenomenon (differential subsidence)
- Hydraulic resistance of Custard Apple trees probably was not the controlling factor



Custard Apple Shoreline: The “Dead Rivers”

- Flowed south, out of Lake into Everglades
- Short (1-2 miles)
- Much branched at head
- Becoming smaller toward head
- Times Democrat (1884) frustration...



The Sawgrass Shoreline

“[In July of 1857,] we... began looking for an outlet into the Everglades, but without success. We were bounded by a high, almost impenetrable wall of saw-grass, through which the water from the lake oozed its way into the Everglades.” (Canova 1885,p. 29-30).

very few trees appear. . . . In a long stretch of coast, but one tree is in sight . . .” (Ober 1874, p. 593)

“The [southwestern] shore of the lake [Okeechobee] was marked by only 3 groups of trees, 2 cypress and 1 of willows, being everywhere else, as far as could be seen, bare of trees.” (J.L. Meigs, 1879, p. 865).

“the saw-grass margin surrounding the lake is very wide and presents no breaks in the vicinity of the Upper Caloosahatchee.” (Sackett 1888)

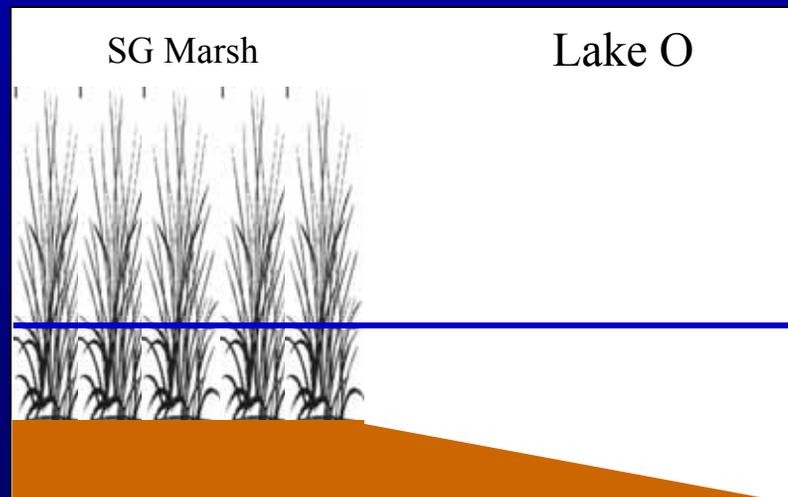


Shoreline and the Size of the Lake

- Curiously, was simultaneously “not absolutely defined” and yet “well marked:”

A. Heilprin in 1887:

“The border line of the lake is in most places not absolutely defined, owing to a continuous passage of the open waters into those of the Everglades; on the whole, however, the delimitation of the latter region is fairly well marked, the growth of saw-grass or flag terminating rather abruptly.” (p. 413).



Size then and now: See next presentation (but surprisingly similar)

Littoral Zone – Water Surface

“[the water surface in the marsh] being manifestly on the same level with the water of the lakes, it was evident that the leveling might properly be commenced on the south shore of Lake Hikpochee” (J. L. Meigs, 1879, p. 865)

“The men waded the swamp and continued the line [of levels] in the direction of Lake Okeechobee until a point was reached where there was no slope in the surface of the water for several miles. This condition extended to the open water of Lake Okeechobee.” (J. O. Wright, 1907, p. 153)

The fall of water in the Everglades during the dry season,
“corresponds to the fall in the adjacent lake [Okeechobee].” (Col. William Harney, 1848, p. 57)

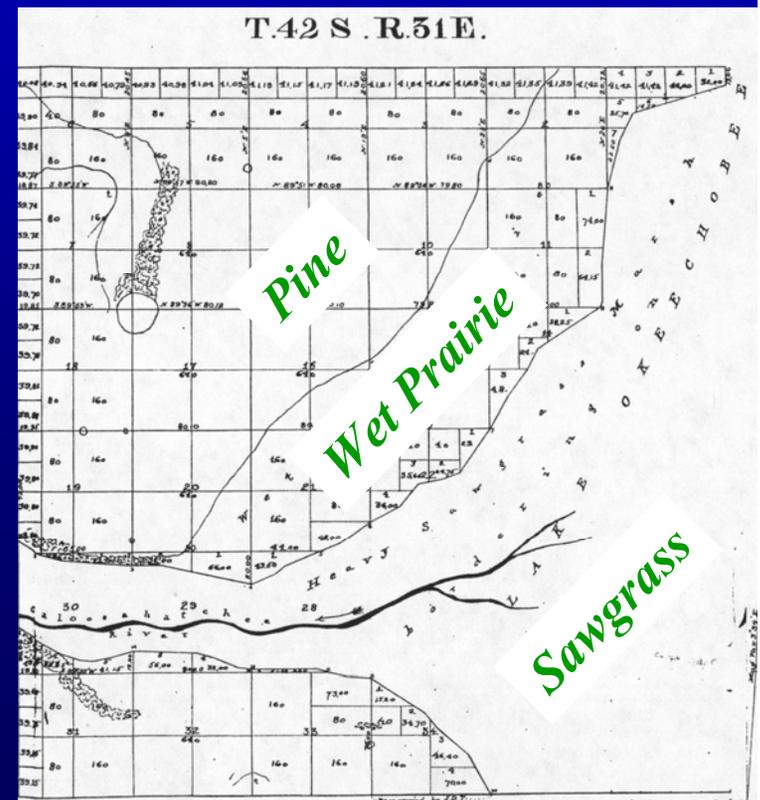
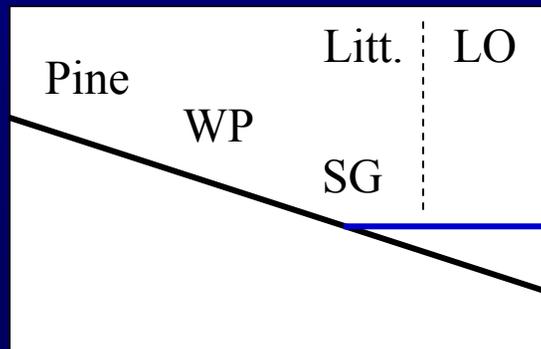
Littoral Zone – Northern Half of Lake (Concentric landscapes)

Col. William Harney in 1848:

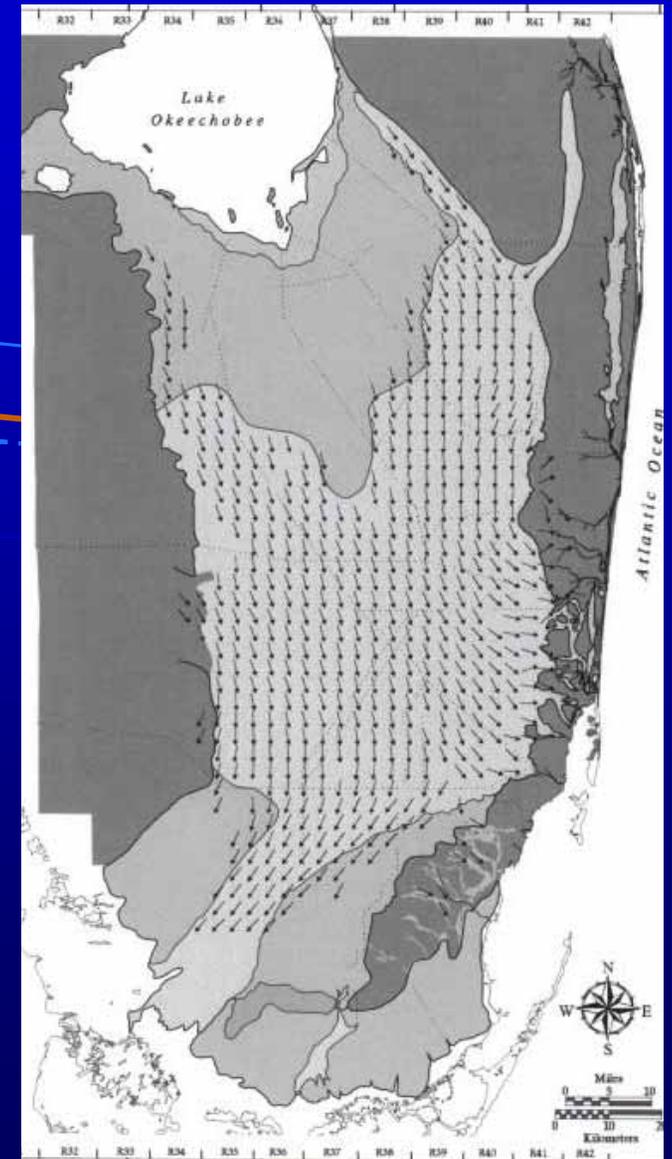
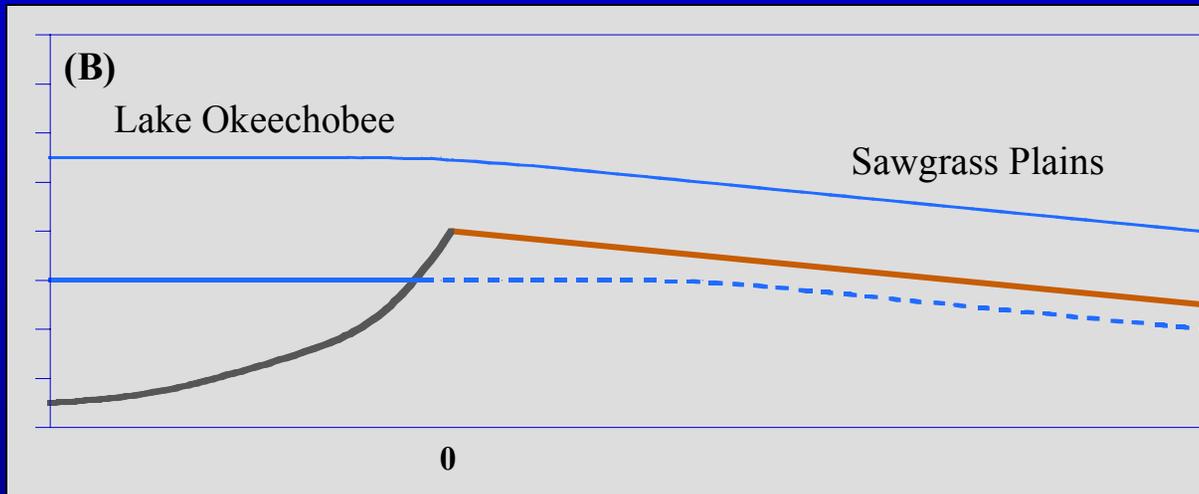
“The lake is a deep reservoir for the rains that fall on the eastern, northern, and western sides of it for many miles (the country for some distance depressing as its shores are approached).” (p. 57)

Sackett in 1888:

“The greater portion of the [Caloosahatchee] river above Fort Thompson is bordered by an almost impenetrable saw-grass marsh, as is also Lake Okeechobee to a still greater degree. This marsh is in turn bordered by a [slightly higher lying] prairie which, with a few exceptions, intervenes between it and the [still higher] timbered land.”



Littoral Zone?? – Southern Shoreline (Outflows into the Everglades)



- Shoreline elevation: About 21 ft (NGVD 1929)
- Lake stage: varied around this controlling elevation
 - Not greatly above
 - Probably not greatly below
- Seiches

Lowering of Lake Okeechobee – Why?

Drainage engineer James Wright in 1909:

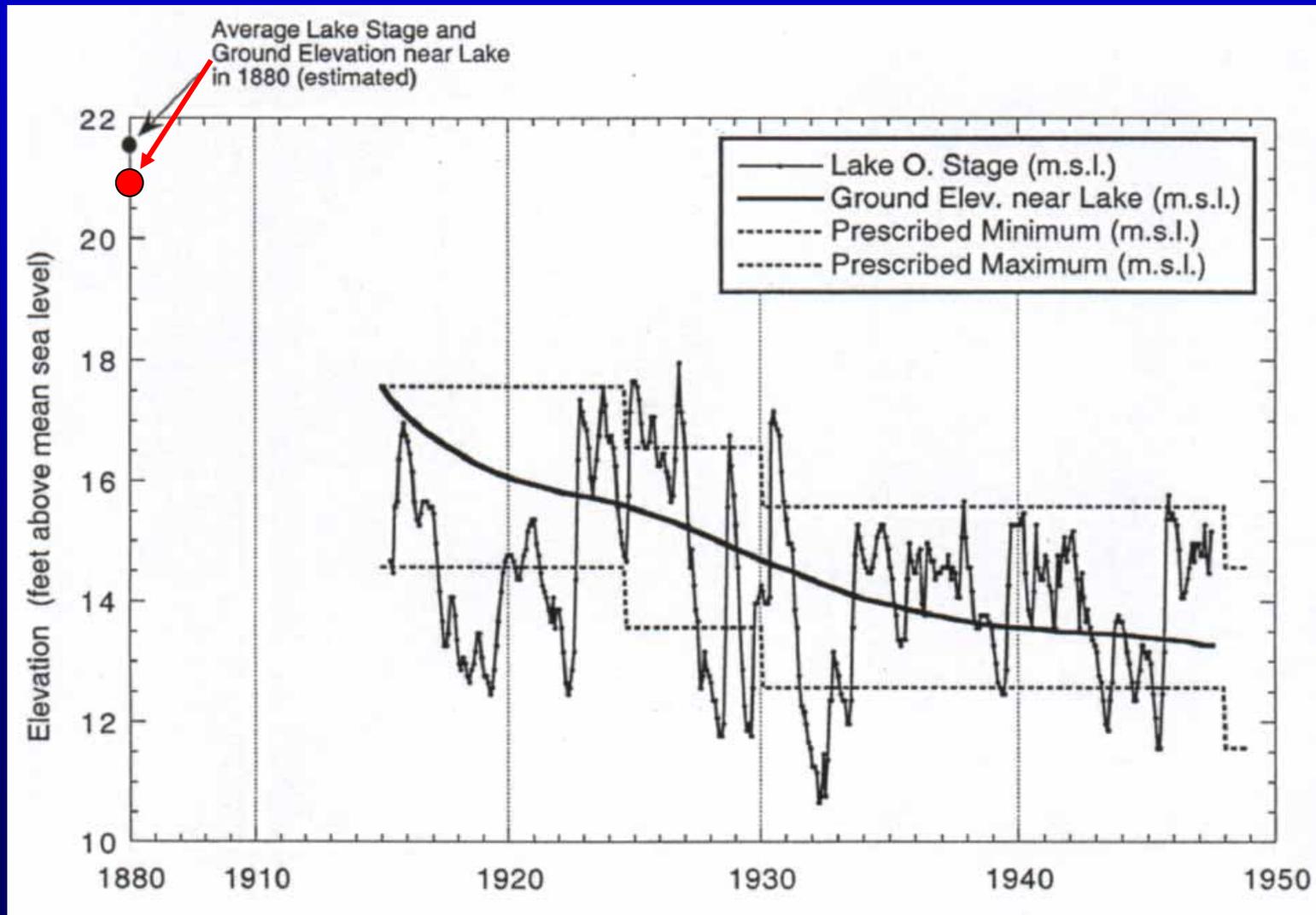
Lake needed to be “*permanently lowered 4 or 5 feet*” (p.160)

Agronomist Lloyd to the U. S. Army Corps of Engineers in 1929:

“The control of Lake Okeechobee is of first importance because of the fact that the overflow of Lake Okeechobee adds an immense amount of water to the Everglades in addition to the water naturally collected from its own heavy rainfall during the rainy season...” (p. 75).

Lowering of Lake Okeechobee

Lamar Johnson (1947):



Change



Conclusions

- (1) Primary outlet from Lake Okeechobee was into Everglades (Zero flow E; only indirect to W)
- (2) Very long outflowing shoreline (50 miles / 80 km)
- (3) Waters continuous between LO and Everglades; outflow during most of year
- (4) Lake stage likely rarely dropped much below shore elevation
- (5) Pre-drainage lakeshore “well-marked” and known at time; Lake size similar to current
- (6) Pre-drainage littoral zone narrow (1-2 miles wide); W and N; Sawgrass
- (7) Pre-drainage lake elevation (ave; NGVD 1929) around 21+ feet
- (8) Early drainage engineers unanimous that Everglades could not be drained w/o lowering LO
- (9) Lowering began 1882; everything later reflects altered system
- (10) Outflows from LO likely signif. part of Everglades H₂O budget; use models to estimate