The Chronology of Historic/Natural Flows, System Alterations and Ecological Consequences

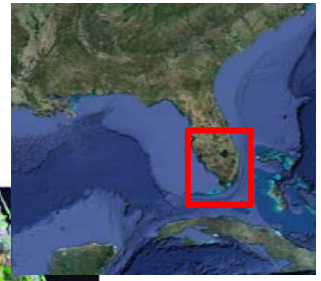
DRAFT

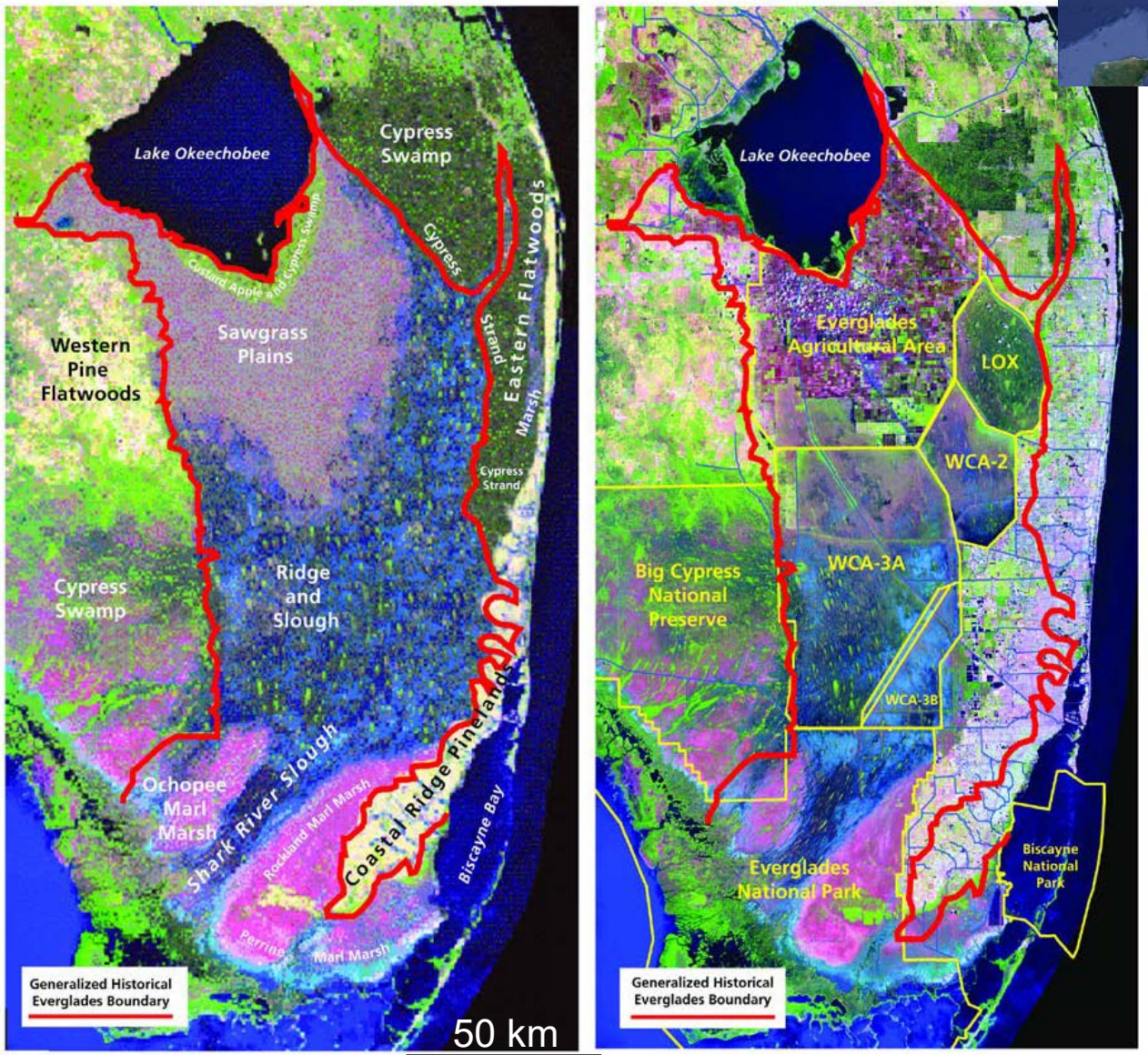
Fred H. Sklar, Ph.D., Section Administrator
Everglades Systems Assessment Section
South Florida Water Management District

sfwmd.gov

DRAFT

Greater Everglades, Then and Now





Chronology of Hydrologic Alterations

1900-1930: Drainage → Fires and soil oxidation

1930-1950: Flood Control → Reduced sheetflow & Wetland Spatial Extent

1950-1980: Water Conservation → Long Hydroperiods, Deep Water & Compartmentalization

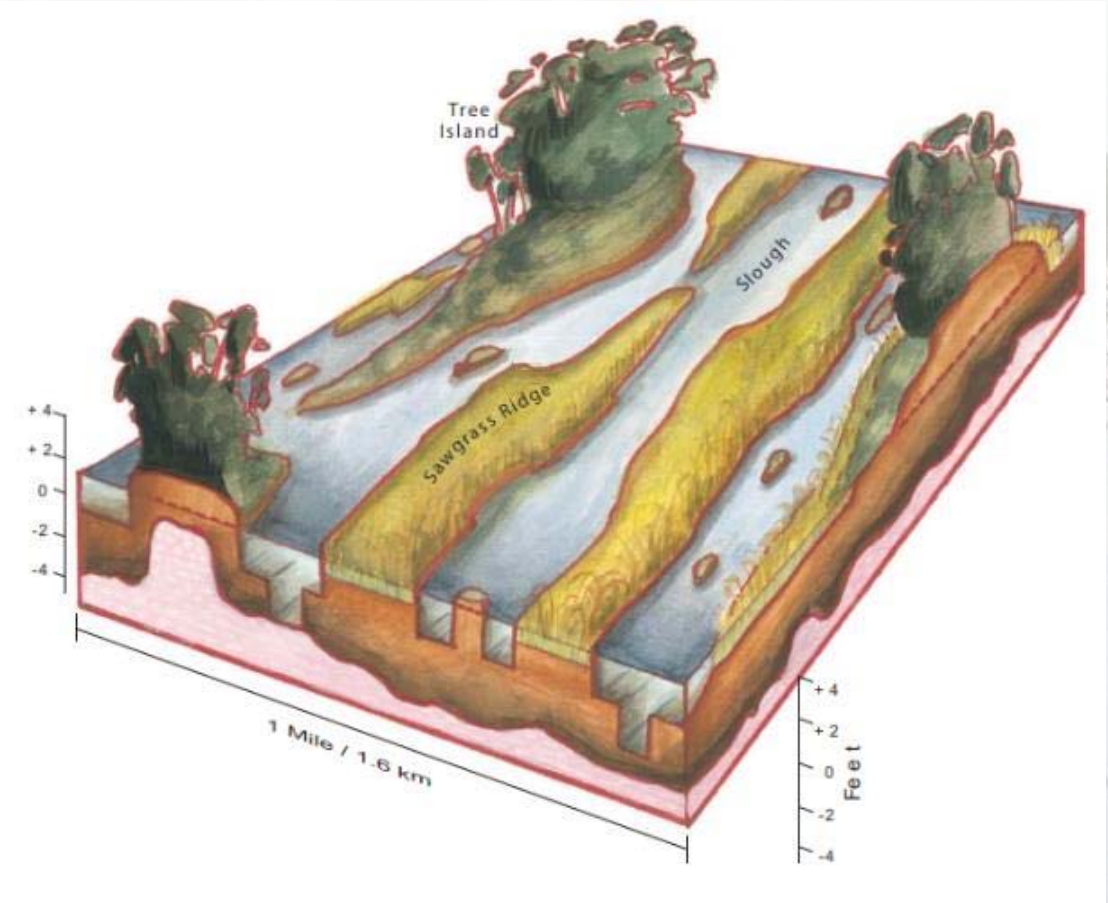
1980-2000: Water Quality Control → Manage TP

2000-Present: Hydrological Restoration → Redistribute of Flow

Modified from McVoy et al. 2011

DRAFT

Pre-drainage Characteristics: The importance of the ridge-slough topography



During the wet season, flows distribute nutrients, food and floc (Everglades “topsoil”)

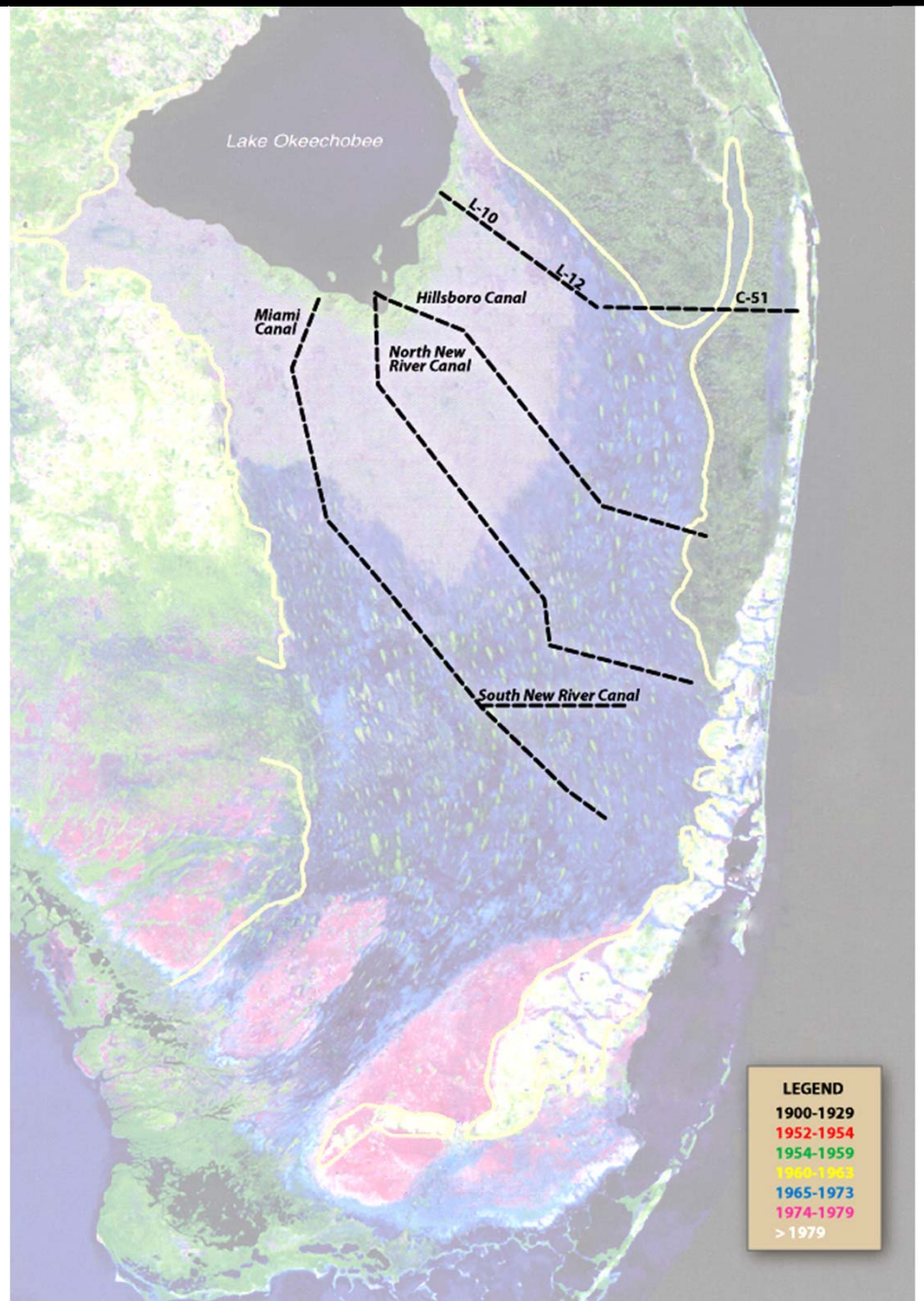
During the dry season, wading birds feed in the sloughs and nest in the tree islands

DRAFT

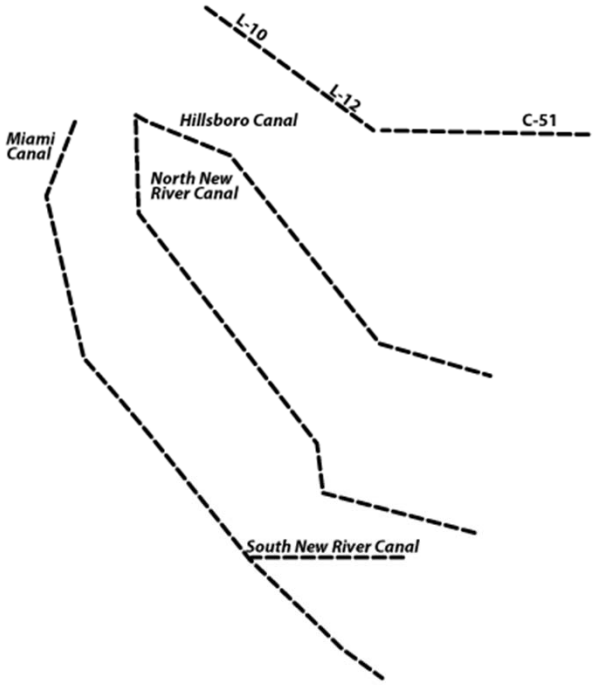
Restoring healthy sloughs is key to Everglades restoration

Video by Greg Hill and Jennifer Rehage, Florida International University

DRAFT



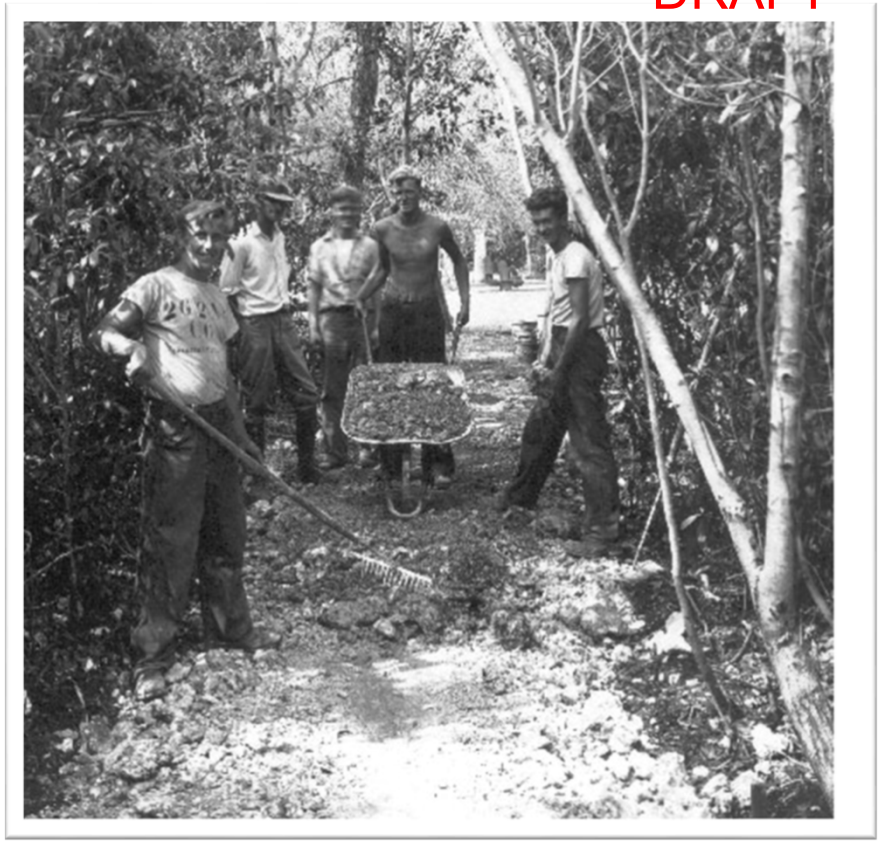
1900-1929



Note: Construction of Tamiami Trail began in January 1928

DRAFT

The fertile, organic soil, south of Lake Okeechobee was called “Black Gold,” and just like the California Gold Rush, humans rushed to Florida to exploit it.

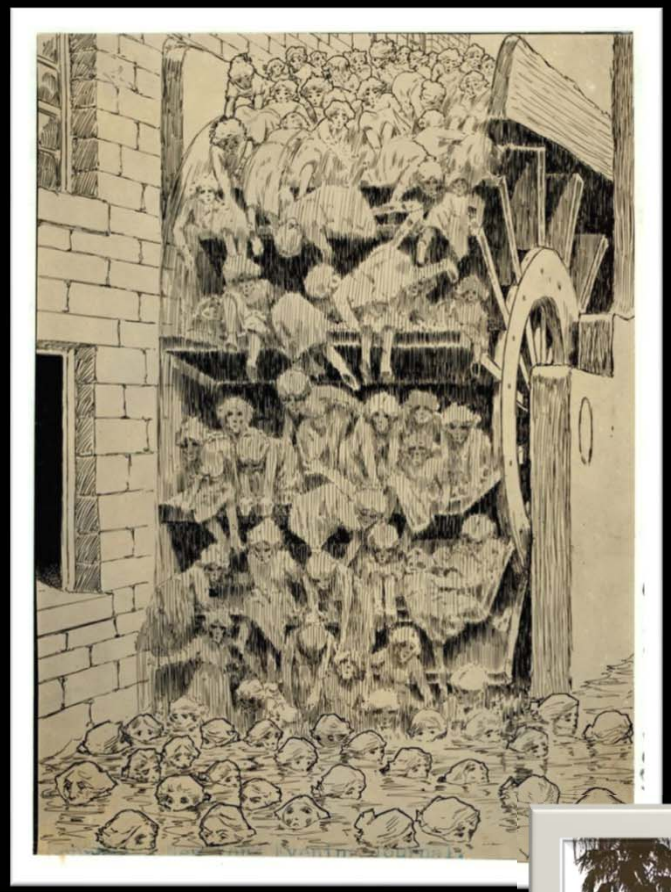


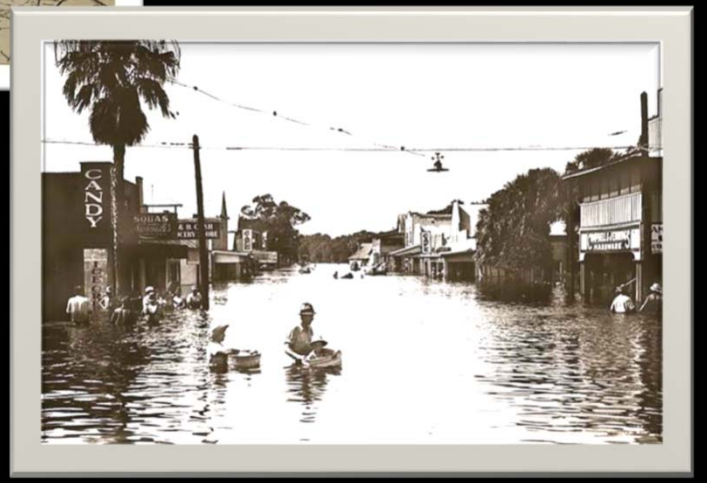
By around 1920, human communities were getting well established, installing drainage systems to connect to the main drainage canals.

1928 EVERTHING CHANGED:

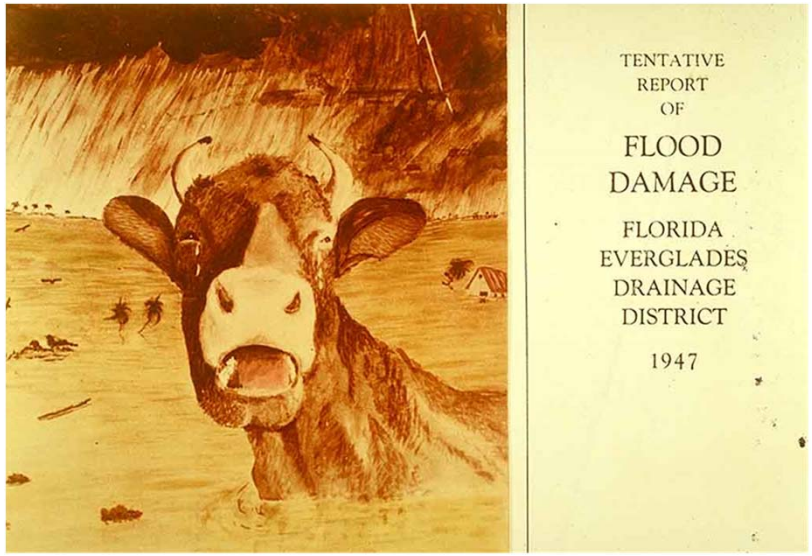
DRAFT

The horrific Okeechobee Hurricane of 1928 created demand for Flood Control.

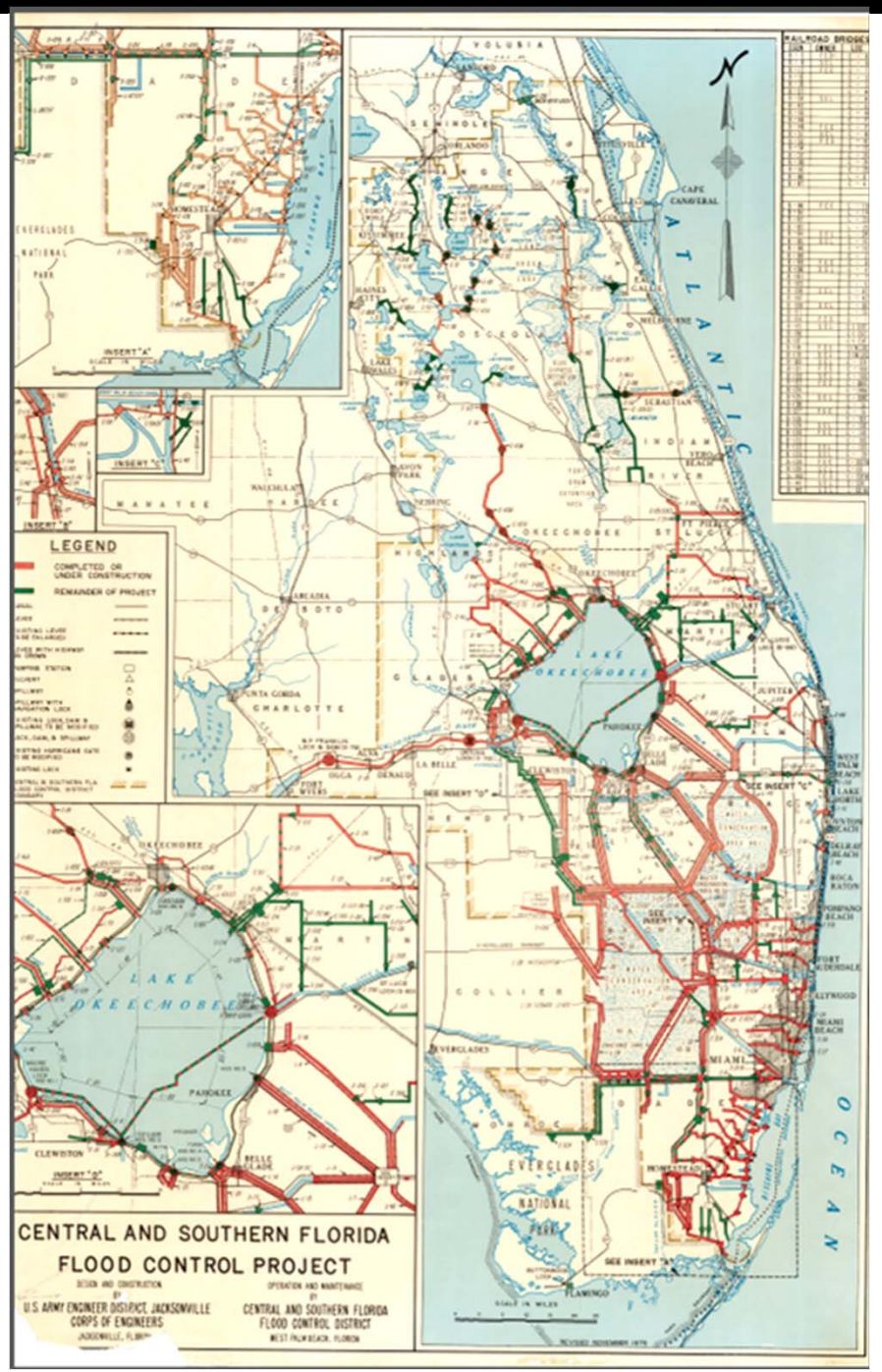




DRAFT



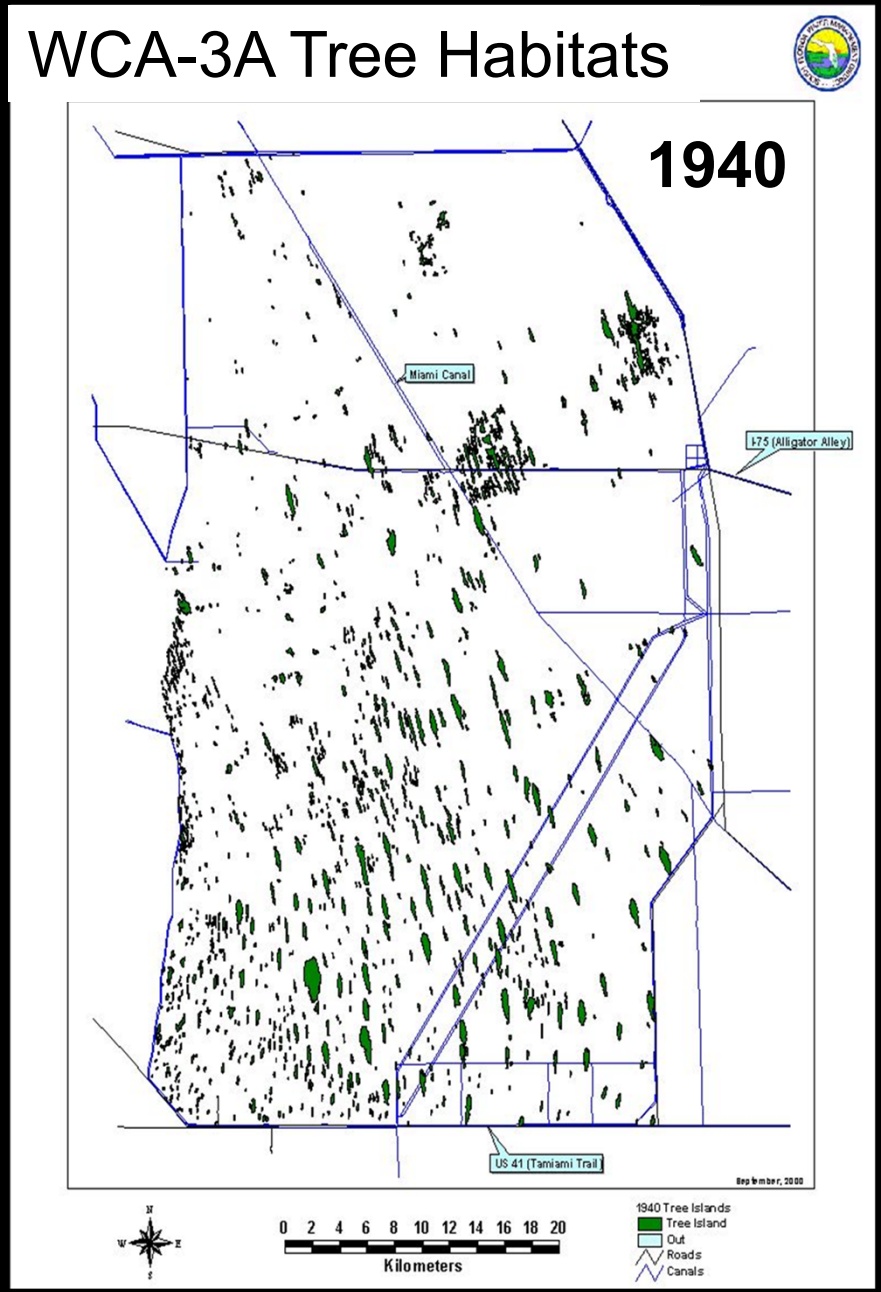
It took time, but eventually Congress funded the US Army Corps of Engineers to build a comprehensive system of drainage canals and they called it the Central and Southern Florida Flood Control District.

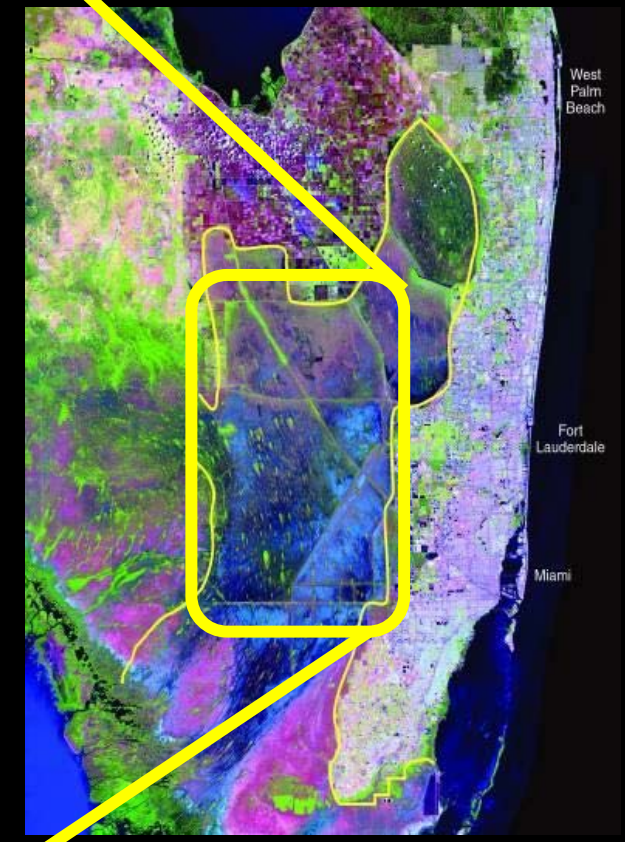


DRAFT

MEANWHILE:

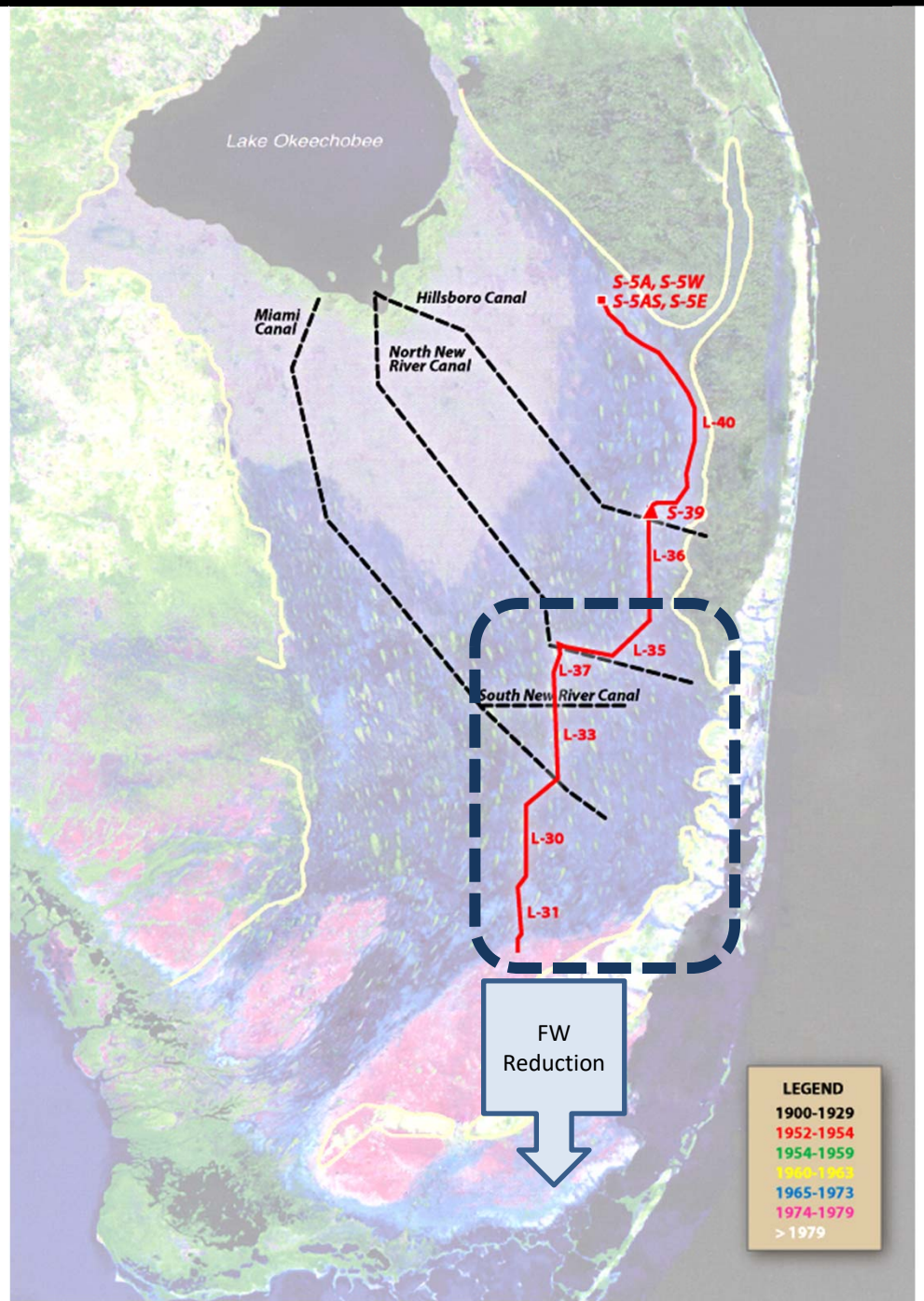
The Black Gold Rush continued creating significant peat fires, soil oxidation and subsidence mostly in areas to be called Northern WCA-3A & the EAA.



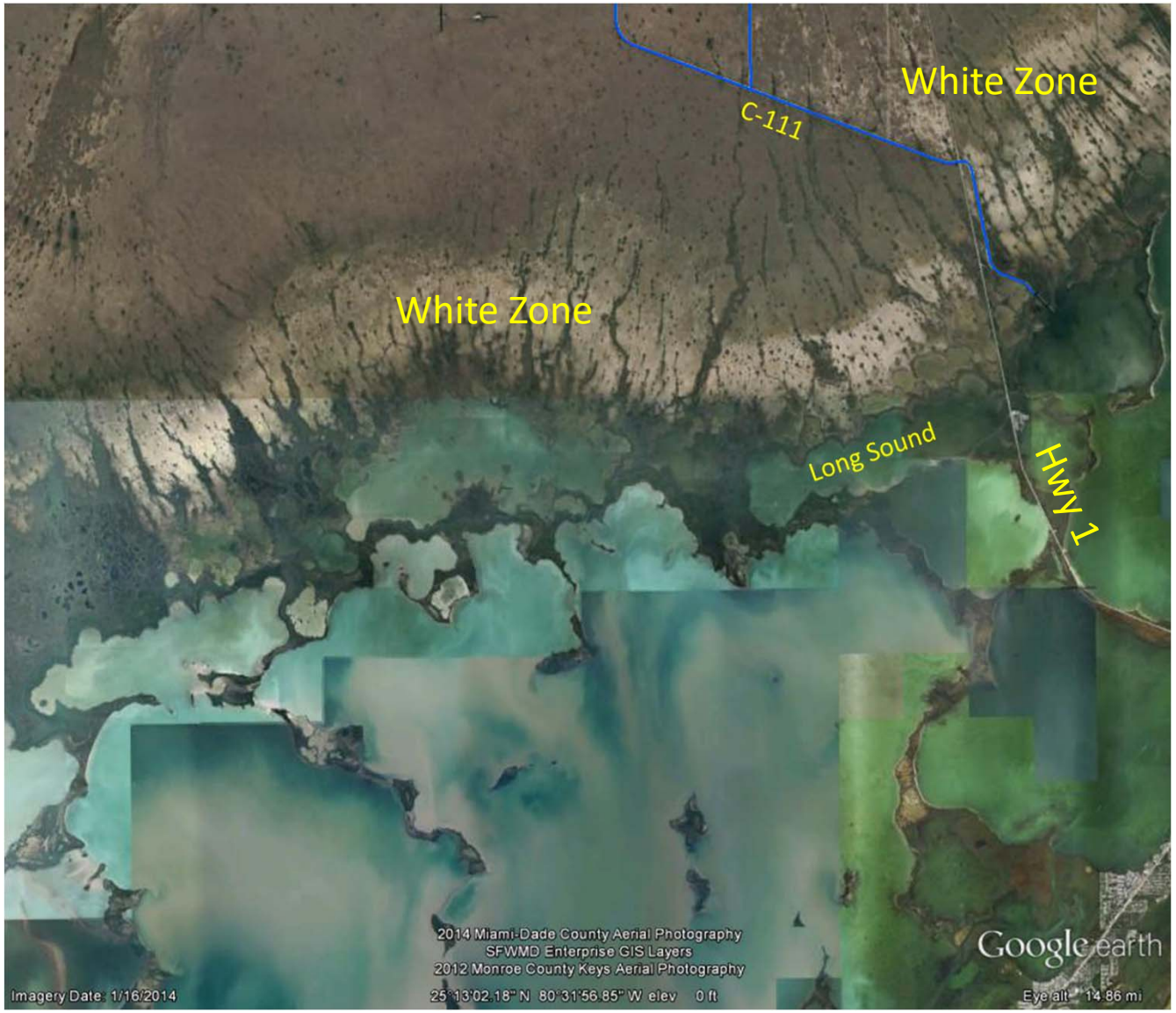


DRAFT

1952-1954



DRAFT

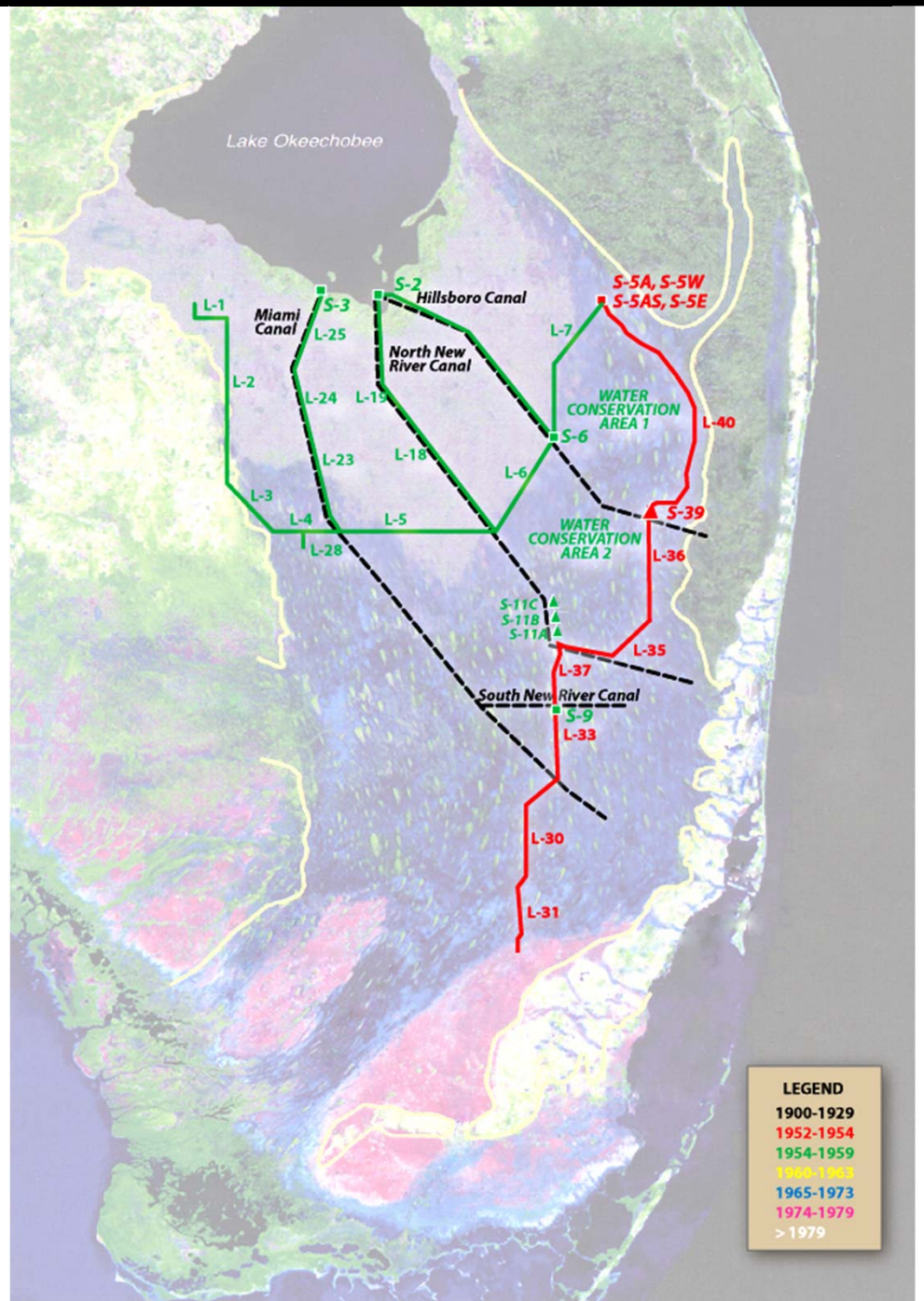


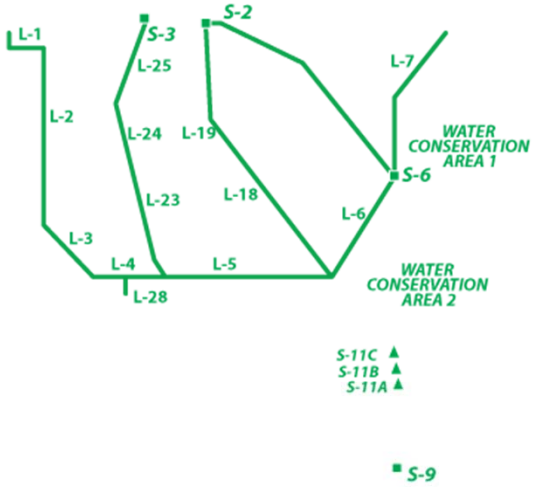
Headwater Reduction Consequence

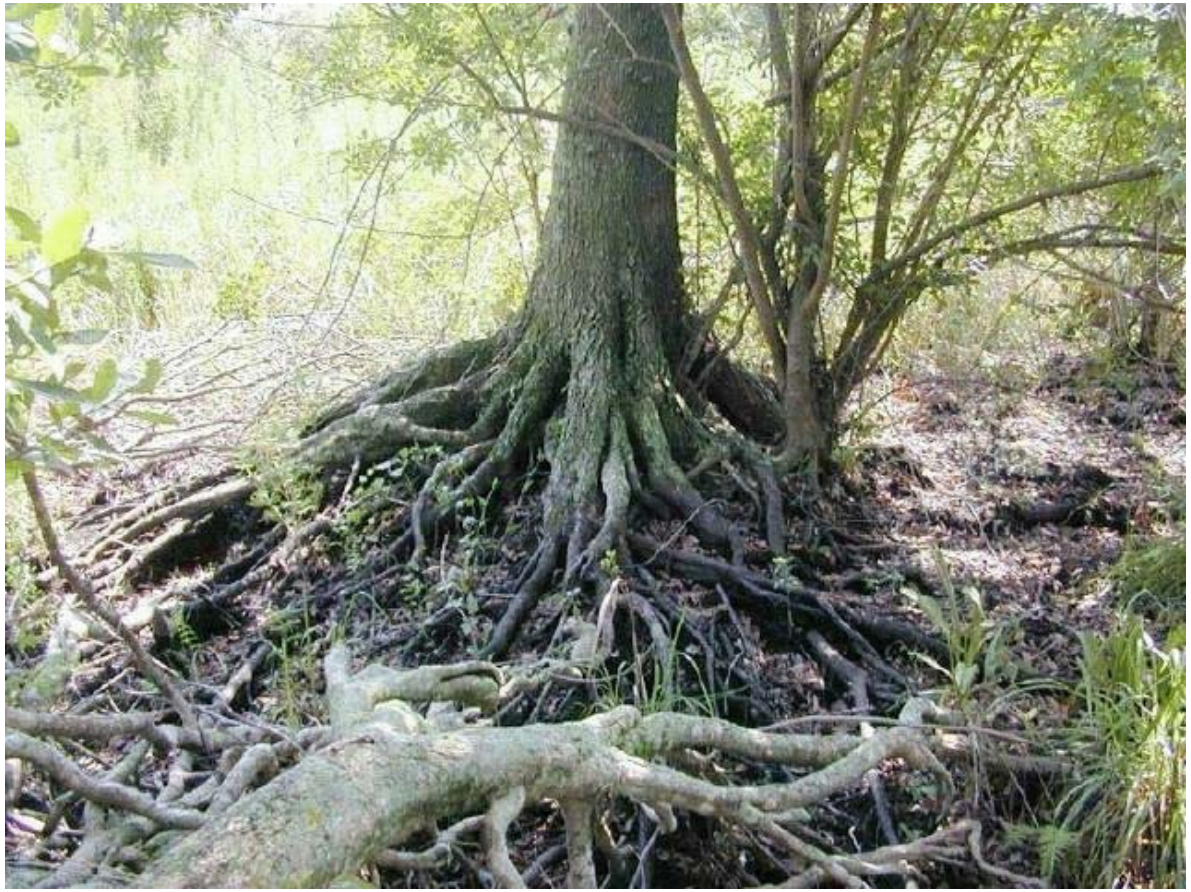
1. Increased salinity in coastal Florida Bay and Biscayne Bay
2. Sawgrass replaced by dwarf mangroves
3. “White Zone” migration inland.
4. Soil oxidation (elevation loss)

DRAFT

1954-1959







Persistent soil oxidation

EAA Creation Consequence

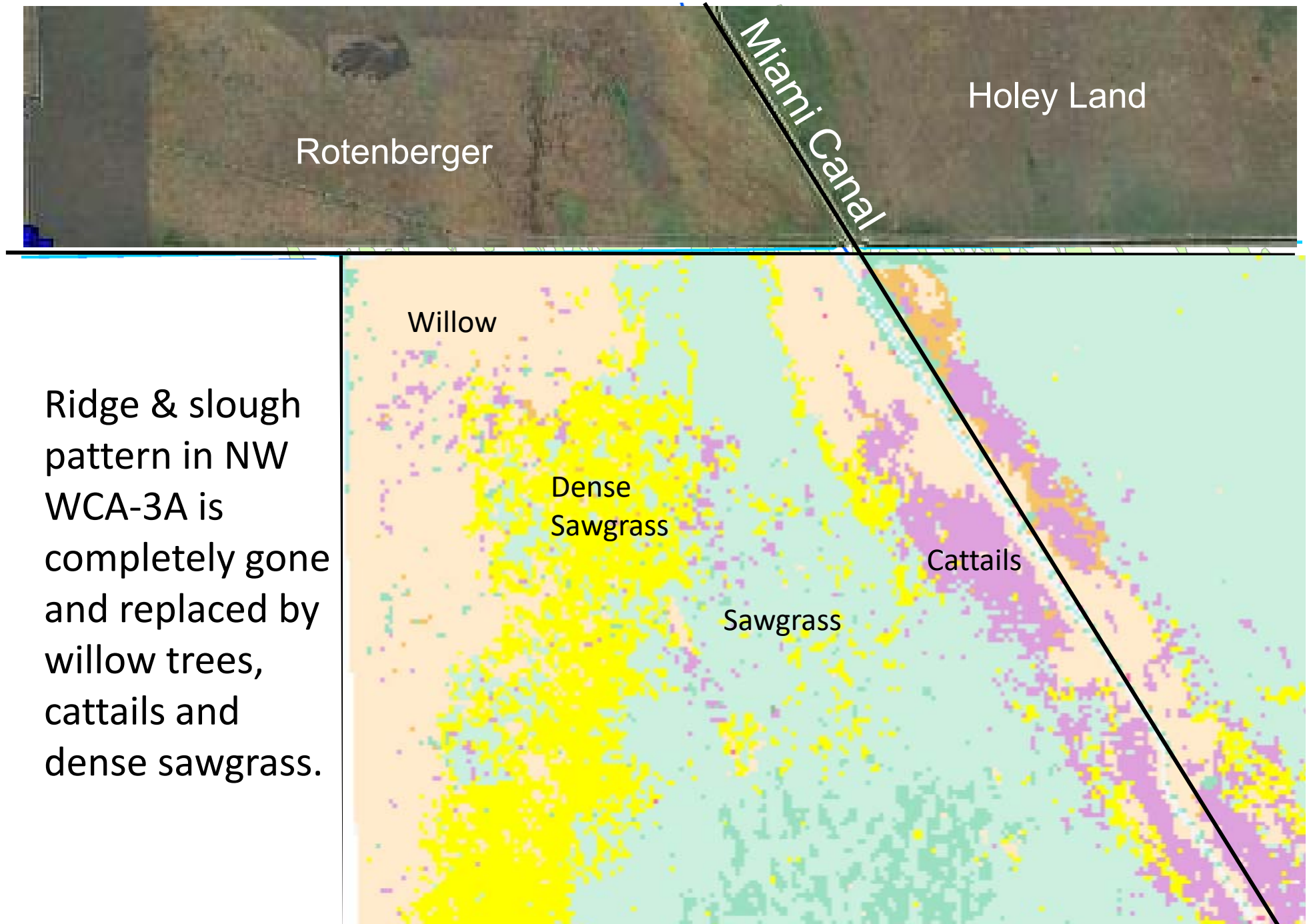
Pond Apple forest gets disconnected from the Everglades

Sheetflow is replaced by inflow structures (point sources).

Soil subsidence → Loss of microtopography

DRAFT

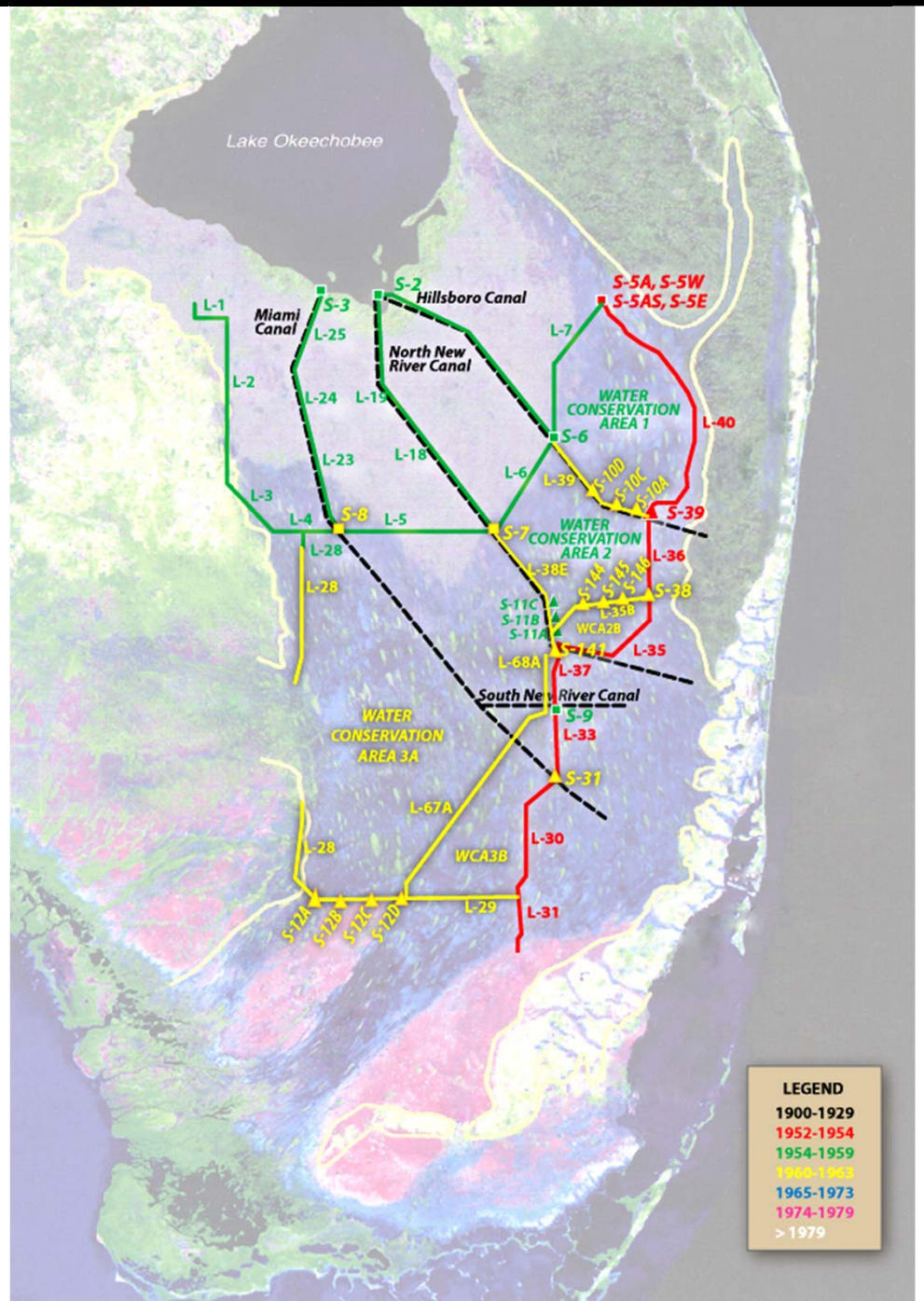
Ridge & slough pattern in NW WCA-3A is completely gone and replaced by willow trees, cattails and dense sawgrass.

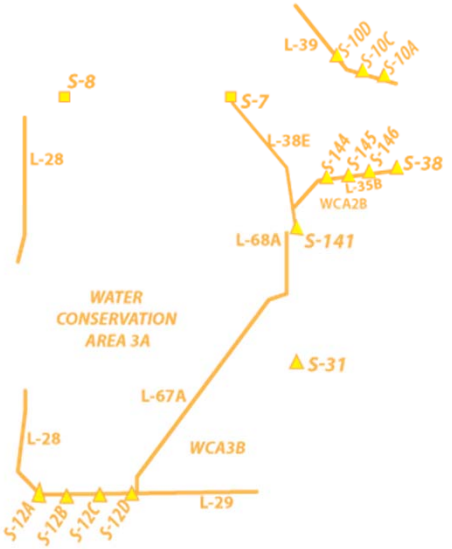


DRAFT

1960-1963

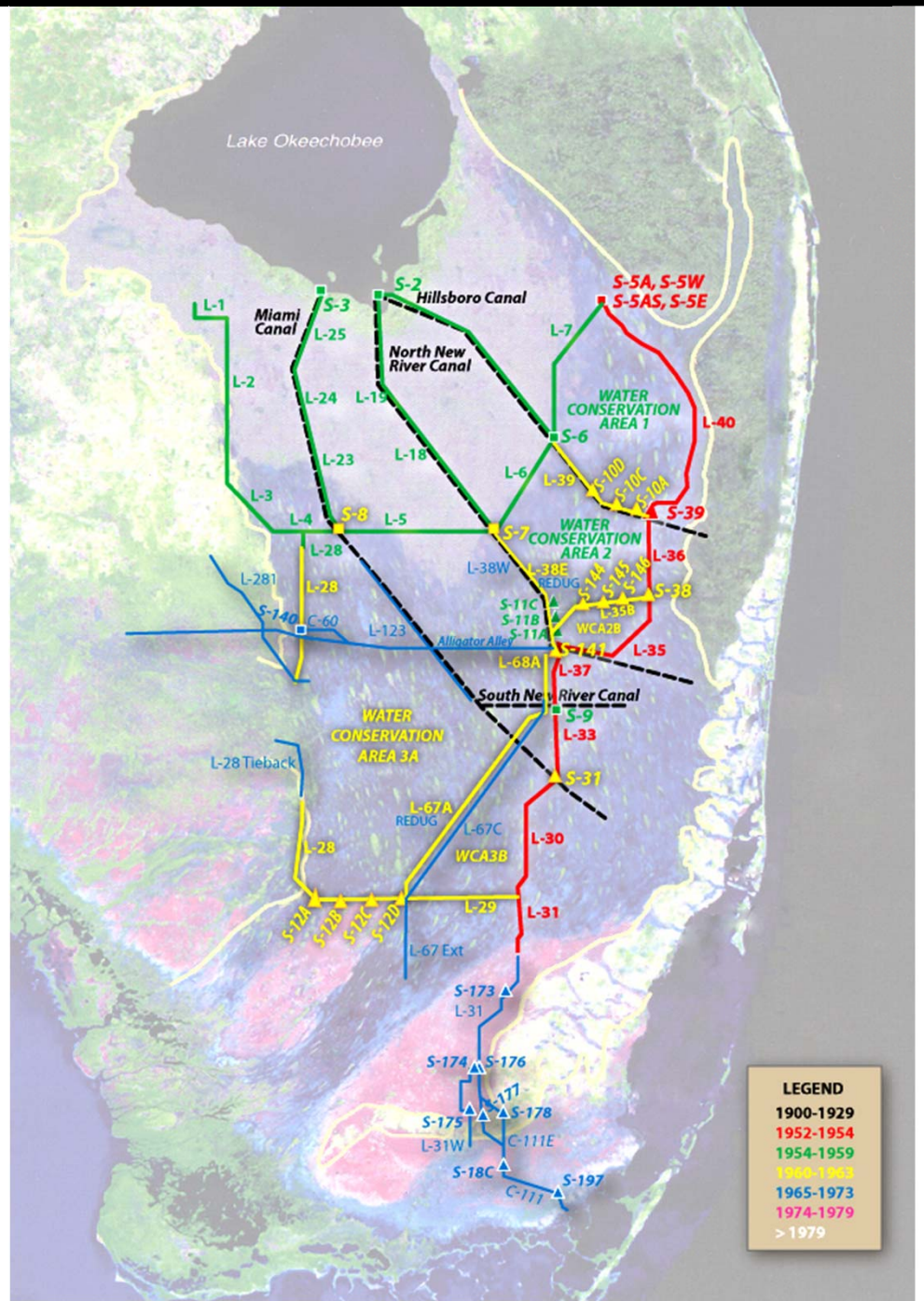
Compartmentalization is Complete

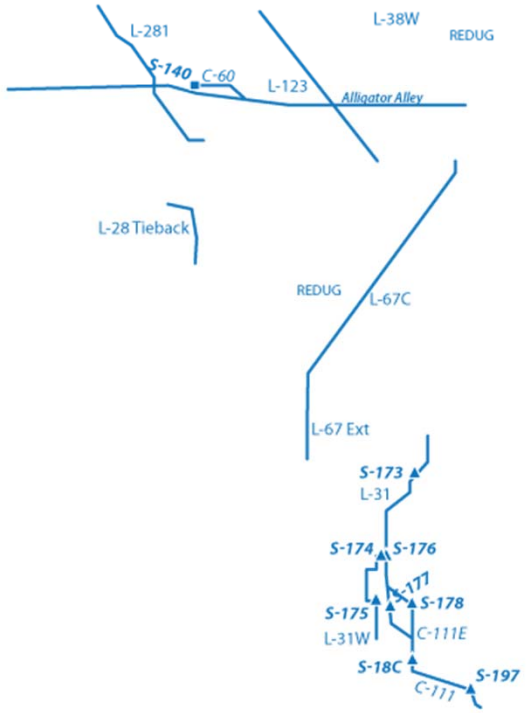




DRAFT

1965-1973





Enhanced Compartmentalization

South Dade Conveyance System

DRAFT

Compartmentalization Consequence

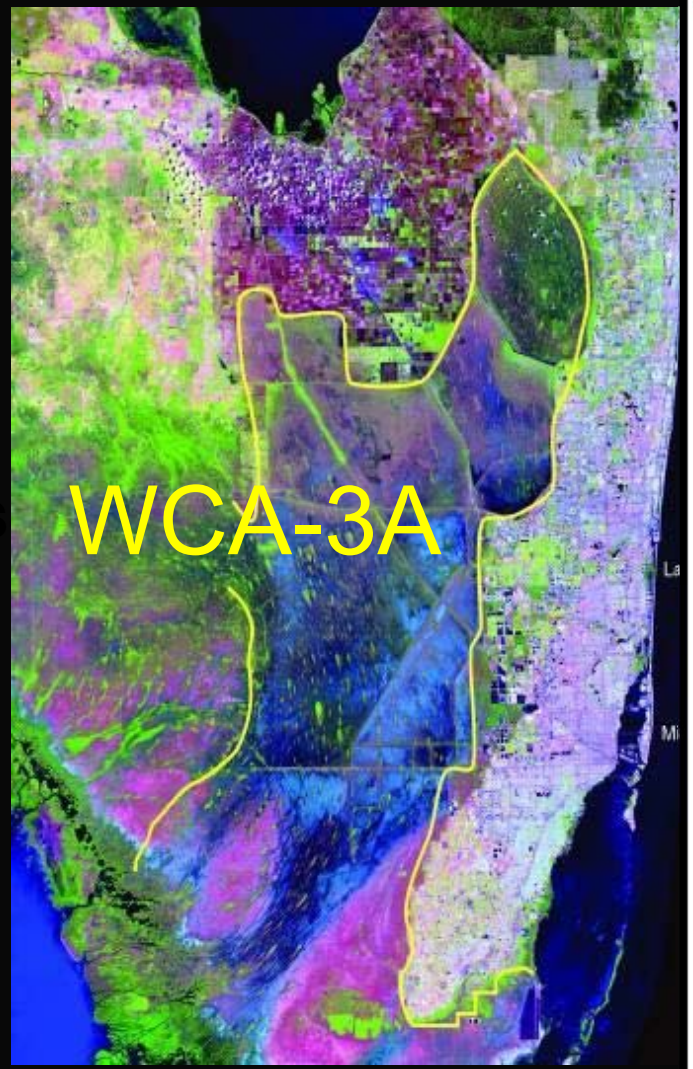
1. WCA Tree Islands “drown”
2. Loss of microtopography
3. Flows to Shark River Slough are diverted west
4. ENP hydroperiods and depths decline
5. Each WCA develops strong hydrologic gradients
6. Water Quality begins to degrade
7. Wading birds continue to decline

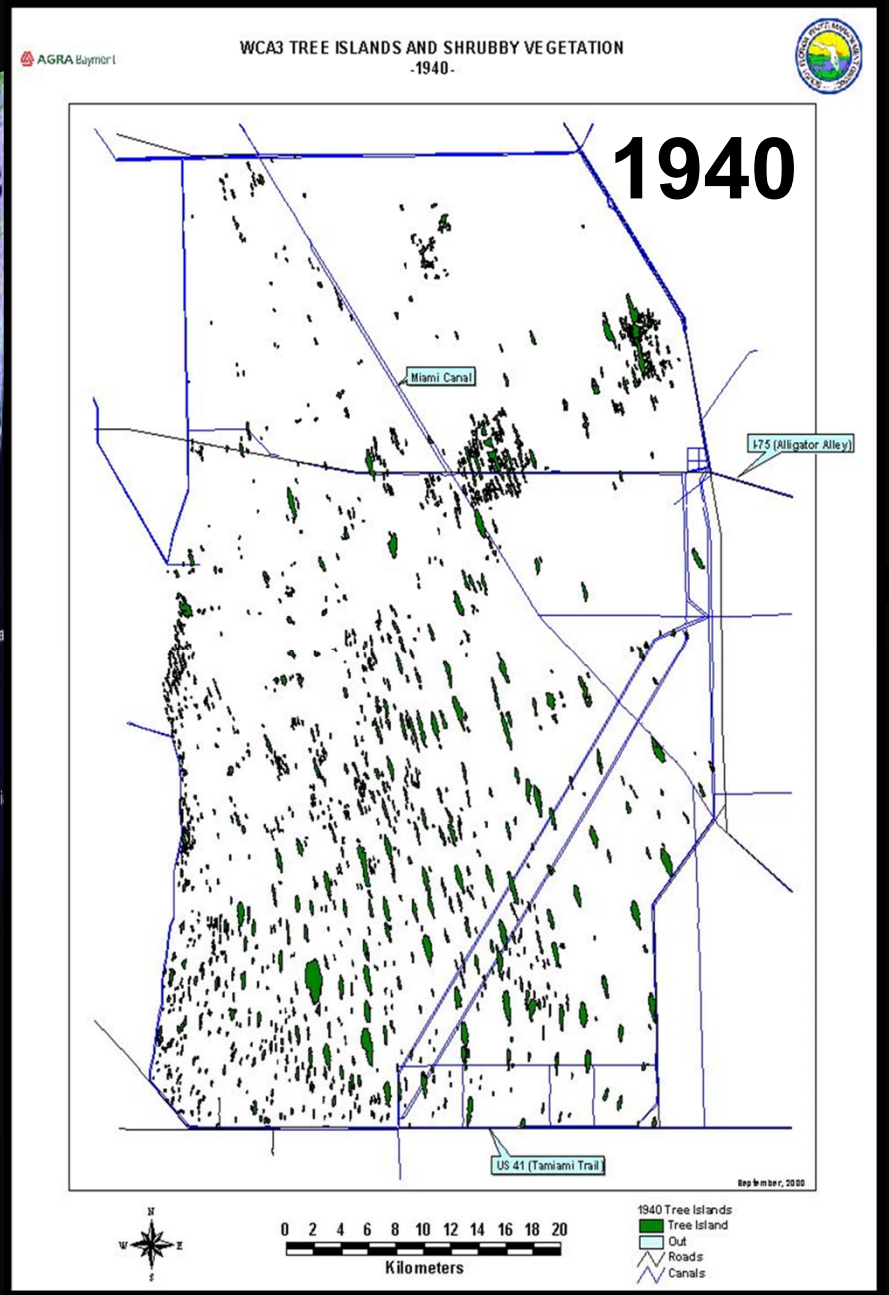
A typical tree island

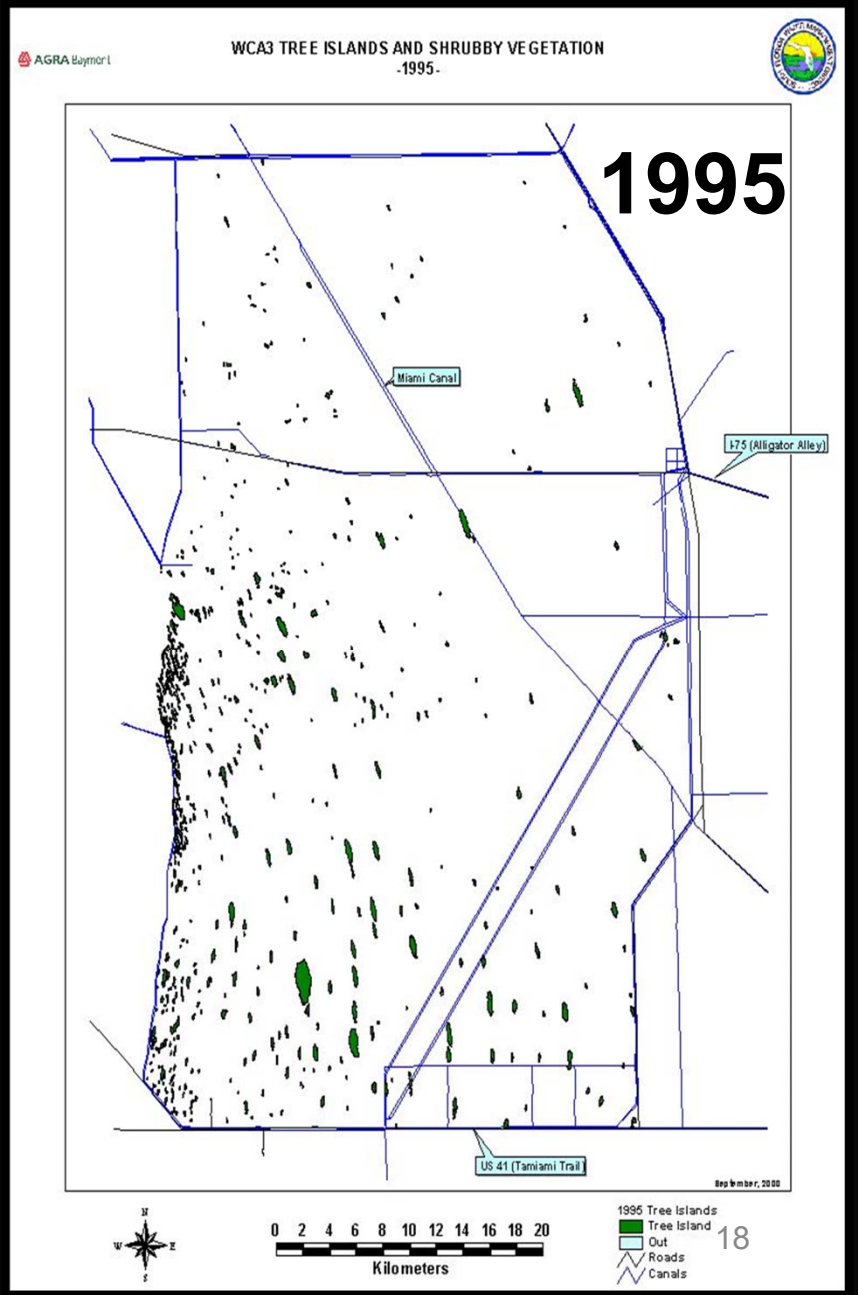
A “ghost” tree island

Some 65% of the tree islands in WCA-3 have either burnt away, oxidized or flooded

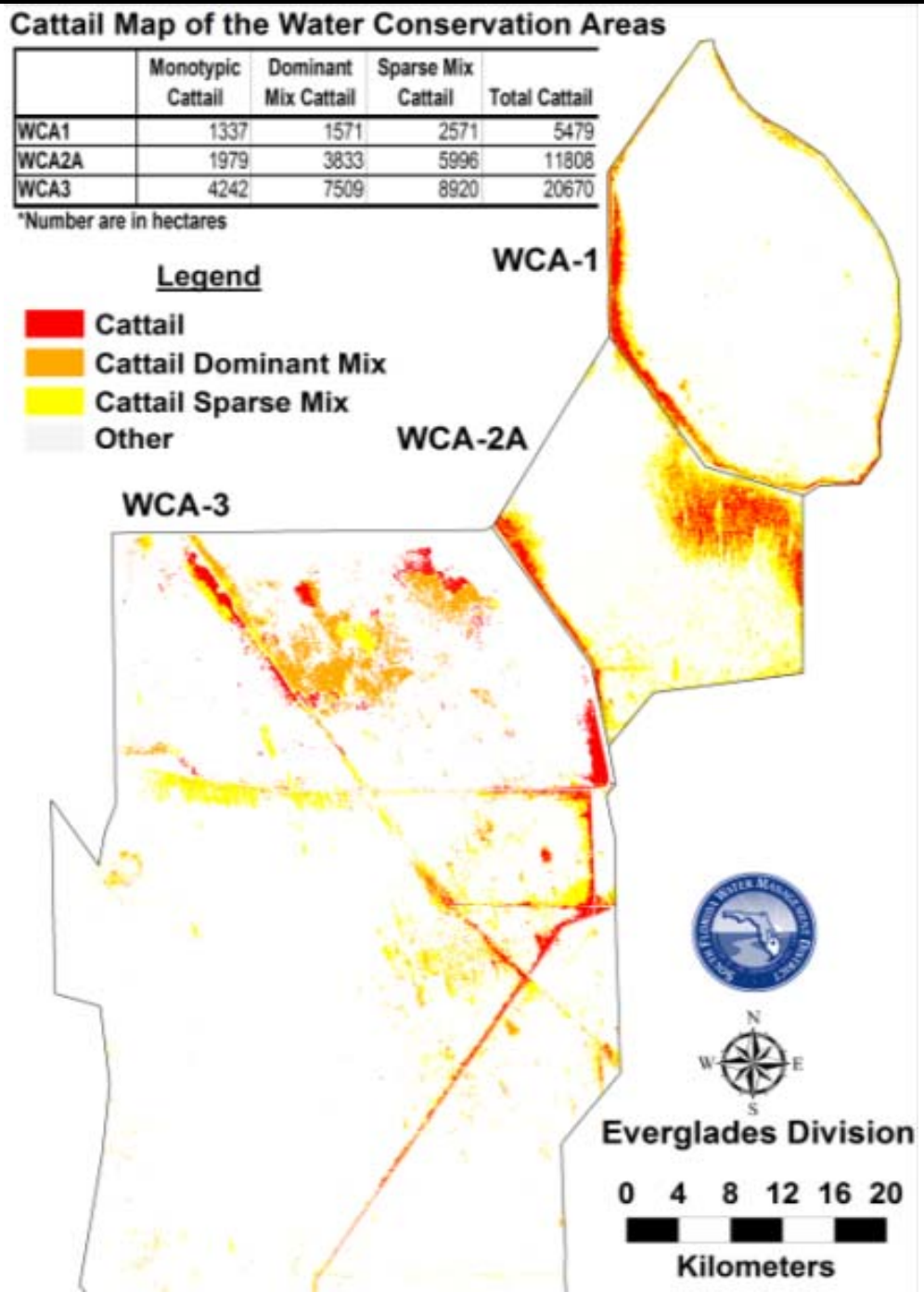
DRAFT







DRAFT

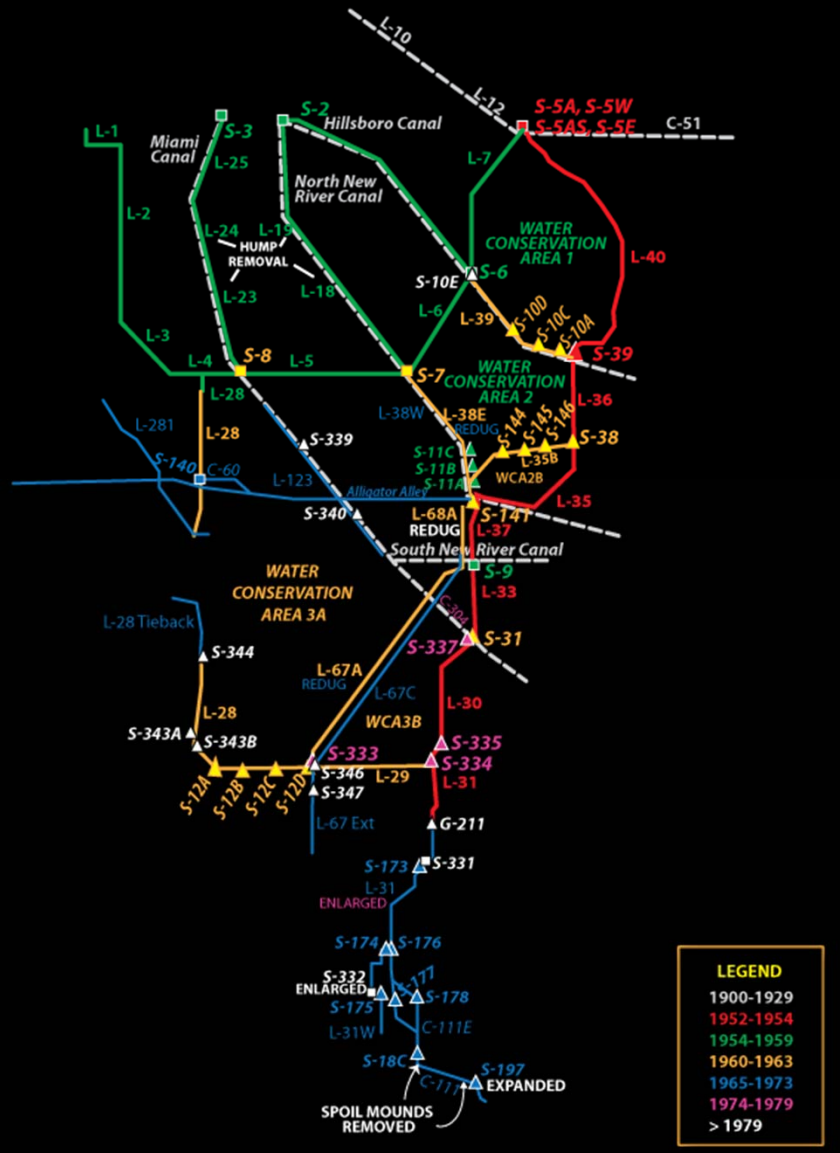


Lost Oligotrophy

Phosphorus enrichment creates a cattail “invasion.”

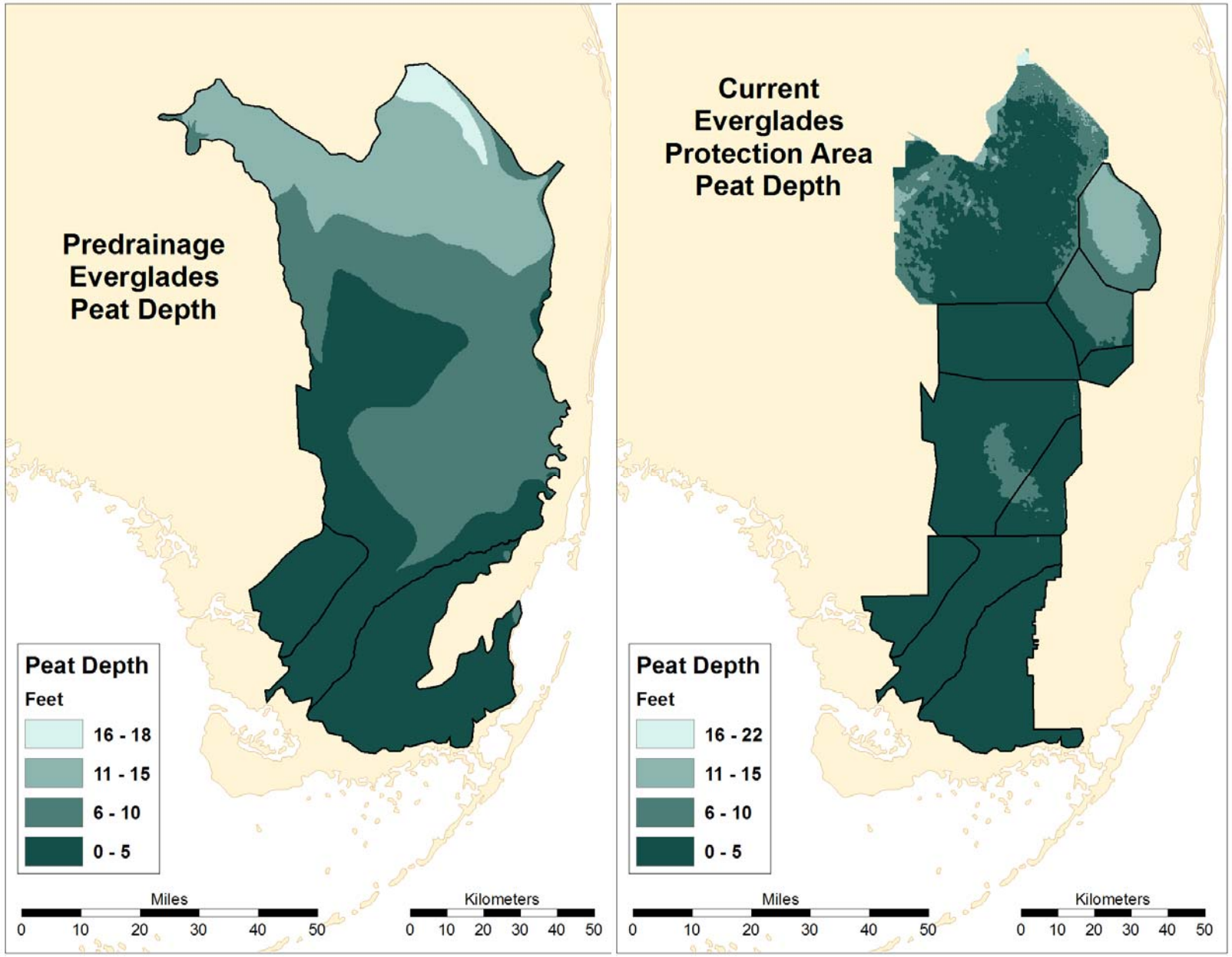
DRAFT

EVERGLADES HYDROLOGICAL ALTERATIONS
1900 – 1979 (THE FORMATIVE YEARS)



DRAFT

Pre-drainage Everglades (150 ybp) had a peat depth of 6.5 ft, a peat volume of 3,7 million yard^3, and a carbon content of about 992 million tons



Current Everglades has a peat depth of 2.5 ft, a peat volume of 0.9 million yard^3, and a carbon content of about 220 million tons.

65% Peat Loss

77% Carbon Loss

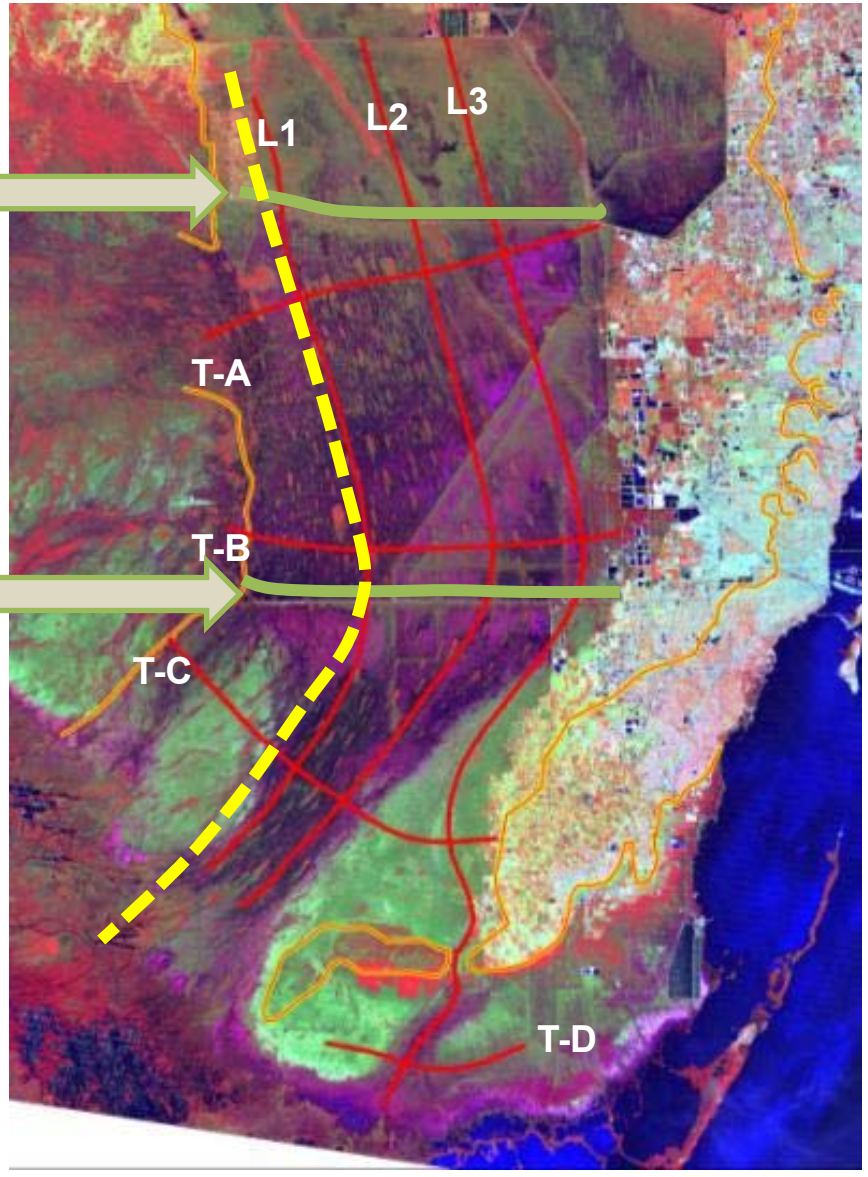
Hohner and Dreschel, 2015. Everglades Peats. Mires and Peat. 16:1-15.

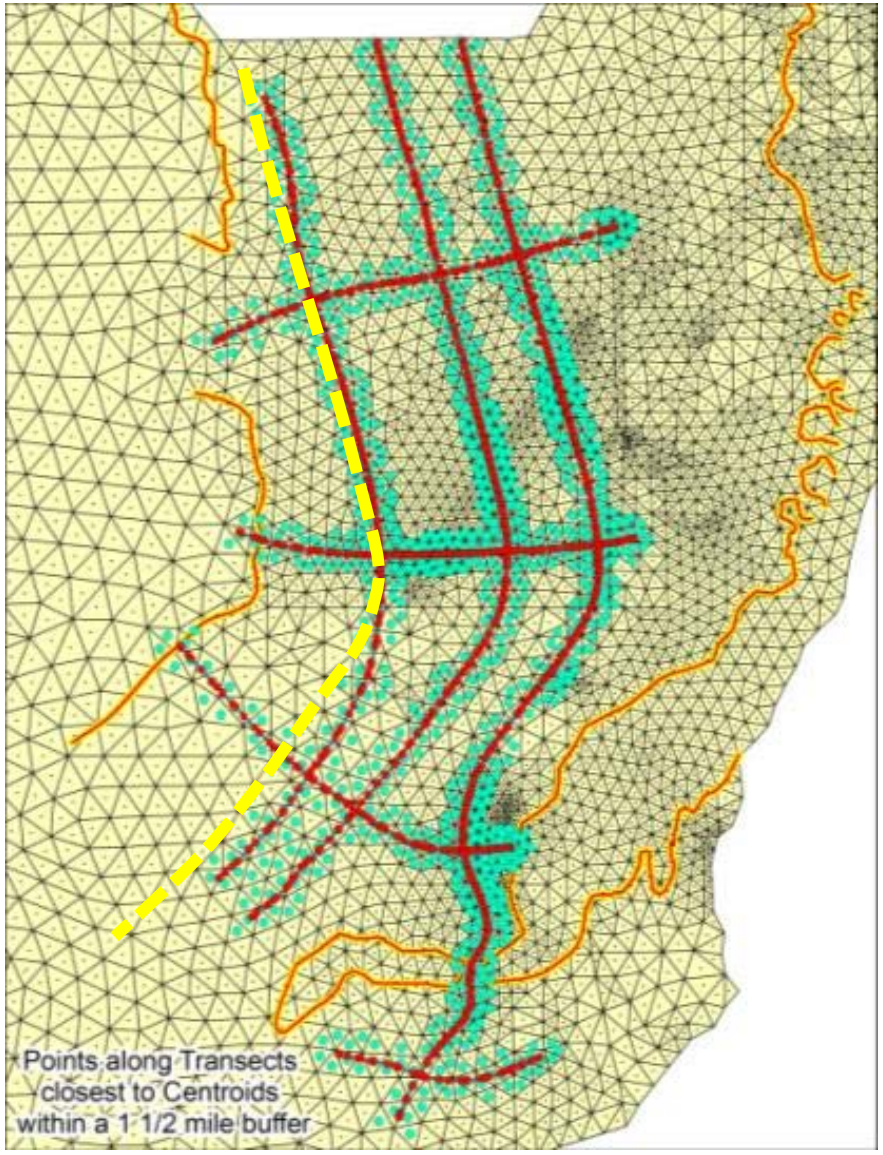
DRAFT

Everglades Hydrology Simulating the Past and Present

Alligator Alley

Tamiami Trail



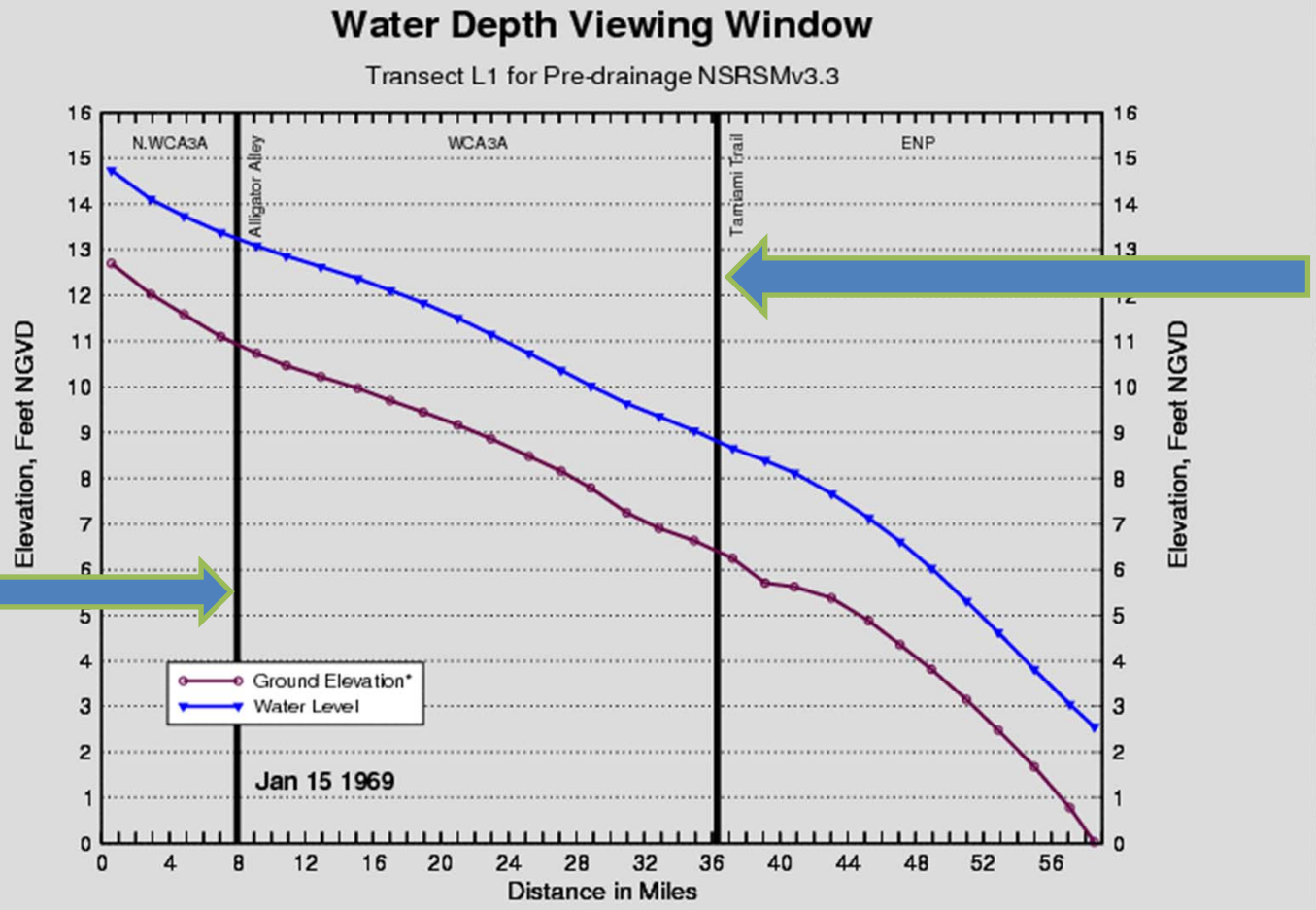


DRAFT

Everglades Pre-Drainage Hydrology From Northern WCA-3A to Southern SRS

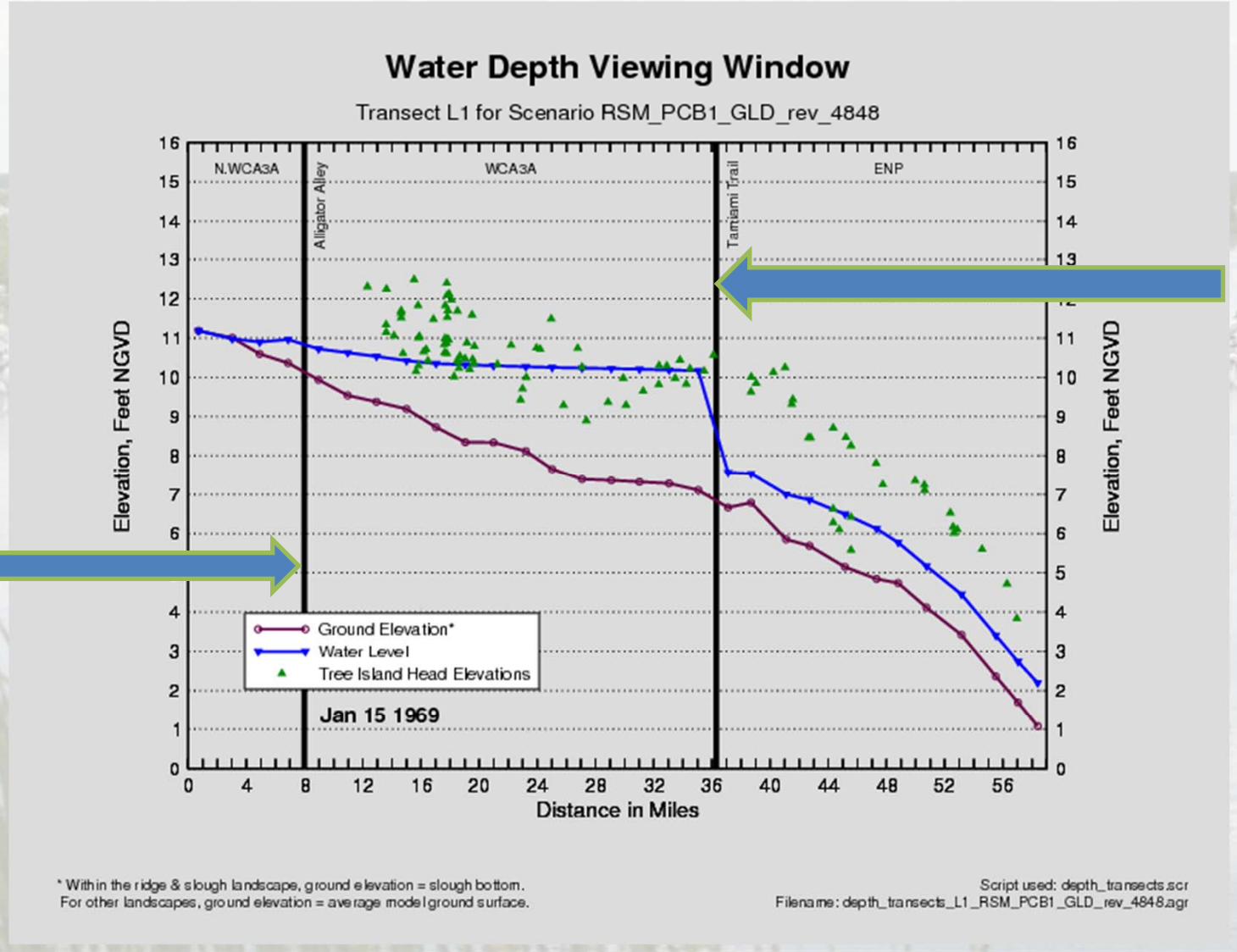
Alligator Alley

Tamiami Trail



DRAFT

Everglades Current Hydrology From Northern WCA-3A to Southern SRS



Alligator Alley

Tamiami Trail

Comparison of Pre-drainage and Current Conditions *Summary*

DRAFT

CONDITION	PRE-DRAINAGE	CURRENT
Water Surface	Conforms to ground surface	"Wedge"- too deep and too shallow
Seasonal Rise and Fall	Remains parallel	Not parallel
Median Slough Depth	About 2 feet	N. WCA3A= 0 ft; SRS=1ft
Slough Hydrology	Sloughs contain water 99% of the time	Sloughs in many areas often dry out
Sheetflow	Even across landscape; aligned with vegetation	Slow, uneven, not aligned
Shark Slough Discharge	1,700 - 2,000 kac-ft/yr	760 kac-ft/yr
Taylor Slough Discharge	120 - 270 kac-ft/yr	100 kac-ft/yr

DRAFT

Thank You

A Clyde Butcher photo of a WCA-1 slough and tree island