The Everglades & Northern Estuaries; St. Lucie River Estuary, Indian River Lagoon & Caloosahatchee Estuary

Water Flows & Current Issues

Florida Governor

Rick Scott

August 20, 2013

Florida Oceanographic Society

Upper Chain of Lakes (8) flow south into Lake Kissimmee

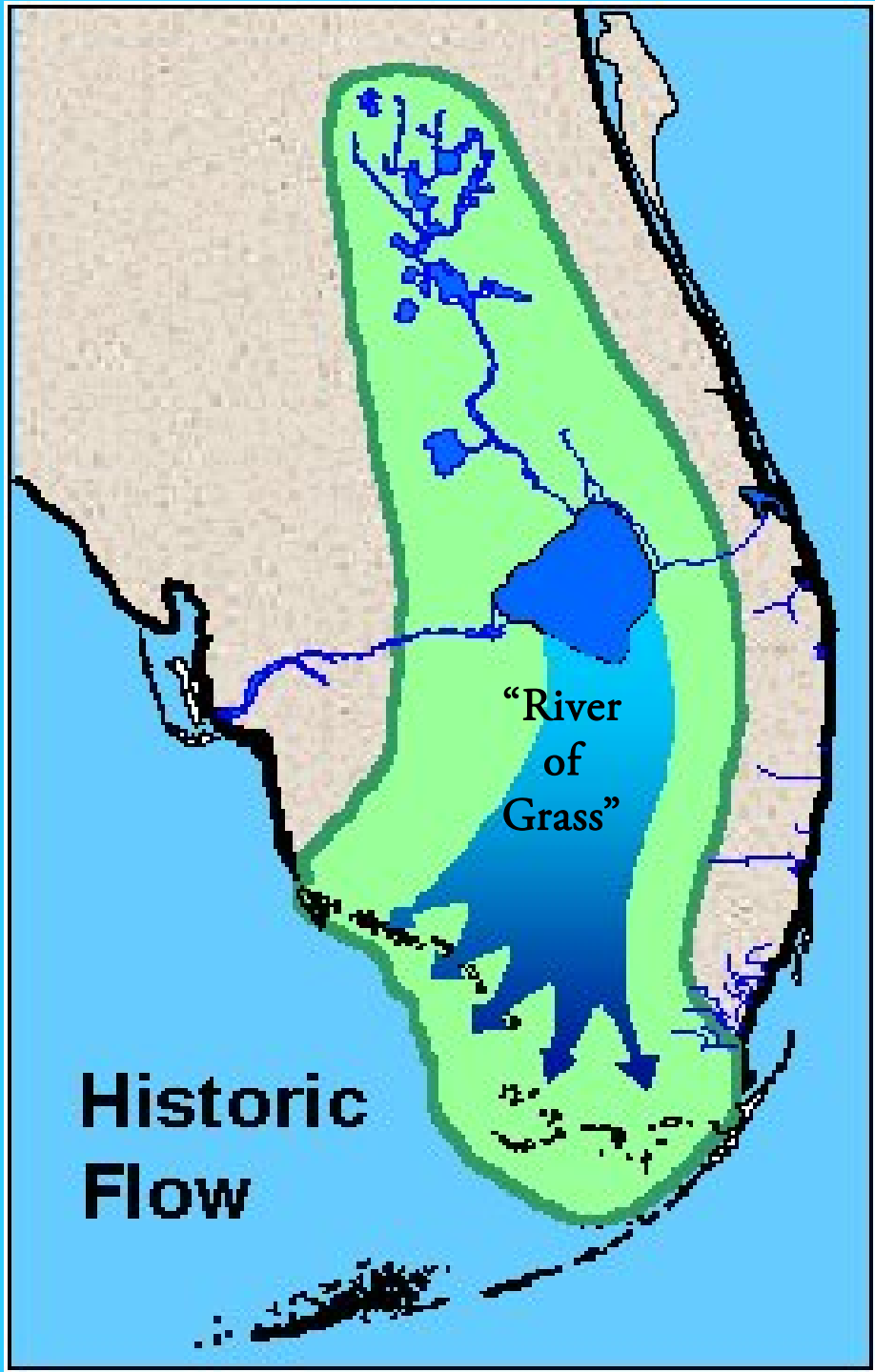
Lake Kissimmee flows south into the Kissimmee River – 105-mile Oxbow River with 2-mile-wide floodplain

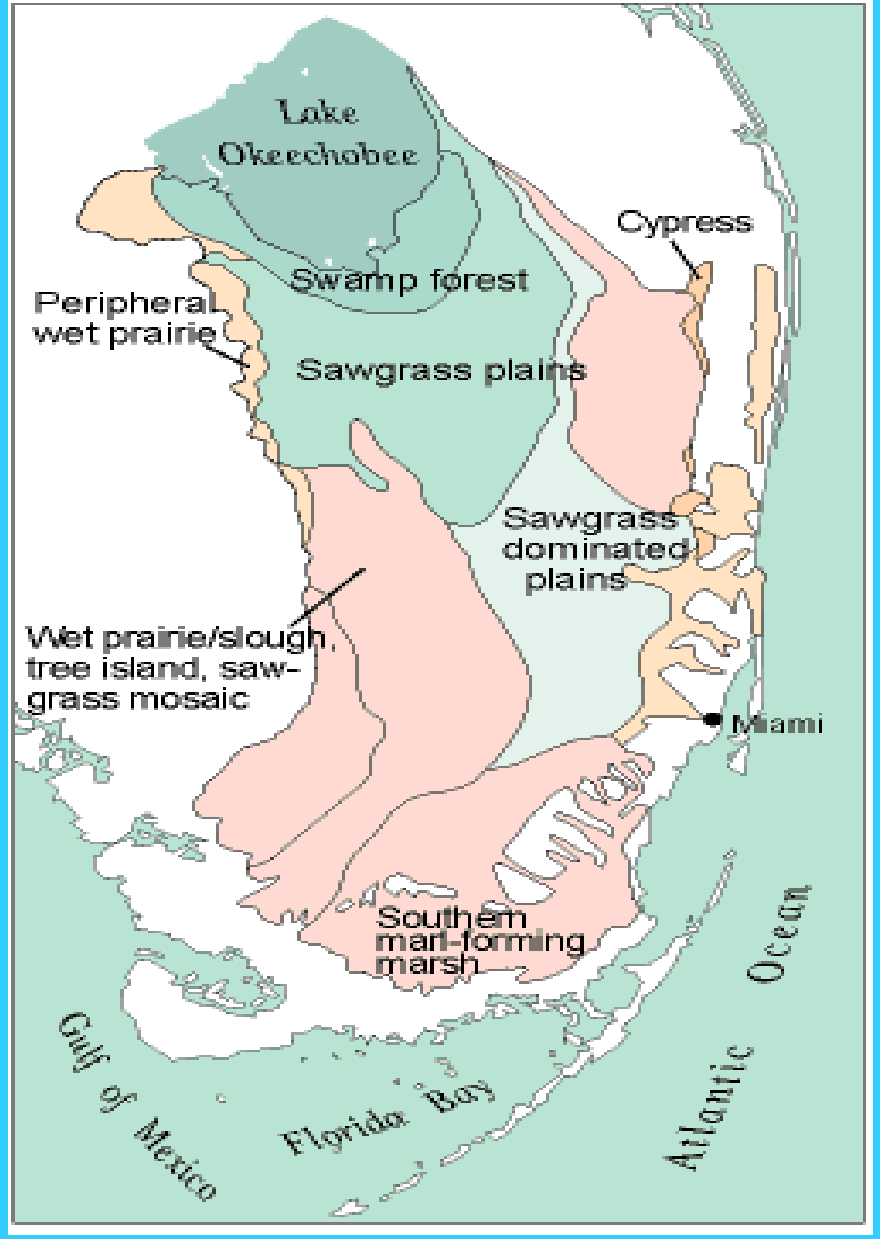
Water takes 6-8 Months to reach Lake Okeechobee

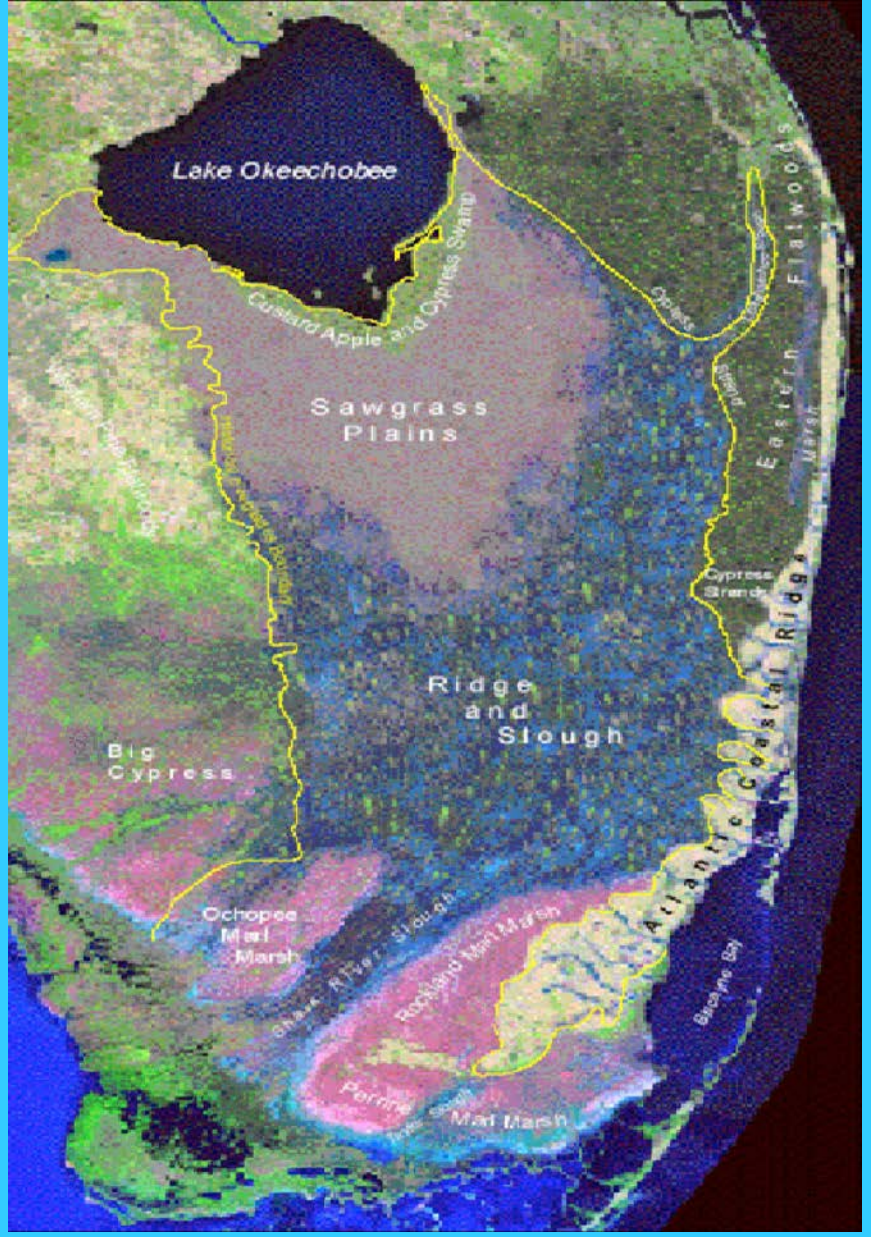
Lake Okeechobee flows south through "River of Grass", 60-mile-wide shallow (1 ft deep) river flowing at 1 mile in 4 days.

Water takes 16 Months to reach Florida Bay

Florida Oceanographic Society







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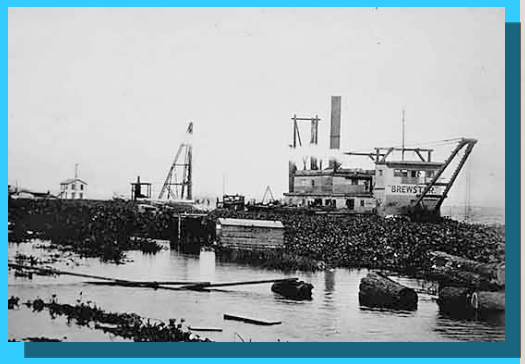
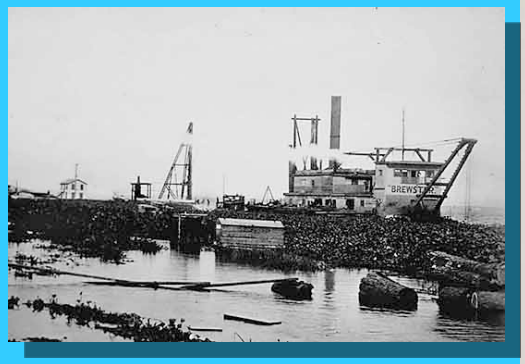
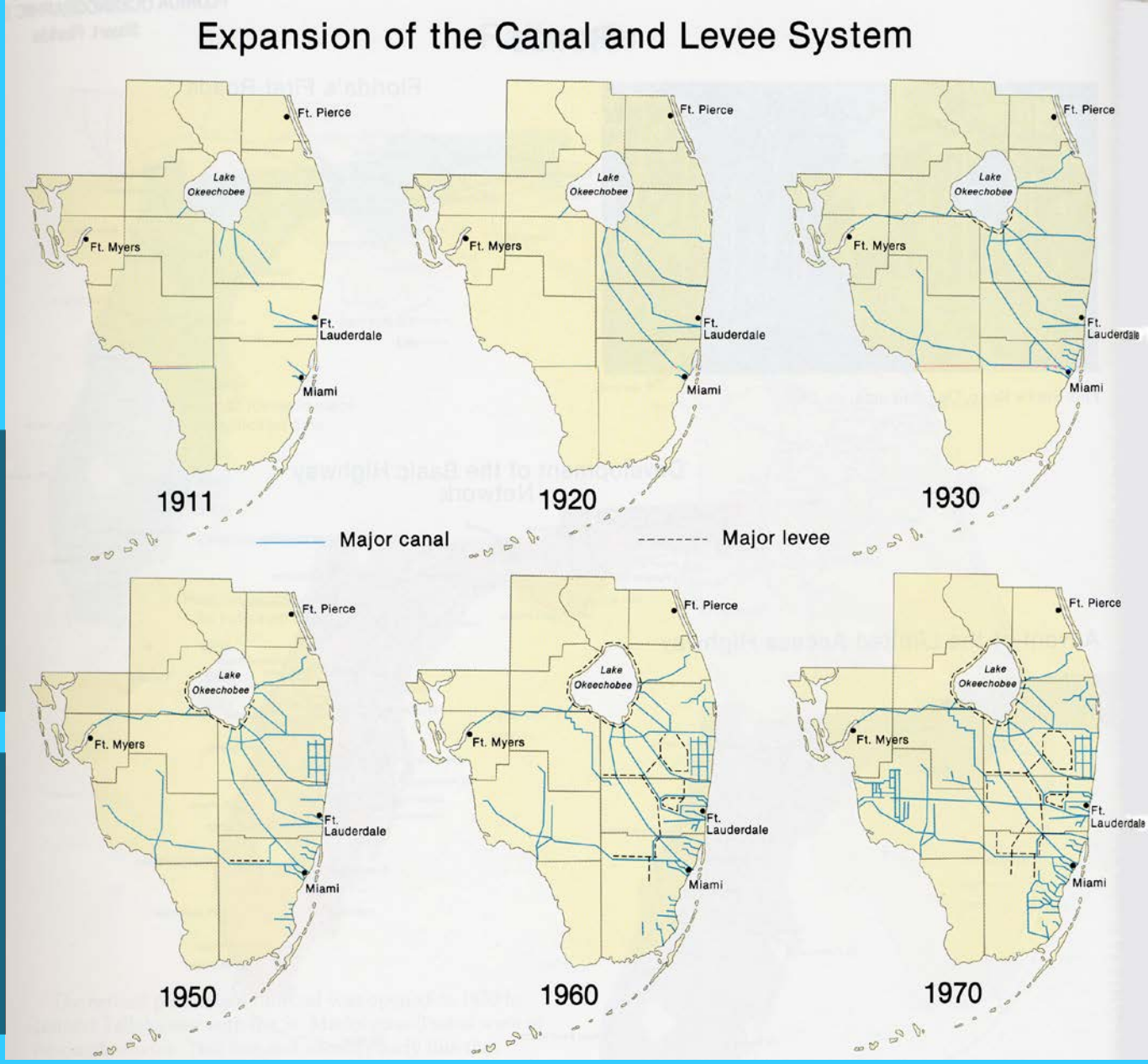
Everglades Changes - **Then**







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"Drain The Swamp"

Hurricanes in 1926 & 1928

Florida Oceanographic Society

"Dam The Lake"

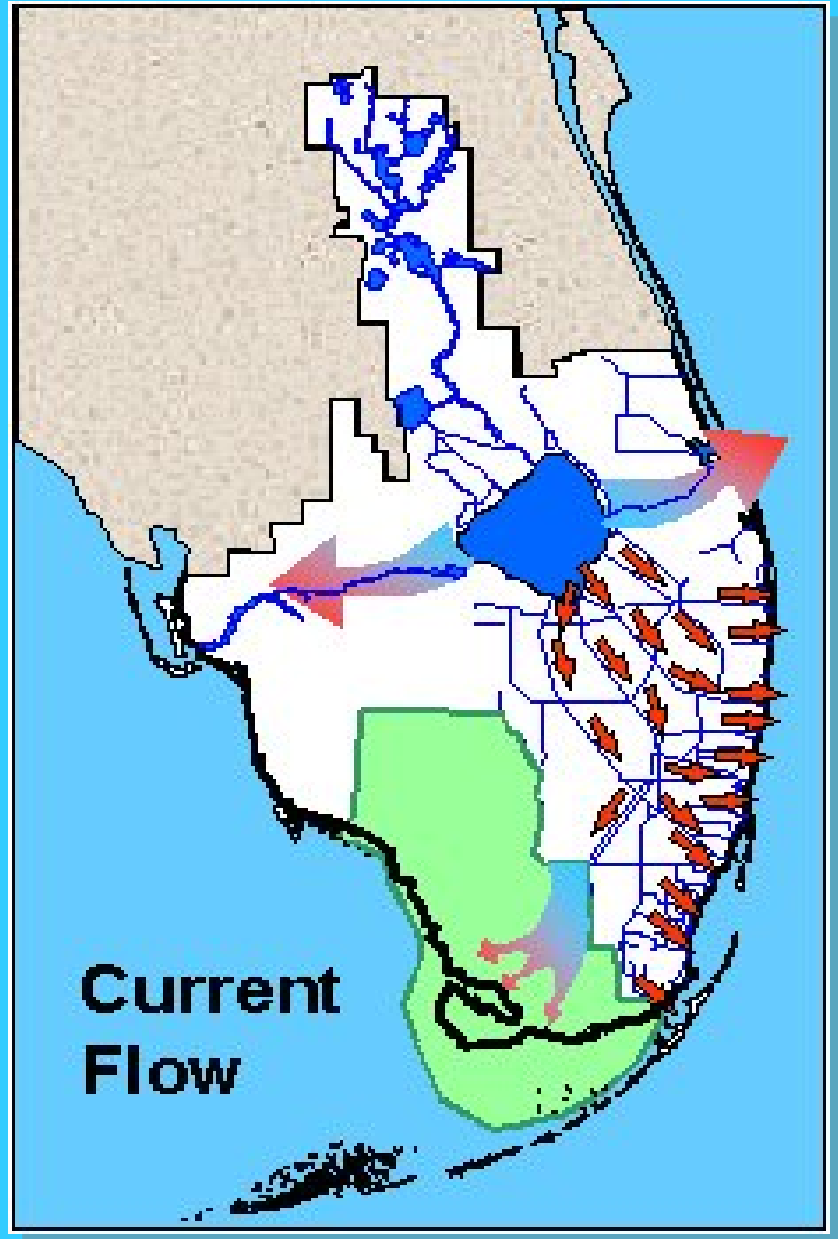
Dam Lake Okeechobee- Stop the flow to the River of Grass (Killed the River of Grass)

Florida Oceanographic Society


Digging the Kissimmee River canal in the early 20th century in response to a devastating flood.
Photo copyright 2008, DEP

Florida Oceanographic Society

Killed the Kissimmee River- 1962-1970 Dug C-38 Canal up 105 mile oxbows-drained floodplain



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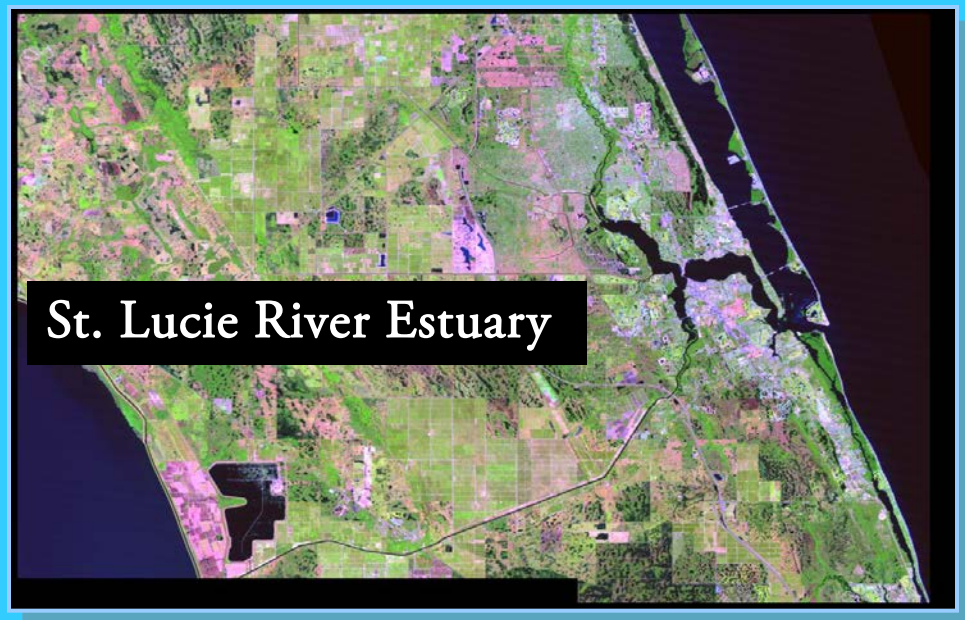
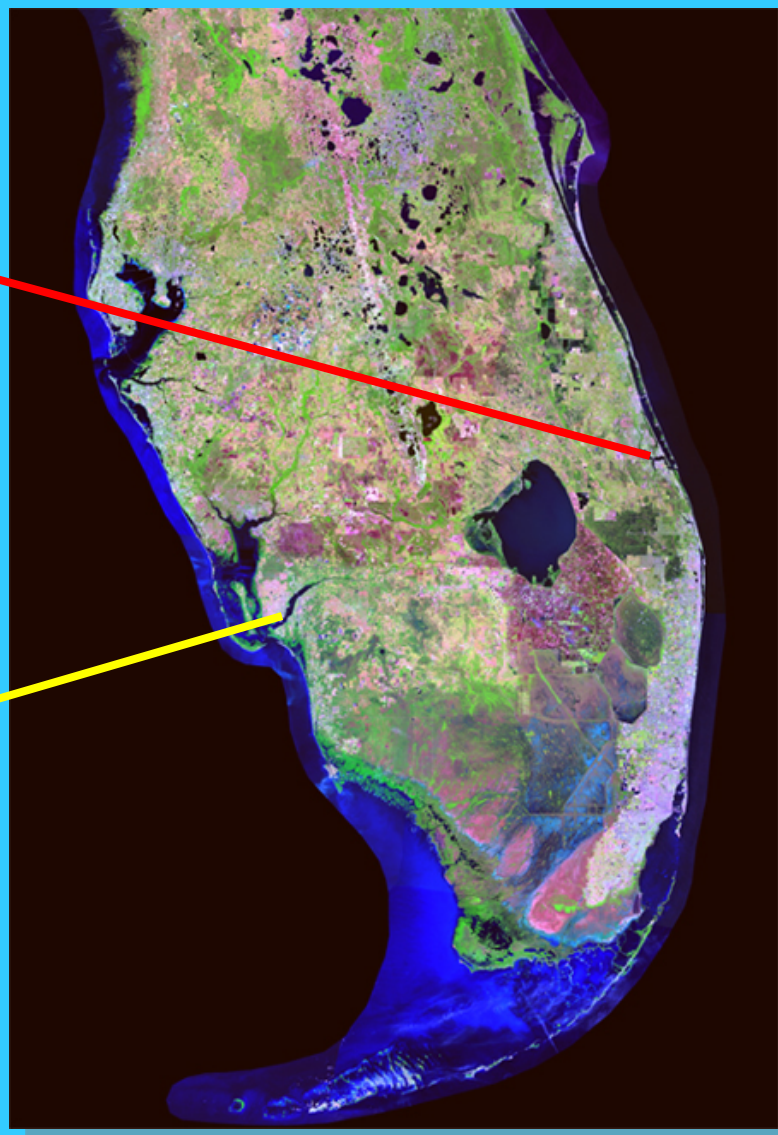
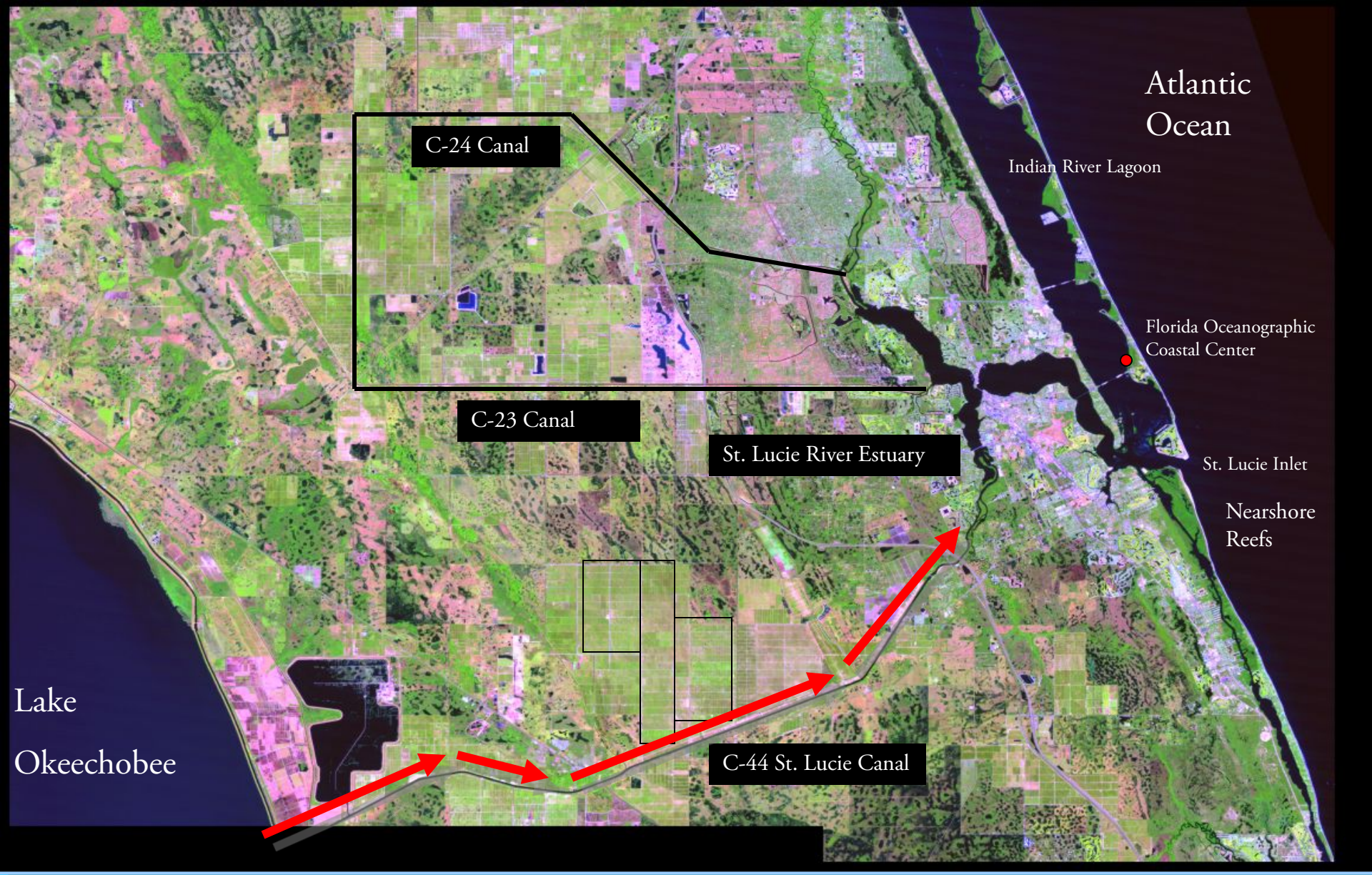
1.7 Billion Gallons per Day of freshwater is wasted to the Atlantic Ocean and Gulf of Mexico! ($5.9 million/day)

South Florida's Northern Coastal Estuaries





Major Impacts



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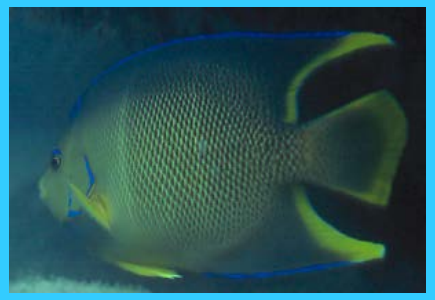
Discharges from Lake Okeechobee to the St. Lucie River Estuary and Indian River Lagoon

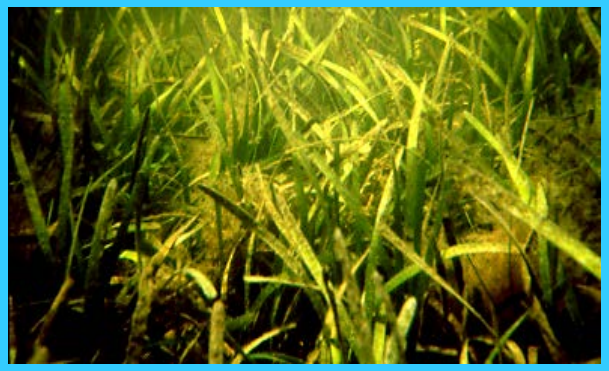
Florida Oceanographic Society

Discharges from Lake Okeechobee and St. Lucie Canal to the Estuary. Up to 4.6 Billion Gallons per Day!

Loss of Fisheries & Coastal Habitat



Seagrass Beds



Oyster Reefs

Mangroves

Coral Reefs

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Indian River Lagoon Seagrass Beds

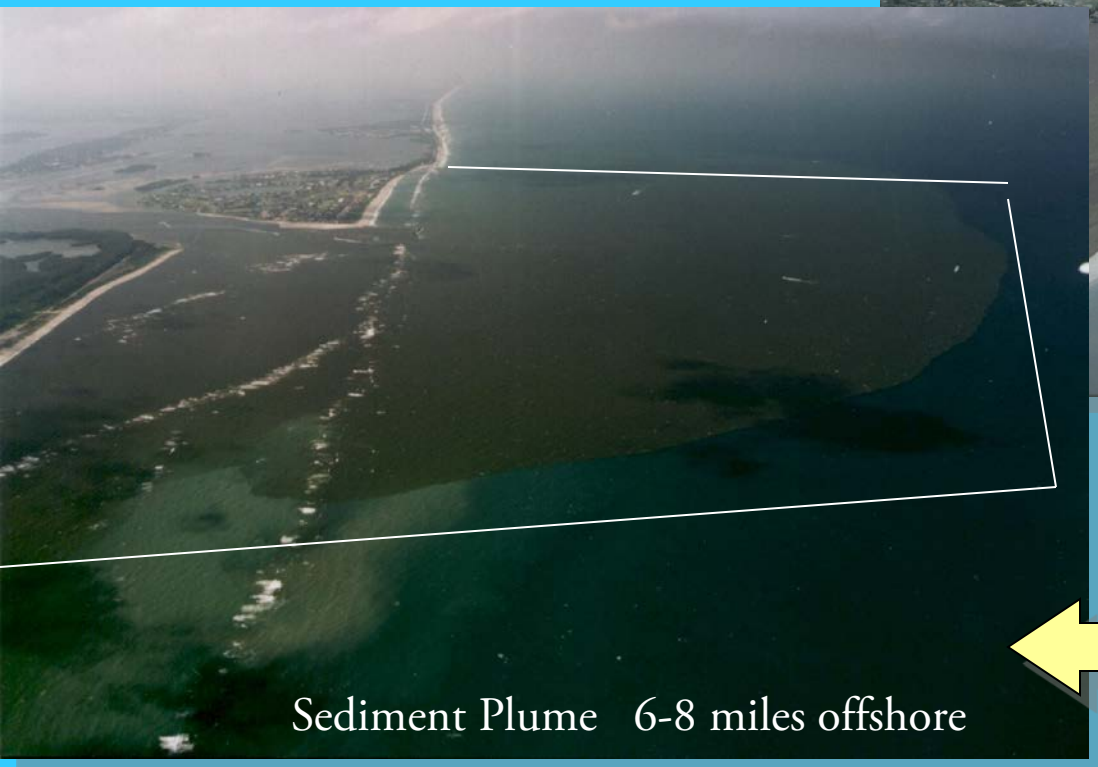
Before Discharges

During Discharges

Florida Oceanographic Society

St. Lucie Inlet Nearshore Reefs

Before Discharges



During Discharges

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St. Lucie River Estuary
Muck Bottom

4-8 ft. thick on bottom

7.9 million cubic yards ++

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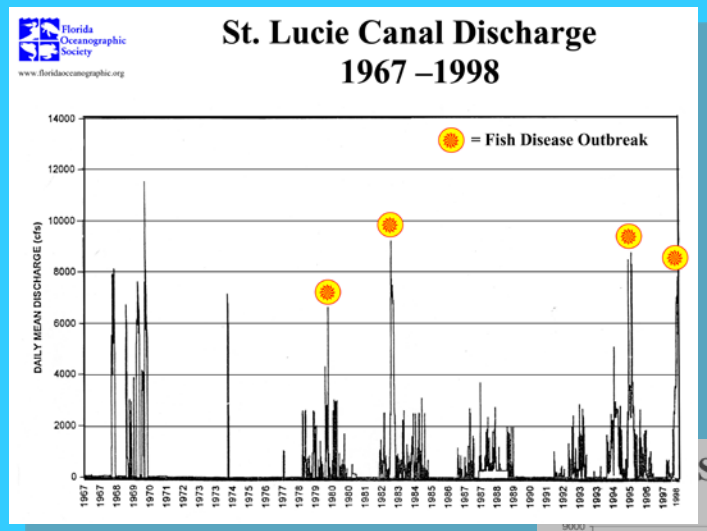
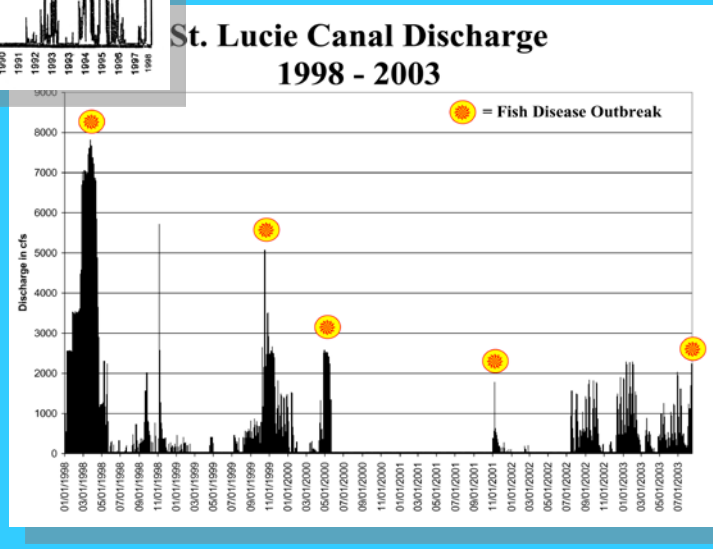
Fish Lesions and Abnormalities



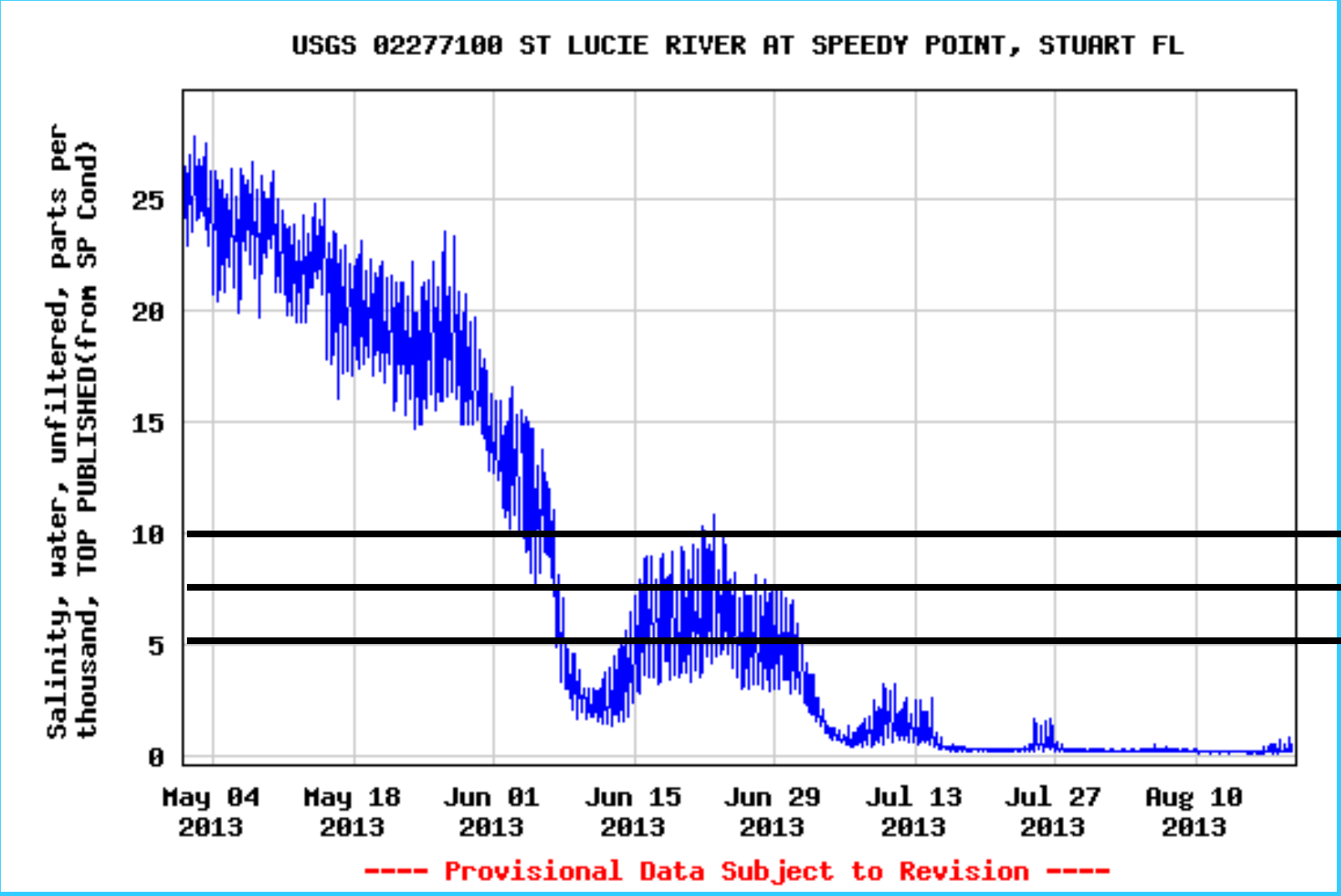


33 Species of Fish

6% of the population

Florida Oceanographic Society


N
0
0.5
1
2 Miles
North Fork
Middle Estuary
Lower Estuary
South Fork
FOS
Florida Oceanographic Coastal Center
Martin Co./NOAA Reefs
Historic Oyster Reefs
OYSTER REEF RESTORATION
FLORIDA
YES24
INDIAN RIVER LAGOON



Stress

Harm

Death

74 Days

Salinity Tolerance for <u>Oysters</u>

Florida Oceanographic Society

<u>Death</u>

<u>7 Days For Spat & Juveniles</u>

<u>14 – 28 Days For Adults</u>

Pollution Discharges from Lake Okeechobee & C-44 Basin to the St. Lucie River Estuary and Indian River Lagoon- State Aquatic Preserve

Pollution over the St. Lucie Inlet State Preserve Reef and Hobe Sound National Wildlife Refuge

St. Lucie Inlet 7-6-13 (photos by J. Thurlow-Lippisch)

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Pollution Discharges from Lake Okeechobee & C-44 Basin to the St. Lucie River Estuary and Indian River Lagoon- State Aquatic Preserve- covering 700 acres of Seagrass Habitat 6-28-13 (photos by J. Thurlow-Lippisch)

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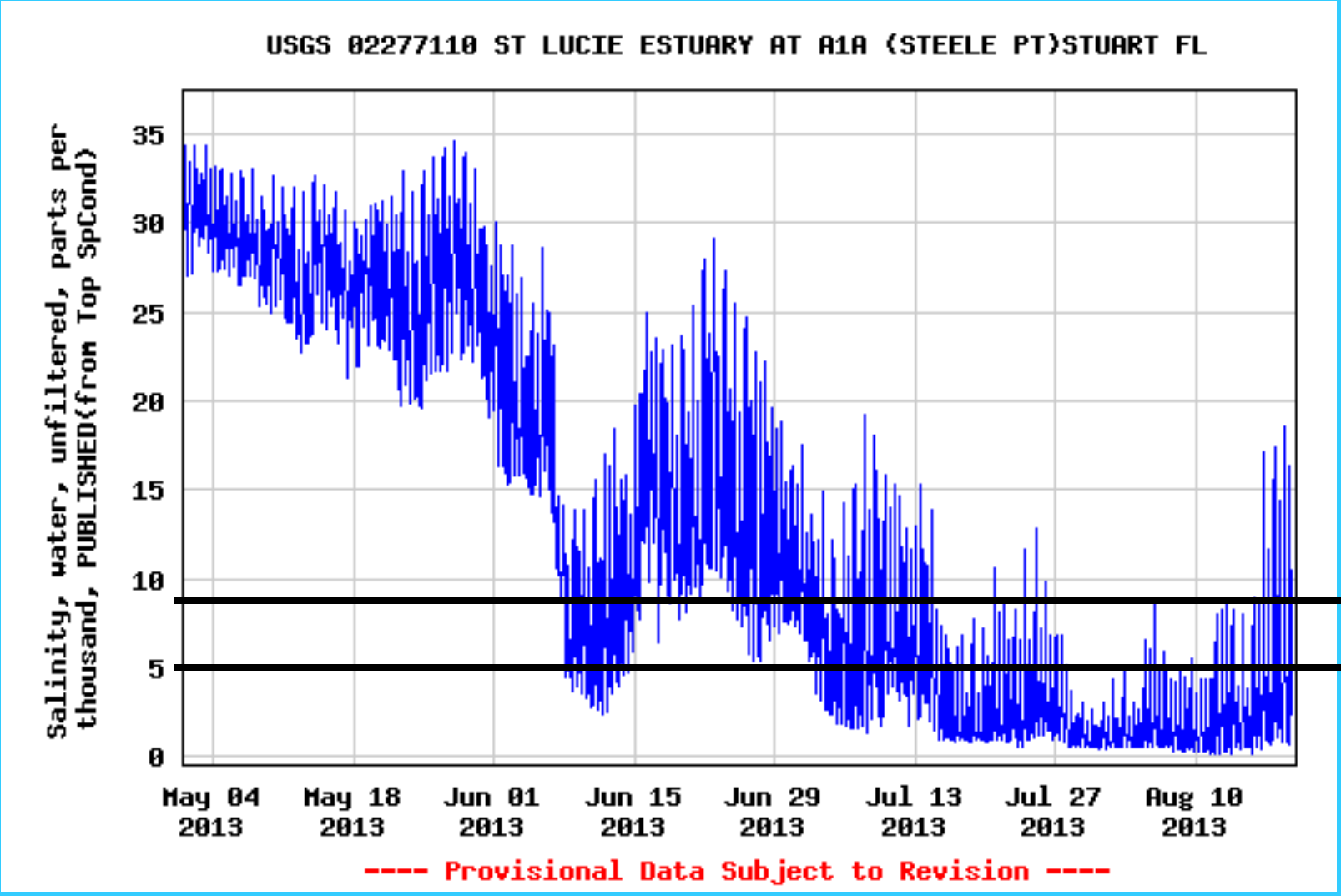

Death

Death

49 Days

Salinity Tolerance for Seagrass

Death

14 days < 9 ppt

3 days < 5ppt

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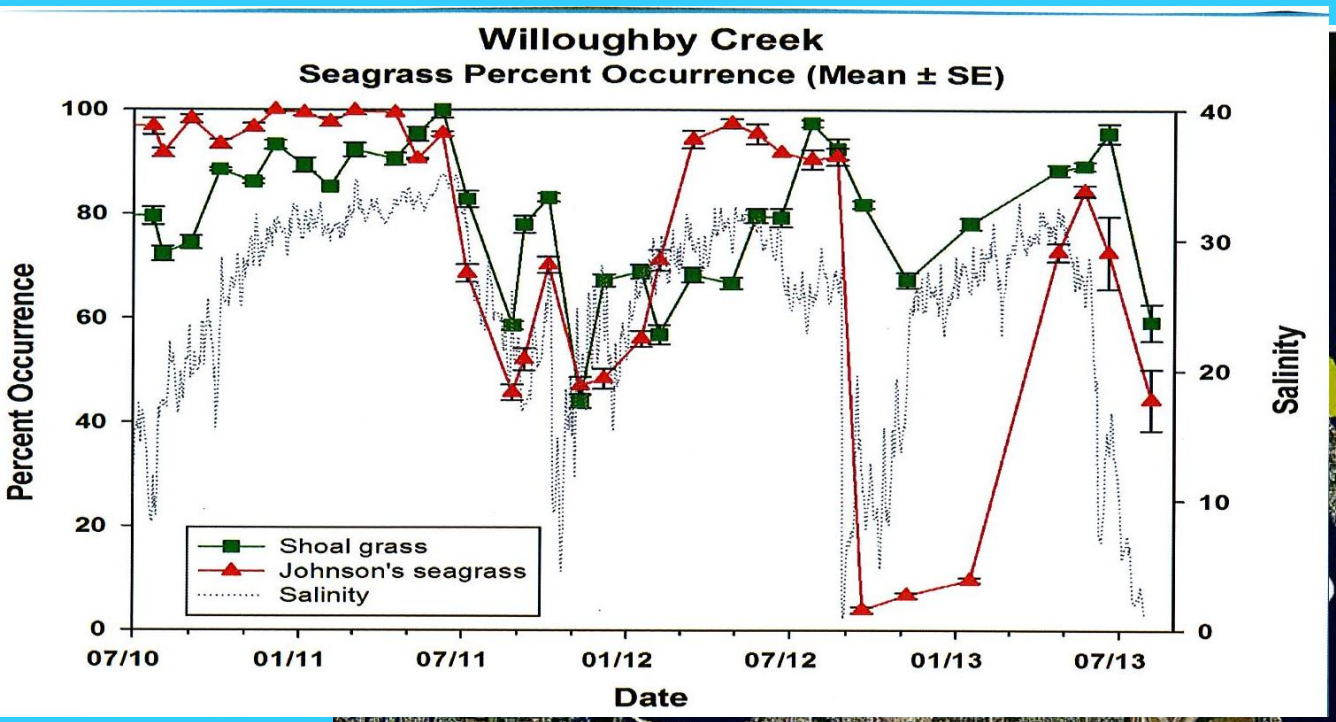

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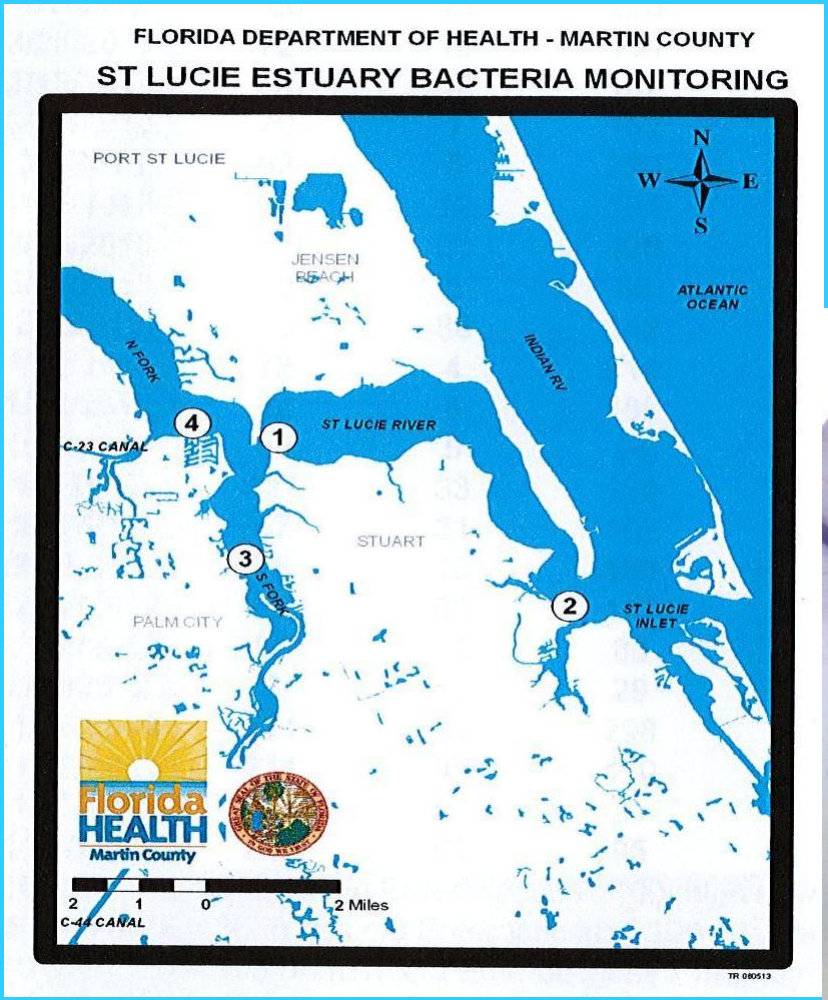
Effects of Freshwater Discharges on Seagrasses – Johnson's Seagrass is a Threatened Species under the ESA

Health Warnings posted in the St. Lucie River Estuary – 2004, 2005, 2006, 2010, 2012 and 2013

Green Algae Bloom Observed in St. Lucie River along shoreline in Rio by Douglas Ashley – 7-13-13

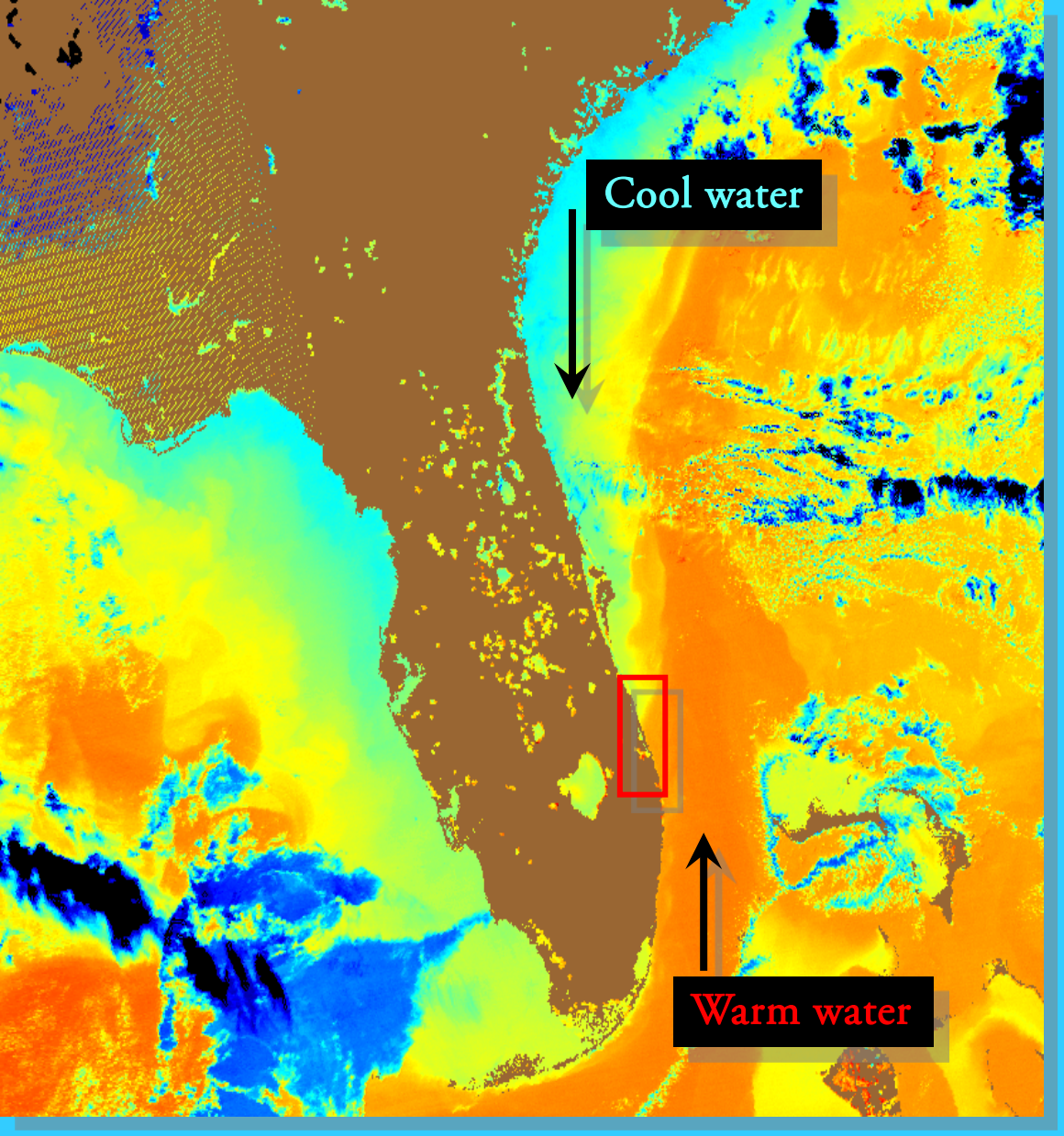


Date	Roosevelt Bridge (1)	Sandsprit Park (2)	Leighton Park (3)	E of Bessey Creek (4)
7/15/2013	1140	354	1440	1480
7/8/2013	910	156	1020	1560
7/2/2013	790	216	2020	1080
6/24/2013	560	102	1640	1400
6/17/2013	302	86	700	590
6/12/2013	Not sampled	134	Not sampled	Not sampled
6/10/2013	600	122	1620	1500

Highest Bacteria Levels Observed

Health Warnings Posted

Avoid Contact with Water



Most Biodiverse Ecosystem in North America

- 2100 plant species
- 2200 animal species
  - 800 fish species
  - 310 bird species

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Uniqueness of the Indian River Lagoon Estuary

Indian River Lagoon
Economic Assessment and Analysis Update
Contract No. 24706

For the
Indian River Lagoon National Estuary Program

In cooperation with
St. Johns River Water Management District
South Florida Water Management District

Final Report
August 18, 2008

Photo by E. Vamos courtesy of the SJRWMD

HAZEN AND SAWYER
Environmental Engineers & Scientists

Executive Summary

The Indian River Lagoon is an Estuary of National Significance and one of twenty-eight (28) national estuary programs in the U.S. The Indian River Lagoon National Estuary Program is working toward the goals of attaining and maintaining the water and sediment quality needed to support a healthy seagrass-based ecosystem, endangered and threatened species, fisheries and recreation in the Lagoon.

Study Purpose

This study updated the economic values of the Indian River Lagoon that were estimated in 1995. The study area for this project is the Indian River Lagoon, including Mosquito Lagoon and Banana River Lagoon, and associated tributaries including but not limited to the St. Lucie River Estuary, St. Sebastian River, Turkey Creek, Crane Creek, Moore's Creek, and the inlets of Ponce de Leon Inlet, Port Canaveral Inlet, Sebastian Inlet, Ft. Pierce Inlet, St. Lucie Inlet, and Jupiter Inlet. The residents surrounding the Indian River Lagoon are located in the counties of Volusia, Brevard, Indian River, St. Lucie and Martin. The uses and values presented in this study represent the year 2007.

Economic Value of the Indian River Lagoon

The 2007 economic value of the Indian River Lagoon is provided in Table ES.1. Overall, residents and visitors of the five Indian River Lagoon counties received about $3.7 billion in benefits in 2007 because of the existence of the Indian River Lagoon in its 2007 environmental condition.

Table ES.1
Estimated Annual Economic Value of the Indian River Lagoon in its Existing Environmental Condition, 2007

Indian River Lagoon Related-	Value
(1) Recreational Expenditures	$1,302,000,000
(2) Recreational Use Value	$762,000,000
(3) Non-Use Value of Lagoon	$3,400,000
(4) Real Estate Value, annualized	$934,000,000
(5) Income Generated in IRL Counties	$629,700,000
(6) Restoration, Research, Education Expenditures	$91,000,000
(7) Commercial Fishing Dockside Value	$3,800,000
Total Annual Value	**$3,725,900,000**

405548-001\Wpdocs\Report\R2 Final

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Indian River Lagoon – Economic Value **$ 3.725 Billion** 2007

Water-Related Benefits to Martin and St. Lucie Counties

TOTAL: $840 million annually

Sales - *$519 million/yr*

- Marinas
- Boat sales/repairs
- Fishing tackle/bait/charters

Personal income - *$206 million/yr*

- *6,600* jobs supported—Marine Industries
  - Guide/commercial fishing
  - Repair personnel
- *20,500* jobs supported—Tourism
  - Food/beverage services
  - Hotel/motel personnel

Tourism - *$115 million/yr*

- Visitation to beaches/hotels
- Recreational fishing/boating

PLUS-Property Values - *$588 million Plus (Martin County)*

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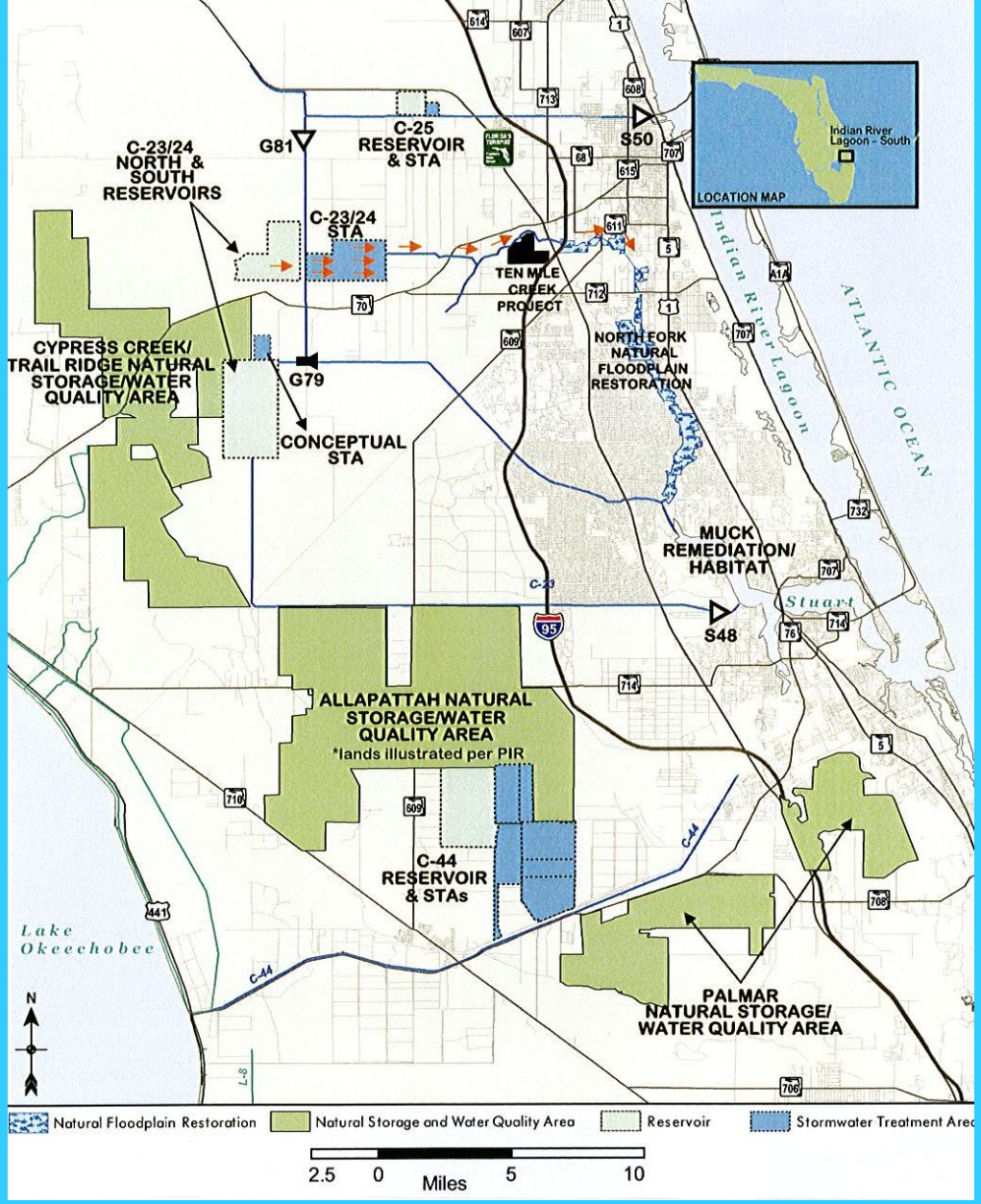

Indian River Lagoon-South Plan

12,000 acres above ground Storage Reservoirs

9,000 acres STA manmade wetlands

90,000 acres Natural Area Storage

2,650 acres benthic habitat created- 922 acres submerge aquatic habitat restored

7.9 million cubic yards of muck removed

889 acres of restored oyster habitat

41% reduction in Phosphorus

26% reduction in Nitrogen

C-44 BASIN COMPONENTS

- C-44 – Reservoir
- C-44 – Stormwater Treatment Area
- Palmar Complex – Natural Storage and Water Quality Area

C-23/24 BASIN COMPONENTS

- C-23/24 – North and South Reservoirs
- C-23/24 – Stormwater Treatment Area
- Allapattah, Cypress Creek and Trail Ridge Complex – Natural Storage and Water Quality Area

C-25, NORTH FORK AND SOUTH FORK BASIN COMPONENTS

- C-25 – Reservoir
- C-25 – Stormwater Treatment Area
- North Fork Natural Floodplain Restoration Muck Remediation and Artificial Habitat

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Everglades Restoration Improves the Economy & Provides Jobs

Projects Include:

- Tamiami Trail
- Kissimmee River Restoration
- Picayune Strand
- C-111
- Site 1 Impoundment
- IRL-South-C44

Florida Oceanographic Society

Everglades Coalition

Everglades Restoration Works!

Creating jobs, protecting water supply.

Everglades National Park is one of America's greatest treasures. In addition to being a one-of-a-kind subtropical destination for tourists, this World Heritage Site is a tremendous economic generator for Florida. In 2009 alone, Everglades National Park created nearly 3,000 jobs. More than 2,300 of these jobs were in the local private sector and generated more than $165 million in visitor spending. Further, a 2010 study by Mather Economics revealed that investment in Everglades restoration provides a four-to-one economic benefit for ever dollar invested in restoration projects. Benefits from restoration come in many forms including:

- Ensuring drinking water supply for one in three Floridians
- Saving jobs in the tourism, boating, and fishing industries
- Reducing the levels of toxic pollutants like methyl mercury that has been found in Florida fish
- Protecting Endangered wildlife like the Florida Panther and the Southern Bald Eagle

Over the last three years, Everglades restoration projects have generated **10,500** jobs. **22,000** short- to mid-term jobs on the restoration itself, and more than **442,000** jobs will be created over the next several decades in tourism, real estate and commercial and recreational fishing industries.

Everglades restoration is a sound investment in our environment and creates jobs <u>today</u>!

Investments in Everglades restoration create private sector jobs and lead to long-term economic benefits for Florida. Here is a sampling of jobs generated by restoration work.

JOB TYPE	Mean Annual Salary
Civil Engineers	$79,630
Electrical Engineers	$77,760
Cost Engineers	$72,909
Surveyors	$36,730
Economists	$96,320
Ecologists	$61,180
Geologists	$62,090
Project Managers	$93,290
Regulatory Specialists	$99,735
Financial Specialists	$111,970
Ground Maintenance Workers	$32,020
Dredge Operator	$34,840

JOB TYPE	Mean Annual Salary
Environmental Engineers	$67,600
Mechanical Engineer	$74,470
Engineering Drafters	$47,680
Planning and Mapping Specialists	$36,370
Biologists	$69,430
Hydrologists	$76,760
Archeologists	$57,230
Environmental Scientists	$67,360
Accountants	$61,816
Administrative Specialists	$96,050
Construction Laborers	$33,190
Structural Iron and Steel Workers	$.48,470

Study by Everglades Foundation shows investing $11.5 billion in Everglades Restoration will result in $46.5 billion in gains to Florida's economy and create more than 440,000 jobs over the next 50 years.

Florida Oceanographic Society

FACT SHEET

Measuring the Economic Benefits of America's Everglades Restoration

An Economic Evaluation of Ecosystem Services Affiliated with the World's Largest Ecosystem Restoration Project

EVERGLADES RESTORATION: A 4-TO-1 RETURN ON INVESTMENT

EVERGLADES FOUNDATION
evergladesfoundation.org

BACKGROUND

The Everglades Foundation has released a comprehensive study detailing the financial return on investment in Everglades ecosystem restoration. Conducted by Mather Economics, the study shows that the country—and the state of Florida in particular—stand to gain significant economic growth and new job creation as a result of America's Everglades restoration.

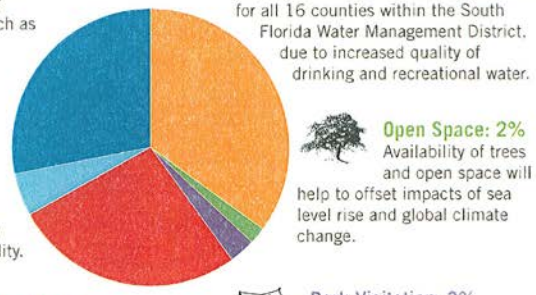
ECONOMIC BENEFIT OF RESTORING AMERICA'S EVERGLADES

Projections show that investing $11.5 billion in Everglades restoration will result in $46.5 billion in gains to Florida's economy and create more than 440,000 jobs over the next 50 years! For every dollar invested in Everglades restoration, $4 are generated in economic benefits.

ECONOMIC GAINS BY SECTOR

Water Quality: 28%
Enhanced availability of freshwater will protect the region's drinking water supply and cut down on costs of purification methods, such as desalination facilities.

Real Estate: 35%
Property values are expected to increase for all 16 counties within the South Florida Water Management District, due to increased quality of drinking and recreational water.



Fishing: 5%
Recreational and commercial fishing industries will see a significant rebound with the protection of territory and enhanced water quality.

Open Space: 2%
Availability of trees and open space will help to offset impacts of sea level rise and global climate change.

Habitat and Hunting: 27%
Restoring the everglades will provide valuable ecosystem habitat. Native wildlife populations will flourish and lead to increased availability of hunting opportunities.

Park Visitation: 3%
Restoration of the Everglades ecosystem will increase wildlife populations and allow for more recreational opportunities during park visitation for residents and tourists.

New Report from Restore America's Estuaries shows that restoring coastal ecosystems can create more than 30 jobs for each $1million invested. That's more than 2X as many as the oil & gas and road construction industries combined.

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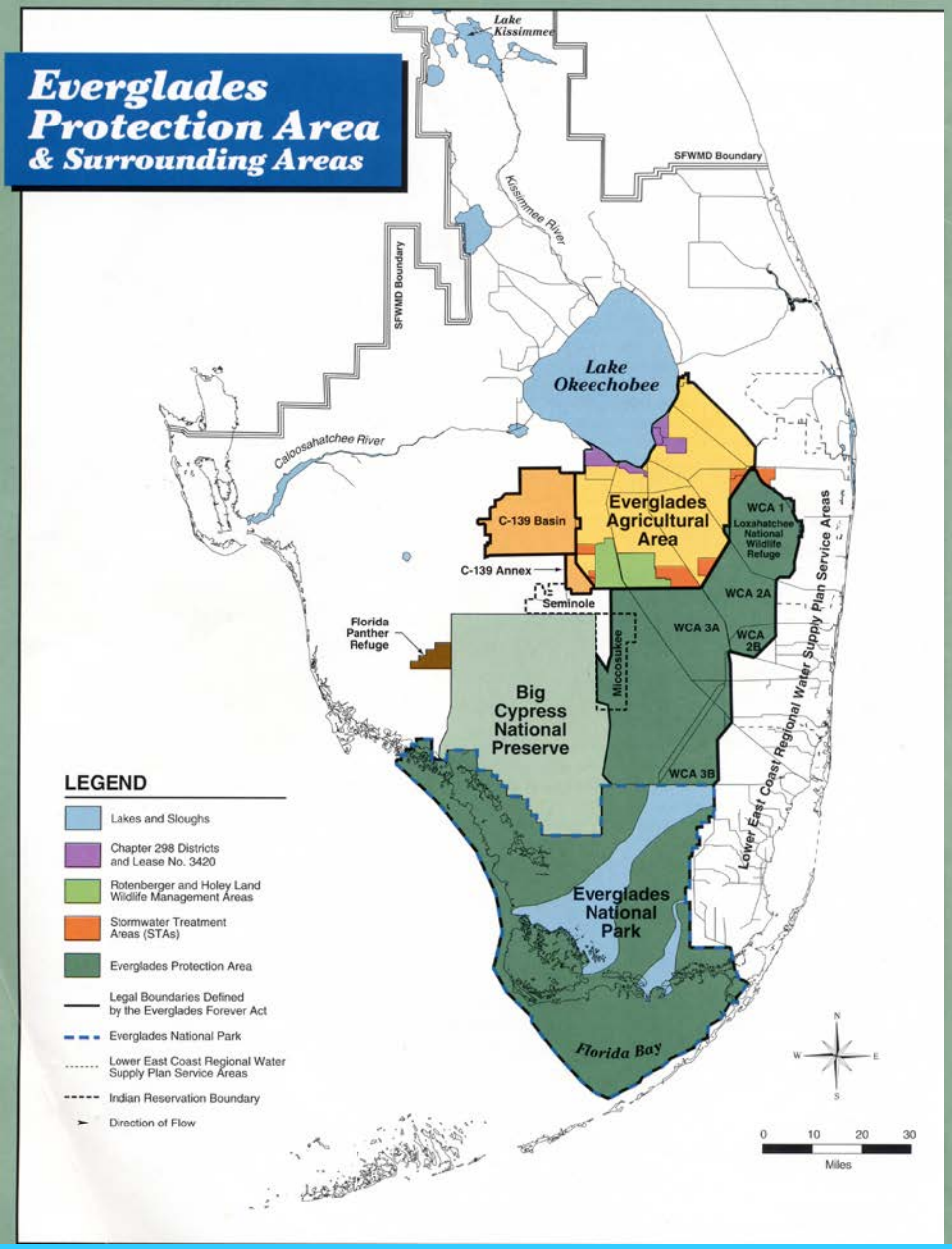

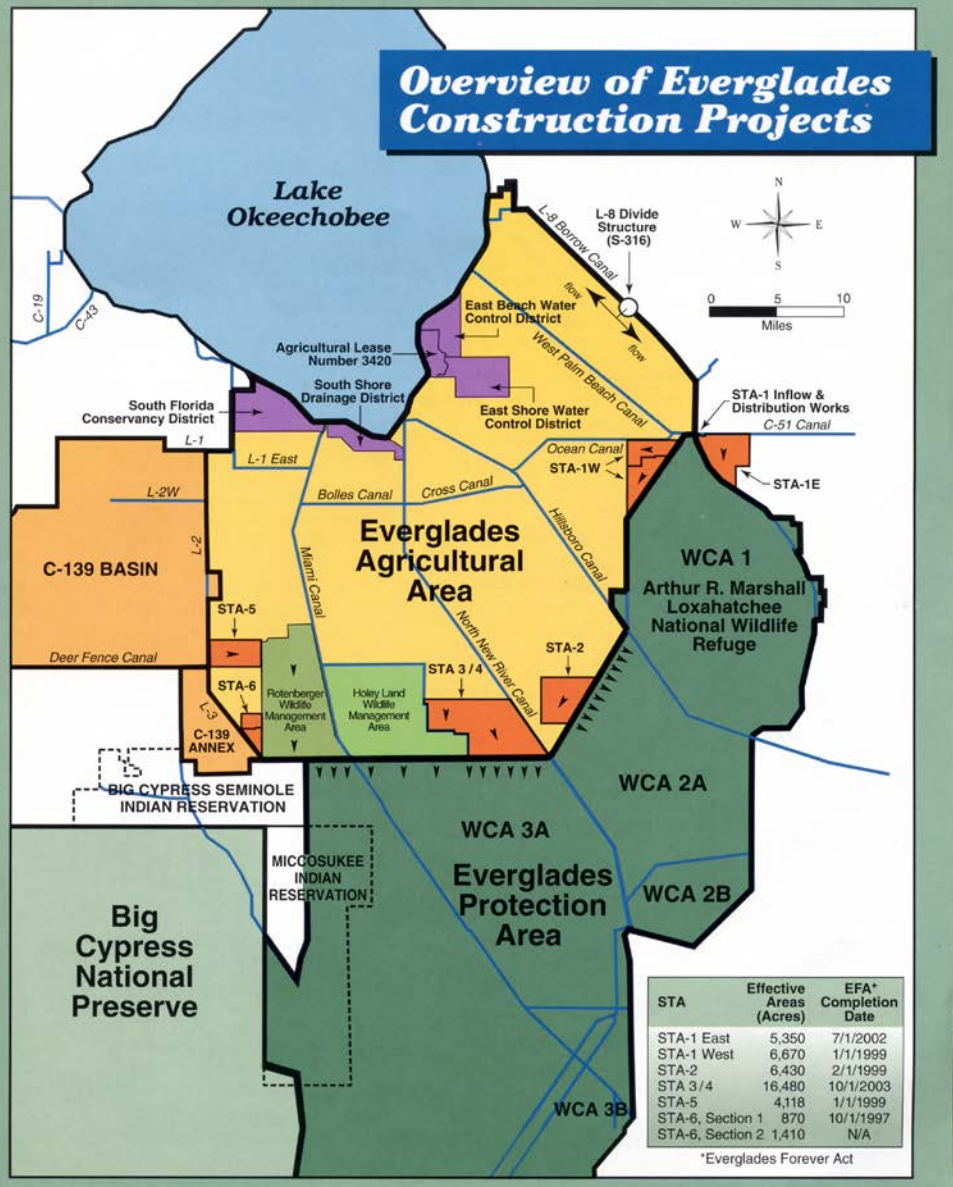

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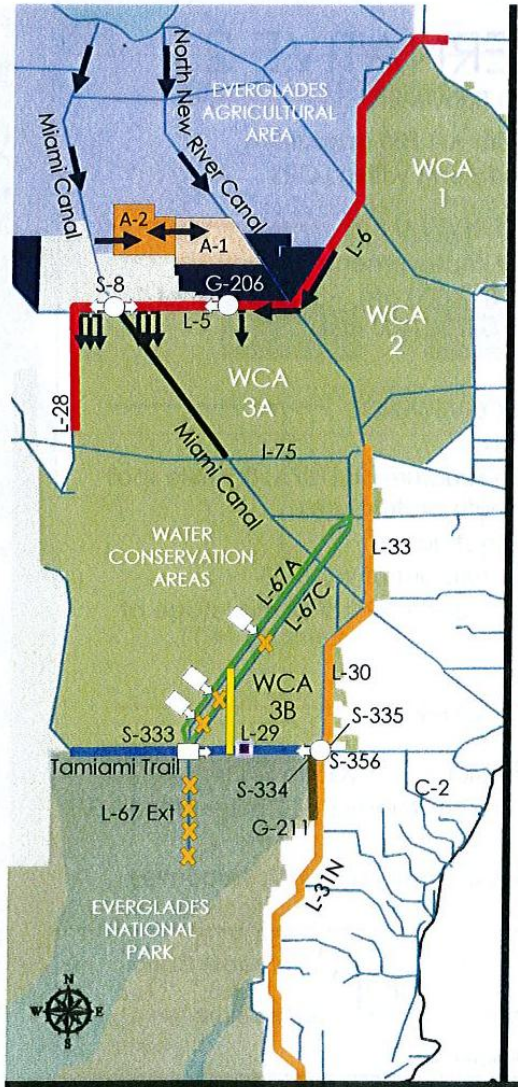
1994 Everglades Forever Act – Projects $ 1.8 Billion



PROPOSED ALTERNATIVE 4

STORAGE AND TREATMENT

- Construct A-2 FEB and integrate with A-1 FEB operations
- Lake Okeechobee operation refinements within LORS

DISTRIBUTION/CONVEYANCE

- Diversion of L-6 flows and L-5 canal improvements
- Spreader canal: ~3 miles west of S-8 (3,000 cfs), ~3 miles east of S-8 (800 cfs) and ~1.5 miles east of G-206 (400 cfs)
- Backfill Miami Canal from S-8 to I-75

DISTRIBUTION/CONVEYANCE

- Increase S-333 capacity to 3,000 cfs
- Two 500 cfs gated structures in L-67A, 0.5 mile spoil removal west of L-67A north and south of structures
- Include levee in WCA 3B
- Degrade L-67C levee in Blue Shanty flowway
- One 500 cfs gated structure north of Blue Shanty levee and 6,000-ft gap in L-67C levee
- Degrade L-29 levee in Blue Shanty flowway, divide structure east of Blue Shanty levee at terminus of western bridge
- Tamiami Trail western 2.6 mile bridge and L-29 canal max stage at 9.7 ft (FUTURE WORK BY OTHERS)
- Degrade entire L-67 extension levee

SEEPAGE MANAGEMENT

- Increase S-356 to 1,000 cfs
- Partial depth seepage barrier south of Tamiami Trail 5 miles along L-31N
- G-211 operational refinements; use coastal canals to convey seepage

FEB · STA · Pump · Spreader Canal · Backfill · Levee Removal · Gated Structure · Seepage Barrier · Divide · Levee

36

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Including "Restoration Strategies" Water Quality Improvements, A-1 & A-2 FEBs, Miami Canal, Tamiami Trail …

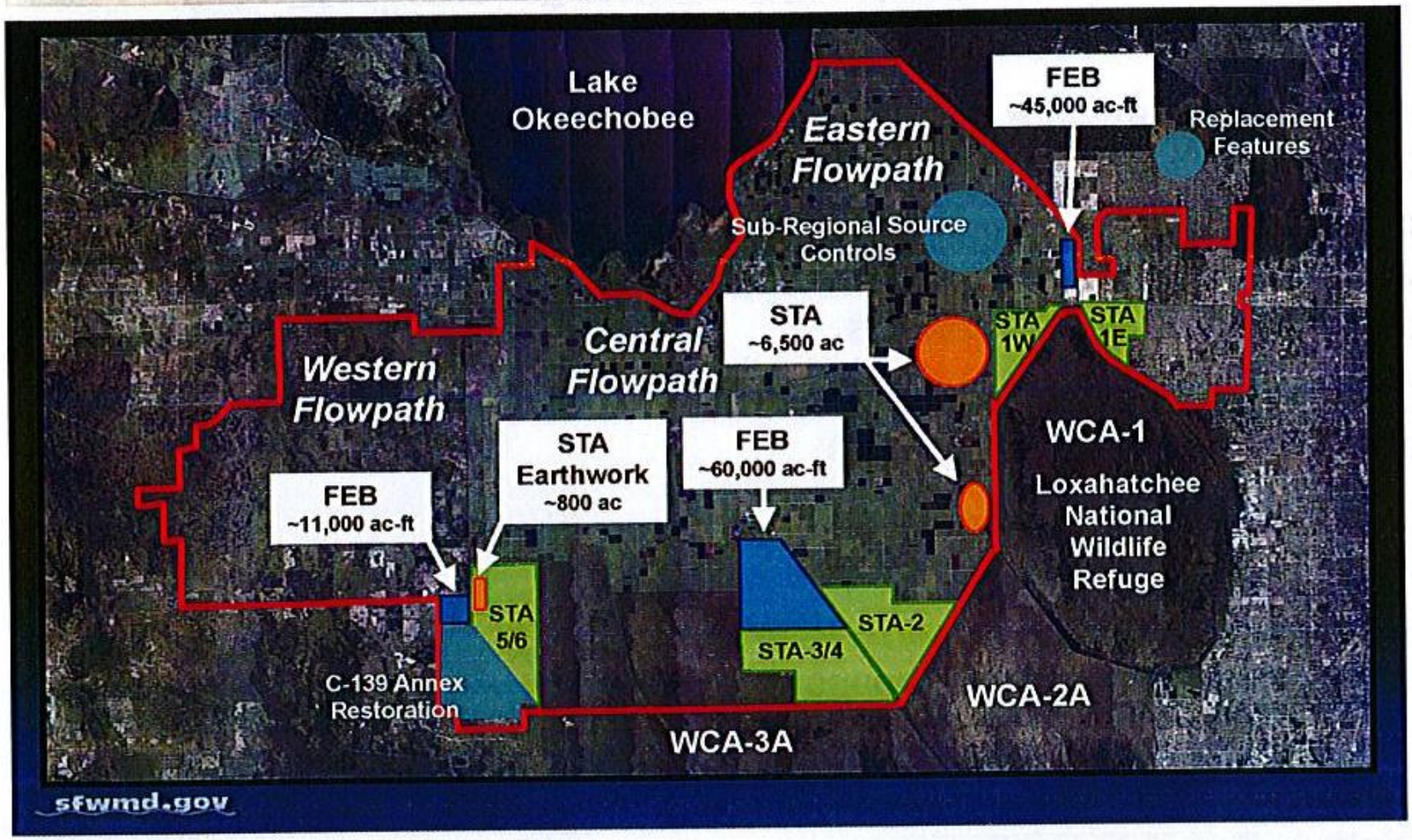
Principals' Meeting
October 6, 2011

Florida

Governor- Rick Scott
SFWMD – Melissa Meeker

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

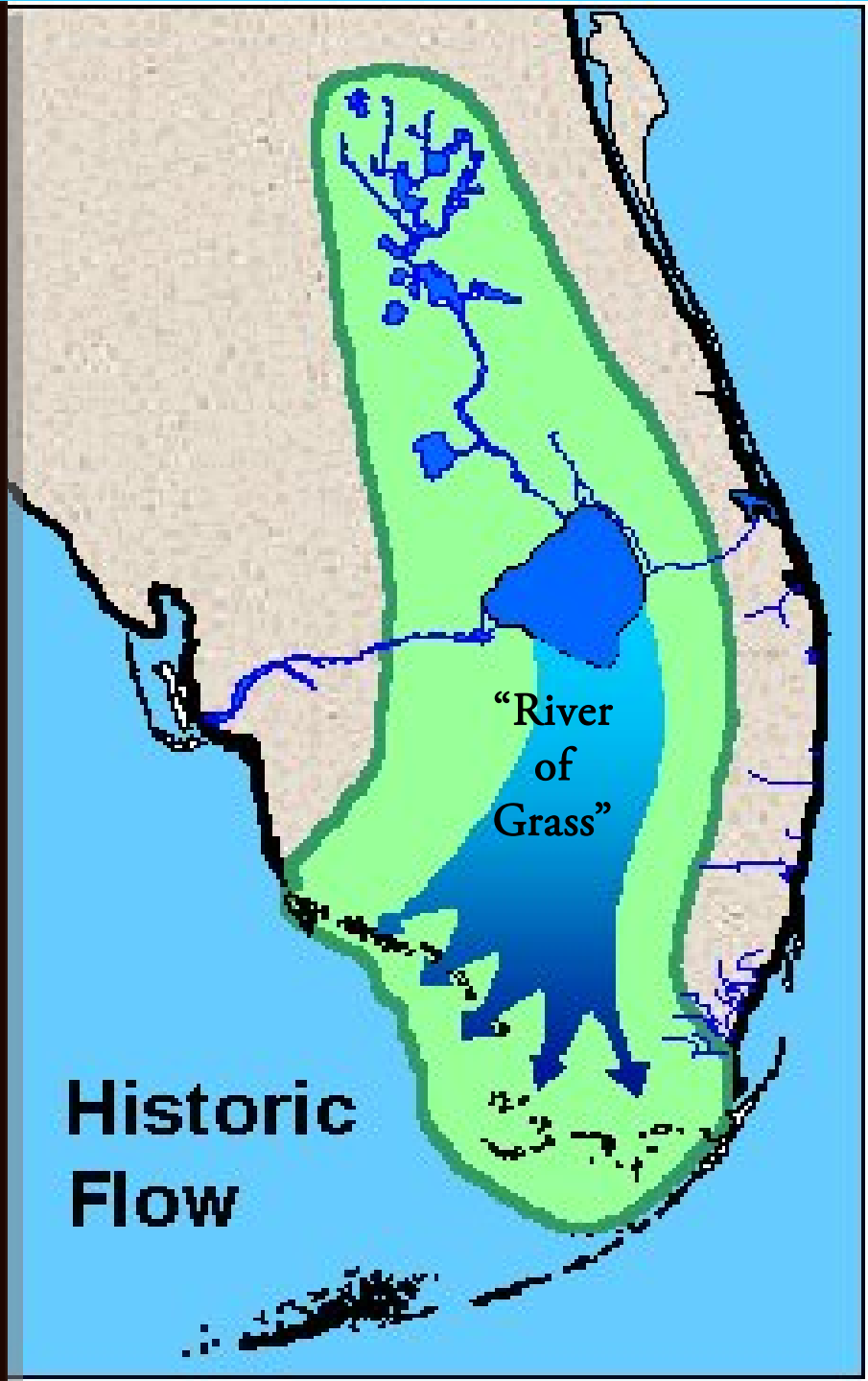
Restoration Strategies – Key Projects

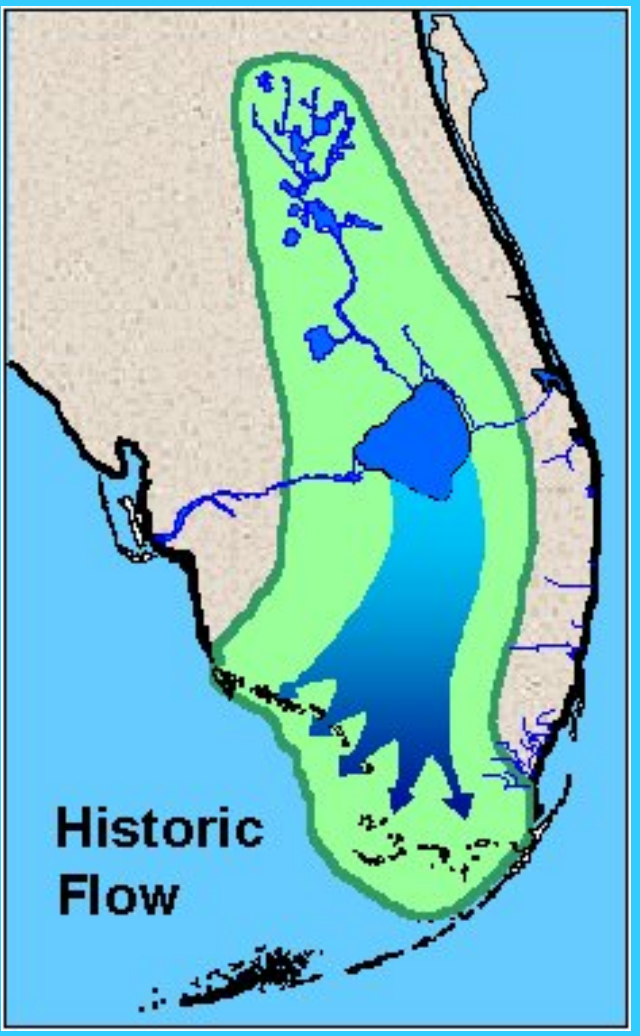


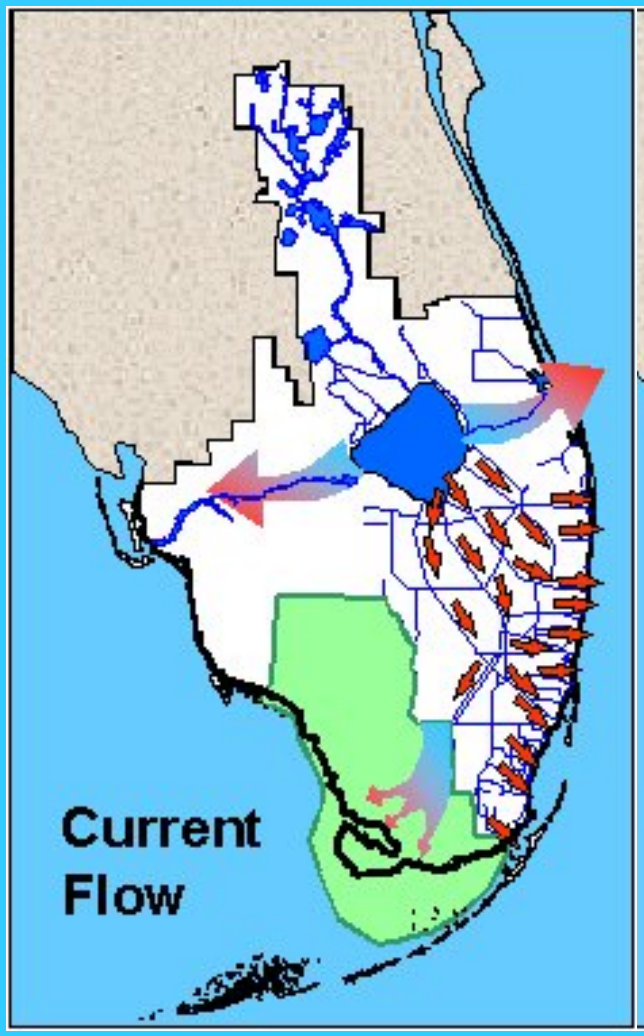
Plan 6 Project

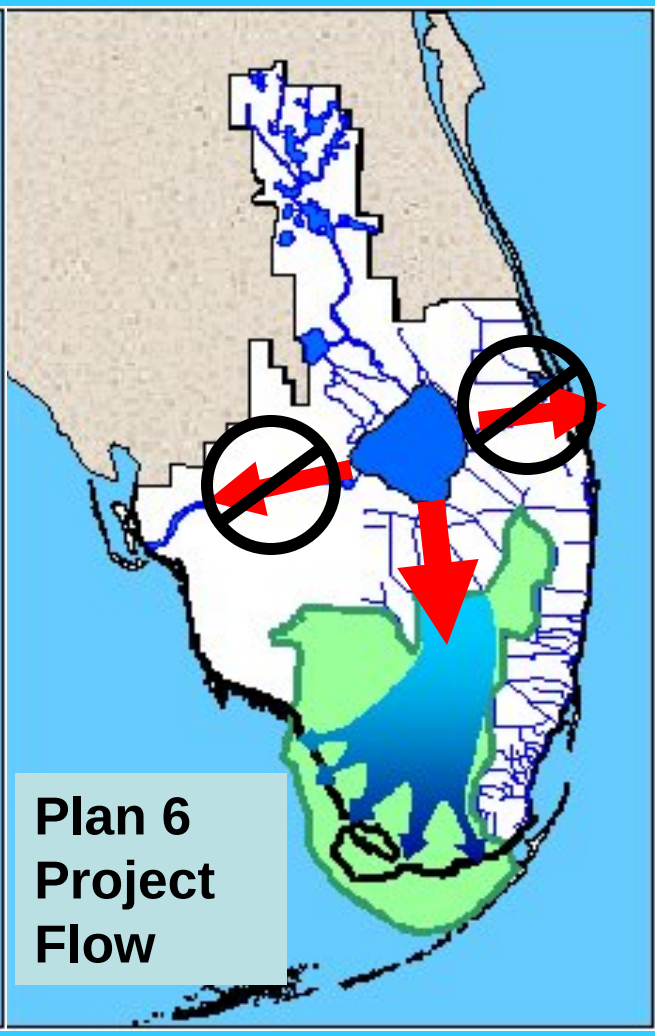
Stop the destructive discharges to the Northern Estuaries and Restore the River of Grass


Upper Chain of Lakes
Lake Kissimmee
Indian River Lagoon
Kissimmee River
St. Lucie Estuary
Lake Okeechobee
Caloosahatchee Estuary
Everglades
Biscayne Bay
Florida Bay
Coral Reefs


"River of Grass"
Historic Flow







Historic, Current & Plan 6 Project Flow

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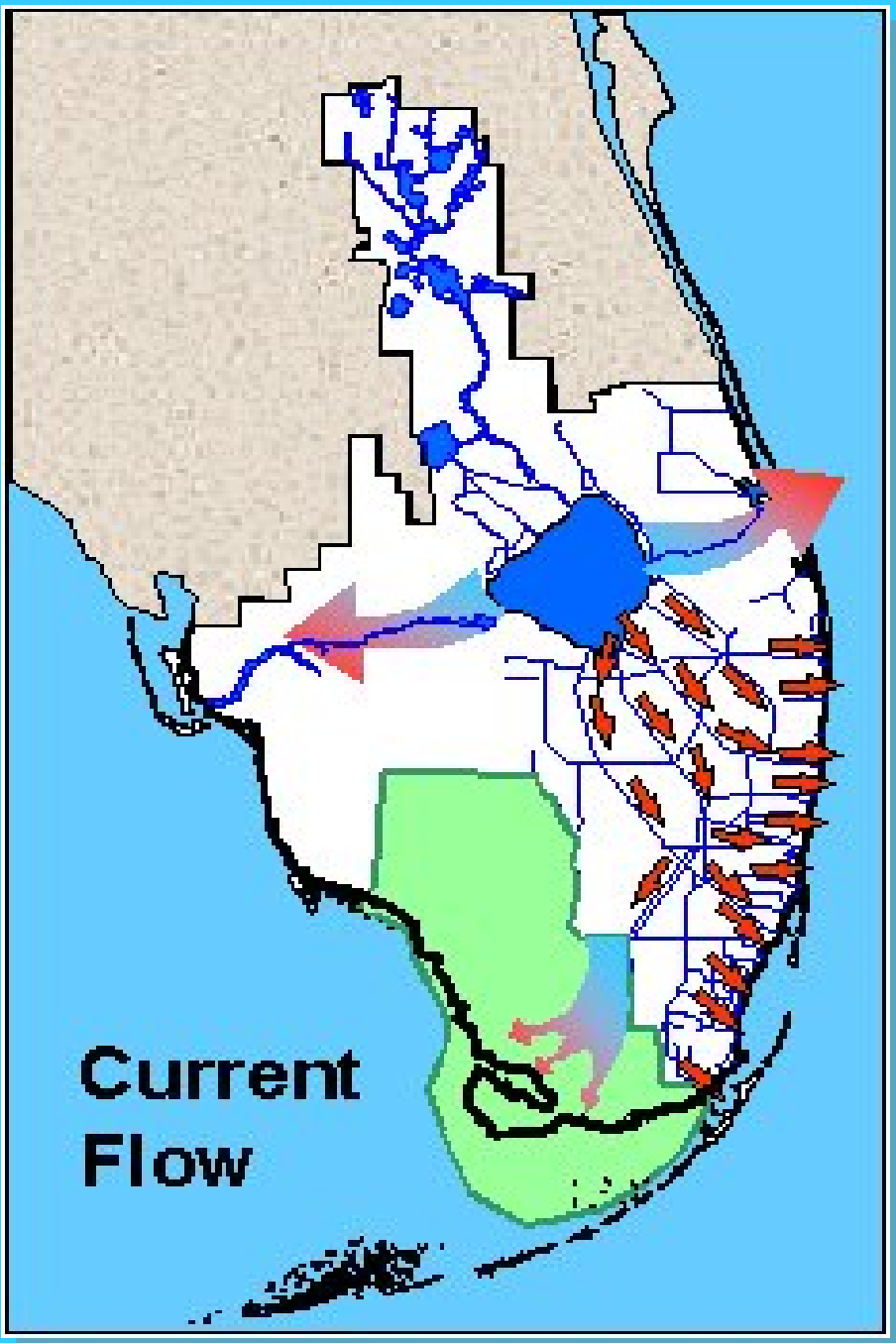
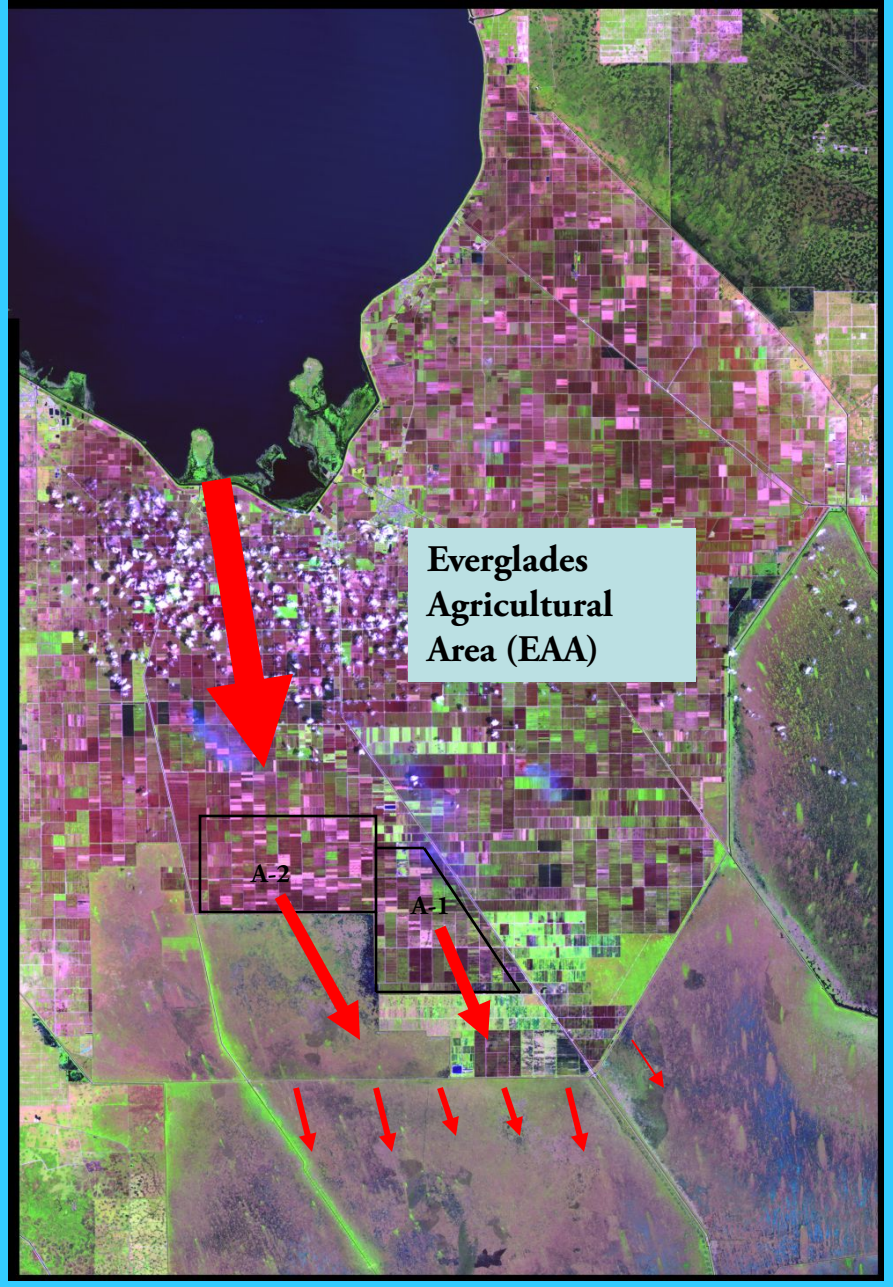
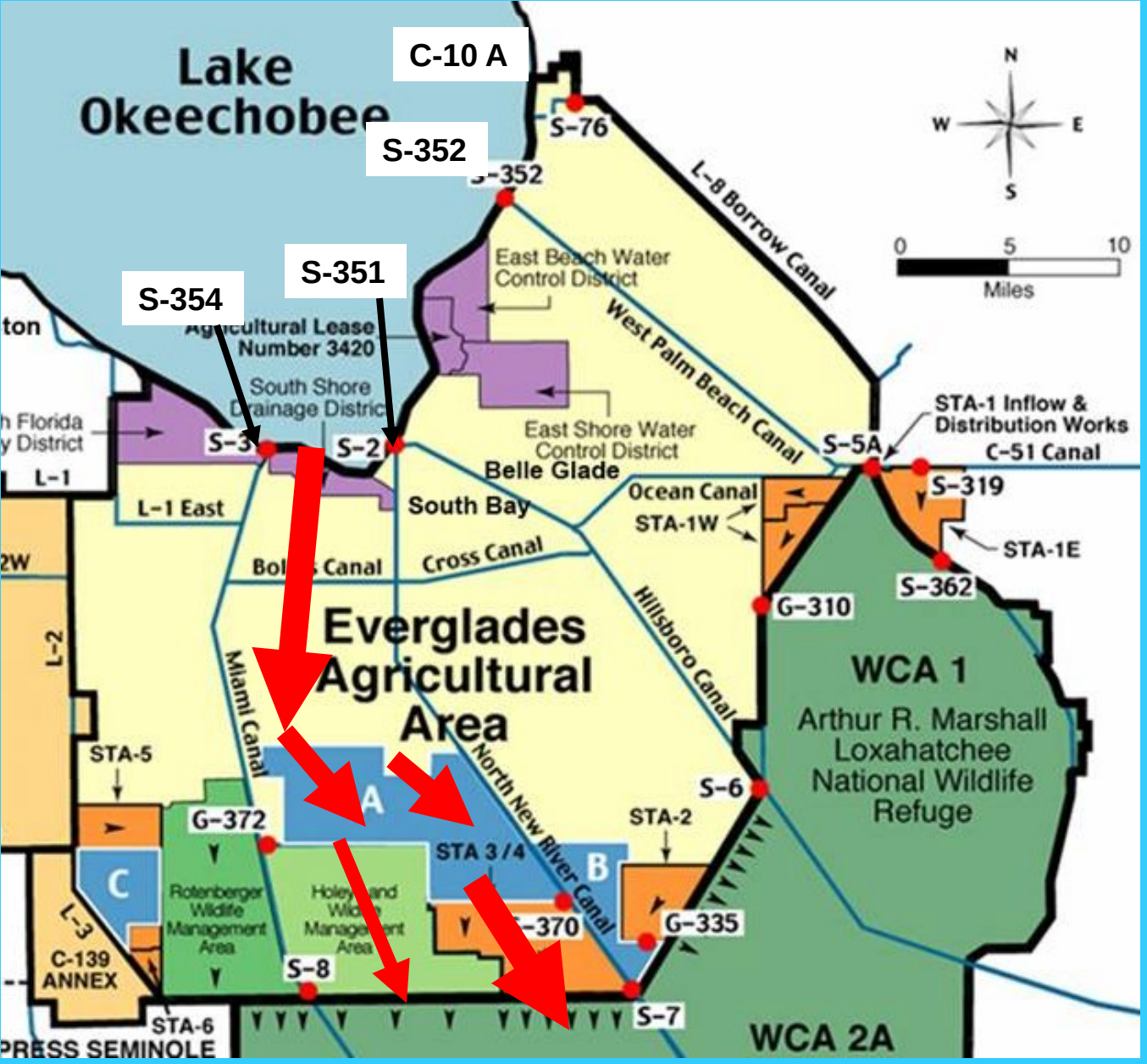

Current
Flow


Plan 6 Project
Flow



Plan 6 Project – Stop destructive discharges to the Northern Estuaries and Restore the River of Grass



1. Becomes THE Primary outflow for Lake Okeechobee, not the Estuaries
2. Stops harmful discharge releases from Lake Okeechobee to the Northern Estuaries
3. Replaces the Lake Okeechobee ASR Project of CERP with a project of greater flow & capacity
4. Restores water flows south to the Everglades
5. Provides for healthy water levels in Lake Okeechobee
6. Maintains Water Quantity, Quality, Timing and Distribution for South Florida and Everglades Restoration

Plan 6 Project – Stop destructive discharges to the Northern Estuaries and Restore the River of Grass

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Greater Everglades Restoration

1 - Reconnect the “River of Grass” between Lake Okeechobee and the Everglades.

2- Restore the Kissimmee River valley and flood plain.

3 - Manage Lake Okeechobee between 12.5 ft and 15.5 ft.

4 - Enforce treating water pollution at the source of the problem, not downstream.

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