

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

Mark Perry  
Executive Director  
October 30, 2013



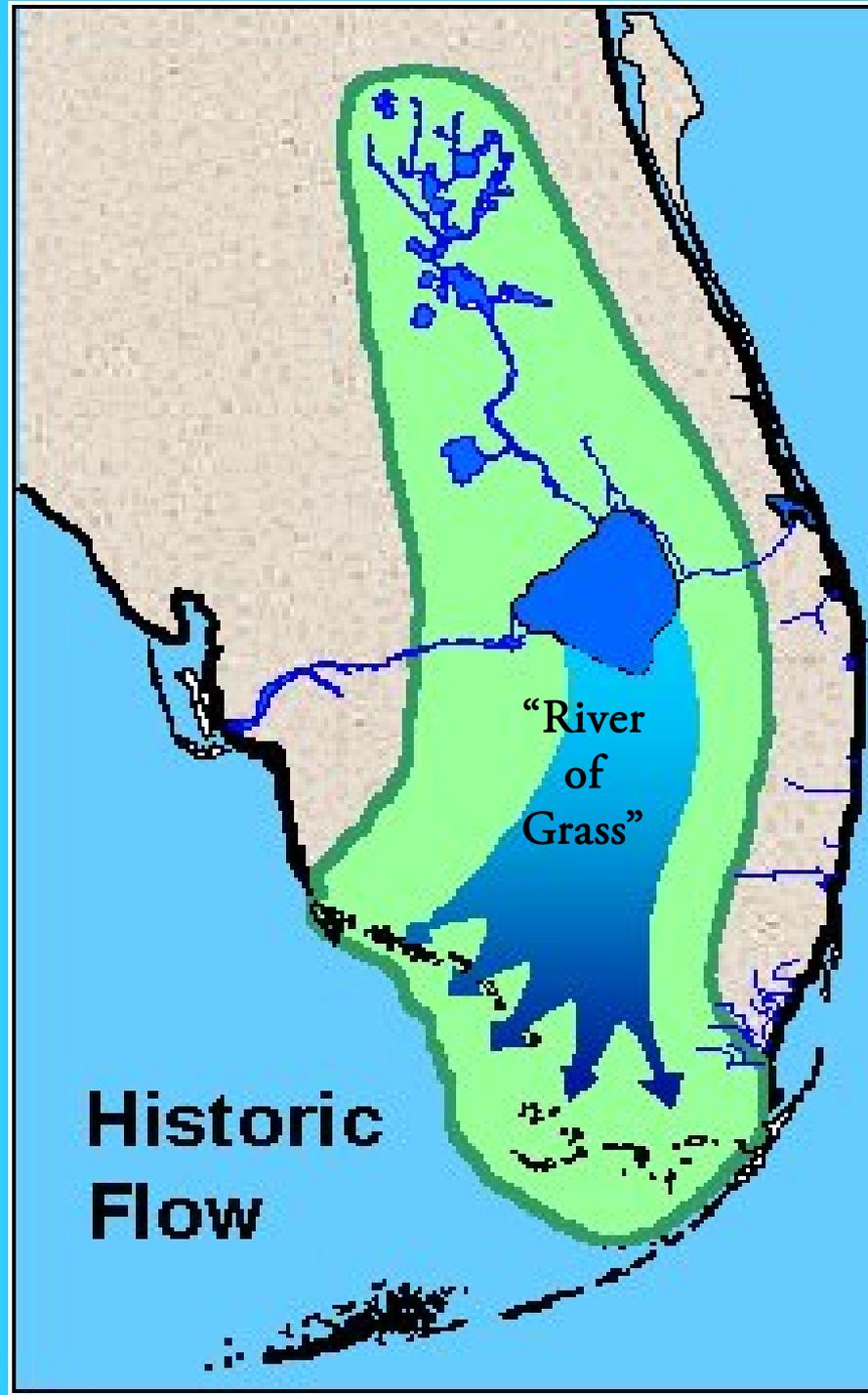
Upper Chain of Lakes (8) flow south  
into Lake Kissimmee

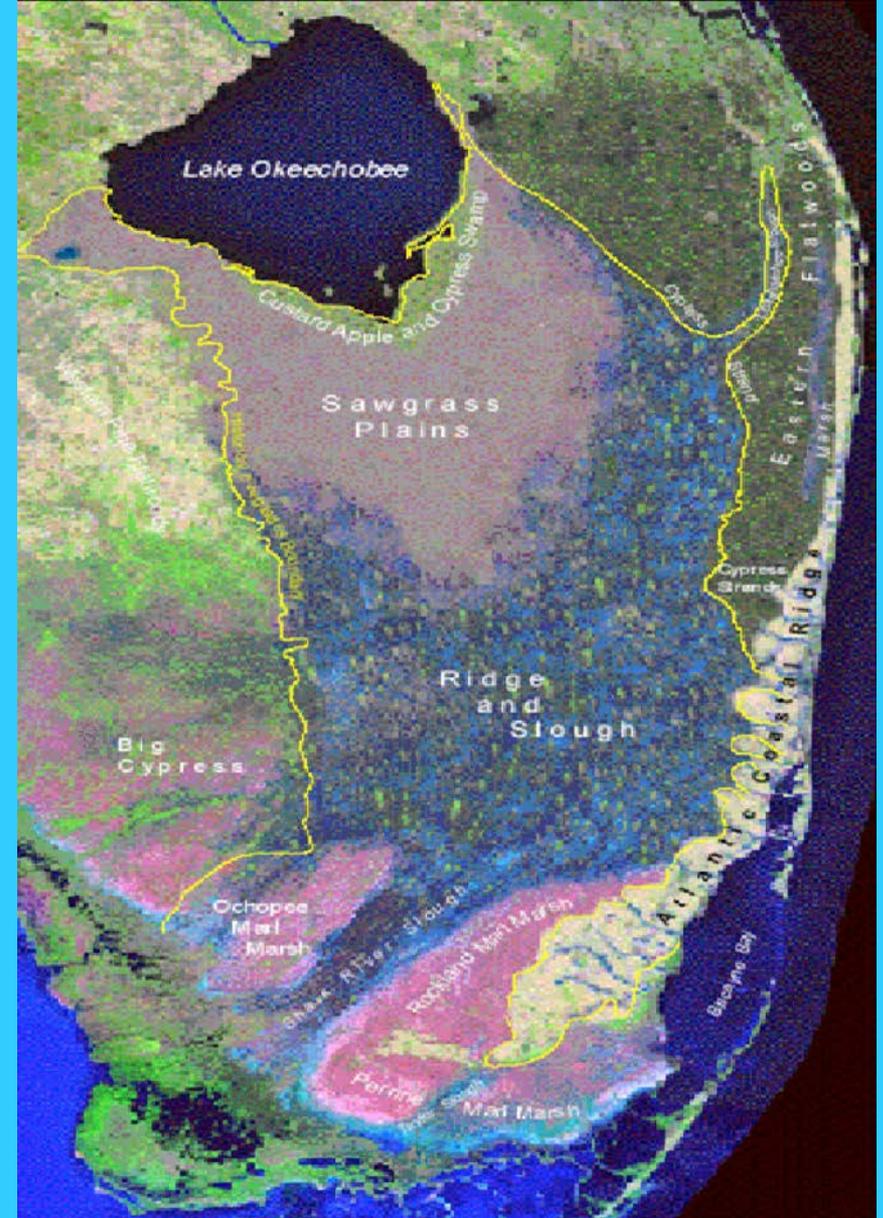
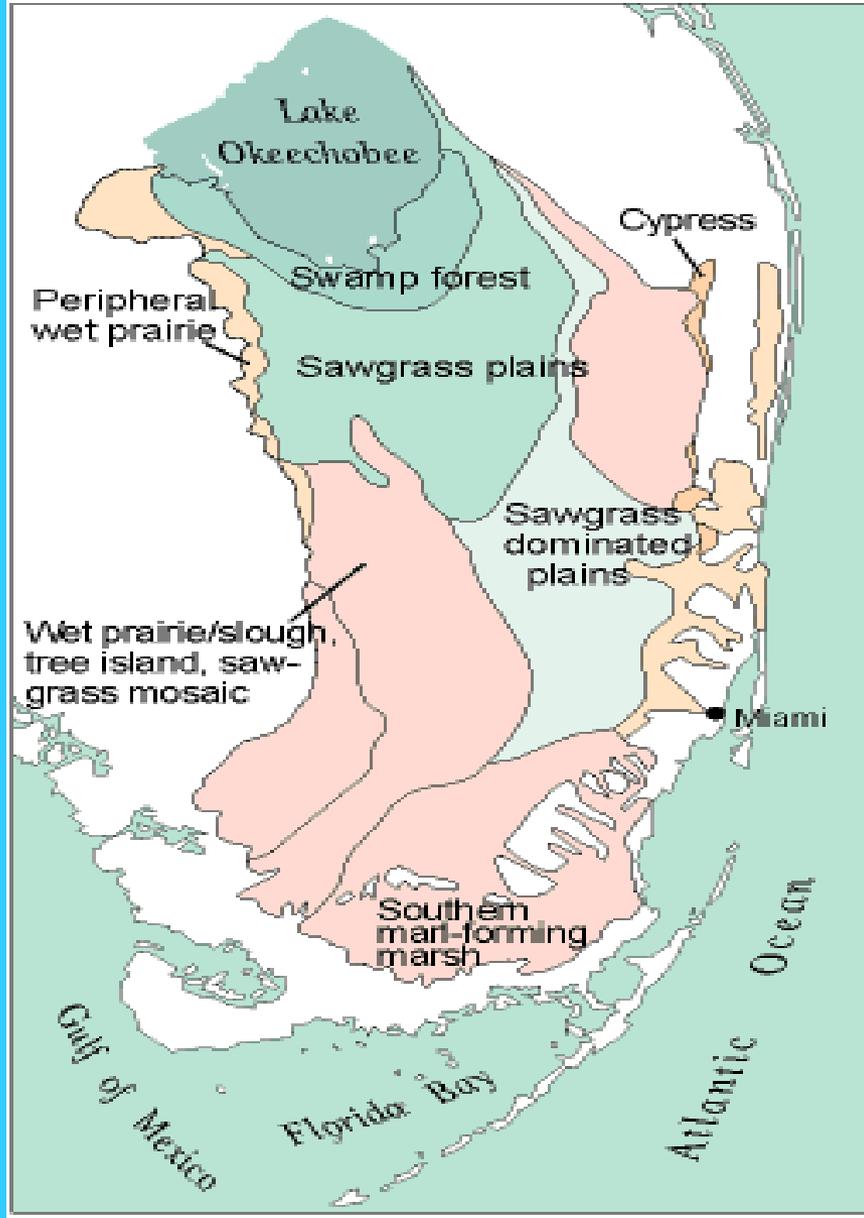
Lake Kissimmee flows south into the  
Kissimmee River – 105-mile Oxbow  
River with 2-mile-wide floodplain

Water takes 6-8 Months to reach Lake  
Okeechobee

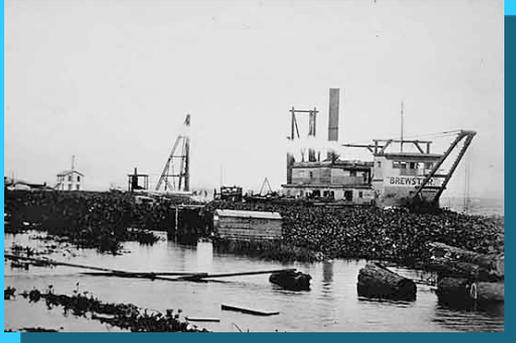
Lake Okeechobee flows south through  
“River of Grass”, 60-mile-wide shallow  
(1 ft deep) river flowing at 1 mile in 4  
days.

Water takes 16 Months to reach  
Florida Bay





# Expansion of the Canal and Levee System



1911



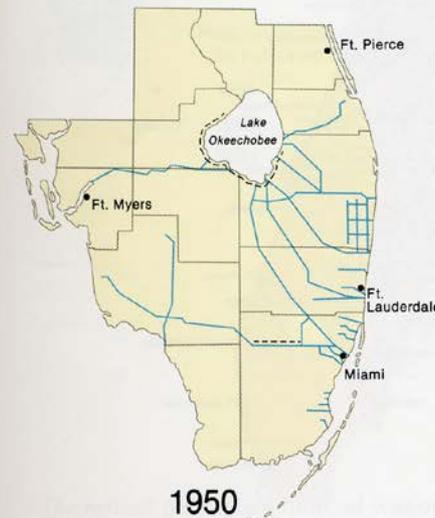
1920



1930

— Major canal

- - - Major levee



1950

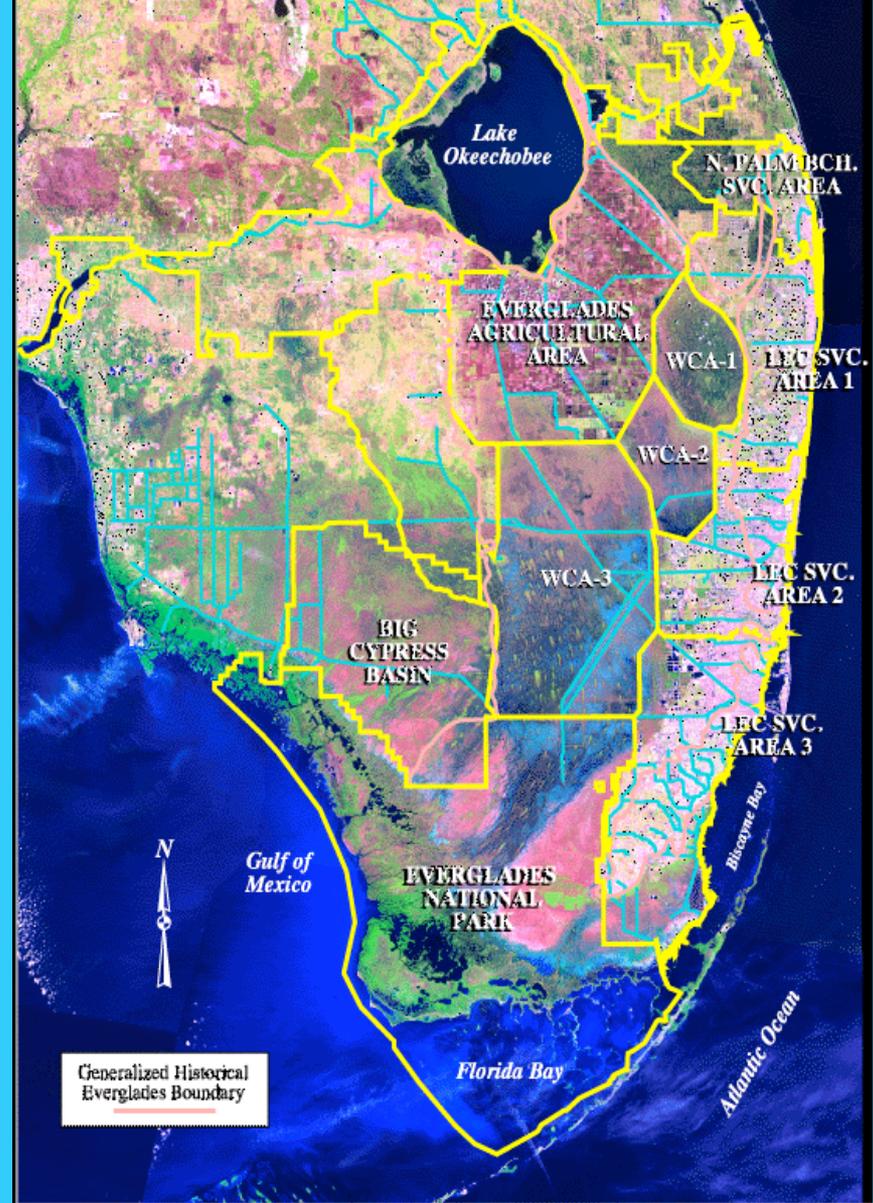
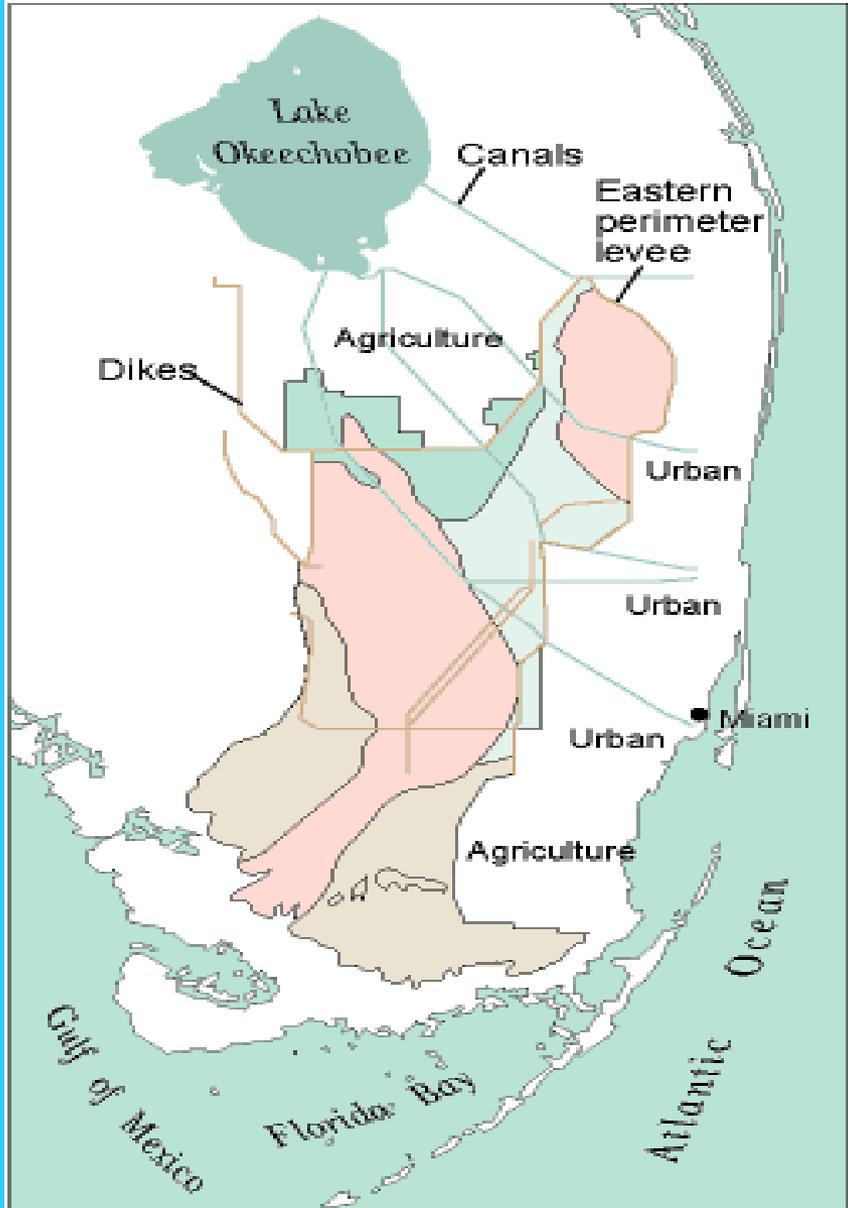


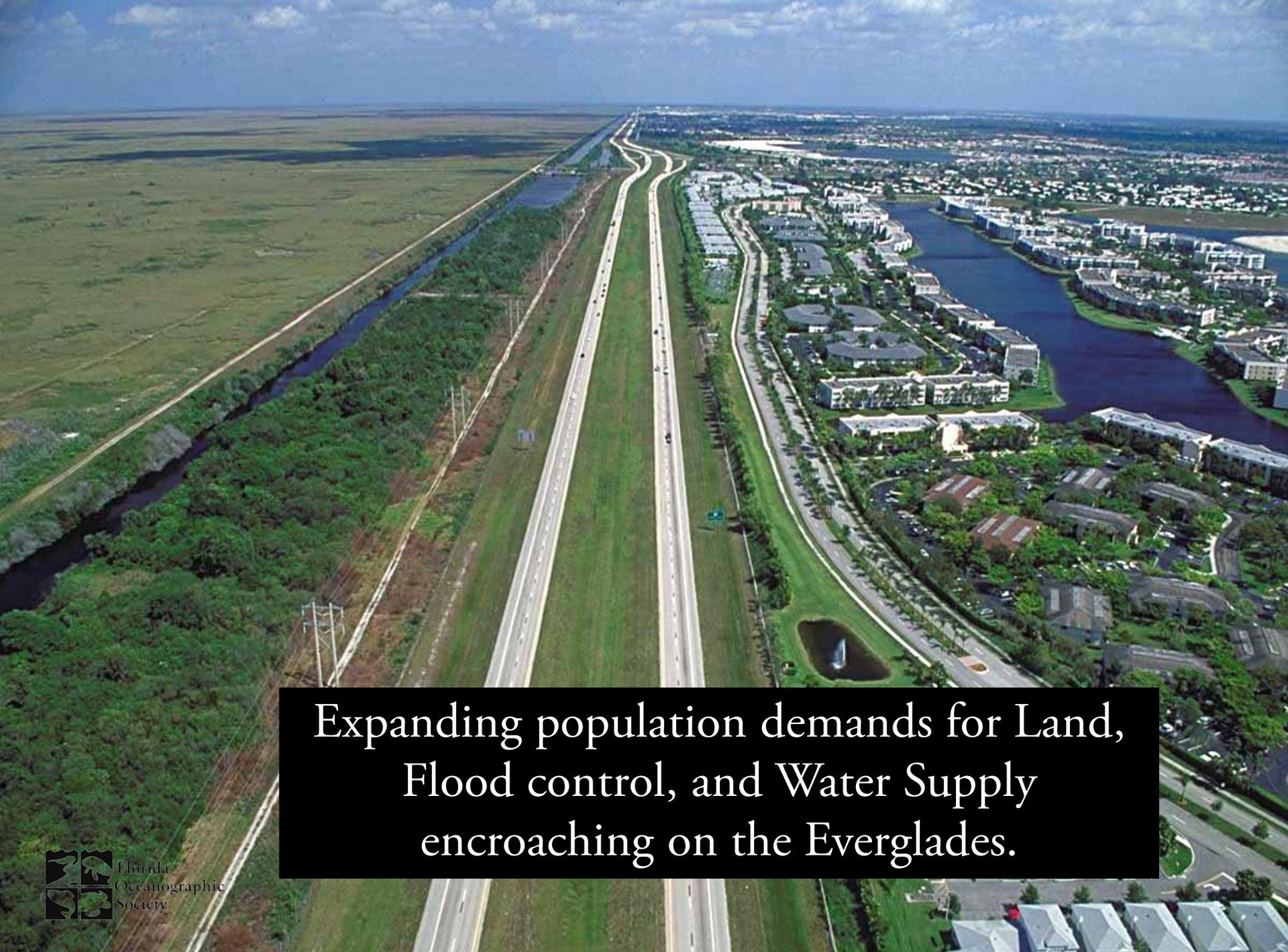
1960



1970

# “Drain The Swamp”





Expanding population demands for Land, Flood control, and Water Supply encroaching on the Everglades.

# Hurricanes in 1926 & 1928

**1926 AND 1928**  
**DEVASTATING HURRICANES**  
... LOSS OF 2,500 LIVES

**HOOVER DIKE AUTHORIZED 1930**

... COMPLETED 1937

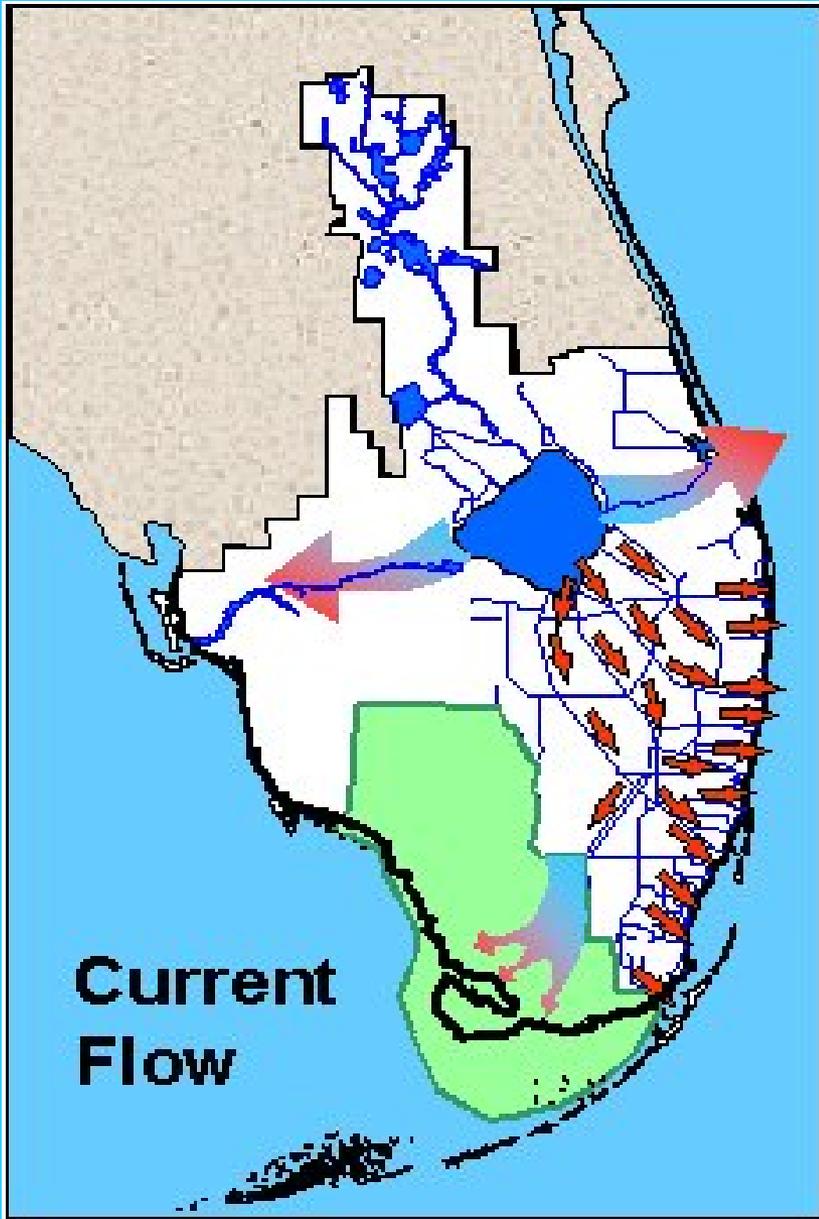
The poster features a central illustration of a long dike extending from a city towards the ocean. The background of the poster is a light blue and white, with a dark blue border at the top. The text is in various colors: white on a dark blue background, red on a white background, and blue on a white background.





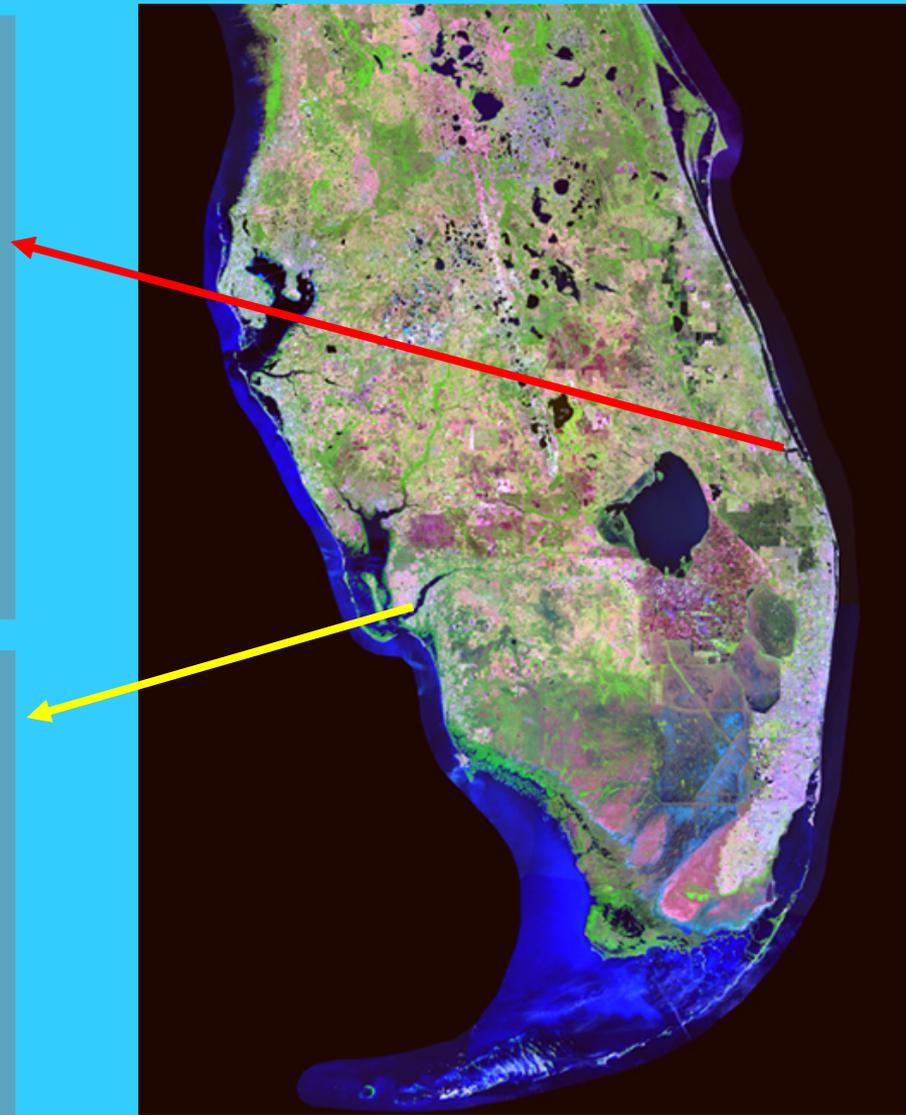
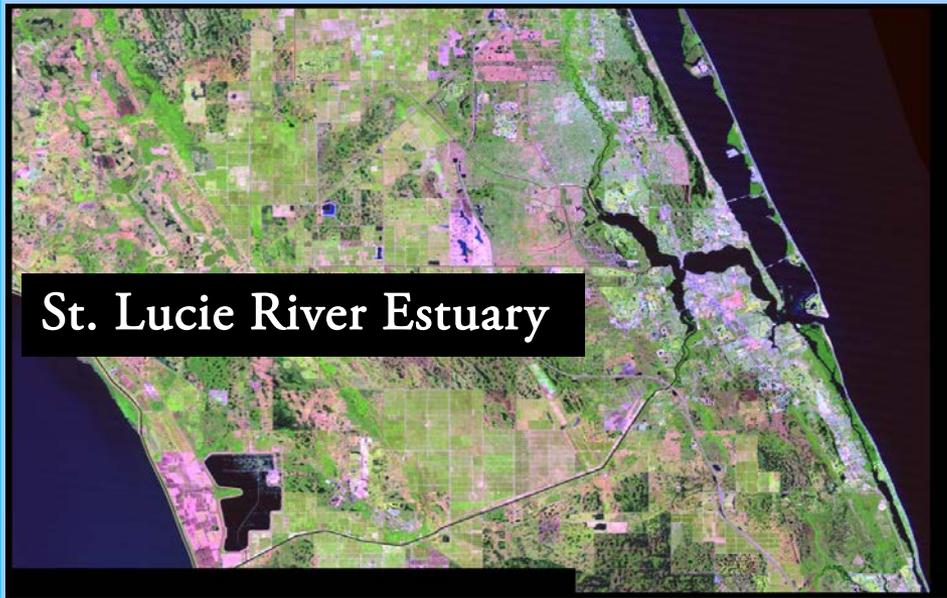
**Dam Lake Okeechobee- Stop the flow to the River of Grass (Killed the River of Grass)**





**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

# Caloosahatchee Estuary

“Dark Water”  
at Point Ybel,  
Sanibel

Photo by: Greg Rawl  
Illustrative of past  
high discharge events  
Mid-2000

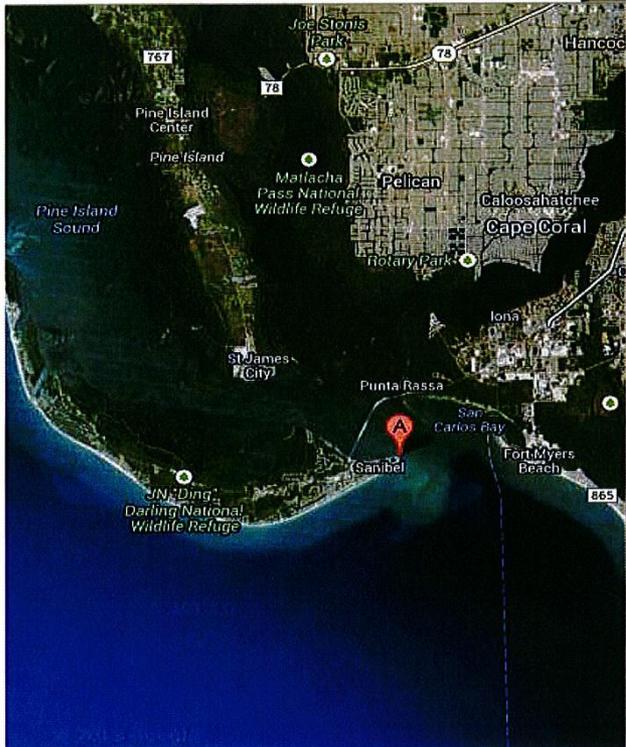




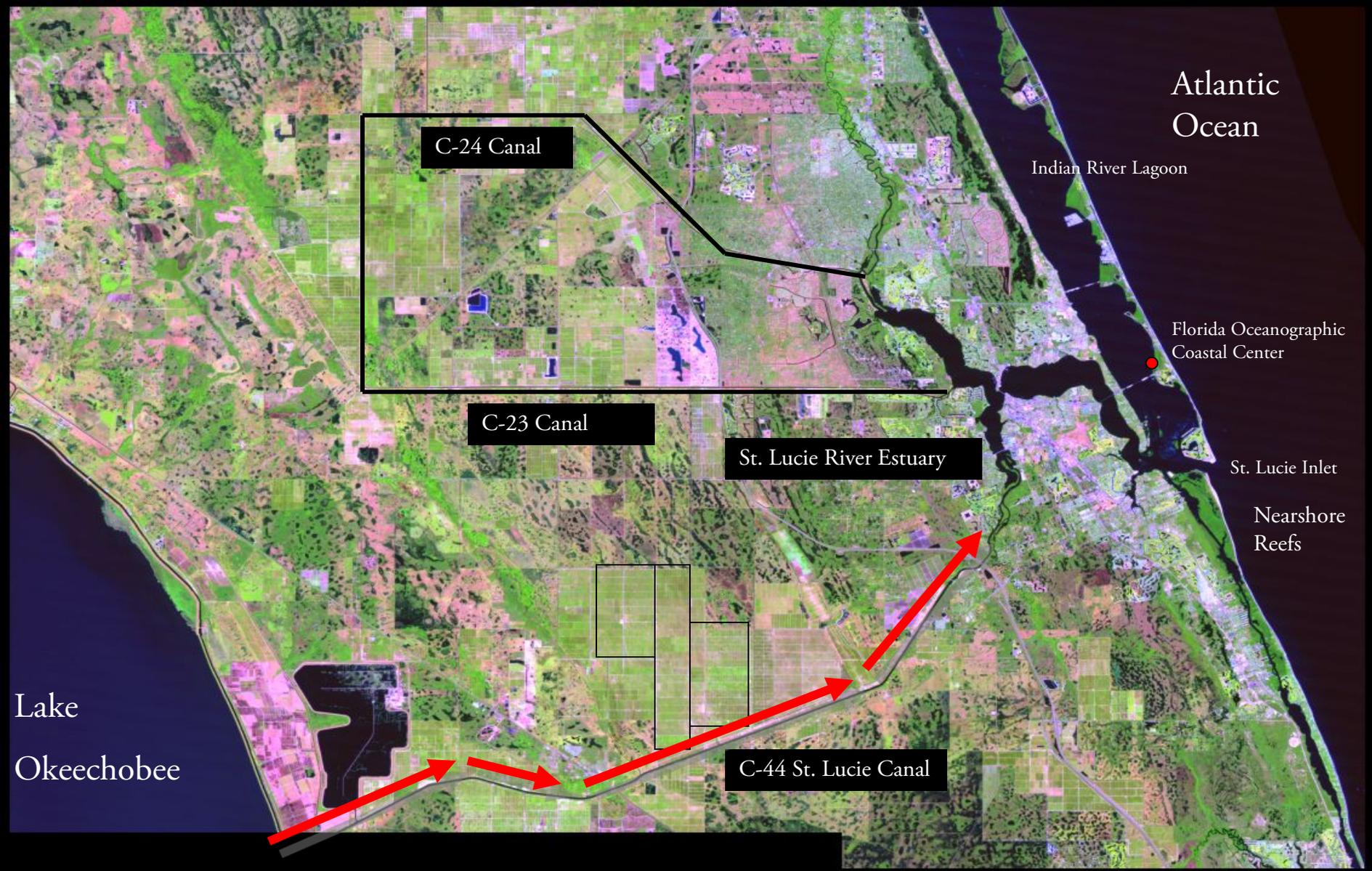
Photo by: John Cassani

## **Toxic Algae in the Caloosahatchee River From Lake Okeechobee (2005)**



Photo by: John Cassani

## **Caloosahatchee River Water Treatment Plant Closed Due To Toxic Algae (2005)**

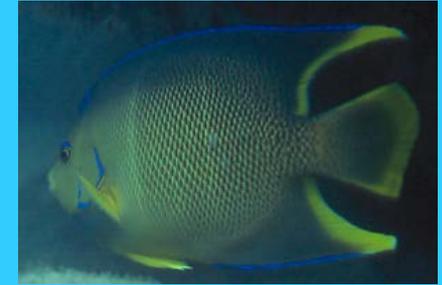


## Discharges from Lake Okeechobee to the St. Lucie River Estuary and Indian River Lagoon



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**



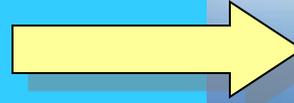
**Mangroves**

**Coral Reefs**



# Indian River Lagoon Seagrass Beds

Before Discharges

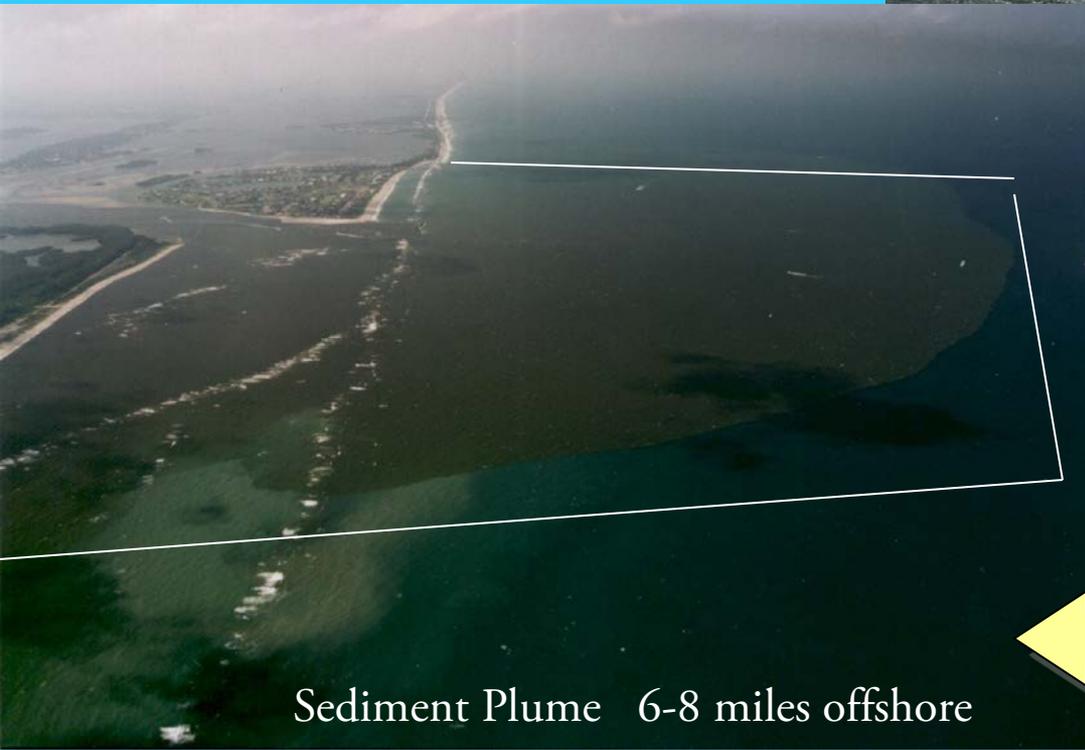


During Discharges



# St. Lucie Inlet Nearshore Reefs

Before Discharges 



 During Discharges

# St. Lucie River Estuary Muck Bottom



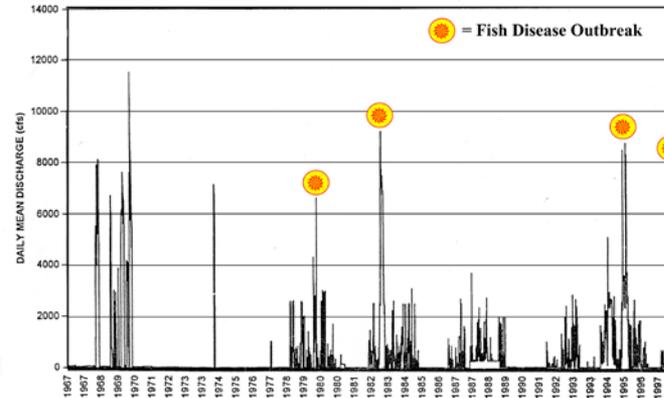
4-8 ft. thick on bottom

7.9 million cubic yards ++

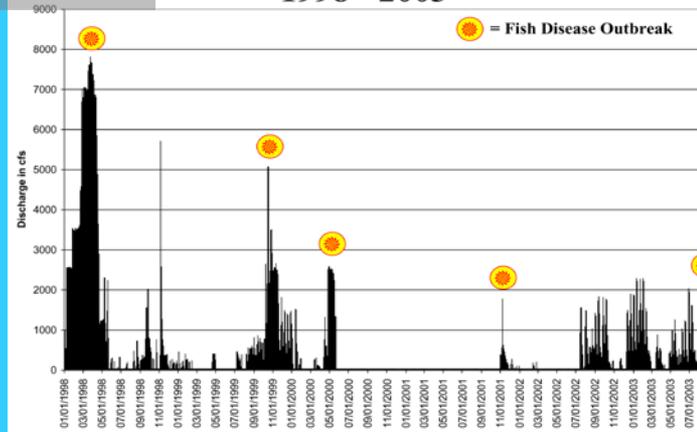
# Fish Lesions and Abnormalities



St. Lucie Canal Discharge  
1967 - 1998



St. Lucie Canal Discharge  
1998 - 2003

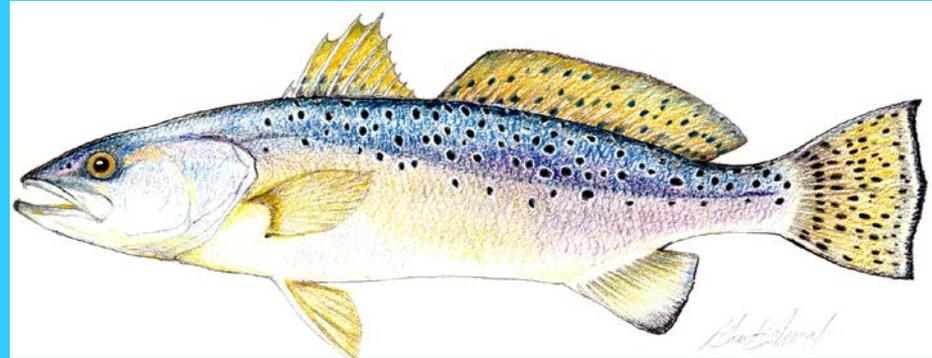


33 Species of Fish  
6% of the population

# Direct Effects on Fisheries

Economically important Spotted Seatrout

Reproduction is inhibited by low salinity levels in the estuary.



N

0 0.5 1 2 Miles

FOS 

North Fork

Middle Estuary

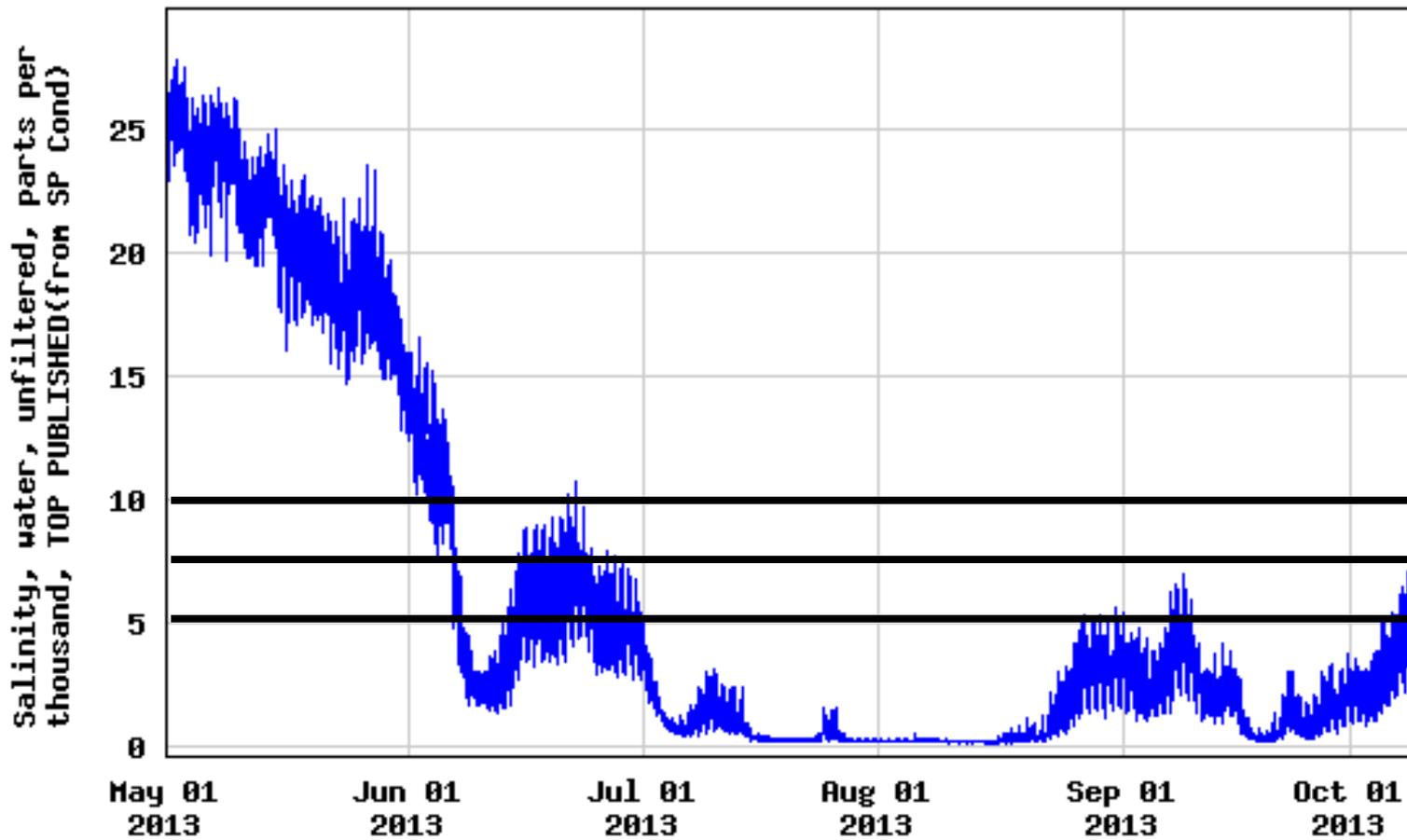
MS Oyster Reef

Lower Estuary

South Fork

-  Florida Oceanographic Coastal Center
-  Martin Co./NOAA Reefs
-  Historic Oyster Reefs





----- Provisional Data Subject to Revision -----

Stress

Harm

Death

130 Days

# Salinity Tolerance for Oysters



Death

7 Days For Spat & Juveniles

14 – 28 Days For Adults

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



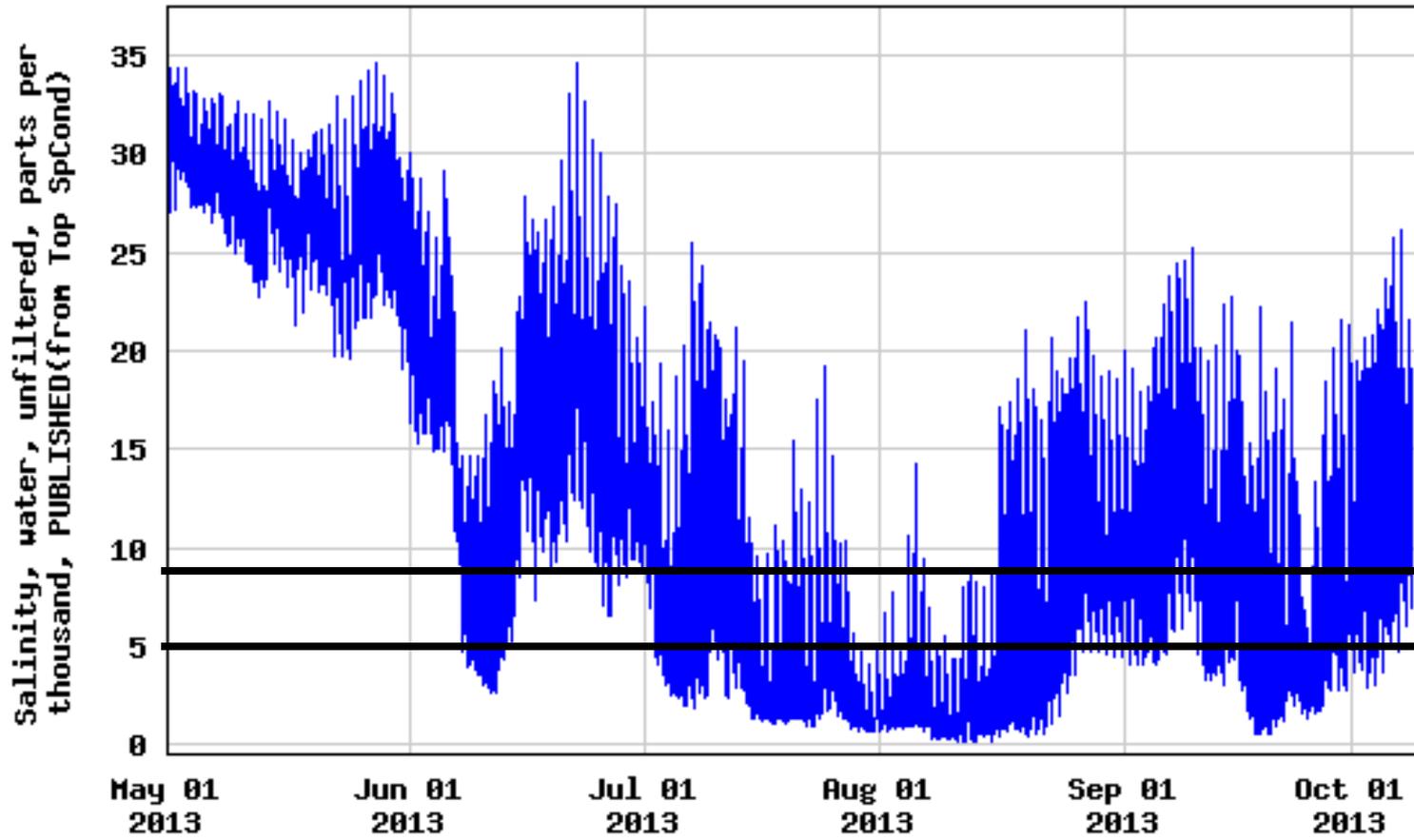
Pollution over the St. Lucie  
Inlet State Preserve Reef  
and Hobe Sound National  
Wildlife Refuge

St. Lucie Inlet 7-6-13

(photos by J. Thurlow-Lippisch)



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



----- Provisional Data Subject to Revision -----

Death

Death

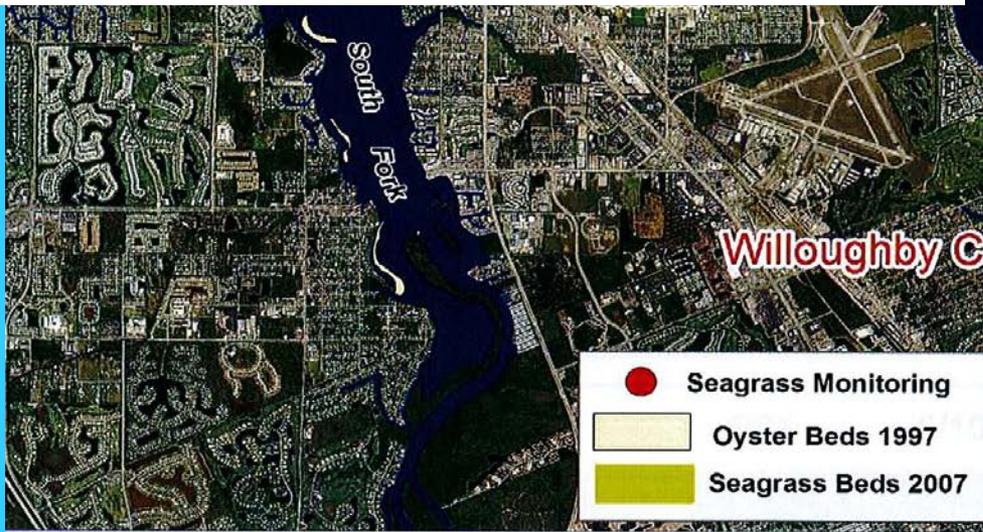
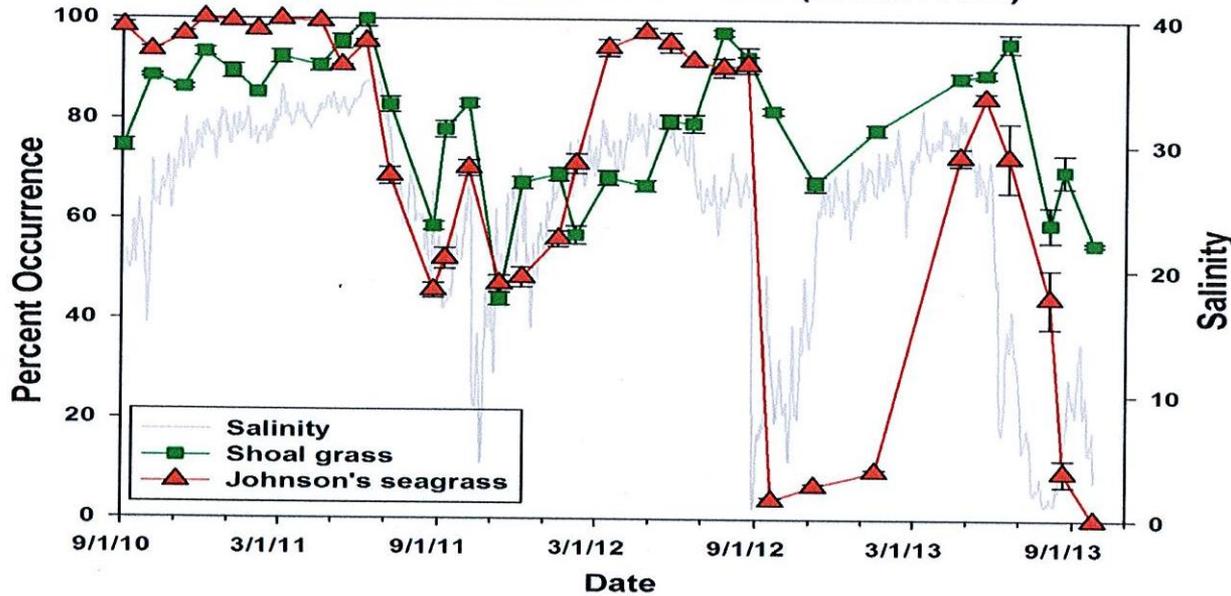
95 Days

# Salinity Tolerance for Seagrass

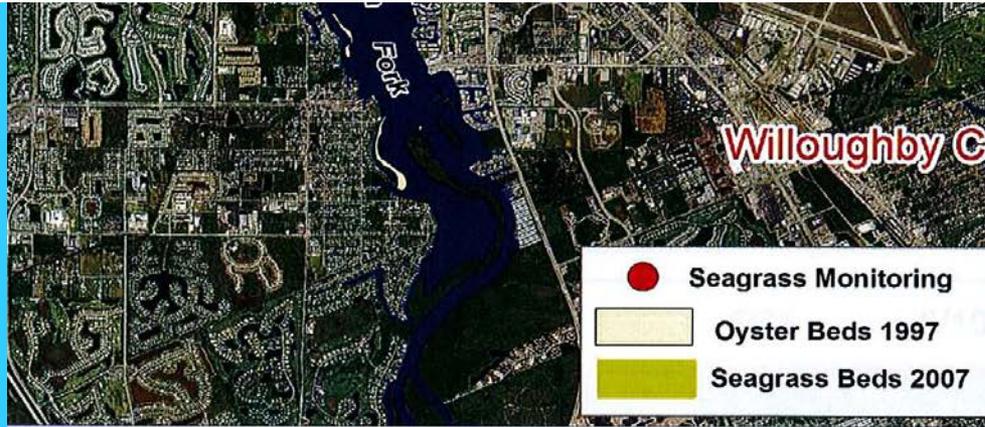
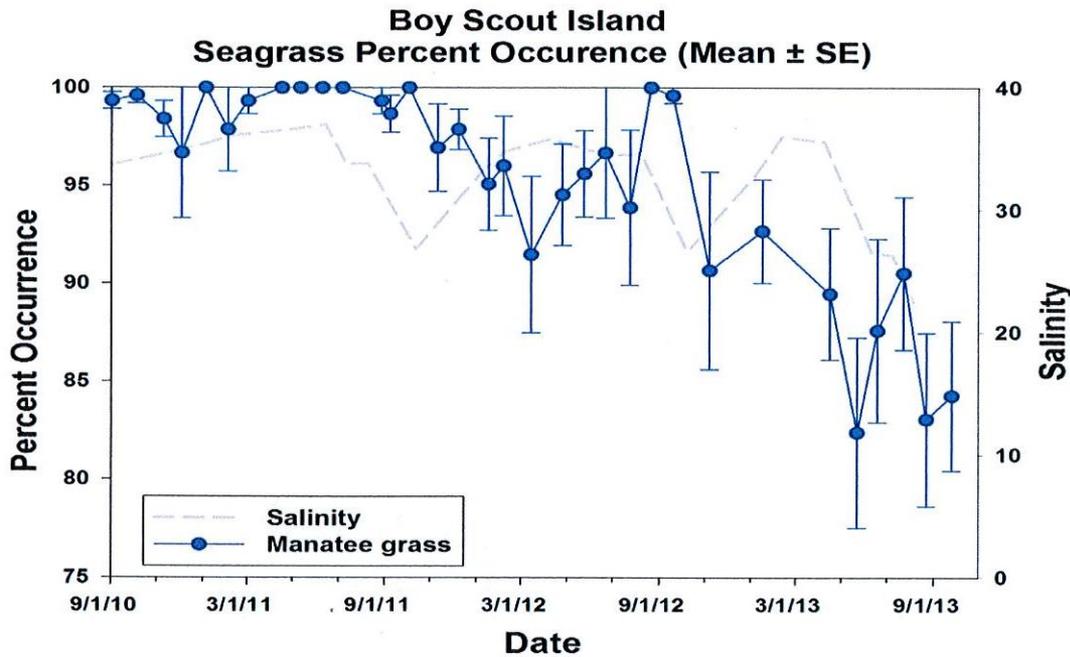


Death  
14 days < 9 ppt  
3 days < 5ppt

## Willoughby Creek Seagrass Percent Occurrence (Mean $\pm$ SE)



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



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

# St. Lucie River Estuary Water Quality Outlook

This information is provided by the Florida Oceanographic Society with support of the Marine Resources Council. It is collected by the Citizen Volunteer Water Quality Monitoring Network. For complete data go to our website at: <http://www.floridaoceanographic.org/water.htm>

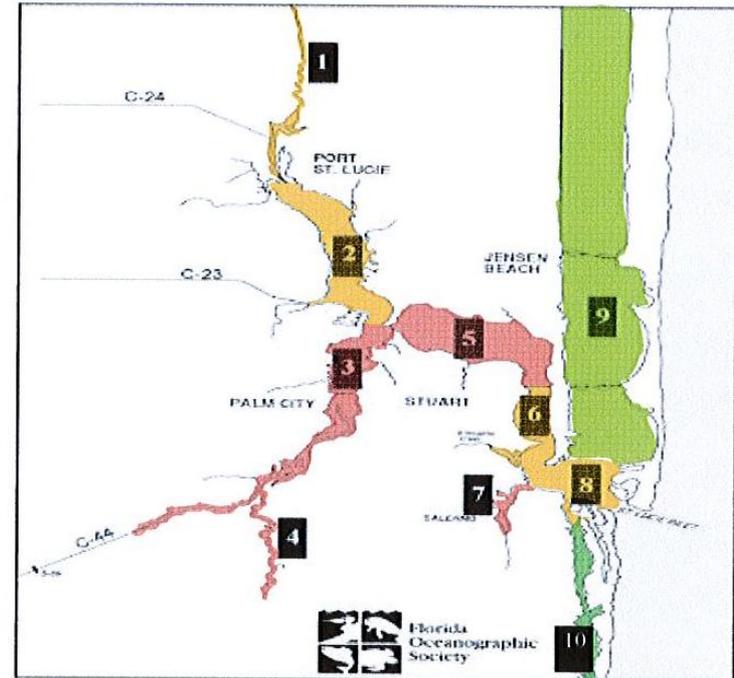
For sample results related to bacteria levels go to:  
[www.martincountyhealth.com](http://www.martincountyhealth.com) and click on the Environmental Health link.

Posted:

**07/18/13**

Overall Grade:	<b>65.2%</b>	<b>D</b>	<b>POOR</b>
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Zone/ Location	Water Temp. Deg. F	pH	Visibility (Secchi) Meters	Salinity ppt	Dissolved Oxygen mg/L	Location Score	Grade
1. Winding North Fork	82	7.7	0.60 Fair	0.0 Poor	6.5 Good	66% Poor	D
2. North Fork	82	7.5	0.64 Fair	0.5 Poor	3.8 Fair	61% Poor	D
3. South Fork	78	7.6	0.45 Poor	0.0 Poor	6.2 Good	56% Destructive	F
4. Winding South Fork	79	7.2	0.50 Fair	0.0 Poor	2.8 Poor	56% Destructive	F
5. Wide Middle River	80	7.6	0.42 Poor	1.7 Poor	5.3 Good	56% Destructive	F
6. Narrow Middle River	83	7.7	0.83 Fair	2.0 Poor	3.3 Fair	61% Poor	D
7. Manatee Pocket	81	7.6	0.08 Poor	0.0 Poor	8.1 Good	56% Destructive	F
8. Inlet Area	83	8.2	0.98 Fair	24.5 Poor	4.6 Fair	61% Poor	D
9. Indian River Lagoon	79	8.2	1.37 Good	26.0 Fair	5.0 Fair	81% Good	B
10. Intracoastal Waterway South	80	8.0	1.50 Good	32.0 Good	5.6 Good	97% Ideal	A



Grading				
A	B	C	D	F
90-100	80-89	70-79	60-69	0-59
IDEAL	GOOD	SATISFACTORY	POOR	DESTRUCTIVE

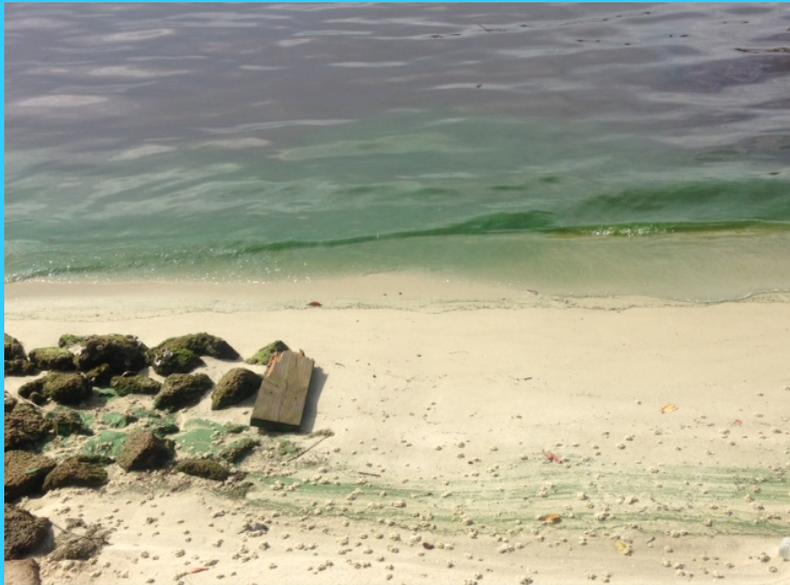
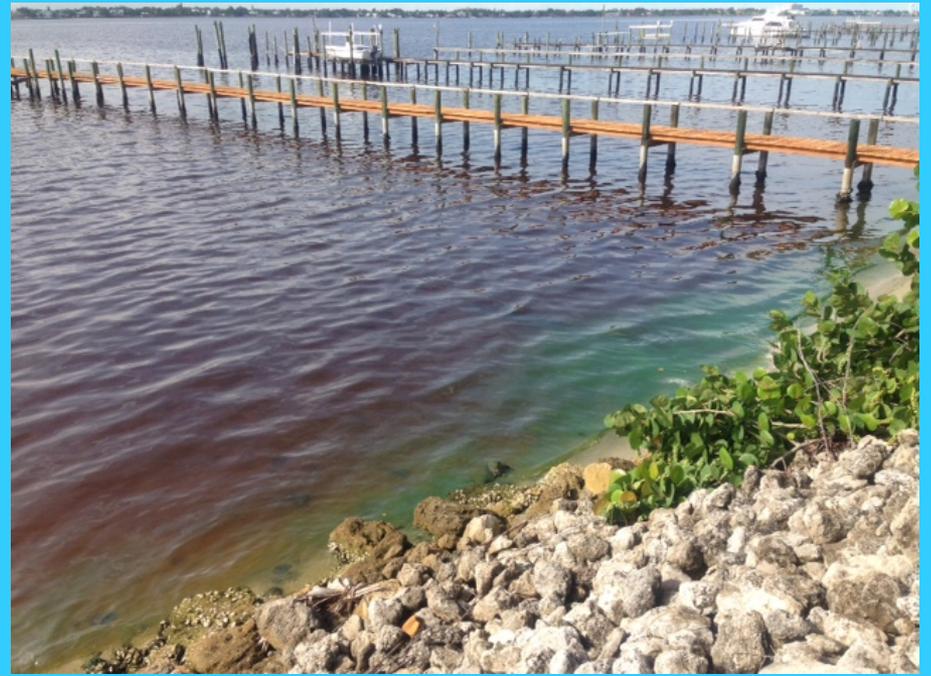
Salinity (Parts per Thousand)				
Zones	Description	Good	Fair	Poor
1 & 4	Winding North & South Forks	2 to 8	1 to 2 or 8 to 15	< 1 or > 15
2 & 3	Inner St. Lucie Estuary (North & South Fork)	15 to 25	10 to 15 or > 25	< 10
5	Wide Middle St. Lucie River	> 20	15 to 20	< 15
6	Narrow Middle St. Lucie River	> 25	20 to 25	< 20
7	Manatee Pocket	> 27.5	20 to 27.5	< 20
8, 9 & 10	Inlet, Indian River Lagoon, & Intracoastal Waterway South	>30	25 to 30	< 25



Comment: The data above may indicate areas of concern in the St. Lucie Estuary. Citizens should call the Florida Department of Environmental Protection (DEP) at 871-7662 or the South Florida Water Management District (SFWMD) 223-2600 to ask about the quality of a specific area and report observations of pollution.



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



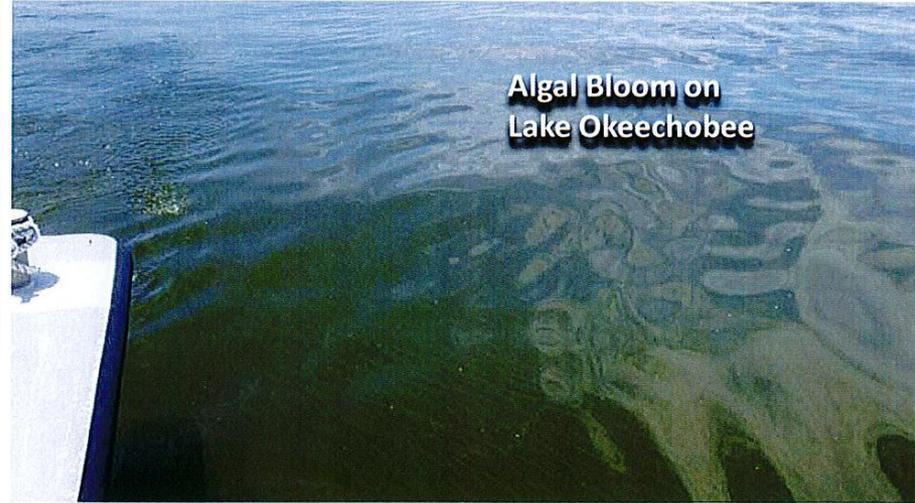
**Green Algae Bloom Observed in St. Lucie River along shoreline in Rio –  
Microcystis - Douglas Ashley – 7-13-13**

# Lake Okeechobee

## Current Conditions



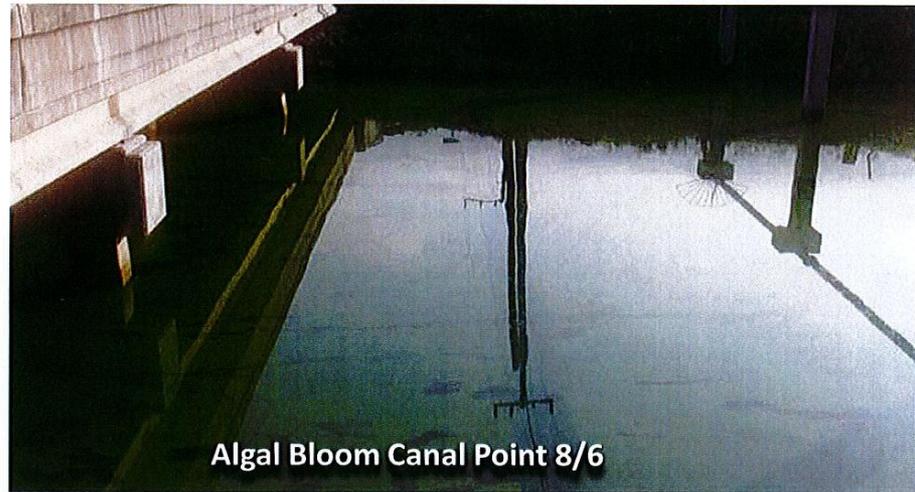
Algal Bloom NE by S-135 8/6



Algal Bloom on  
Lake Okeechobee

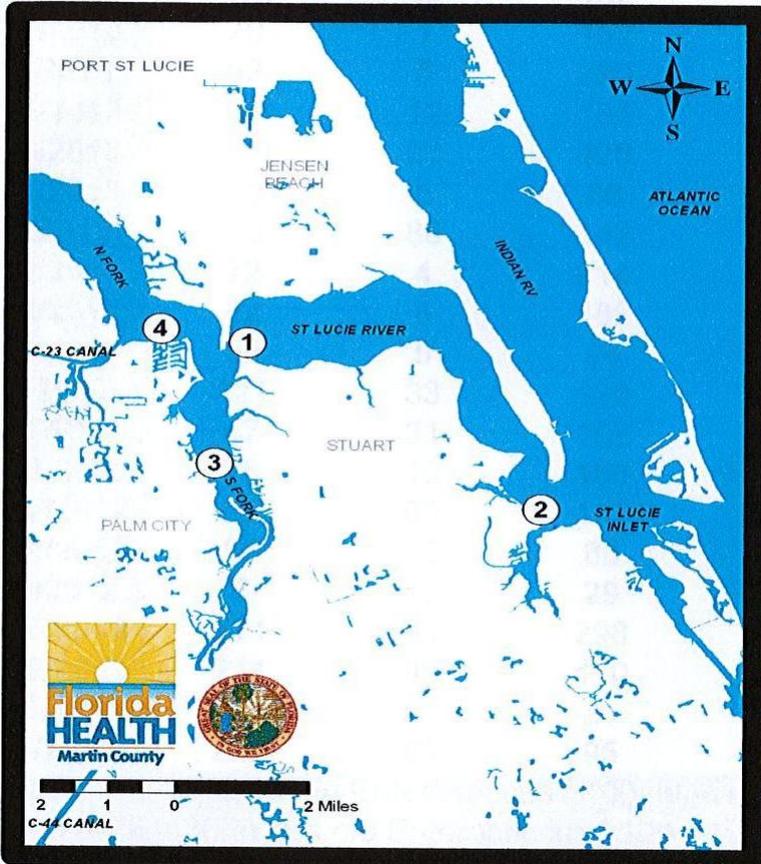


Algal Bloom NE 8/6

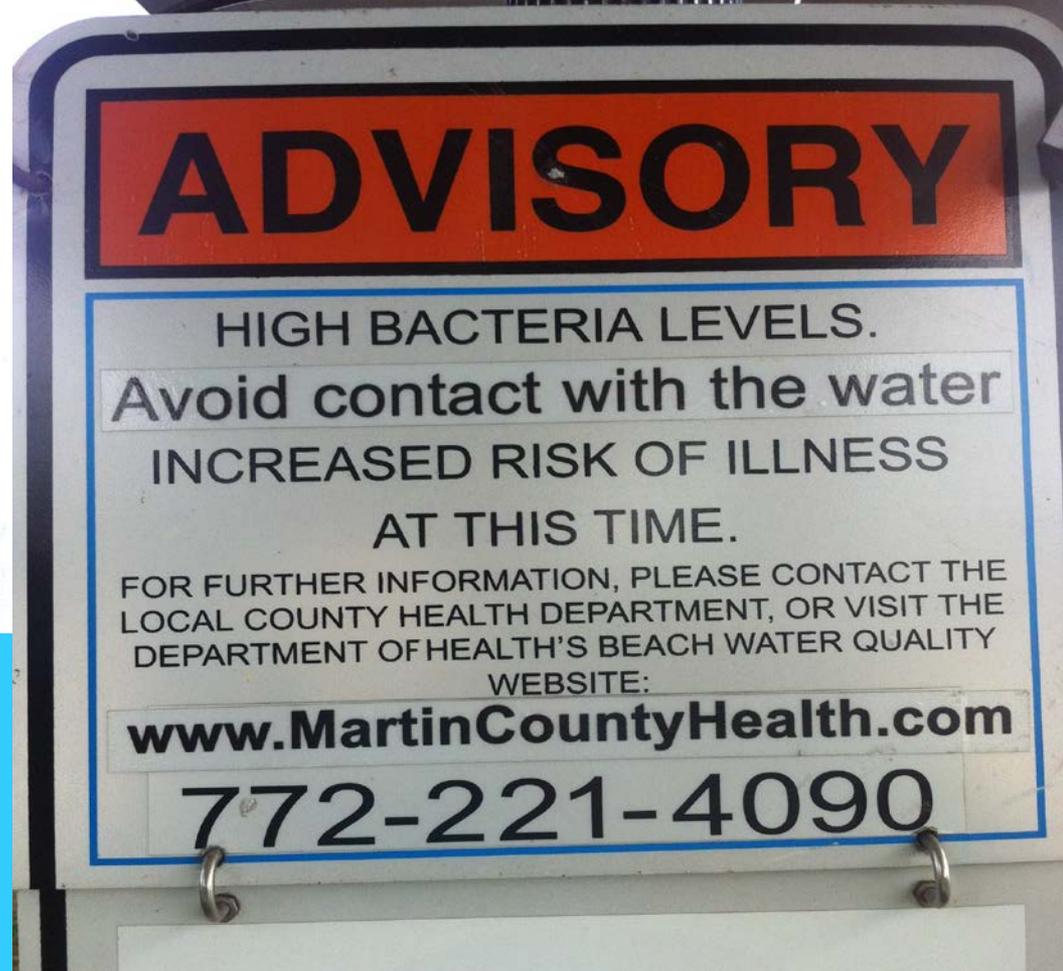


Algal Bloom Canal Point 8/6

FLORIDA DEPARTMENT OF HEALTH - MARTIN COUNTY  
ST LUCIE ESTUARY BACTERIA MONITORING



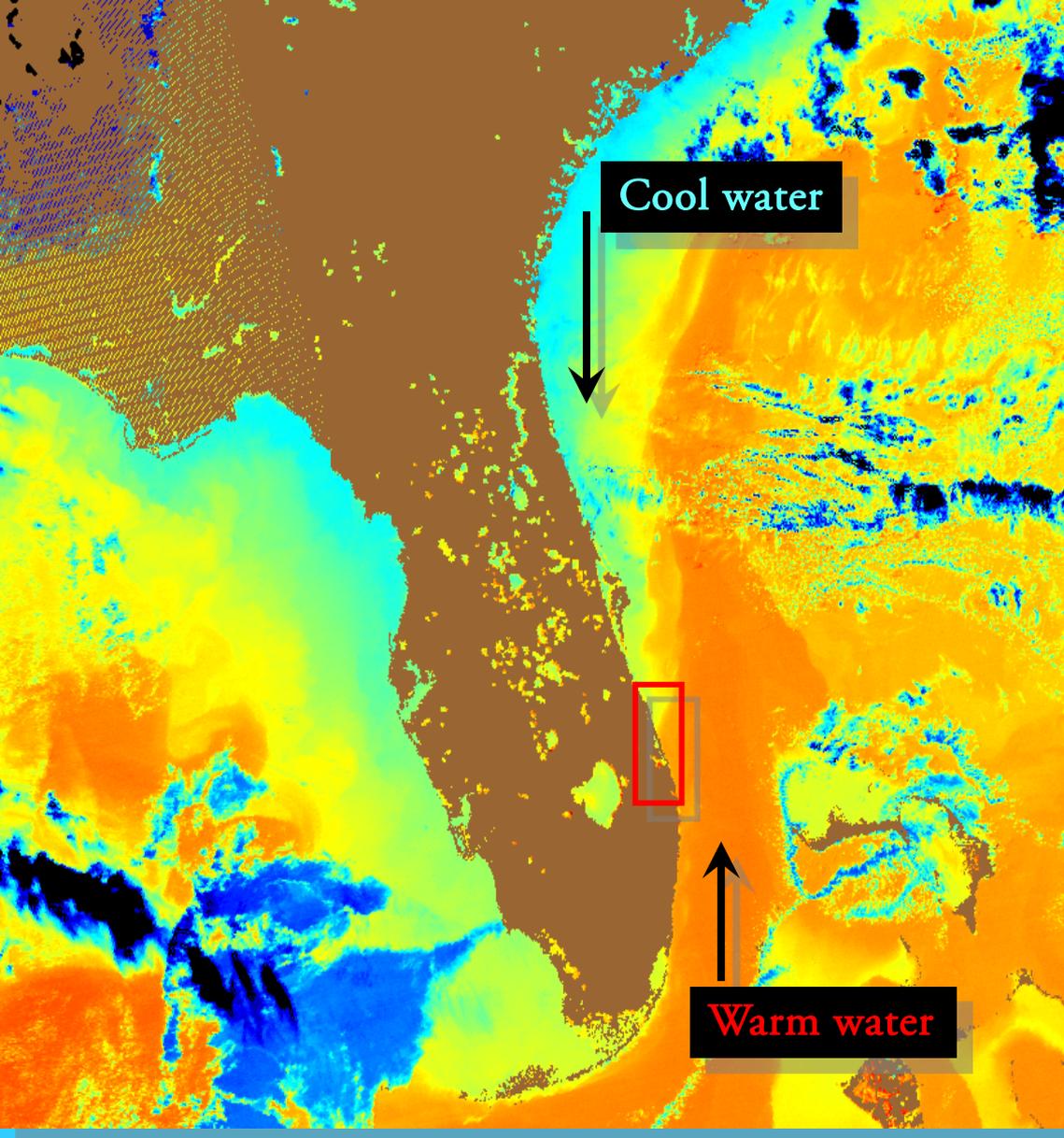
Date	Roosevelt Bridge (1)	Sandsprit Park (2)	Leighton Park (3)	E of Bessey Creek (4)
7/15/2013	1140	354	1440	1480
7/8/2013	910	156	1020	1560
7/2/2013	790	216	2020	1080
6/24/2013	560	102	1640	1400
6/17/2013	302	86	700	590
6/12/2013	Not sampled	134	Not sampled	Not sampled
6/10/2013	600	122	1620	1500



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



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



**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
<b>Total Annual Value</b>	<b>\$3,725,900,000</b>

40548-001\Wpdocs\Report\ERZ\_Final



# 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)***



# Now What?

## Restoration Plans & Efforts for the Greater Everglades Ecosystem



# Kissimmee River

**Channalized 1962-1971**

**C-38 Canal**



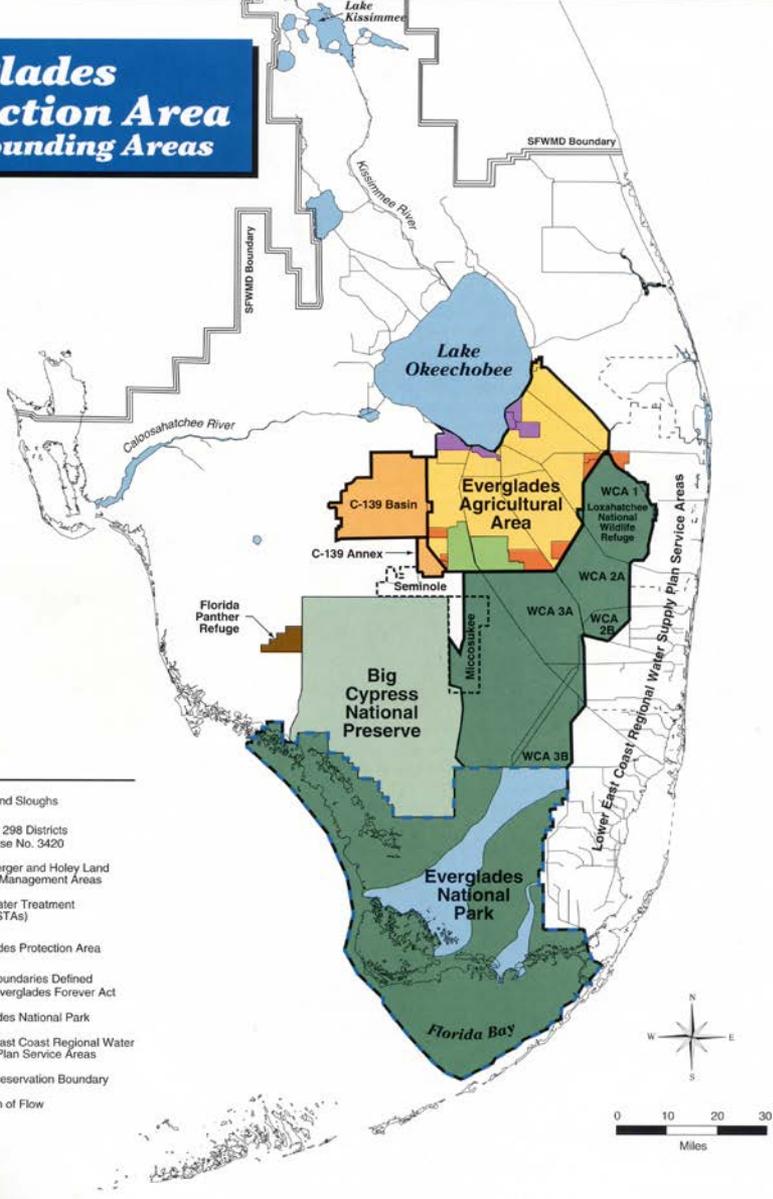
# Kissimmee River

**Restoration- July 11, 2001**

**C-38 Canal  
(filled in)**

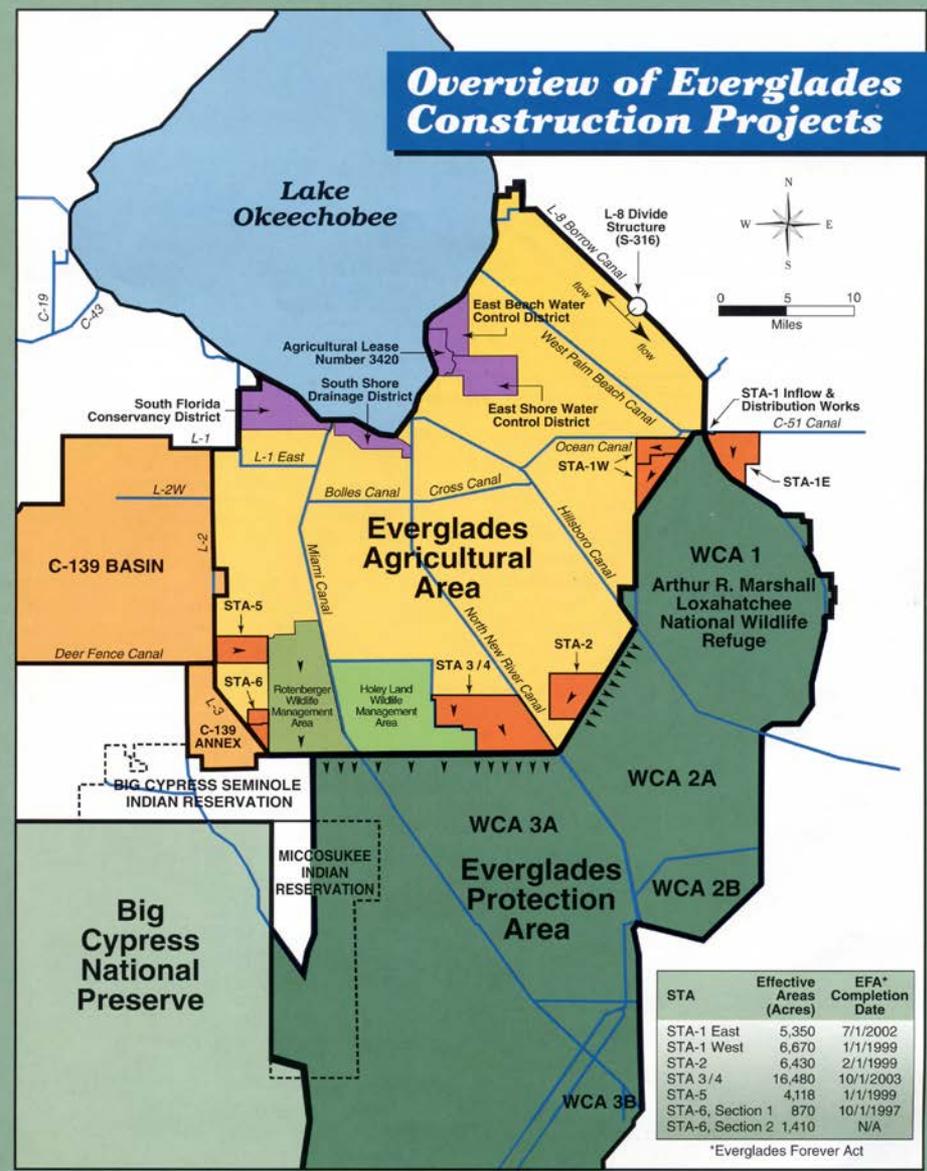


# Everglades Protection Area & Surrounding Areas



- LEGEND**
- Lakes and Sloughs
  - Chapter 298 Districts and Lease No. 3420
  - Rotenberger and Holey Land Wildlife Management Areas
  - Stormwater Treatment Areas (STAs)
  - Everglades Protection Area
  - Legal Boundaries Defined by the Everglades Forever Act
  - Everglades National Park
  - Lower East Coast Regional Water Supply Plan Service Areas
  - Indian Reservation Boundary
  - Direction of Flow

# Overview of Everglades Construction Projects



STA	Effective Areas (Acres)	EFA* Completion Date
STA-1 East	5,350	7/1/2002
STA-1 West	6,670	1/1/1999
STA-2	6,430	2/1/1999
STA 3/4	16,480	10/1/2003
STA-5	4,118	1/1/1999
STA-6, Section 1	870	10/1/1997
STA-6, Section 2	1,410	N/A

\*Everglades Forever Act



**1994 Everglades Forever Act – Projects \$ 1.8 Billion**

*Rescuing an Endangered Ecosystem:  
The Plan to Restore America's  
Everglades*



*The Central and Southern Florida Project  
Comprehensive Review Study  
(The Restudy)*

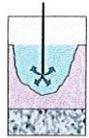
On December 11, 2000, the President signed the Water Resources Development Act (WRDA) of 2000, approving:

## **Comprehensive Everglades Restoration Plan**

**A series of environmental and other improvements over 30+ years with an estimated cost of \$7.8 billion (Now \$10-14 billion )**

# Comprehensive Everglades Restoration Plan

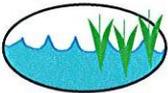
## 68 Components



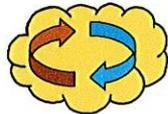
**Aquifer Storage & Recovery – 330 Wells**



**Surface Water Storage Reservoir – 170,000 acres**



**Stormwater Treatment Areas (STAs) – 36,000 acres**



**Reuse Wastewater at 2 Regional Plants**



**Seepage Management**

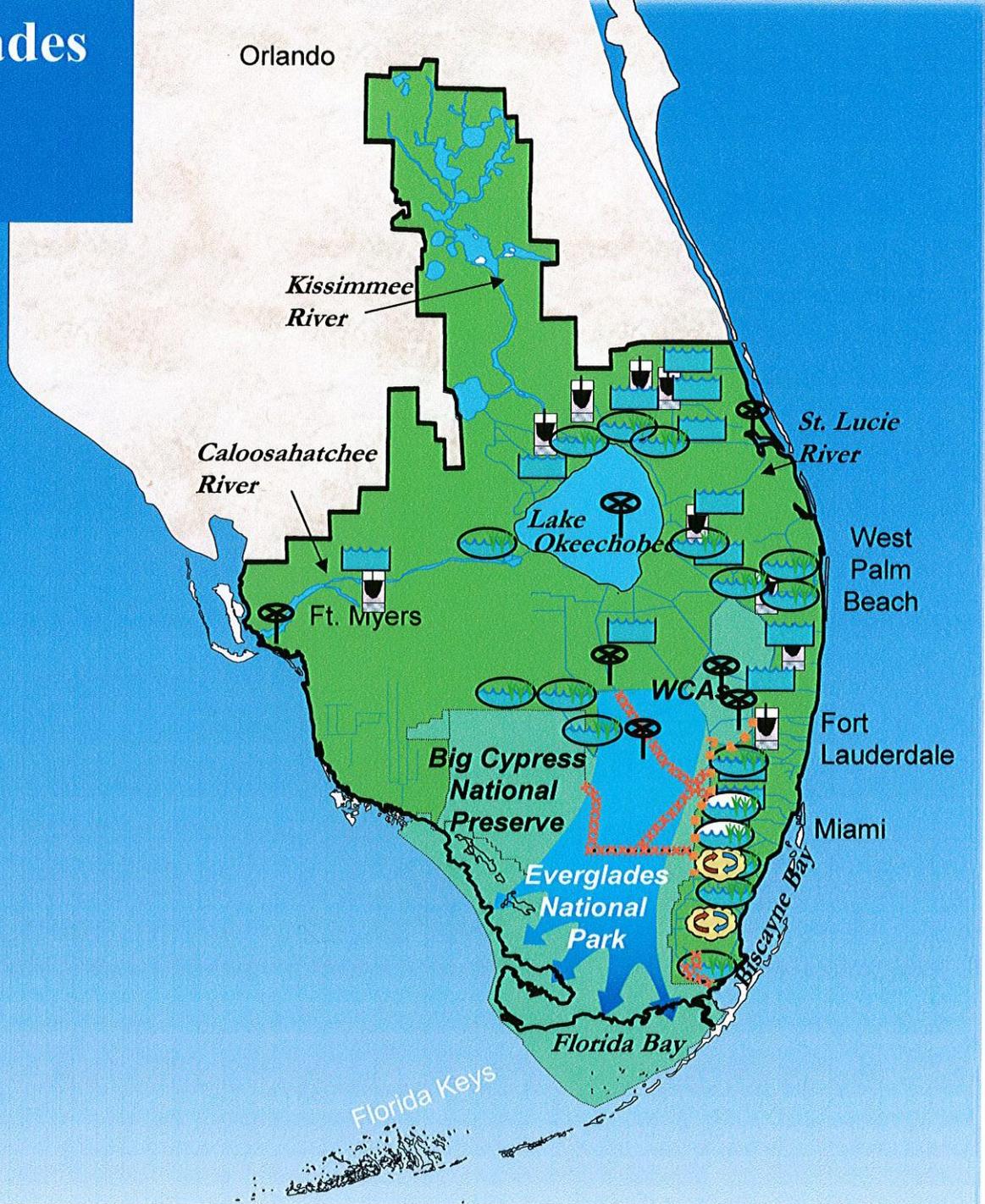


**Removing 240 miles of Barriers to Sheetflow**

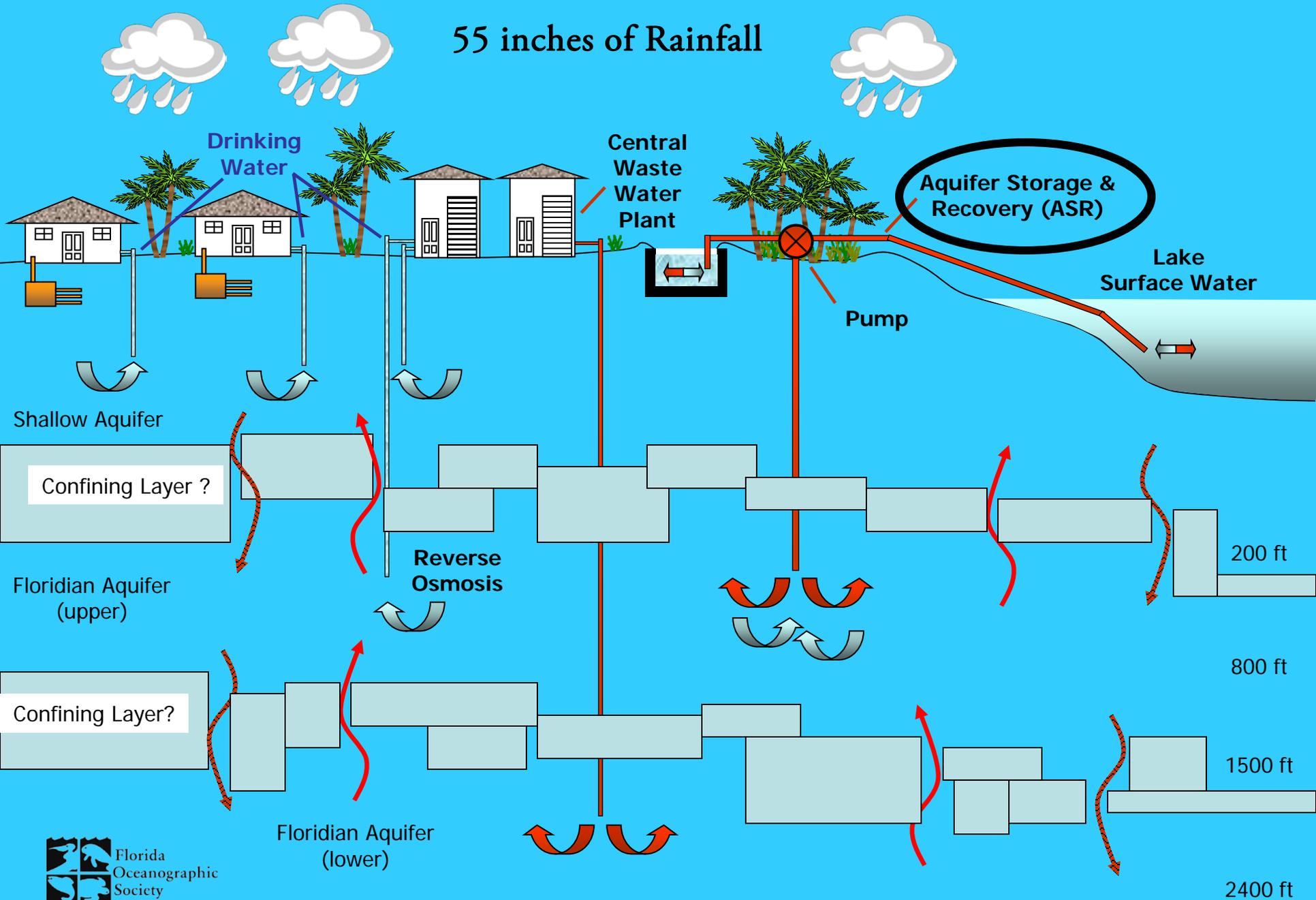


**Operational Changes**

Florida  
Seawater  
Society



# 55 inches of Rainfall



# South Florida Water Management District –State Efforts

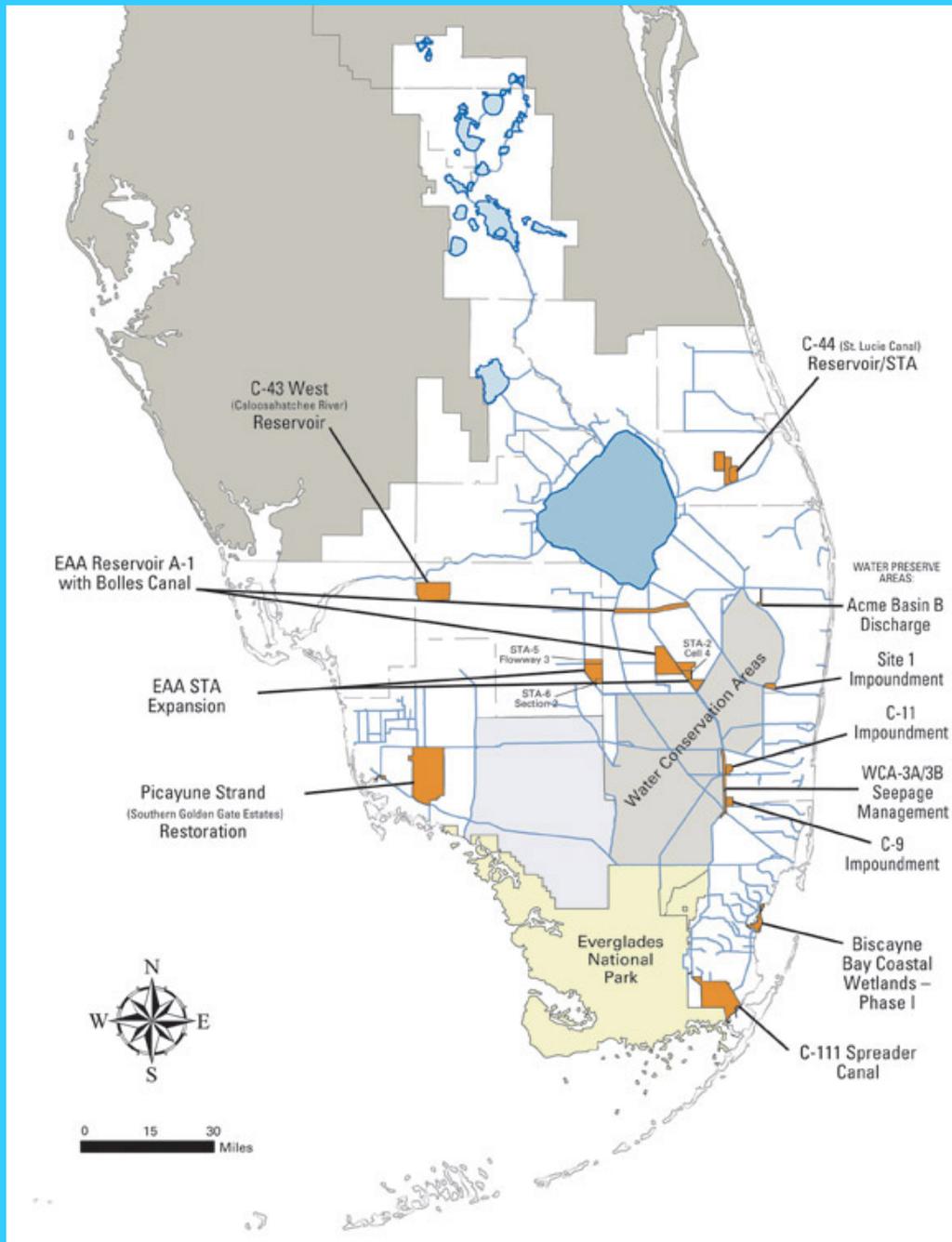
## Everglades Restoration

### “Acceler8 Projects”

2000-2008

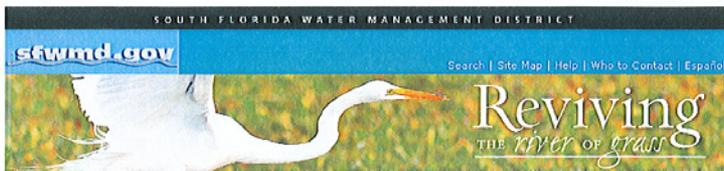
State Investment

\$ 2.1 billion









**Governor Shares Proposal to Achieve Everglades Restoration Vision in Tough Economic Climate - APRIL 1, 2009**

**TALLAHASSEE** – After gathering key input from the public, legislators and South Florida’s communities and in recognition of the nation’s current economic climate, Governor Charlie Crist today shared details of a revised strategy to acquire land for Everglades restoration from the United States Sugar Corporation. The approach incorporates today’s fiscal realities by saving \$800 million at closing, providing ready access to strategically located acreage for restoration projects and preserving thousands of jobs.

“By taking this fiscally conservative approach, we can secure this once-in-a-lifetime opportunity to restore and revive the Everglades despite continued economic challenges,” said Governor Crist. “The proposal represents a balance for both the environment and the economy by allowing us to acquire hundreds of square miles of prime property in affordable steps.”

Under the proposal, the district would initially invest approximately **\$530 million for 72,500 acres of property** south of Lake Okeechobee – a land mass nearly twice the size of Orlando. Approximately 32,000 acres of that land, currently in citrus production, would be available to the district within a year after closing. The United States Sugar Corporation would lease back the other approximately 40,500 acres of sugar cane land for \$150 per acre per year for at least seven years. **The district would have an option to purchase the remaining 107,500 acres of United States Sugar Corporation property for restoration within the first 10 years after closing.**

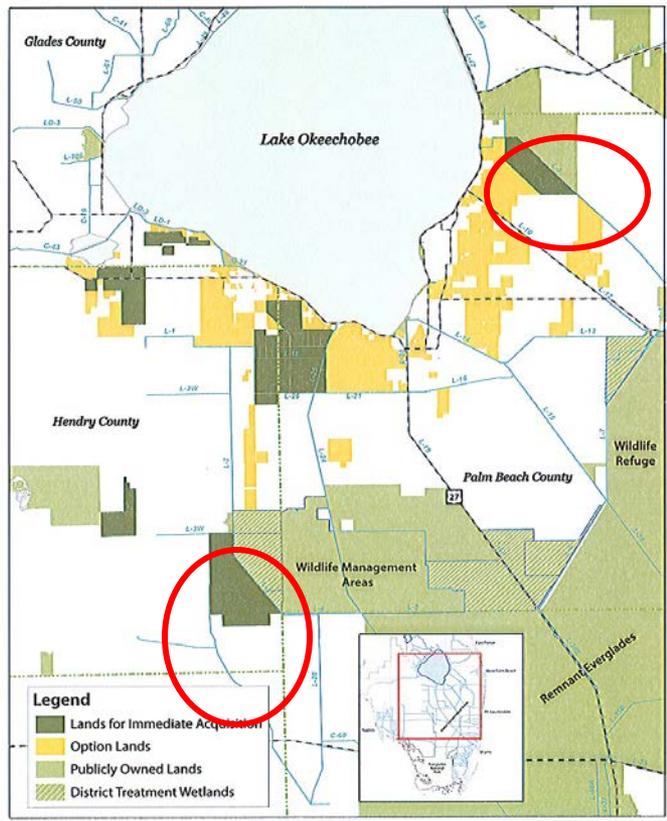
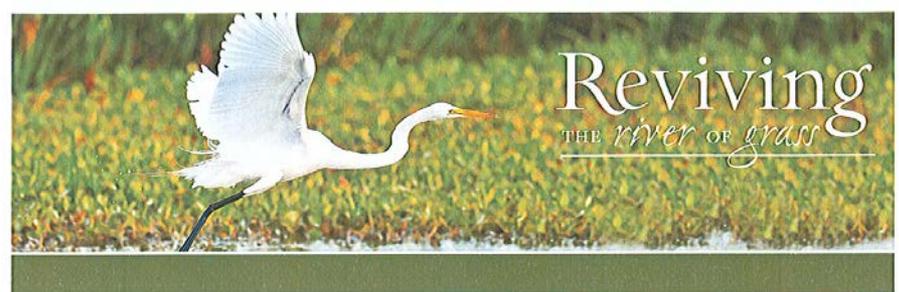
**Highlights of the proposed acquisition terms include:**

- Reducing the immediate public investment by 60 percent, or \$800 million, in addition to **reducing annual debt service payments by an estimated \$65 million.**
- Tripling the land lease rate to **\$150 an acre per year to generate a minimum of \$40 million in revenue** and avoid at least \$11 million in land management costs.
- Potentially freeing up revenue over the coming years for “shovel-ready” restoration projects that could create jobs and deliver environmental benefits to the Everglades Protection Area and Florida’s coastal estuaries.
- Sustaining regional agriculture.
- Keeping 1,700 direct jobs intact and protecting 10,000 indirect jobs for at least another decade with the continued operation of the United States Sugar Corporation’s mill and refinery.

**Environmental goals of the acquisition include:**

- Increasing the availability of water storage, significantly reducing the potential for harmful discharges from Lake Okeechobee to the St. Lucie and Caloosahatchee rivers and estuaries when lake levels are high.
- Delivering cleaner water to the Everglades during dry times and greater water storage to protect the natural system during wet years.
- Preventing tons of phosphorus from entering the Everglades every year.
- Significantly reducing the need for “back-pumping” water into Lake Okeechobee from the Everglades Agricultural Area.
- Relieving some pressures on the Herbert Hoover Dike while the federal government undertakes repairs by providing alternative water storage alternatives.
- Improved flexibility in managing Lake Okeechobee levels in a more environmentally friendly way.

[www.sfwmd.gov/riverofgrass](http://www.sfwmd.gov/riverofgrass)



**US Sugar Corp purchase reduced- 73,000 ac \$530 M in April 2009**  
**Then to 27,000 acres for \$197 M - October 2010- 10-year option**



# CENTRAL EVERGLADES PLANNING PROJECT



*Restoring the Heart of the Everglades*

## Central Everglades Planning Project (CEPP)

### Proposed Final Array of Alternatives

Kim Taplin, Chief  
Central Everglades Branch  
U.S. Army Corps of Engineers  
Jacksonville District

December 7, 2012

•CENTRAL EVERGLADES

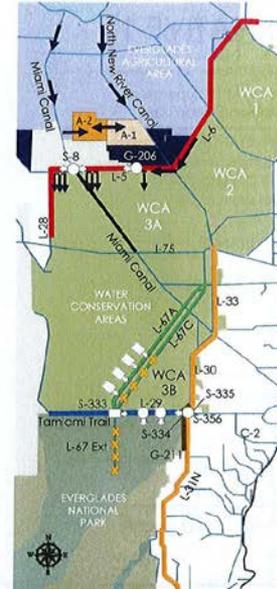
## WHAT'S NEXT? CENTRAL EVERGLADES

- Reduce undesirable discharges to east and west coast estuaries
- Deliver "new" sources of clean water to the Central Everglades and Everglades National Park
- To restore habitat in the Central Everglades and Everglades National Park, focusing on the "River of Grass"

2

RESTORING THE HEART OF THE EVERGLADES

CENTRAL EVERGLADES



## PROPOSED ALTERNATIVE 3

### STORAGE AND TREATMENT

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

### DISTRIBUTION/CONVEYANCE

- Division 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
- Four 500 cfs gated structures in L-67A, 0.5 mile spoil removal west of L-67A north and south of structures
- 6,000-ft gaps in L-67C levee at each structure
- Two 500 cfs pumps out of WCA-3B at existing agricultural canals with improvements to agricultural canals in WCA-3B
- 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
- Full depth penetrating seepage barrier from S-335 to S-334
- G-211 operational refinements and use coastal canals to convey seepage



35

RESTORING THE HEART OF THE EVERGLADES

CENTRAL EVERGLADES



## 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

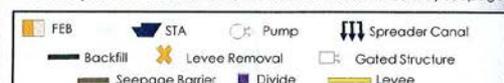
- Division of L-6 flows and L-5 canal improvements
- Spreader canal: ~3 miles west of S-8 (3,000 cfs), ~3 miles east of S-8 (800 cfs) and ~1.5 miles east of G-206 (400 cfs)
- Backfill Miami Canal from S-8 to I-75

### 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

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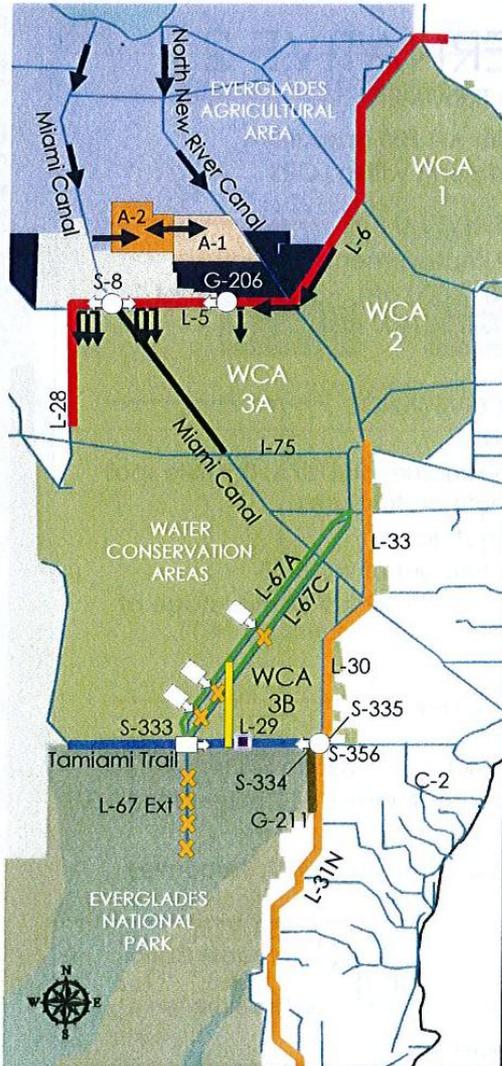
36

RESTORING THE HEART OF THE EVERGLADES

CENTRAL EVERGLADES



# Central Everglades Planning Project – Nov. 2011 to Apr. 2013 Including “Key Projects” Mandated State WQ Improvements



## 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

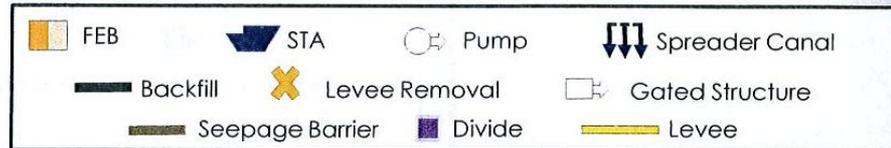
- Diversion of L-6 flows and L-5 canal improvements
- Spreader canal: ~3 miles west of S-8 (3,000 cfs), ~3 miles east of S-8 (800 cfs) and ~1.5 miles east of G-206 (400 cfs)
- Backfill Miami Canal from S-8 to I-75

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- 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
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- G-211 operational refinements; use coastal canals to convey seepage





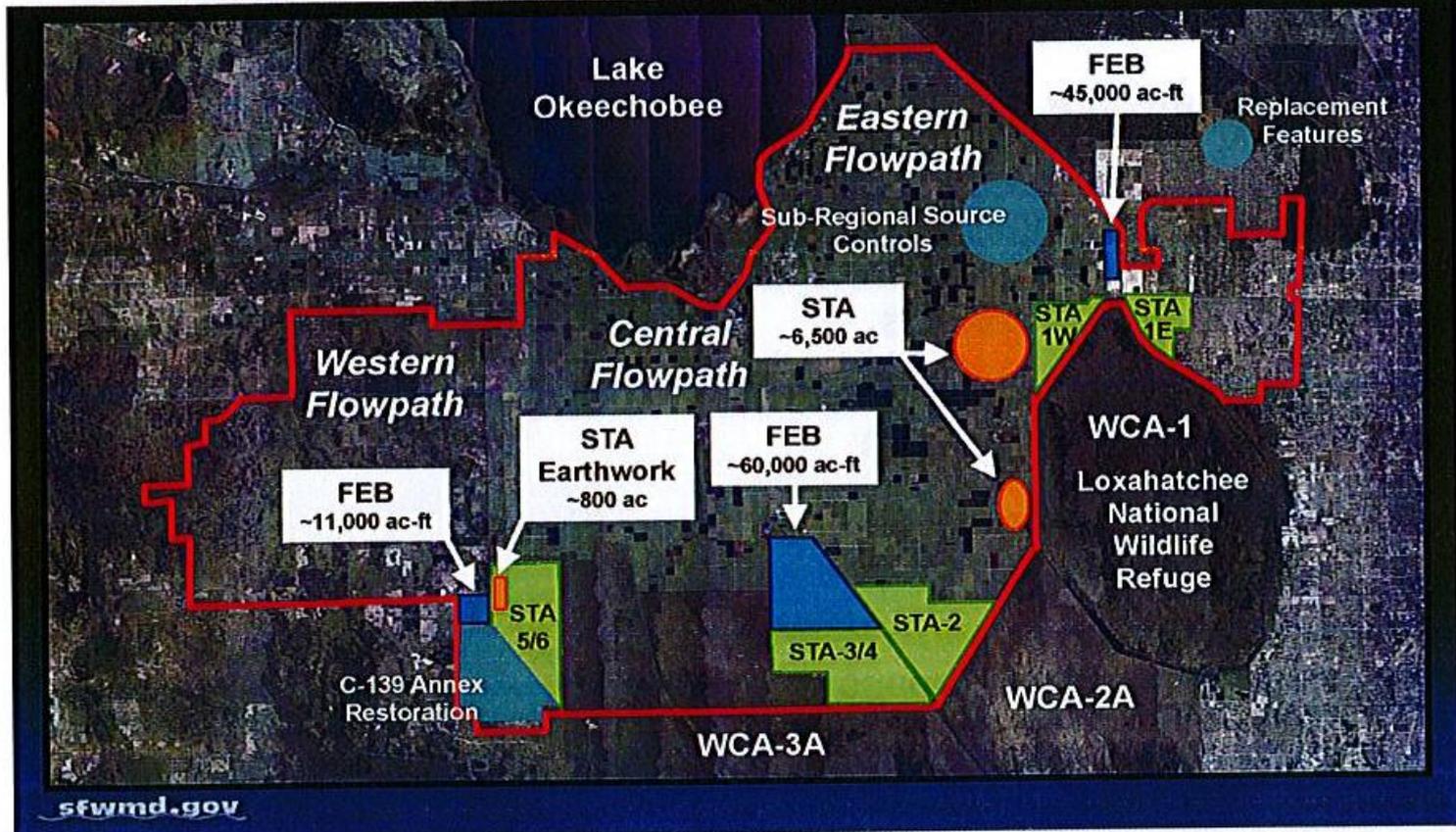
# Principals' Meeting October 6, 2011



Florida

Governor- Rick Scott  
SFWMD – Melissa Meeker

## Restoration Strategies – Key Projects



“Restoration Strategies” – Mandated Water Quality Treatment projects - \$ 880 Million – State of Florida – (CS/HB 7065-May 28, 2013)

Everglades Forever Act (1994)  
Existing 6 – Stormwater Treatment  
Areas (STAs) Cost \$ 1.2 Billion

Now WQ Mandated Projects (2013  
– 2026) 2 – Flow Equalization  
Basins (FEB) Cost \$ 890 Million

\$ 220 Million SFWMD Reserves

\$ 292 Million New Ad Valorem

\$ 379 Million State Appropriation

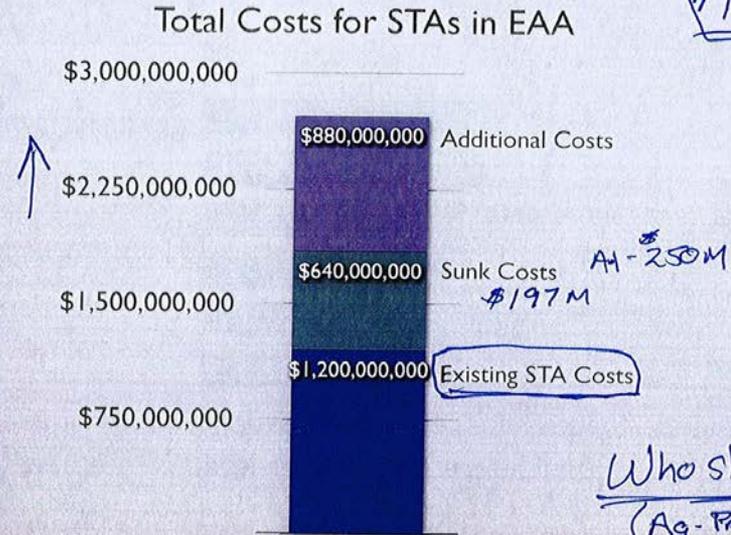
Agricultural Privilege Tax is \$ 25  
per Acre = \$ 11 Million per Year  
Over 13 Years = \$ 143 Million

(NOT ENOUGH)



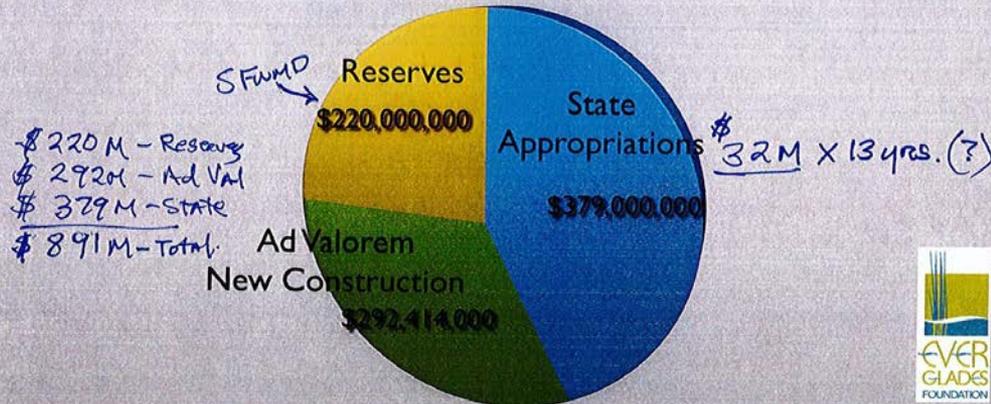
# COST OF EAA WQ TREATMENT

\$ 1.2 B on STAs



Who should Pay?  
(Ag - Priv. Tx. \$25/ac  
\$11M/yr?  
\$1.2B of \$890M)

Sources of Revenue for New Projects "Key Projects"



**ST. LUCIE WATERSHED ASSESSMENT**

**VOLUME B: BASIN PRIORITIES**

Prepared for:

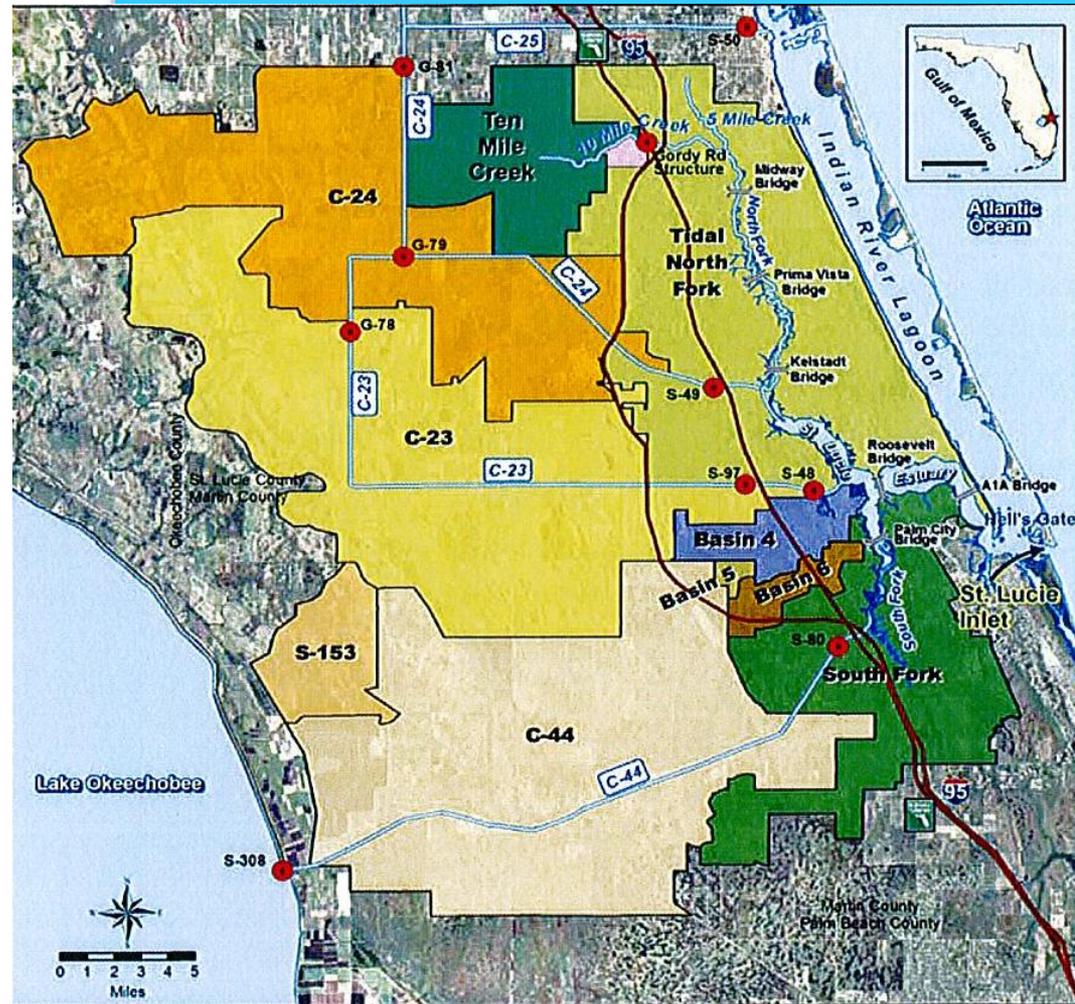
South Florida Water Management District  
P.O. Box 24680  
3301 Gun Club Road  
West Palm Beach, Florida 33416-4680

Prepared by:

Anthony Janicki, David Wade, J. Raymond Pribble, Pam Latham  
PBS&J  
5300 West Cypress Street  
Suite 300  
Tampa, Florida 33607-1712

**FINAL REPORT**

**February, 1999**



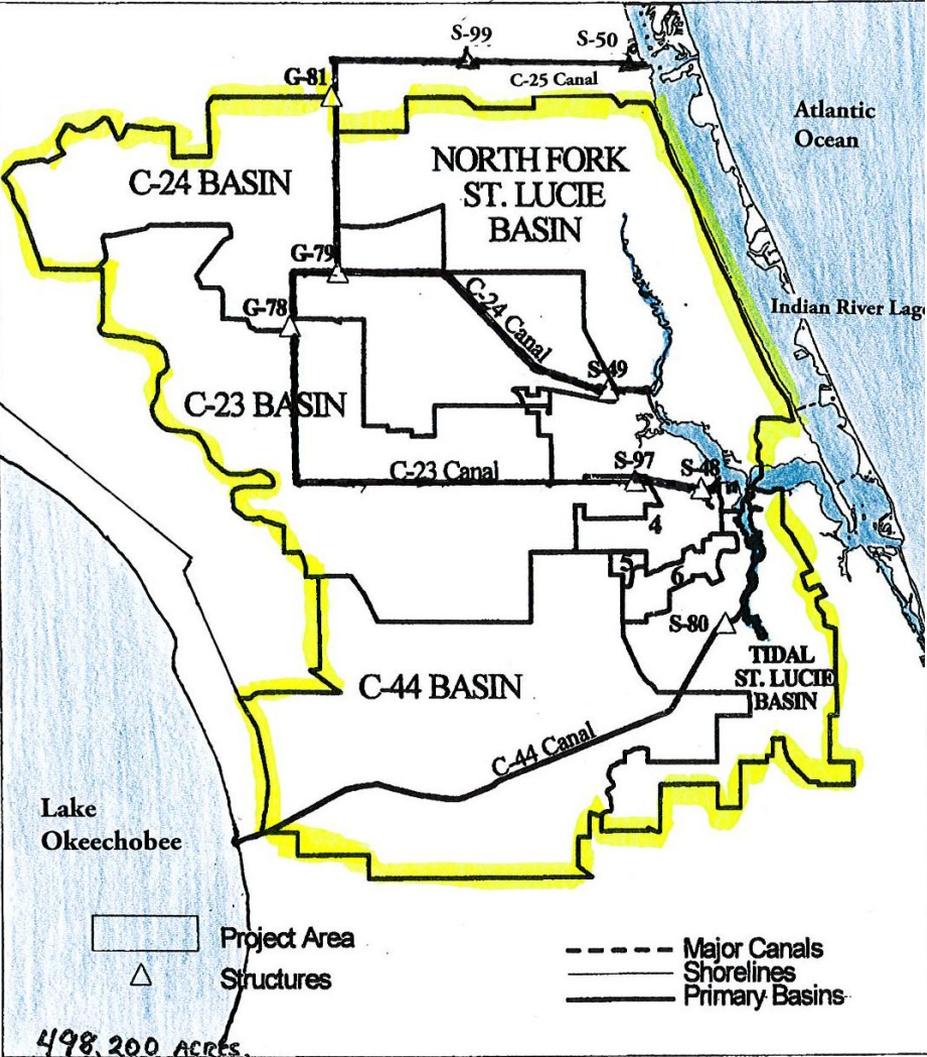
**St. Lucie River Watershed**

**514,646 Acres**

**Watershed Assessment - February 1999**

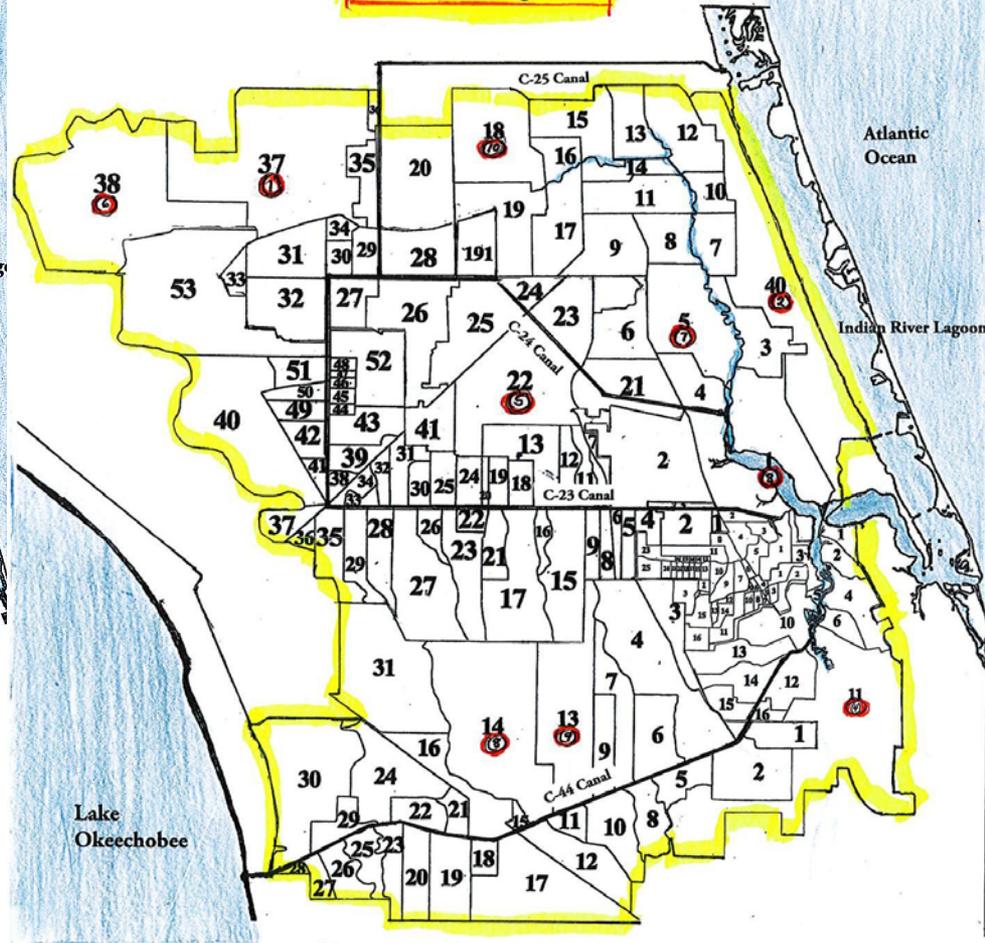
# St. Lucie River Estuary Watershed

## Primary Drainage Basins



# St. Lucie River Estuary Watershed

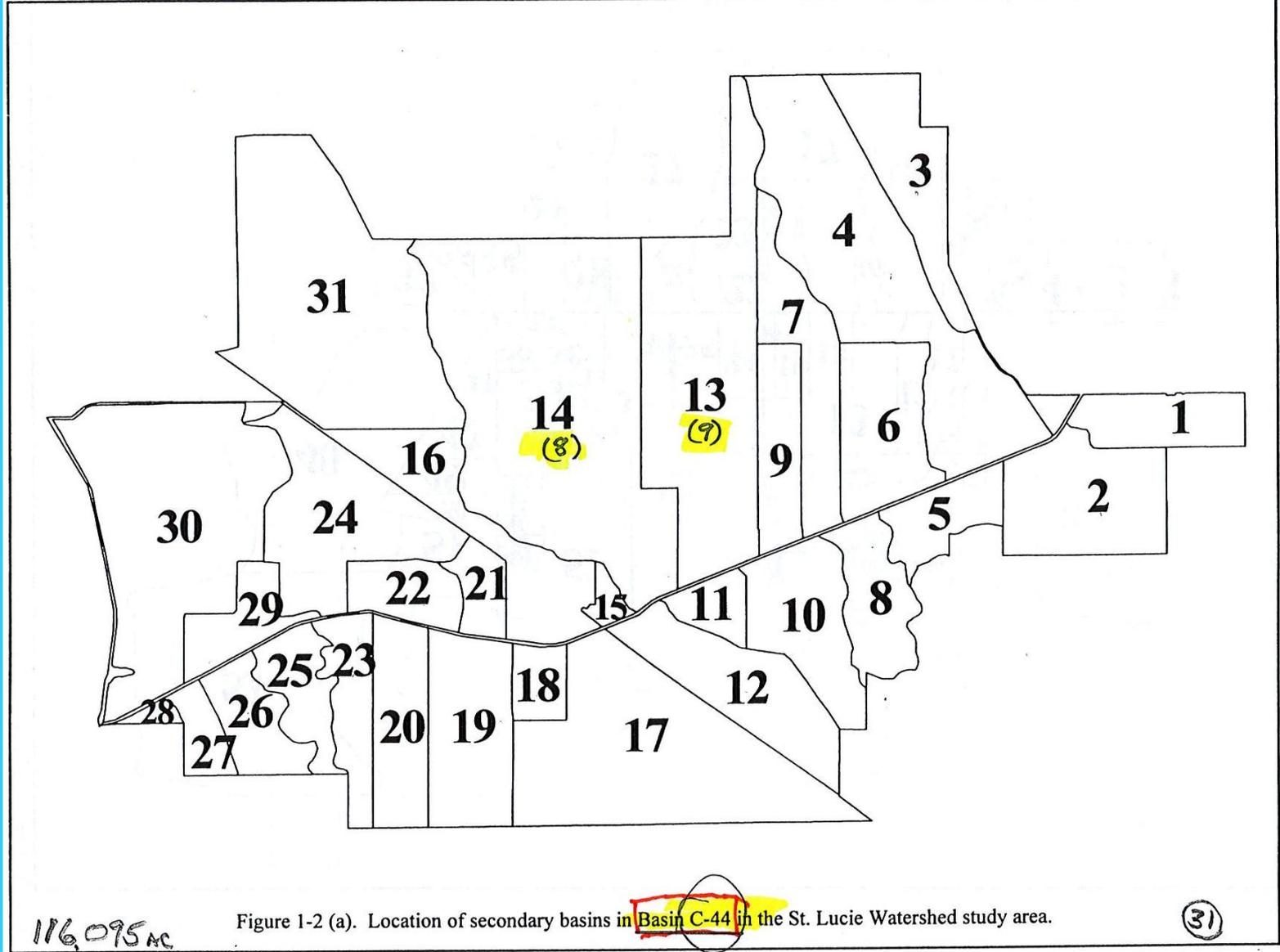
## Secondary Drainage Basins



8 Basins – 186 Secondary Basins

# St. Lucie River Estuary Watershed





116,095 ac

Figure 1-2 (a). Location of secondary basins in Basin C-44 in the St. Lucie Watershed study area.

(31)

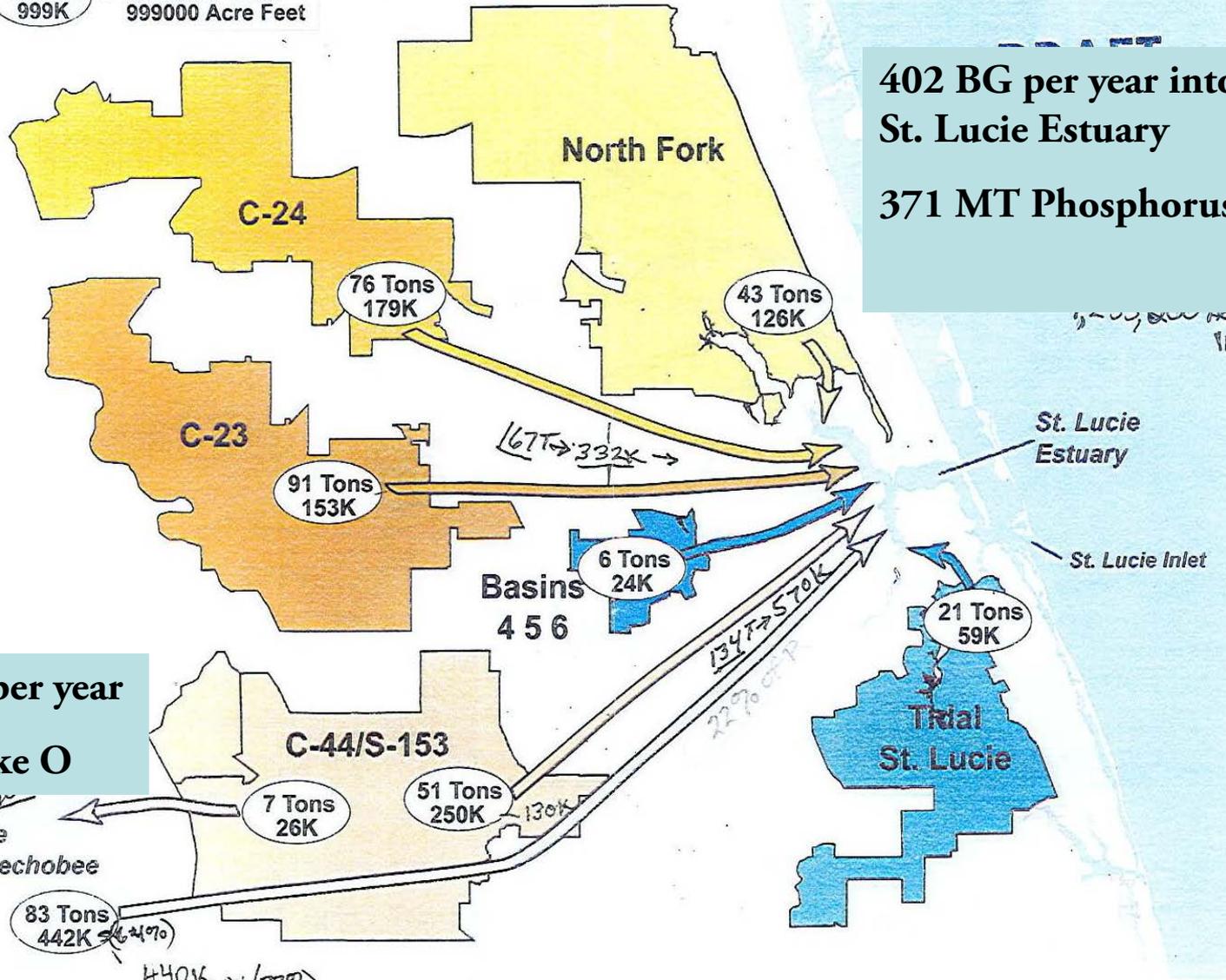
# C-44 Basin - 31 Secondary Drainage Basins

## 25 Pump Stations for Agriculture Irrigation



99 Tons = 99 Metric Tons  
999K = 999000 Acre Feet

402 BG per year into  
St. Lucie Estuary  
371 MT Phosphorus



144 BG per year  
From Lake O



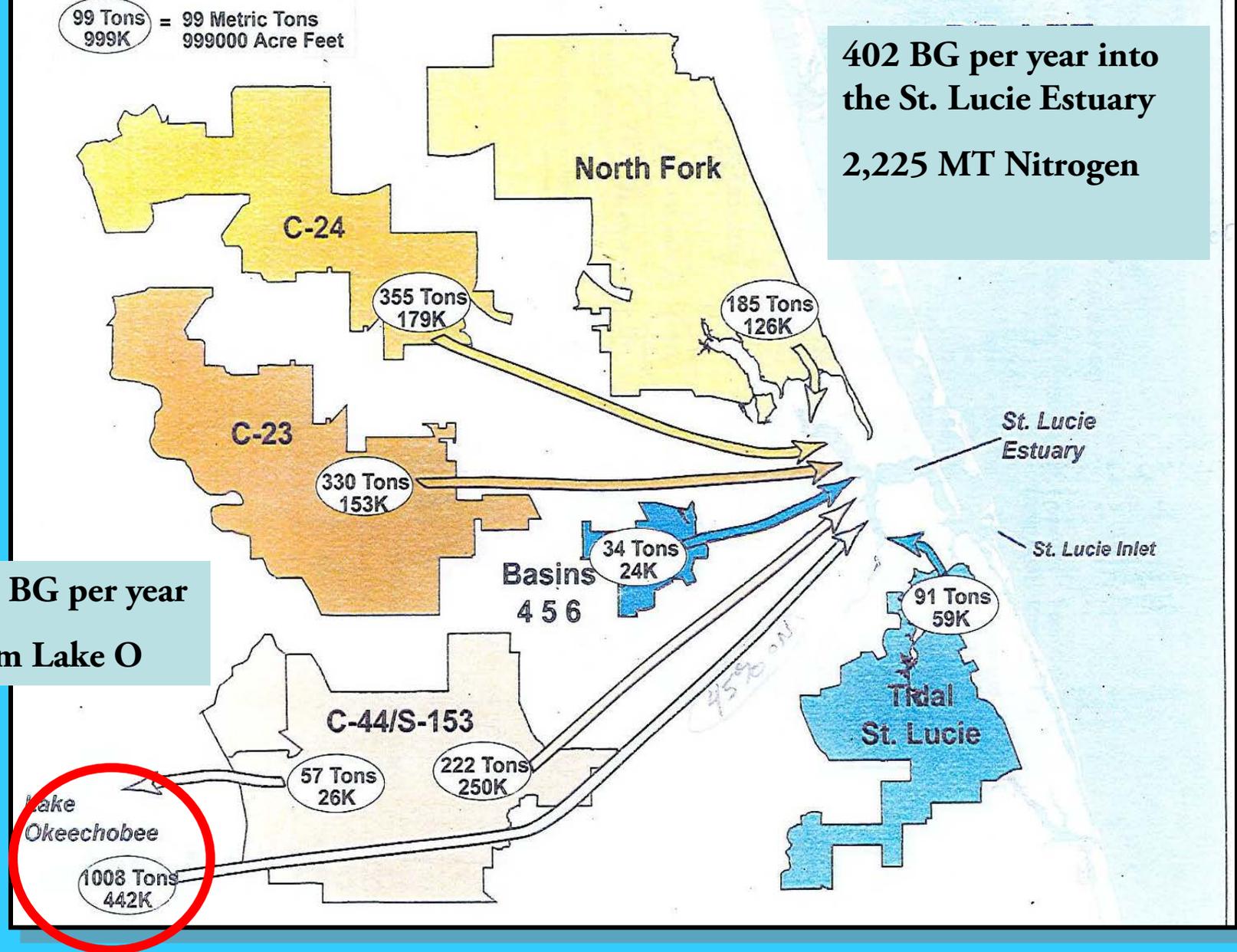
# Annual Phosphorus Loads by Basin to the St. Lucie Estuary

Period of Record 1995-2005 SFWMD

99 Tons = 99 Metric Tons  
999K = 999,000 Acre Feet

402 BG per year into  
the St. Lucie Estuary  
2,225 MT Nitrogen

144 BG per year  
From Lake O



# Annual Nitrogen Loads by Basin to the St. Lucie Estuary

Period of Record 1995-2005 SFWMD

DRAFT

## BASIN MANAGEMENT ACTION PLAN

for the Implementation of Total Maximum Daily Loads for Nutrients and Dissolved Oxygen Adopted by the Florida Department of Environmental Protection

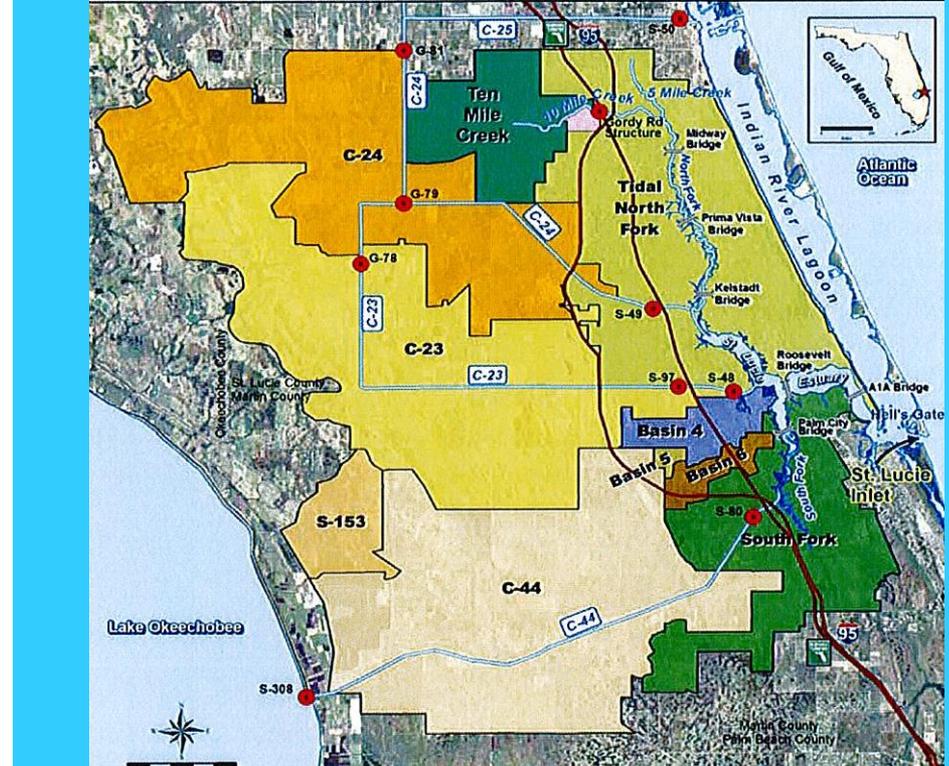
in the

# St. Lucie River and Estuary Basin

developed by the  
St. Lucie River and Estuary Basin Technical Stakeholders

in cooperation with the  
**Florida Department of Environmental Protection**  
Division of Environmental Assessment and Restoration  
Bureau of Watershed Restoration  
Tallahassee, Florida 32399

April 2013



Draft St. Lucie River and Estuary Basin Management Action Plan – April 2013

TABLE 8: ACRES BY ENTITY

ENTITY	BASINS 4, 5, AND 6 (ACRES)	C-23 (ACRES)	C-24 (ACRES)	C-44 S-153 (ACRES)	NORTH FORK (ACRES)	SOUTH FORK (ACRES)	TOTAL (ACRES)
Agriculture	2,445	84,744	63,488	65,937	3,967	18,176	238,757
Copper Creek CDD	-	-	2	-	-	-	2
FDOT District 4	171	306	137	270	864	636	2,384
Fort Pierce MS4	-	-	-	-	3,706	-	3,706
FPL Pond	-	-	-	6,501	-	-	6,501
Hobe St. Lucie Conservancy District	-	-	-	2,949	-	1,945	4,894
Martin County MS4	4,989	1,738	-	2,231	4,378	7,763	21,099
Natural Lands	7,830	23,706	15,701	37,163	33,129	18,987	136,516
North St. Lucie River WCD	-	-	4,028	-	32,491	-	36,519
Okeechobee County MS4	-	574	30	-	-	-	604
Pal Mar WCD	-	-	-	1,161	-	4	1,165
Port St. Lucie MS4	-	326	1,258	-	34,118	-	35,702
Sewall's Point MS4	-	-	-	-	457	-	457
St. Lucie County MS4	-	-	-	-	3,995	-	3,995
St. Lucie County Non-MS4	-	763	2,172	-	1,146	-	4,081
Stuart MS4	-	-	-	-	353	2,386	2,739
Tradition CDD	-	-	923	-	6	-	929
Troup-Indiantown WCD	-	-	-	13,649	-	-	13,649
Turnpike	147	10	-	-	528	226	911
Verano CDD	-	-	36	-	-	-	36
<b>Total</b>	<b>15,582</b>	<b>112,167</b>	<b>87,775</b>	<b>129,861</b>	<b>119,138</b>	<b>50,123</b>	<b>514,646</b>

TABLE 6: TN STARTING LOADS BY ENTITY

any cell/no data

ENTITY	BASINS 4, 5, AND 6 (LBS/YR)	C-23 (LBS/YR)	C-24 (LBS/YR)	C-44 S-153 (LBS/YR)	NORTH FORK (LBS/YR)	SOUTH FORK (LBS/YR)	TOTAL (LBS/YR)	TOTAL (MT/YR)
Agriculture	17,051	470,081	574,852	350,703	24,355	126,080	1,563,122	709.02
Copper Creek CDD	-	-	14	-	-	-	14	0.01
FDOT District 4	952	1,510	950	1,176	4,277	3,649	12,514	5.68
Fort Pierce MS4	-	-	-	-	17,041	-	17,041	7.73
FPL Pond	-	-	-	41,022	-	-	41,022	18.61
Hobe St. Lucie Conservancy District	-	-	-	13,374	-	10,819	24,193	10.97
Martin County MS4	26,394	5,947	-	8,243	19,806	40,423	100,813	45.73
Natural Lands	15,128	14,991	24,792	49,942	43,326	26,980	175,159	79.45
North St. Lucie River WCD	-	-	37,251	-	160,152	-	197,403	89.54
Okeechobee County MS4	-	3,184	121	-	-	-	3,305	1.50
Pal Mar WCD	-	-	-	6,758	-	22	6,780	3.08
Port St. Lucie MS4	-	1,515	8,275	-	146,691	-	156,481	70.98
Sewall's Point MS4	-	-	-	-	1,771	-	1,771	0.80
St. Lucie County MS4	-	-	-	-	18,114	-	18,114	8.22
St. Lucie County Non-MS4	-	1,594	16,757	-	5,409	-	23,760	10.78
Stuart MS4	-	-	-	-	1,614	12,384	13,998	6.35
Tradition CDD	-	1	7,057	-	31	-	7,089	3.22
Troup-Indiantown WCD	-	-	-	62,219	-	-	62,219	28.22
Turnpike	789	51	-	-	2,651	1,286	4,777	2.17
Verano CDD	-	-	257	-	-	-	257	0.12
<b>TOTAL</b>	<b>60,314</b>	<b>498,874</b>	<b>670,326</b>	<b>533,437</b>	<b>445,238</b>	<b>221,643</b>	<b>2,429,832</b>	<b>1,102.18</b>

Total Required Reduction 1,053,414 (Lbs/yr) 477 (MT/yr)

Target Load 1,136,633 (Lbs/yr) 515 (MT/yr)

TMDL – BMAP Implementation June 2013 - Adopted & Enforceable (?)

2013 – 2018 “First Phase” -30% Reduction

2018 – 2028 “Second & Third Phase” Remaining 70% Reduction



**DRAFT**  
**BASIN MANAGEMENT ACTION PLAN**  
 for the Implementation of Total Maximum Daily Loads for Nutrients and Dissolved Oxygen Adopted by the Florida Department of Environmental Protection  
 in the  
**St. Lucie River and Estuary Basin**  
 developed by the  
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 Florida Department of Environmental Protection  
 Division of Environmental Assessment and Restoration  
 Bureau of Watershed Restoration  
 Tallahassee, Florida 32399  
 April 2013

# Phosphorus

TABLE 7: TP STARTING LOADS BY ENTITY

cell/no data

ENTITY	BASINS 4, 5, AND 6 (LBS/YR)	C-23 (LBS/YR)	C-24 (LBS/YR)	C-44 S-153 (LBS/YR)	NORTH FORK (LBS/YR)	SOUTH FORK (LBS/YR)	TOTAL (LBS/YR)	TOTAL (MT/YR)
Agriculture	3,920	150,255	136,471	66,809	5,988	26,869	390,312	177.04
Copper Creek CDD	-	-	3	-	-	-	3	0.00
FDOT District 4	200	464	226	175	818	659	2,542	1.15
Fort Pierce MS4	-	-	-	-	3,879	-	3,879	1.76
FPL Pond	-	-	-	8,361	-	-	8,361	3.79
Hobe St. Lucie Conservancy District	-	-	-	2,689	-	2,563	5,252	2.38
Martin County MS4	5,930	2,250	-	1,431	4,339	8,419	22,369	10.15
Natural Lands	3,383	19,795	11,341	3,525	9,639	5,054	52,737	23.92
North St. Lucie River WCD	-	-	9,063	-	36,821	-	45,884	20.81
Okeechobee County MS4	-	937	38	-	-	-	975	0.44
Pal Mar WCD	-	-	-	1,008	-	4	1,012	0.46
Port St. Lucie MS4	-	518	2,206	-	32,292	-	35,016	15.88
Sewall's Point MS4	-	-	-	-	384	-	384	0.17
St. Lucie County MS4	-	-	-	-	4,127	-	4,127	1.87
St. Lucie County Non-MS4	-	838	3,961	-	1,273	-	6,072	2.75
Stuart MS4	-	-	-	-	379	2,727	3,106	1.41
Tradition CDD	-	-	1,903	-	7	-	1,910	0.87
Troup-Indiantown WCD	-	-	-	12,623	-	-	12,623	5.73
Turnpike	170	16	-	-	506	233	925	0.42
Verano CDD	-	-	63	-	-	-	63	0.03
<b>TOTAL</b>	<b>13,603</b>	<b>175,073</b>	<b>165,275</b>	<b>96,621</b>	<b>100,452</b>	<b>46,528</b>	<b>597,552</b>	<b>271.03</b>

Total Required Reduction 404,166 (Lbs/yr) 183 (MT/yr)

Target Load 127,016 (Lbs/yr) 57 (MT/yr)

**TMDL – BMAP Implementation June 2013 - Adopted & Enforceable (?)**

**2013 – 2018 “First Phase” -30% Reduction**

**2018 – 2028 “Second & Third Phase” Remaining 70% Reduction**

**DRAFT**

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April 2013



DRAFT

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# St. Lucie River and Estuary Basin

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St. Lucie River and Estuary Basin T

in cooperation with  
Florida Department of Environr  
Division of Environmental Assessme  
Bureau of Watershed Res  
Tallahassee, Florida 3

April 2013

**TABLE 24: AGRICULTURAL TN AND TP LOAD REDUCTION ALLOCATIONS AND ESTIMATED REDUCTIONS IN TN AND TP LOAD IN THE FIRST 5 YEARS**

ESTIMATED LOADS	TN (LBS/YR)	TP (LBS/YR)
Agricultural Starting Load	1,563,122.0	390,312.0
Agricultural Required Reduction	812,924.0	307,059.0
Required Reduction for First Phase of BMAP	243,877.2	92,117.7
Estimated Load Reductions via BMPs, 90% Target Enrollment*	197,216.6	40,442.0
Estimated Load Reduction Credit for Land Use Changes*	171,776.4	54,191.1
<b>Total Estimated Reductions</b>	<b>368,993.0</b>	<b>94,663.1</b>
Remaining Load Reductions Needed for First Phase of BMAP	-125,115.8 (credit)	-2,515.4 (credit)

\* Note: Load reduction estimates/credits do not include agricultural lands within WCDS.

## TMDL – BMAP Implementation

June 2013 - Adopted & Enforceable (?)

2013 – 2018 “First Phase” -30% Reduction

2018 – 2028 “Second & Third Phase” Remaining 70% Reduction

# Indian River Lagoon-South Plan

12,000 acres above ground Storage Reservoirs

9,000 acres STA manmade wetlands

90,000 acres Natural Area Storage

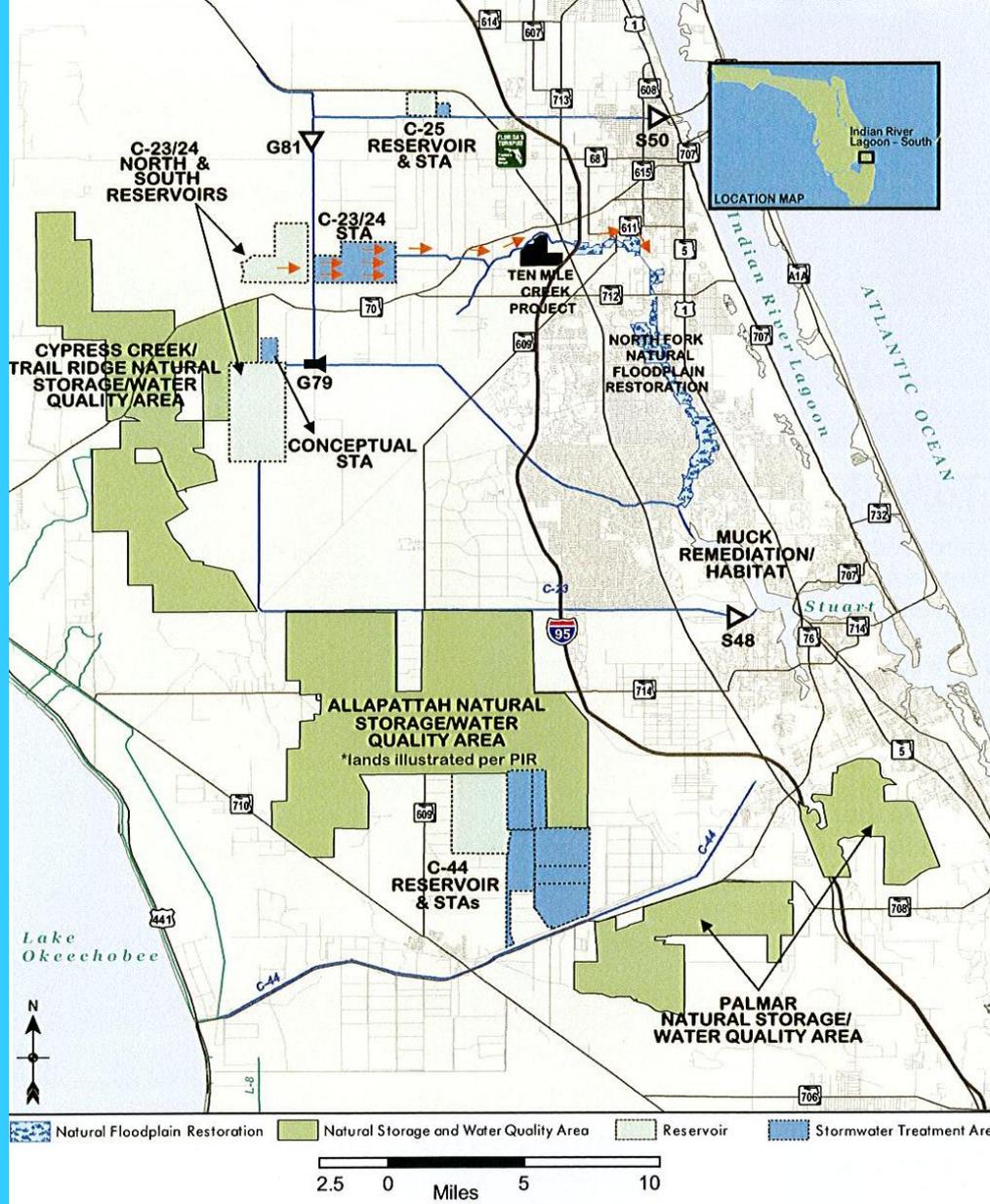
2,650 acres benthic habitat created- 922 acres submerge aquatic habitat restored

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



Part of Comprehensive Everglades Restoration Plan



# Current Everglades Restoration Projects

## Everglades Restoration Projects Non-CERP (Comprehensive Everglades Restoration Plan)

1. Kissimmee River
2. C-111 South Dade
3. C-51/STA-1E
4. Modified Water Deliveries
5. Herbert Hoover Dike Rehab
6. State Restoration Strategies – Water Quality (Florida)
7. Tamiami Trail - Next Steps Bridging (DOI, USACOE, Florida)

## 1st Generation CERP (Authorized WRDA 2007 - Construction)

1. Site 1 Impoundment
2. IRL-South (C-44 Project, C-23/C-24/C-25 Project)
3. Picayune Strand

## 2nd Generation CERP (Waiting Authorization-WRRDA 2013)

1. C-43 Reservoir
2. Broward County WPA
3. C-111 Spreader Canal
4. Biscayne Bay Coastal Wetlands

## 1. Central Everglades Planning Project (CEPP) – CERP (Waiting Authorization-WRRDA 2013 )

- Everglades Agriculture Storage Reservoir
- WCA 3 Decompartmentalization & Sheetflow Enhancement
- S-356 Pump Station Modifications
- L-31 Levee Seepage Management
- System-Wide Operational Changes
- Flow to Northwest & Central WCA 3A

# Everglades Restoration Improves the Economy & Provides Jobs

## Projects Include:

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



***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 every 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 today!**

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	JOB TYPE	Mean Annual Salary
Civil Engineers.....	\$79,630	Environmental Engineers.....	\$67,600
Electrical Engineers.....	\$77,760	Mechanical Engineer.....	\$74,470
Cost Engineers.....	\$72,909	Engineering Drafters.....	\$47,680
Surveyors.....	\$36,730	Planning and Mapping Specialists.....	\$36,370
Economists.....	\$96,320	Biologists.....	\$69,430
Ecologists.....	\$61,180	Hydrologists.....	\$76,760
Geologists.....	\$62,090	Archeologists.....	\$57,230
Project Managers.....	\$93,290	Environmental Scientists.....	\$67,360
Regulatory Specialists.....	\$99,735	Accountants.....	\$61,816
Financial Specialists.....	\$111,970	Administrative Specialists.....	\$96,050
Ground Maintenance Workers.....	\$32,020	Construction Laborers.....	\$33,190
Dredge Operator.....	\$34,840	Structural Iron and Steel Workers.....	\$48,470

Study by the 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.

## 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

### 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.



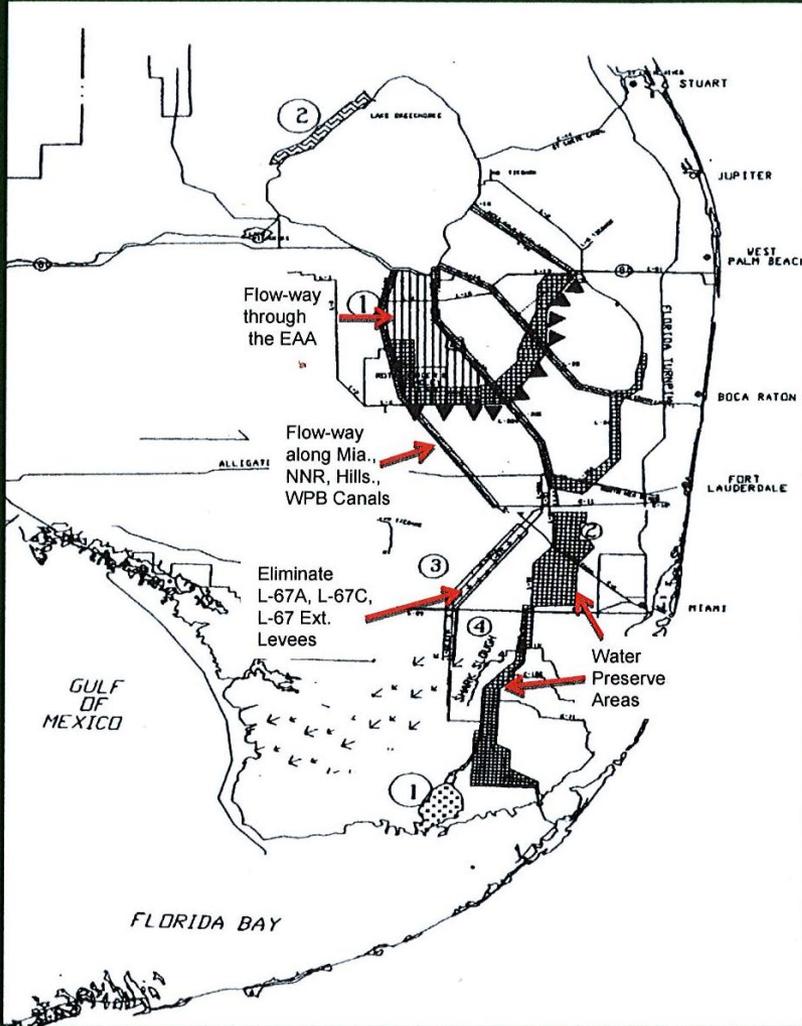
# The next Comprehensive Everglades Restoration Plan Project should be

## A New Plan 6 Project

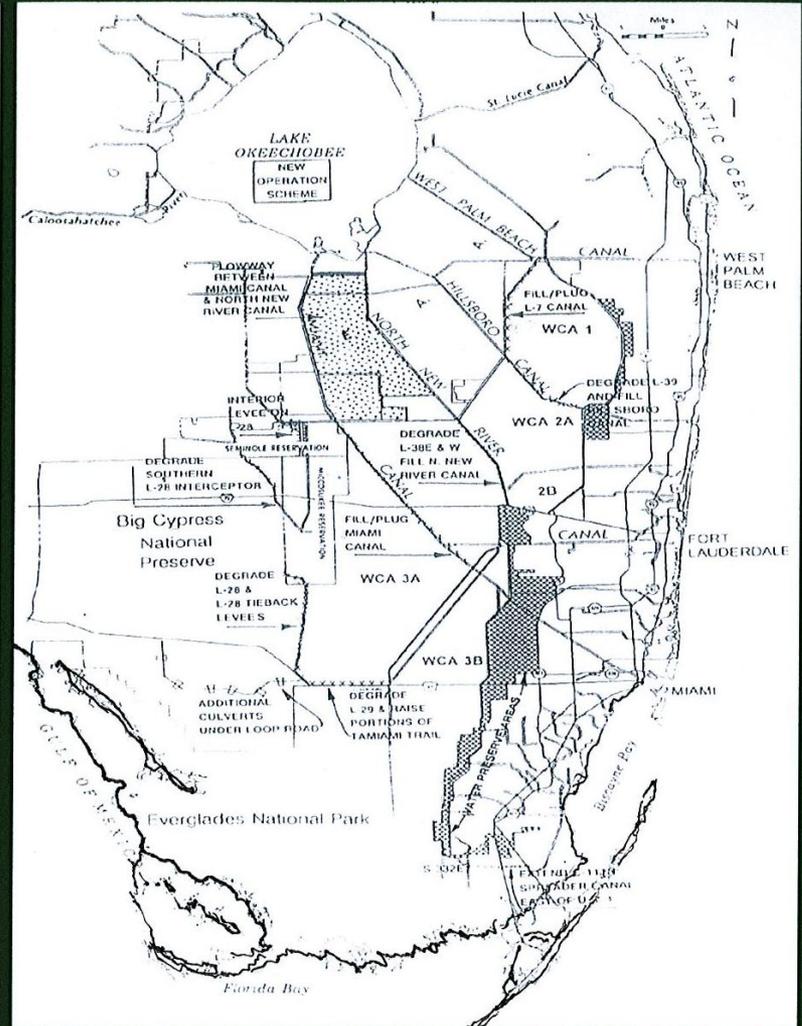
Stop the destructive discharges to the Northern Estuaries and Restore the River of Grass



# Early Conceptual Plans - Everglades Restoration



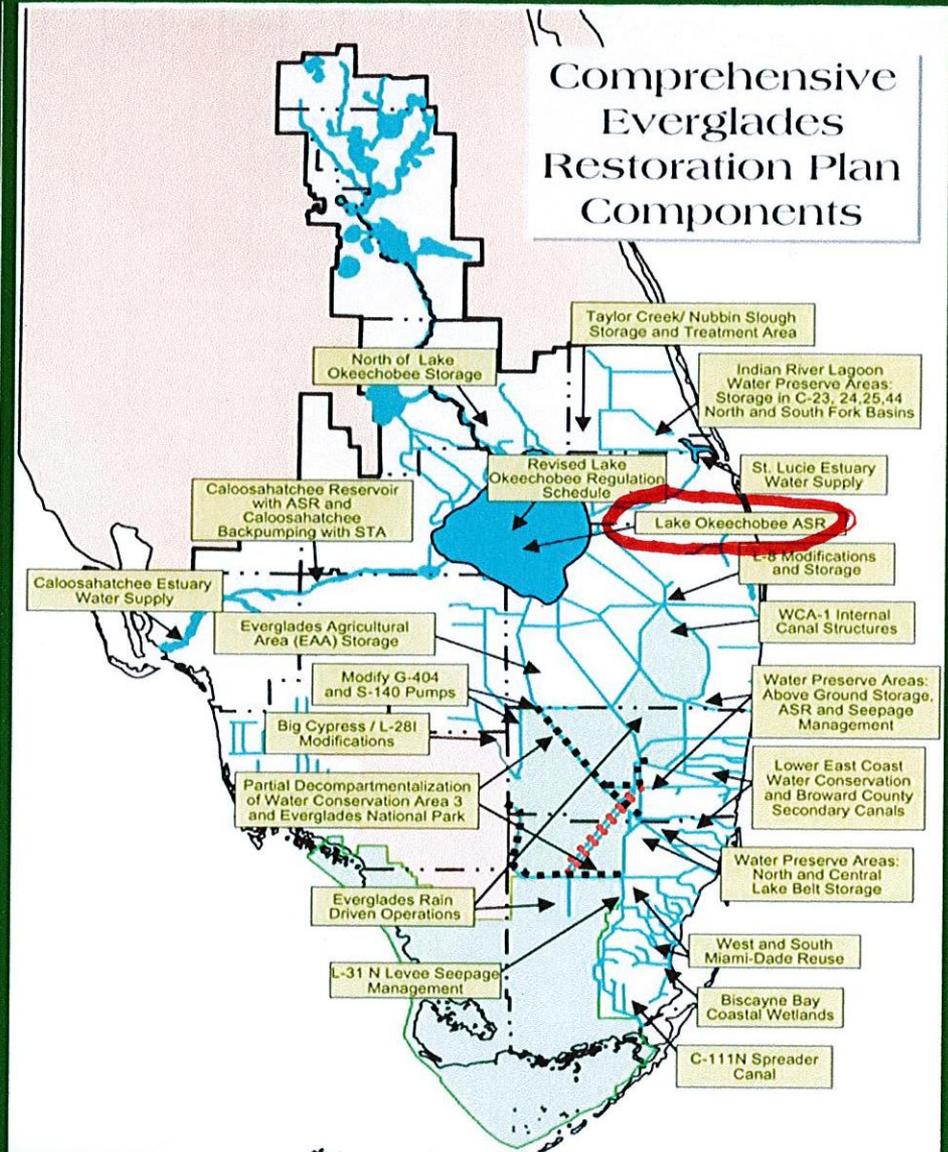
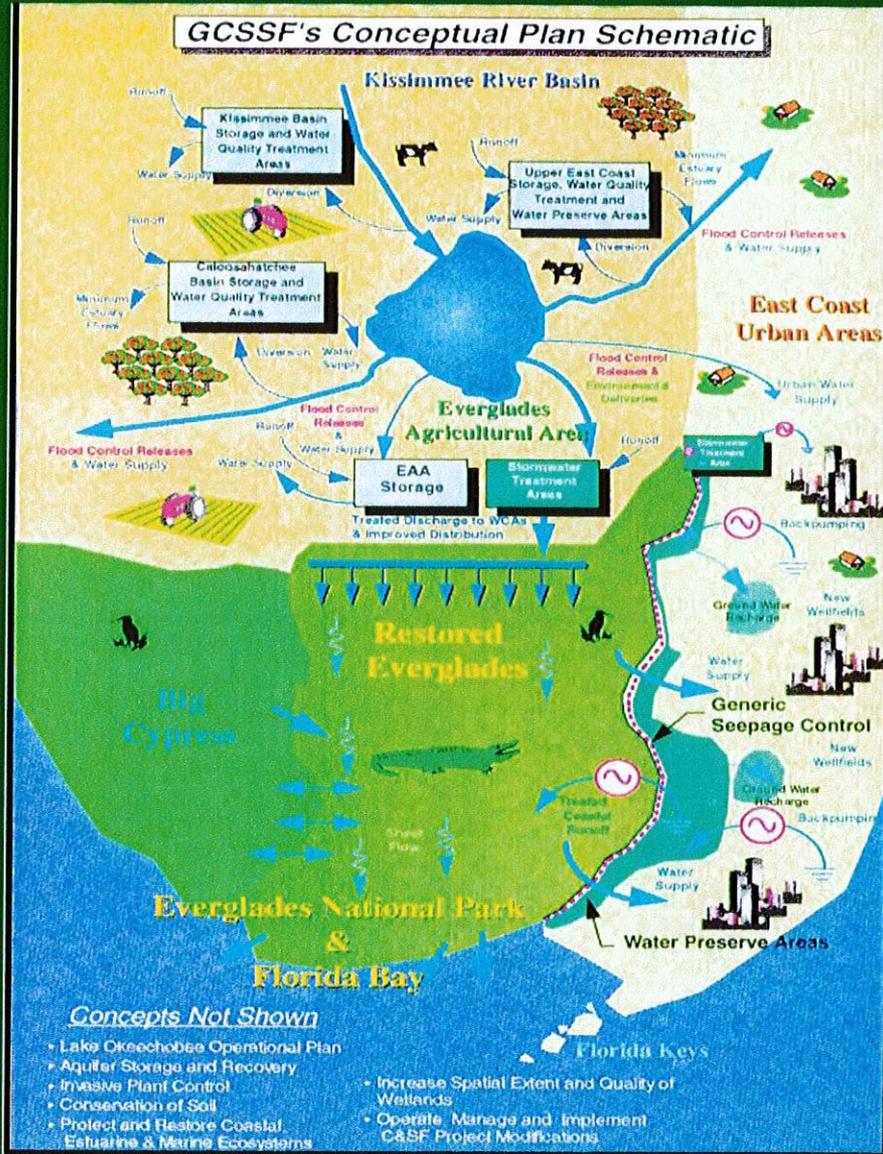
Science Sub-Group Report, Minimum Plan, 1993.

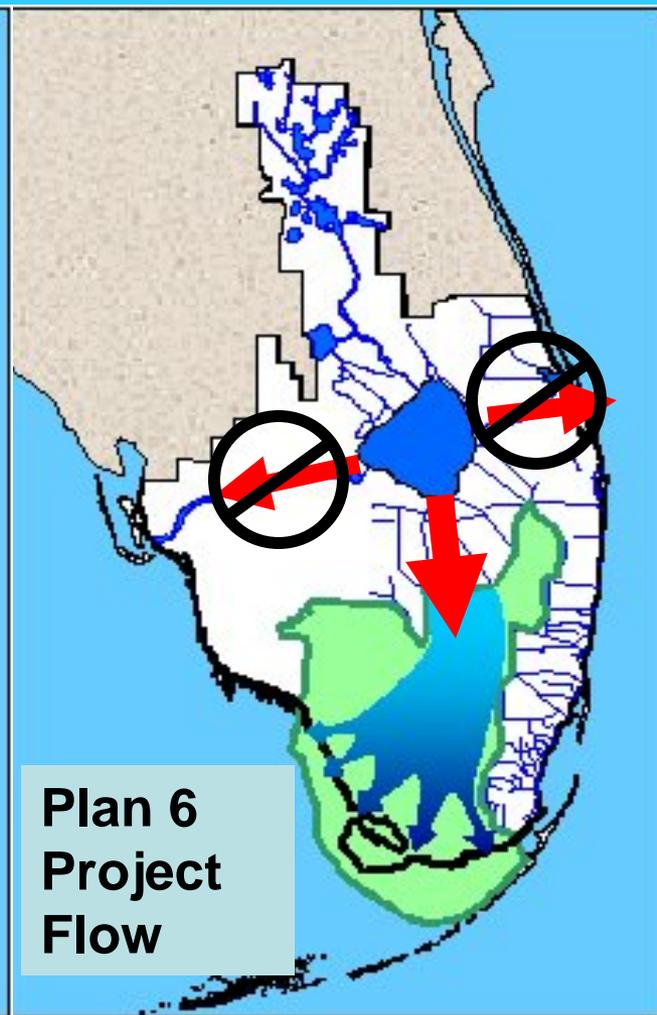
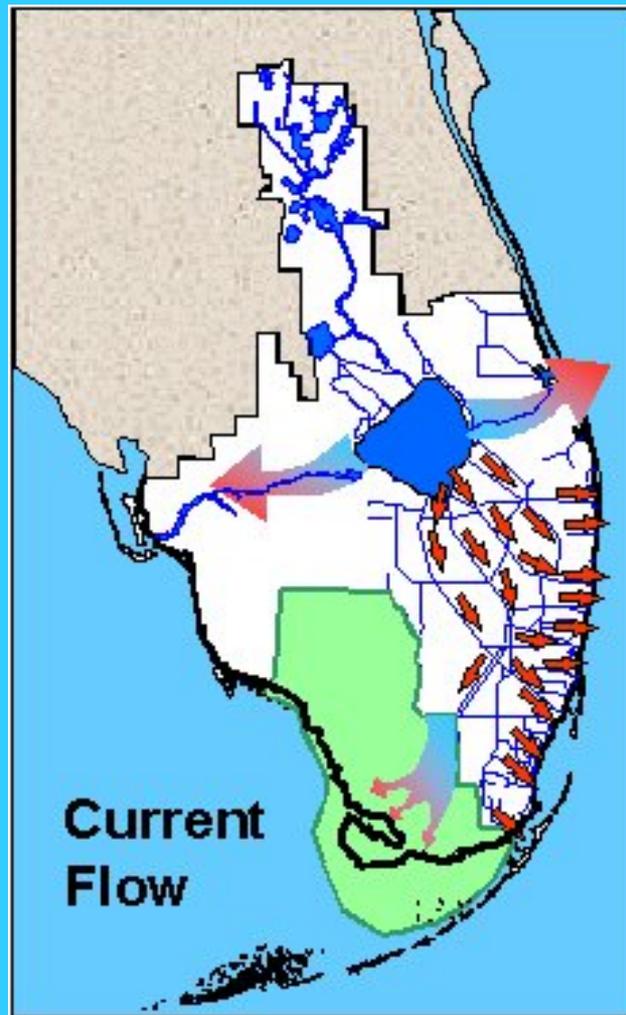


C&SF Restudy Recon. Report, Plan 6, 1994.

## Plan 6 – 1993, 1994 - Reconnect Lake Okeechobee to the Everglades- River of Grass- Move Water South

# Early Conceptual Plans - Everglades Restoration

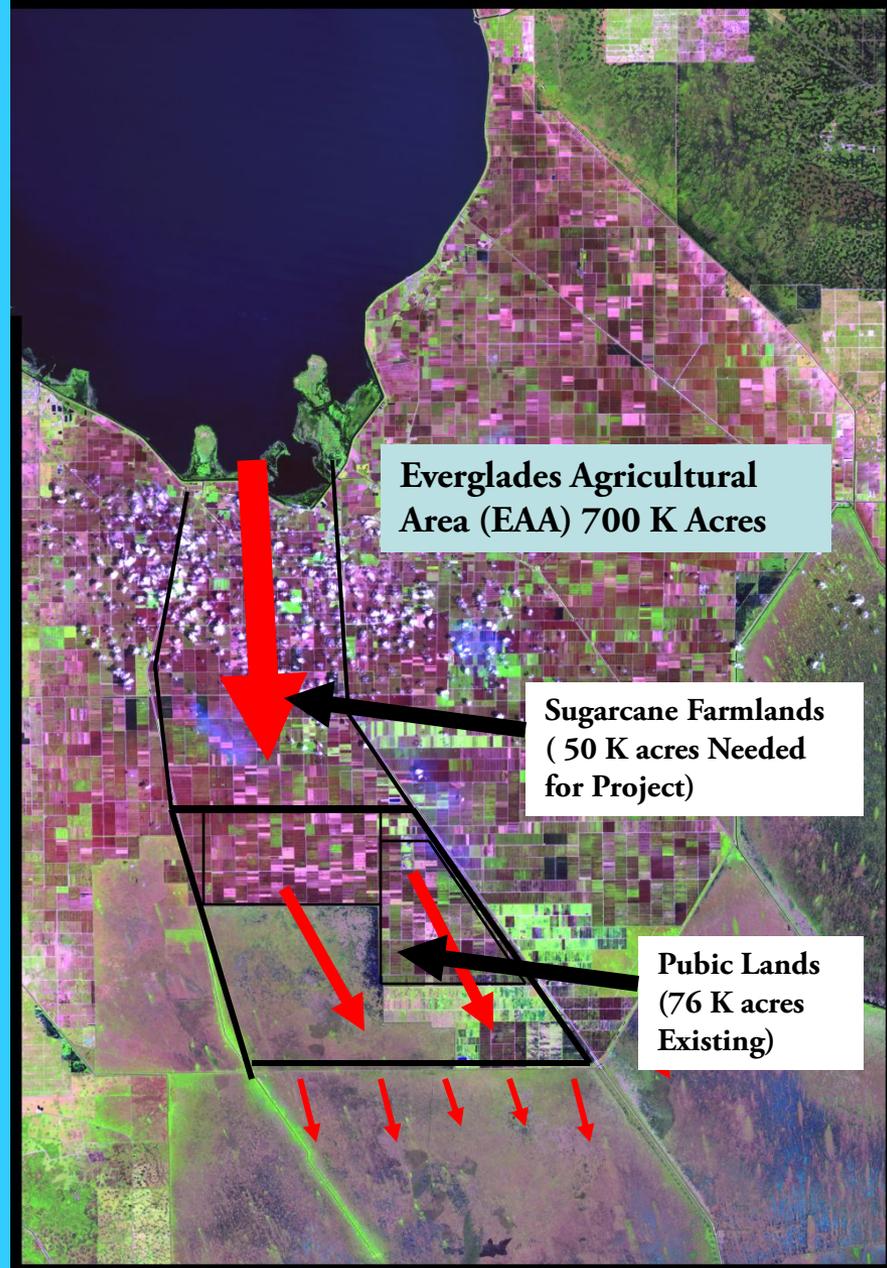




## Historic, Current & New Plan 6 Project Flows

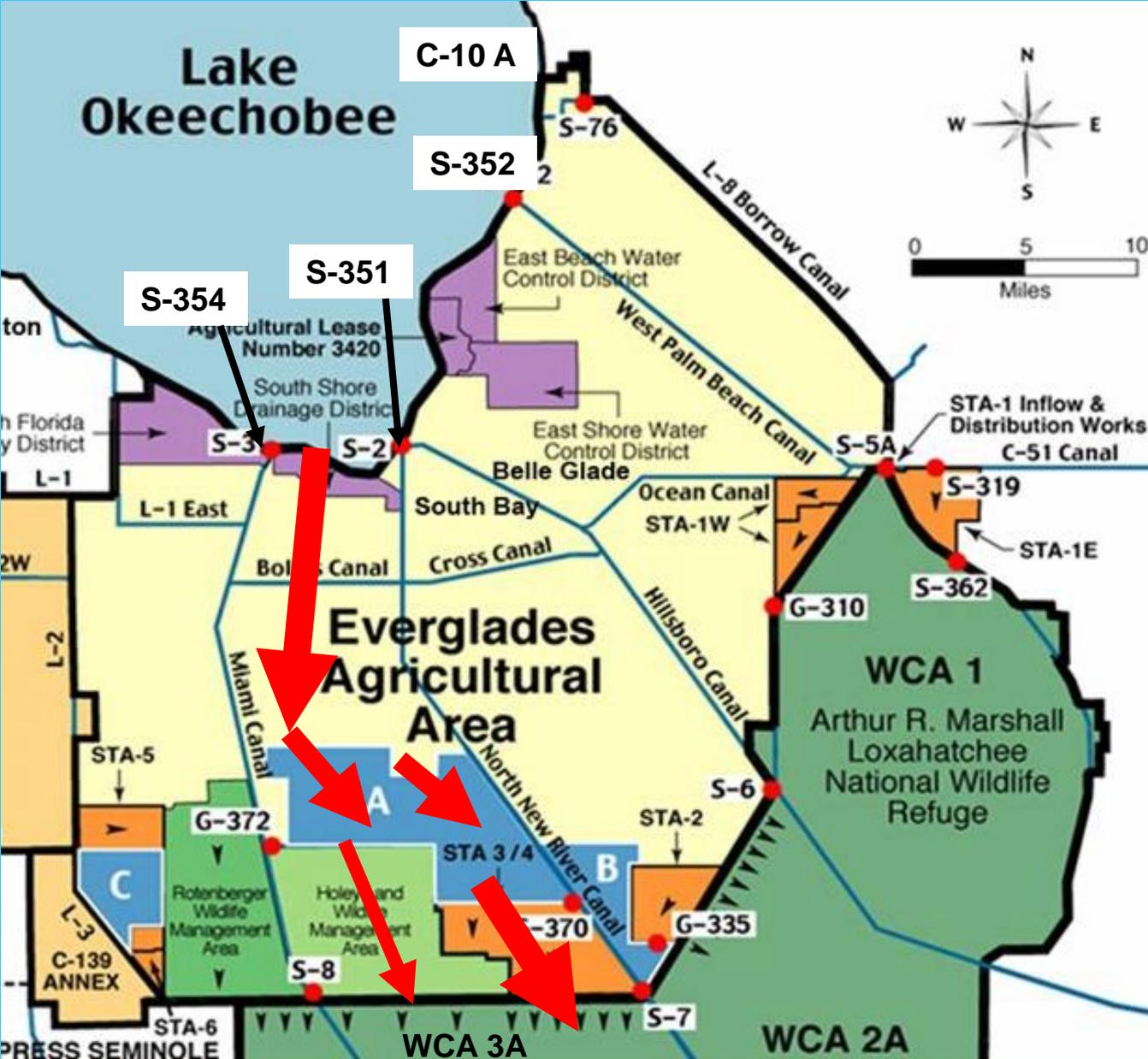
**New and Broader Plan 6 Project**

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



## **New and Broader Plan 6 Project**

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



1. Becomes THE primary outflow for water from Lake Okeechobee
2. Stops destructive 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 from the Lake to the Everglades
5. Provides for healthy water levels in Lake Okeechobee
6. Maintains Water Quantity, Quality, Timing and Distribution for Everglades Restoration

**New and Broader Plan 6 Project**  
**Stop destructive discharges to the Northern Estuaries and Restore the River of Grass**

**Current Average Annual  
Discharge Volumes**

**Current Maximum Flood  
Discharge Rates**

**Lake Okeechobee ASR Project-  
200 wells @ 5 MGD- Proposed  
CERP Project**

**1548 cfs**

**S-77  
9300 cfs**

**S-308  
7300 cfs**

**St Lucie Estuary  
20 %**

**Lake  
Okeechobee**

**2.21 M AF per Year**

**C-10 A  
900 cfs**

**442 K AF per Year**

**S-352  
900 cfs**

**To the Everglades  
13 %**

**Caloosahatchee Estuary  
44 %**

**S-351  
1500 cfs**

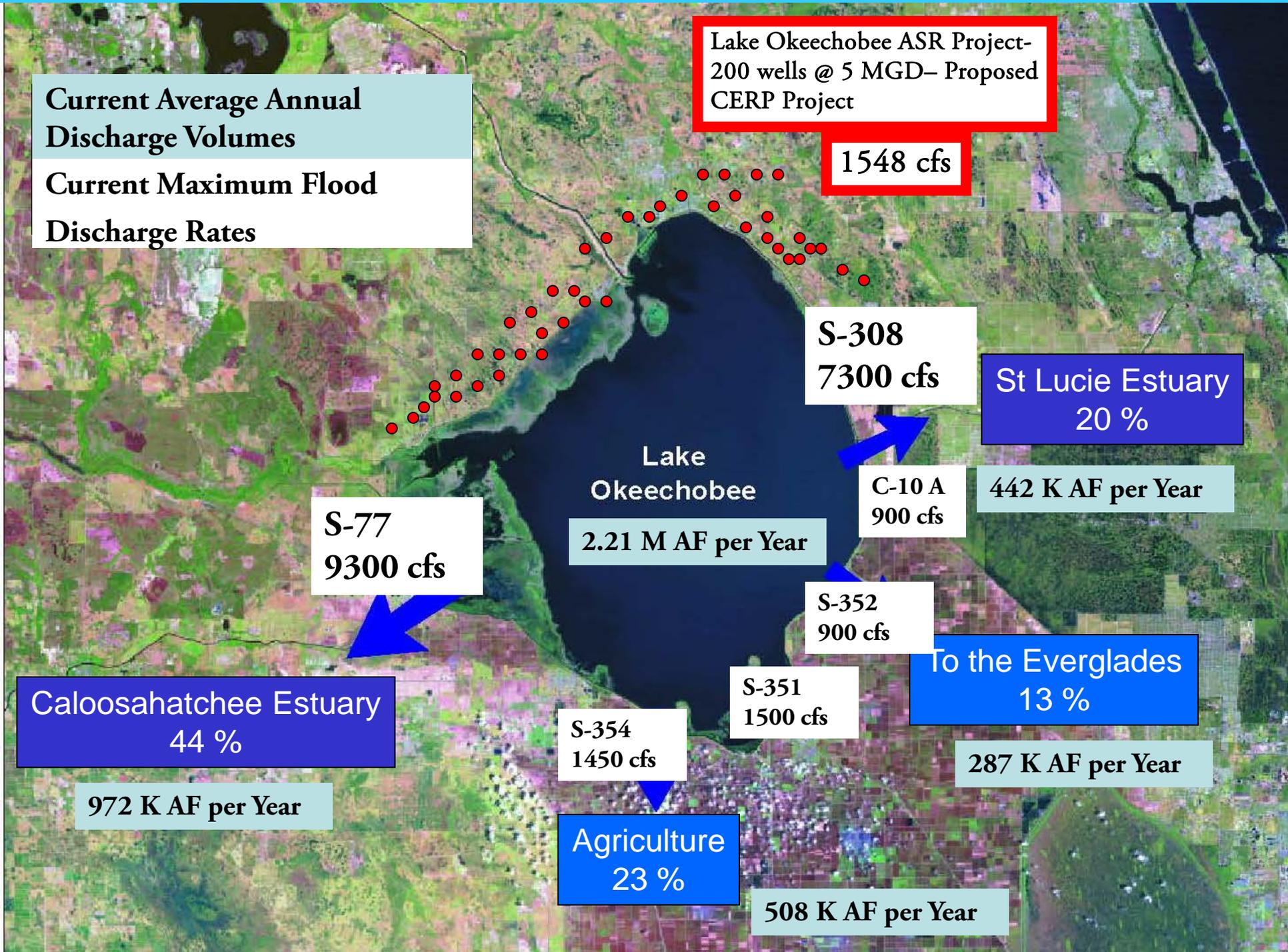
**972 K AF per Year**

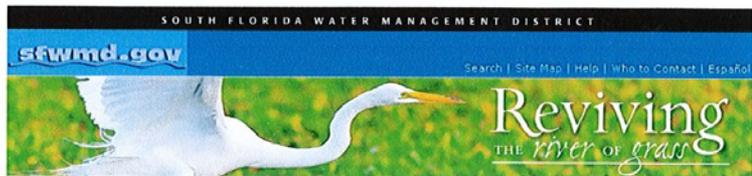
**S-354  
1450 cfs**

**287 K AF per Year**

**Agriculture  
23 %**

**508 K AF per Year**





- Home
- About SFWMD
- Governing Board
- Regional Service Centers
- News, Events & Meetings
- Water Conservation
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- Career Opportunities
- Recreation
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**DISTRICT ACQUIRES 26,800 ACRES TO REVIVE THE RIVER OF GRASS**

**Background**

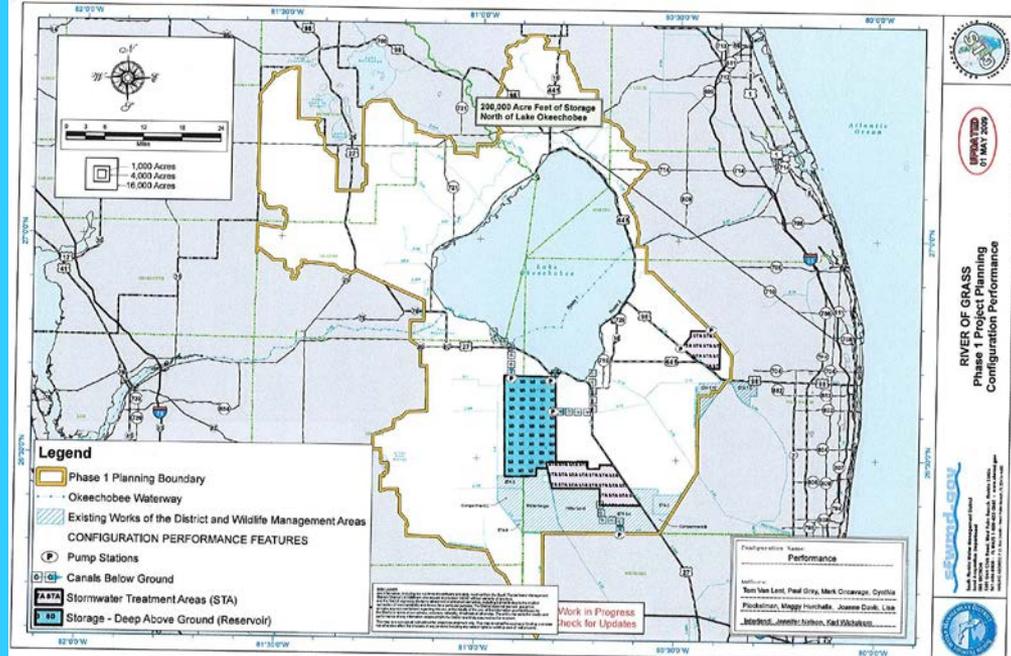
**June 2008:** Governor Charlie Crist announced that the South Florida Water Management District would begin negotiating an agreement to acquire as much as 187,000 acres of agricultural land owned by the United States Sugar Corporation for Everglades restoration. Acquiring the enormous expanse of real estate offers water managers the opportunity and flexibility to store and clean water on a scale never before contemplated to protect Florida's coastal estuaries and to better revive, restore and preserve the fabled River of Grass.

**December 2008:** Following extensive negotiations, due diligence and public deliberation, the South Florida Water Management District's Governing Board voted to accept the negotiated proposal to acquire more than 180,000 of agricultural land for \$1.34 billion, contingent upon financing and affordability.

**May 2009:** After gathering key input from the public, legislators and South Florida's communities and recognizing the nation's current economic climate, the South Florida Water Management District and U.S. Sugar Corporation amended the agreement providing for an initial purchase of close to 73,000 acres for \$536 million, with options to purchase the remaining 107,000 acres during the next ten years when economic and financial conditions improve.

**August 2010:** In light of continued economic impacts, a decline in District revenues and the need to address recent federal court orders related to Everglades restoration, the Governing Board approved on August 12, 2010, a second amended and restated agreement for purchase and sale of land from the U.S. Sugar Corporation. Under the modified purchase, the District will utilize \$197 million in cash on-hand to take ownership of 26,800 acres of strategically located land with high restoration potential while preserving the option to acquire 153,200 acres of additional lands, if future economic conditions allow.

- ☒ Kissimmee
- ☒ Lake Okeechobee
- ☒ Everglades
- ☒ Coastal Areas



RIVER OF GRASS  
 Phase 1 Project Planning  
 Configuration Performance  
 REVISED BY APR 2009  
 South Florida Water Management District  
 1000 West 17th Street, Suite 1000, Fort Lauderdale, FL 33311  
 Phone: 754.371.1000  
 Fax: 754.371.1001  
 www.sfwmd.com

Department of the Interior - DOI  
Everglades Restoration Initiatives

**A Conceptual Discussion to Integrate Water Flow and Water Quality in Everglades Restoration**

**Shannon Estenoz and Robert Johnson**  
NRC/CISRERP IV Meeting,  
August 23, 2011

**Early Conceptual Plans - Everglades Restoration**

Science Sub-Group Report, Minimum Plan, 1993. C&S Restudy Recon. Report, Plan 6, 1994.

**Reconnect Lake Okeechobee to the Everglades-River of Grass- Move Water South**

Florida Oceanographic Society

# Greater Everglades Restoration

1 – Stop the destructive discharges to the Northern Estuaries and reconnect the “River of Grass” between Lake Okeechobee and the Everglades.

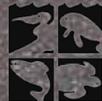
2- Restore the Kissimmee River, its valley and flood plain.

3 - Manage Lake Okeechobee as a “lake” between 12.5 ft and 15.5 ft.

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



# What about our Future?



Florida  
Oceanographic  
Society



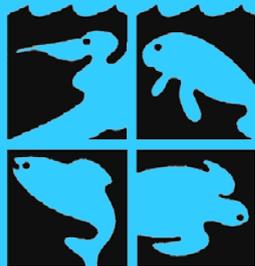
# Our Mission:

*To inspire environmental stewardship of Florida's coastal ecosystems through education and research.*



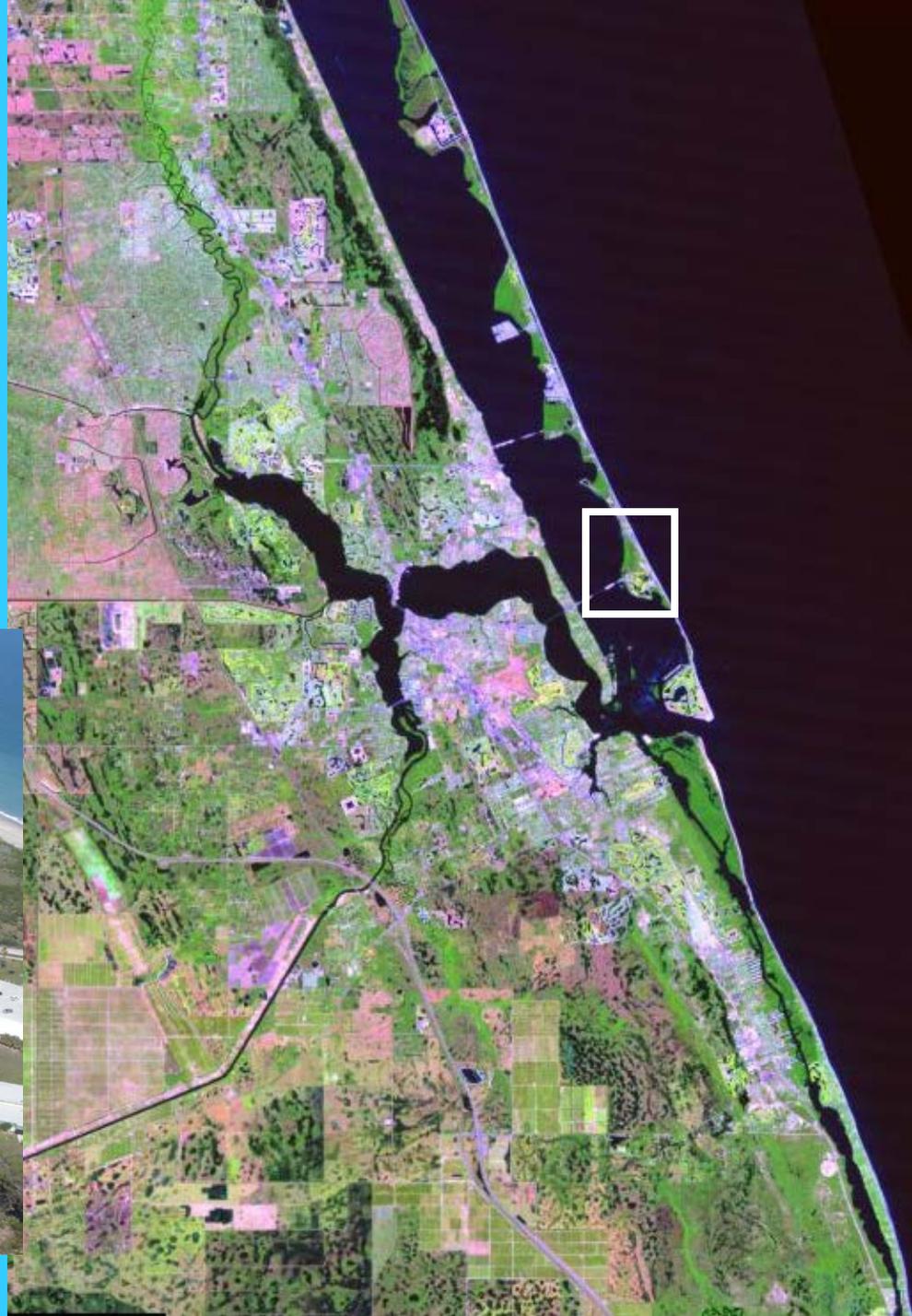
Florida  
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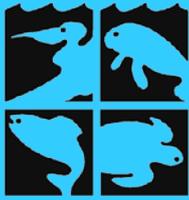
Florida  
Oceanographic  
Coastal Center

**Florida Oceanographic Coastal Center**  
located on Hutchinson Island in  
Stuart, Florida.





**750,000 gallon Game Fish Lagoon**



Florida  
Oceanographic  
Coastal Center

## Education & Programs

*Hands-on learning for  
children and adults*

- *Ray Feeding Programs*
- *Sea Turtle Programs*
- *Game Fish Lagoon Feeding Programs*
- *Guided Nature Trail Walks*



## Research & Conservation

- *Water Quality Monitoring*
- *Oyster Reef Restoration*
- *Native Plant Restoration*
- *St. Lucie Estuary/Indian River Lagoon  
& Everglades Conservation Efforts*



[www.FloridaOcean.org](http://www.FloridaOcean.org)

# St. Lucie River Estuary Water Quality Outlook

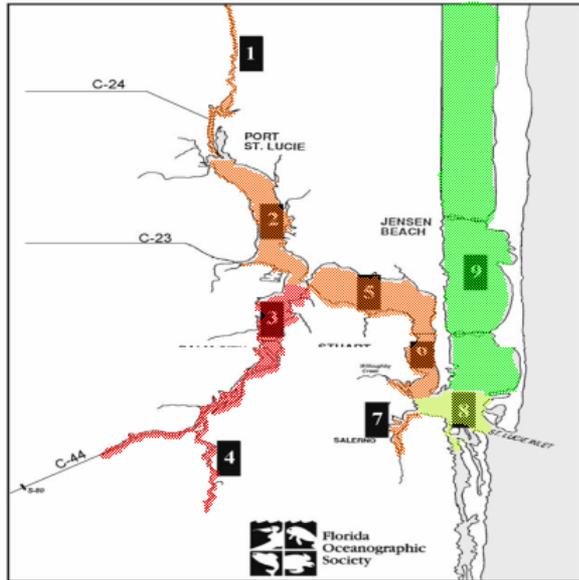
This information is provided by the Florida Oceanographic Society with support of the Marine Resources Council. It is collected by the Citizen Volunteer Water Quality Monitoring Network. For complete data go to our website at:

<http://www.floridaoceanographic.org/water.htm>

Posted: **06/17/10**

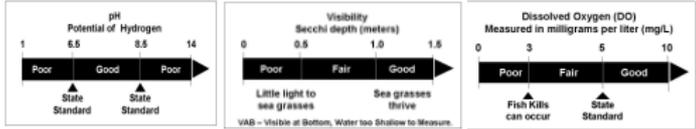
Overall Grade: **67.9%** **D+** **POOR**

Zone/Location	Water Temp. Deg. F	pH	visibility (Secchi) Meters	Salinity ppt	Dissolved Oxygen mg/L	Location Score	Grade
1. Winding North Fork	87	7.7	0.70 Fair	0.0 Poor	4.8 Fair	61%	D Poor
2. North Fork	88	7.7	0.79 Fair	0.0 Poor	4.5 Fair	61%	D Poor
3. South Fork	89	8.0	0.35 Poor	0.7 Poor	6.4 Good	56%	F Destructive
4. Winding South Fork	85	7.3	0.55 Fair	0.0 Poor	2.0 Poor	56%	F Destructive
5. Wide Middle River	89	8.0	0.60 Fair	2.0 Poor	5.8 Good	66%	D Poor
6. Narrow Middle River	86	8.3	0.95 Fair	13.0 Poor	6.9 Good	66%	D Poor
7. Manatee Pocket	90	8.1	0.90 Fair	18.0 Poor	7.1 Good	66%	D Poor
8. Inlet Area	86	8.4	1.15 Good	27.5 Fair	4.9 Fair	81%	B Good
9. IRL	88	8.5	1.45 Good	30.0 Good	6.8 Good	97%	A Ideal



Grading				
A	B	C	D	F
90-100	80-89	70-79	60-69	0-59
IDEAL	GOOD	SATISFACTORY	POOR	DESTRUCTIVE

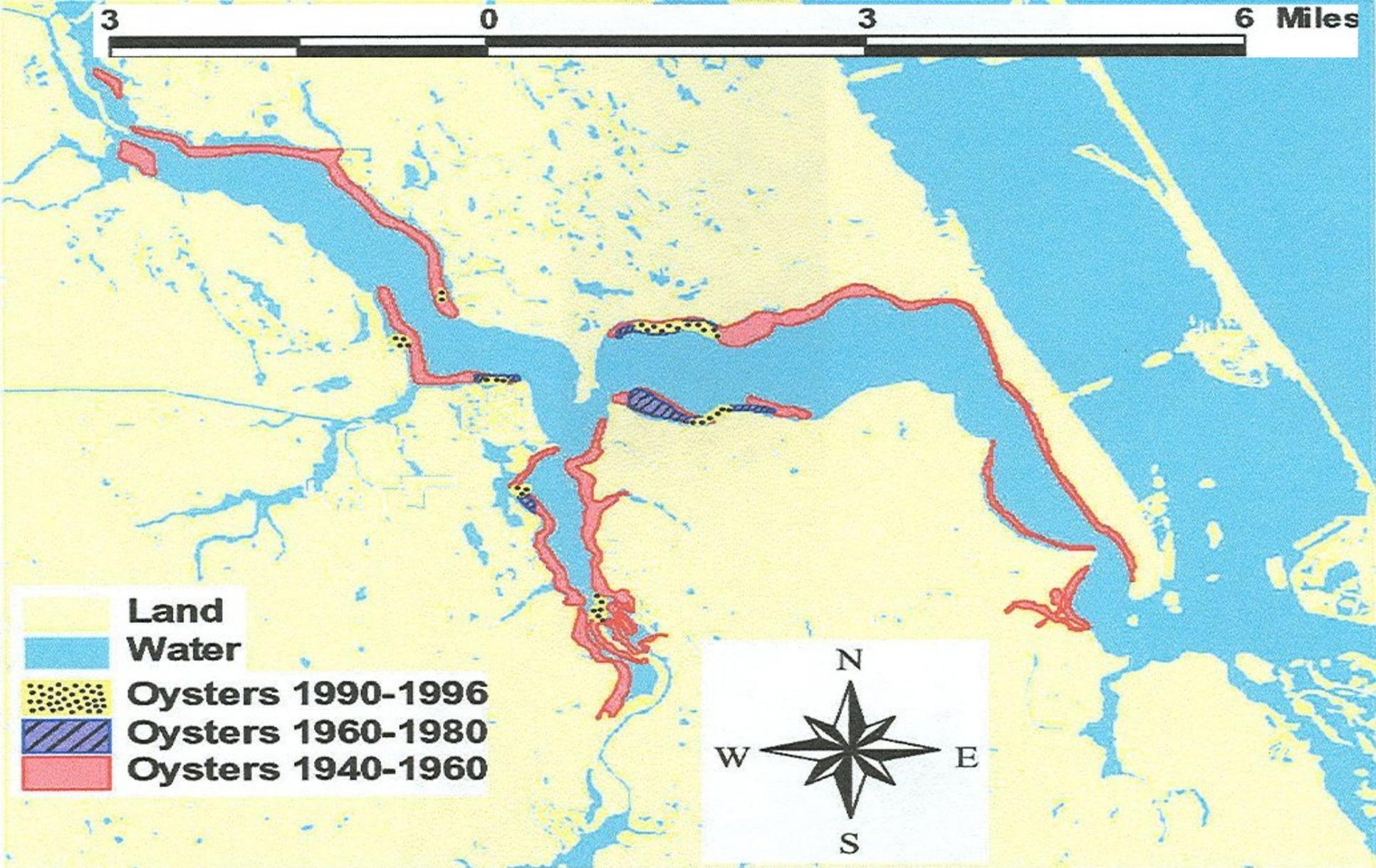
Salinity (Parts per Thousand)				
Zones	Description	Good	Fair	Poor
1 & 4	Winding North & South Forks	2 to 8	1 to 2 or 8 to 15	< 1 or > 15
2 & 3	Inner St. Lucie Estuary (North & South Fork)	15 to 25	10 to 15 or > 25	< 10
5	Wide Middle St. Lucie River	> 20		
6	Narrow Middle St. Lucie River	> 25		
7	Manatee Pocket	> 27.5		
8 & 9	Inlet and Indian River Lagoon (to Jensen Beach Causeway)	>30		



Comment: The data above may indicate areas of concern in the St. Lucie Estuary. Citizens should call the Florida Department of Environmental Protection (DEP) at 871-7862 or the South Florida Water Management District (SFWDMD) 223-2600 to ask about the quality of a specific area and report observations of pollution.

*Water Quality Monitoring preformed weekly by volunteers throughout Martin County. Results published weekly in The Stuart News.*

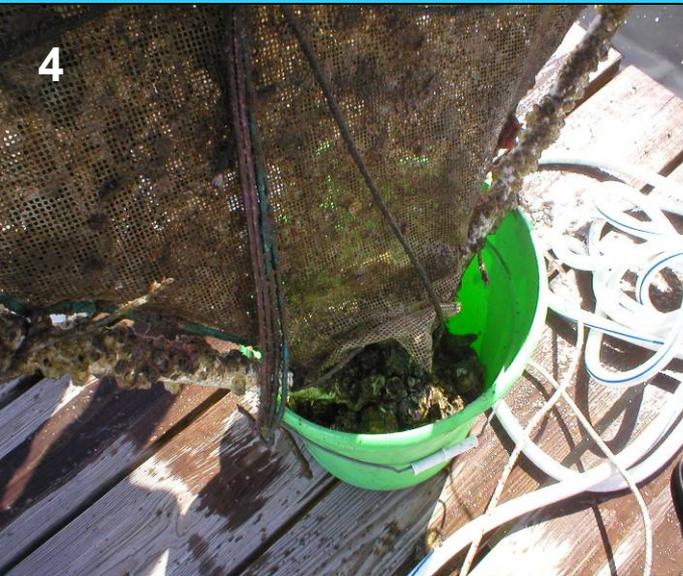




# St. Lucie River Estuary Oyster Reef Habitat

1940s – 470 acres    1996 – 260 acres    2003 – 116 acres

# Oyster Gardening Habitat Restoration Program – Started 2005



# Oyster Reef Restoration

*Oyster Shells collected from local restaurants are bagged and deployed to designated reef restoration sites by staff and volunteers. New oyster growth is monitored by staff*

*1 adult oyster can filter **50 gallons per day**, and oyster reefs provide shoreline stabilization and habitat to **over 300 estuarine species***



In partnership with  
Martin County Oyster  
Reef Restoration Project



N

0 0.5 1 2 Miles

FOS 

North Fork

Middle Estuary

M.S. Oyster Reef

Lower Estuary

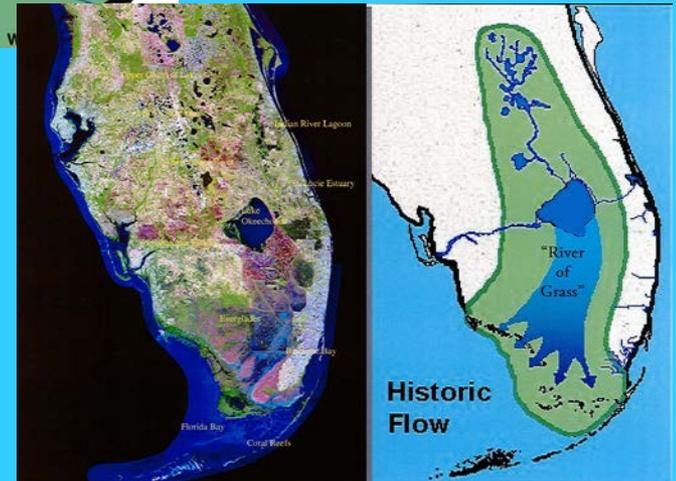
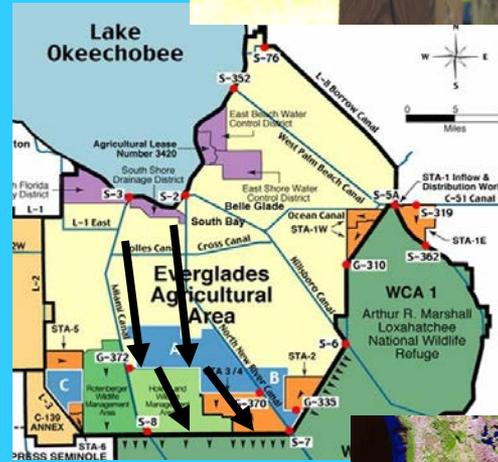
South Fork

-  Florida Oceanographic Coastal Center
-  Martin Co./NOAA Reefs
-  Historic Oyster Reefs



# Mark Perry Executive Director Conservation Advocacy

- *Member of the Everglades Coalition*
- *Member of the State Water Resource Advisory Commission*
- *Member of the Rivers Coalition*
- *Testified to U.S. Senate Committee and in Federal Courts as to value of the Everglades and Florida's coastal ecosystems*





# Florida Oceanographic Society

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## Welcome to Florida Oceanographic Society



Join our mission to *inspire environmental stewardship of Florida's coastal ecosystems through education and research.*



Welcome to Florida Oceanographic Society. With more than 8,500 miles of tidal shorelines, 2.1 million acres of estuaries and 30% of the state's land cover consisting of wetlands, Florida's relationship to water is vital to the prosperity of our state.

Since 1964, Florida Oceanographic Society has worked to protect our coastal ecosystems through education and research. I invite you to get involved today – [VISIT THE COASTAL CENTER](#), [BECOME A MEMBER](#), and [VOLUNTEER](#). Together let's inspire environmental stewardship for generations to come.

## FEATURED EVENTS

**SAVE THE DATE**  
February 23, 2013  
6-10:30 p.m.

**TICKETS:**  
\$175 member  
\$225 non-member

**Birding 101**  
at  
**Florida Oceanographic**

January 9, 16, 23 & 30  
4 Full-Day Classes  
2 Excursions, Presentations  
& Labs Per Day  
Transportation Included  
Very Limited Enrollment  
\$170 Members  
\$200 Non-Members

For Registration & Details  
Call Ellie Van Os  
(772)225-0505 ext. 113

WHAT'S GOING ON?



Florida  
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