Everglades Restoration
Problems, Remedies, Process
1988 – 2010

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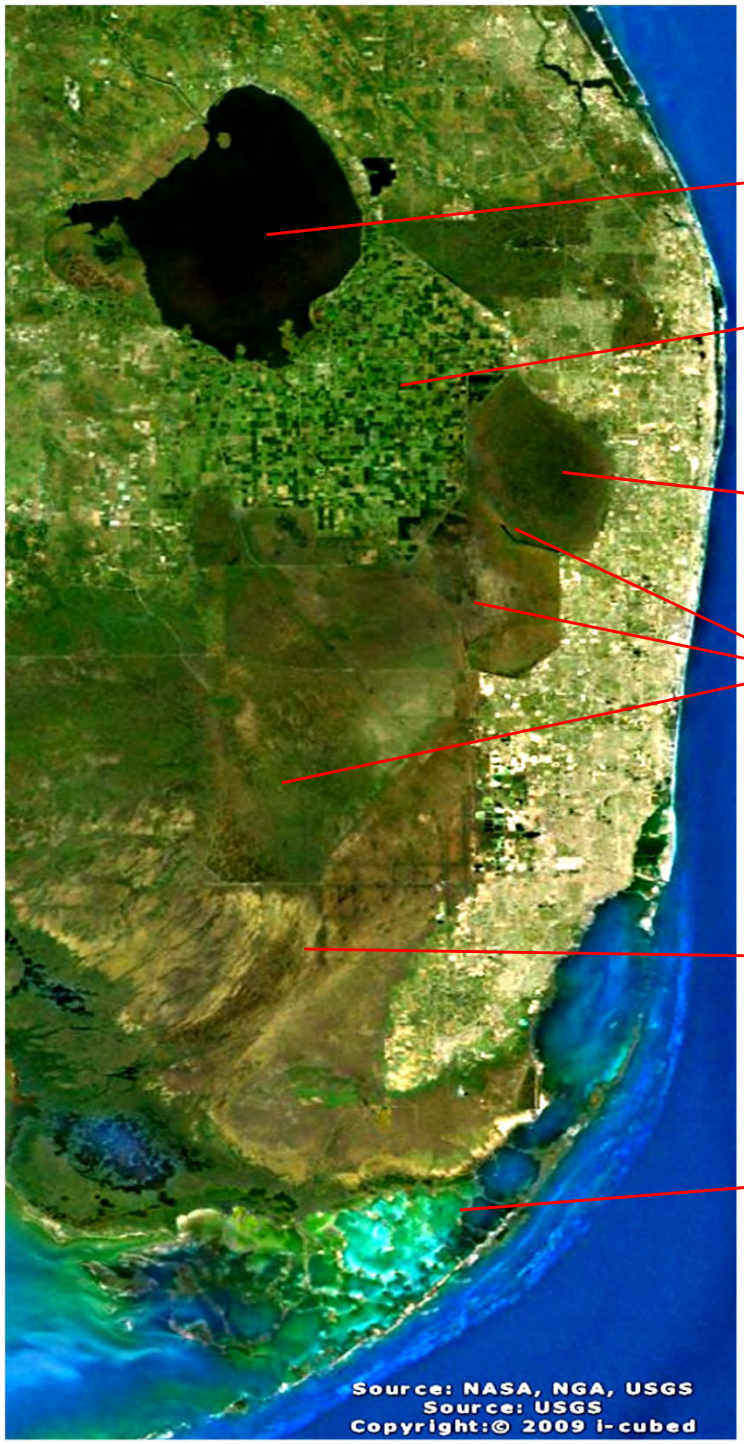
Everglades Restoration
Problems, Remedies, Process

- Setting & History
- Problems & Remedies
  - Water Quality
  - Hydrology
  - Integration
- Decision-Making Process
- Challenges


Lake Okeechobee
Everglades Agricultural Area
Loxahatchee National Wildlife Refuge
Everglades Water Conservation Areas
Everglades National Park
Florida Bay
Source: NASA, NGA, USGS
Source: USGS
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Water Quality Problems

- Nutrient Enrichment (focus), Mercury, Pesticides
- Adverse Impacts on Water Quality, Vegetation, Wildlife Habitat Caused by Excessive Phosphorus Loads
  - Agricultural Runoff (500,000 acres)
  - Lake Okeechobee Outflow
  - Urban Runoff (Minor)
- Problem, Goals, Technology Realtively “Easily” Defined (vs. Hydrologic Restoration) Using Phosphorus as Surrogate & Simple Models
- Resource: Global Experience in Defining and Solving Nutrient Enrichment Problems in Wetlands, Lakes, Rivers, But:
  - Extreme Scale
  - Extreme Sensitivity of Ecosystem (Low Assimilative Capacity)
  - Potential Conflicts with Other Management Objectives & Restoration Goals

Water Quality Problems (ct.)

- Restoration Effort Triggered Largely by 1988 Lawsuit Settled in 1991
- Significant Progress Made over 1991-2010 Period
- Reasonably Functional but Controversial Decision-Making Process
- Challenging Goal: Reduce Inflow P from ~170 ppb to ~10 ppb.
- Further Remedies Being Developed Jointly (Another Settlement?)
  - Additional P Controls (Agric Practices, Treatment Wetlands)
  - Integration with Hydrologic Restoration (Finally!)
- Courtroom Battles Continue & Are Occasionally Productive

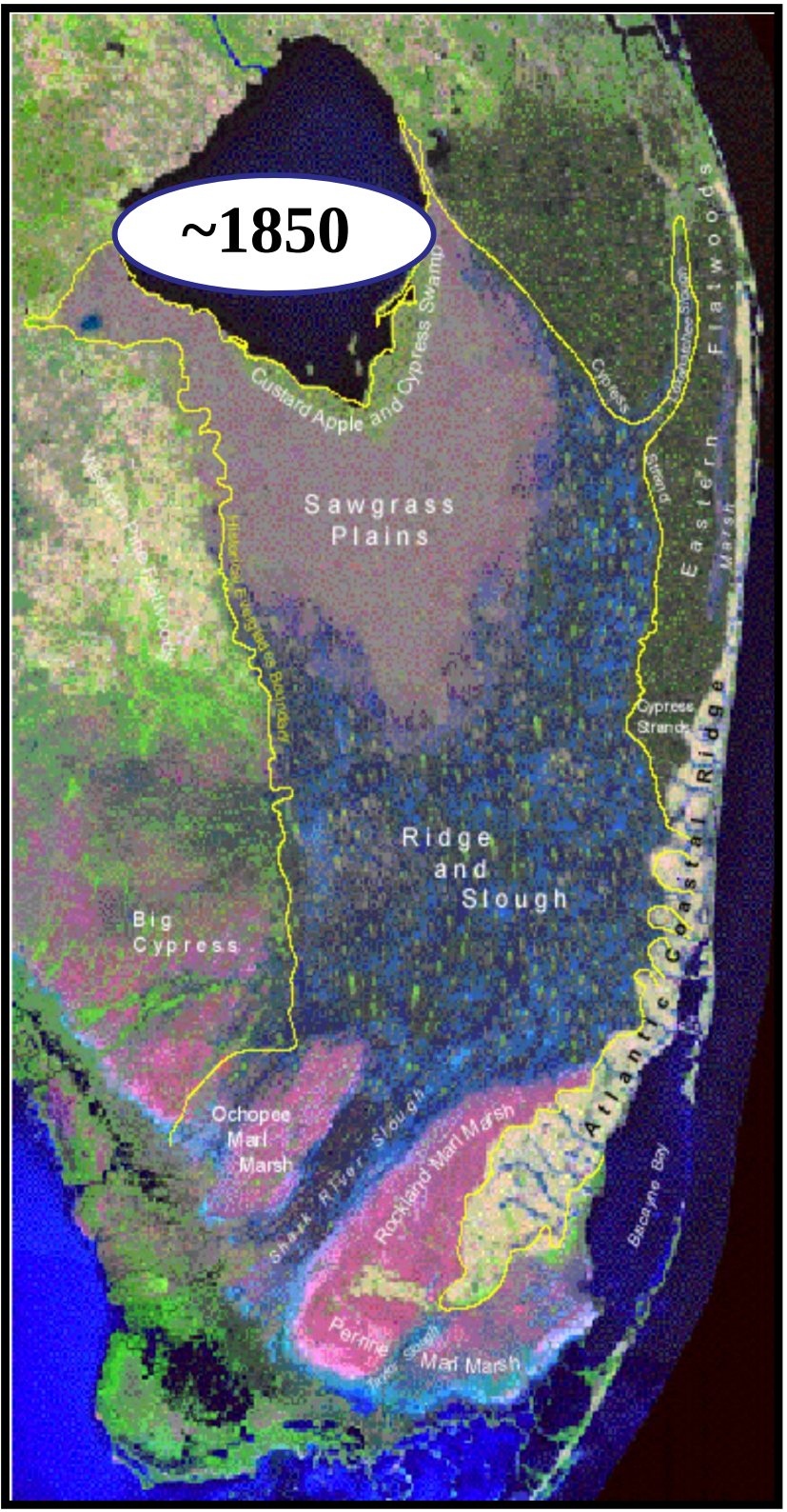
Hydrology Problems

- Adverse Impacts on Wildlife Habitat Caused Mainly by
  - Impoundment of Natural Marsh to Provide Flood Control
  - Drainage to Support Agriculture & Urban Development
  - Changes Inflow Volume and Timing
  - Changes in Water Depth and Hydroperiod (% Wet vs. Dry)
- Problems, Goals, & Remedies Relatively Difficult (vs. WQ)
  - “Natural” Conditions Estimated from Complex Hydrologic Models
  - “Flashy” Hydrology
  - Diverse Hydrologic Needs (WCAs, ENP, Florida Bay, Estuaries)
  - Flood Control and Water Supply for Agric & Urban Areas
  - Conflicts with WQ and Wildlife Management Objectives

Hydrology Problems (ct.)

- Reasonably Dysfunctional Decision-Making Process
- Lots of Big Ideas, but Limited Restoration Accomplished (Research, Water Level Regulation, Buffer Strips, Kissimmee River Wetland Restoration)
- New “River of Grass” Initiative Offers Some Hope
  - Opportunity to Purchase Large Tracts of Agricultural Land
  - Projects: Storage, Treatment, Flow Distribution, Operation
  - Integration with Water Quality Remedies
  - Improved Design & Decision-Making Process

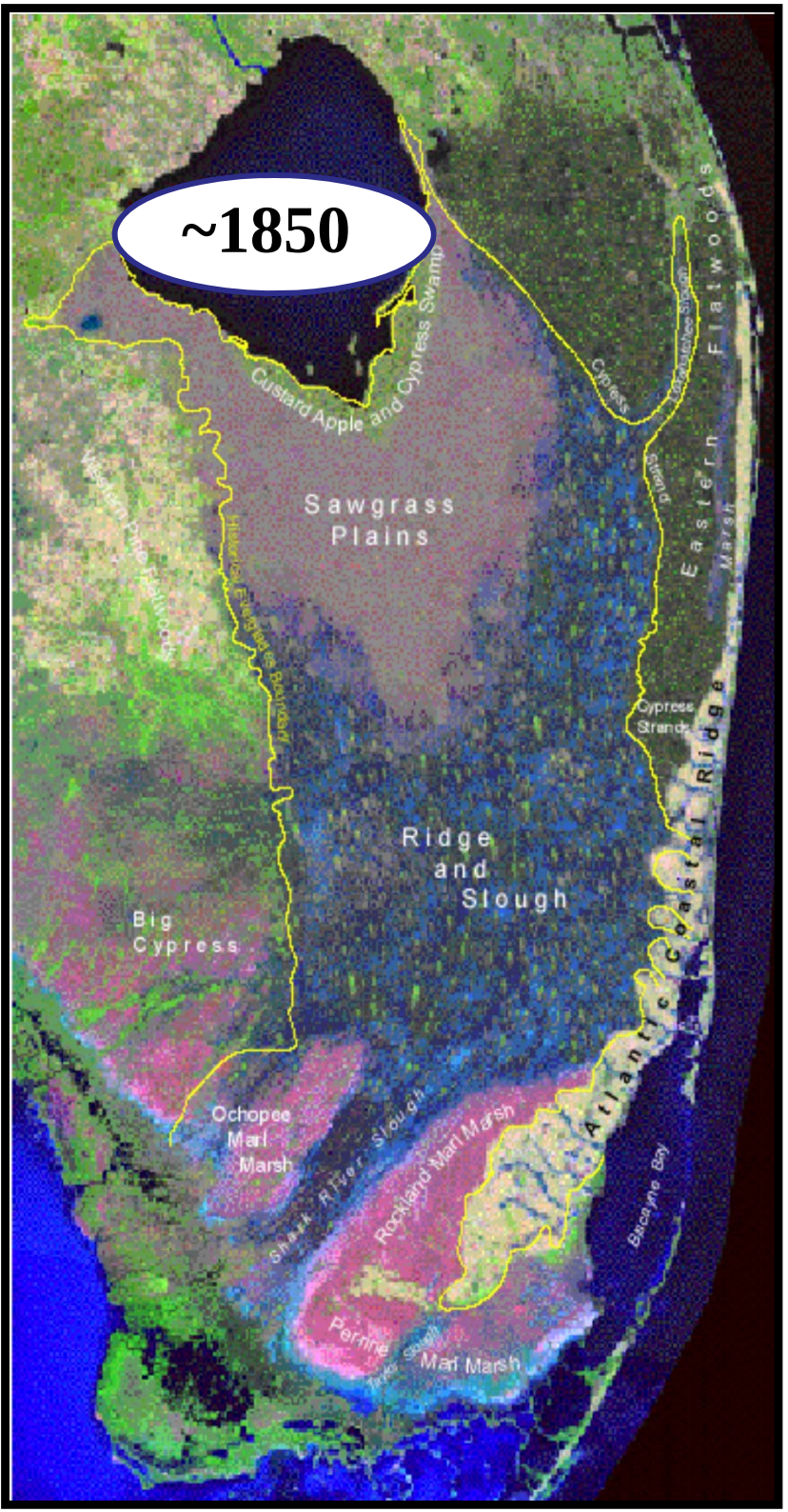
Everglades History – the problems

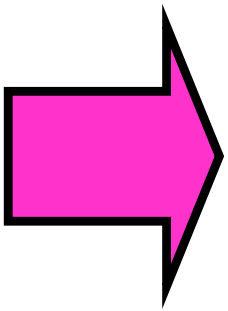


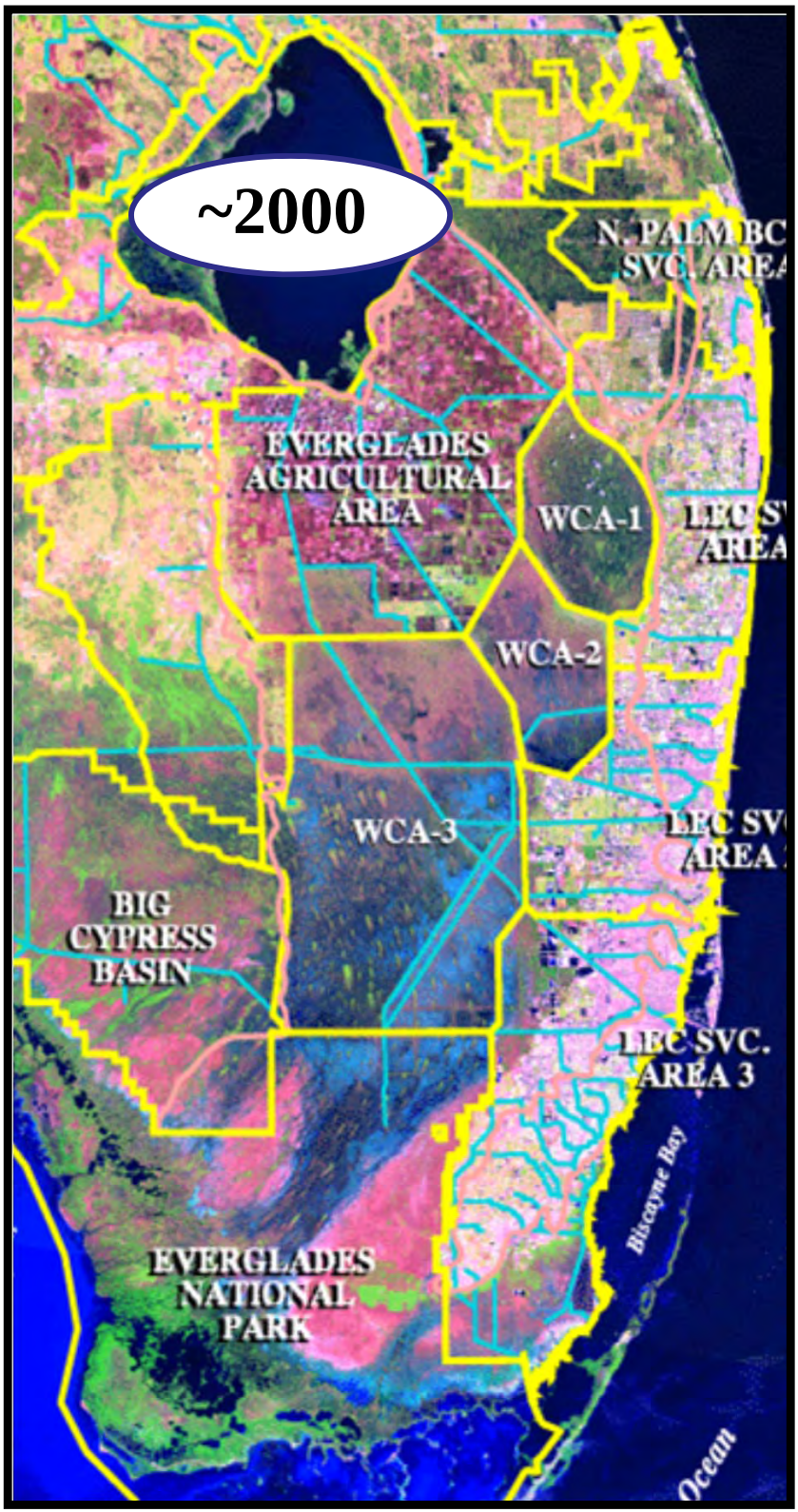
The "River of Grass"

- Vast shallow wetlands
- "Ridge and Slough" landscape of water lily sloughs, sawgrass ridges & tree islands
- Sheetflow
- Low nutrients
- Relatively low species diversity with "hotspots"
- Abundant fish, birds, and reptiles

Ecological Diversity of Native Everglades Marsh


~1850
Custard Apple and Cypress Swamp
Cypress
Lake Okeechobee Slough
Eastern Flatwoods
Sawgrass Plains
Historical Everglades Boundary
Cypress Strands
Marsh
Ridge and Slough
Big Cypress
Atlantic Coastal Ridge
Ochopee Marl Marsh
Shark River Slough
Rockland Marl Marsh
Biscayne Bay
Marl Marsh



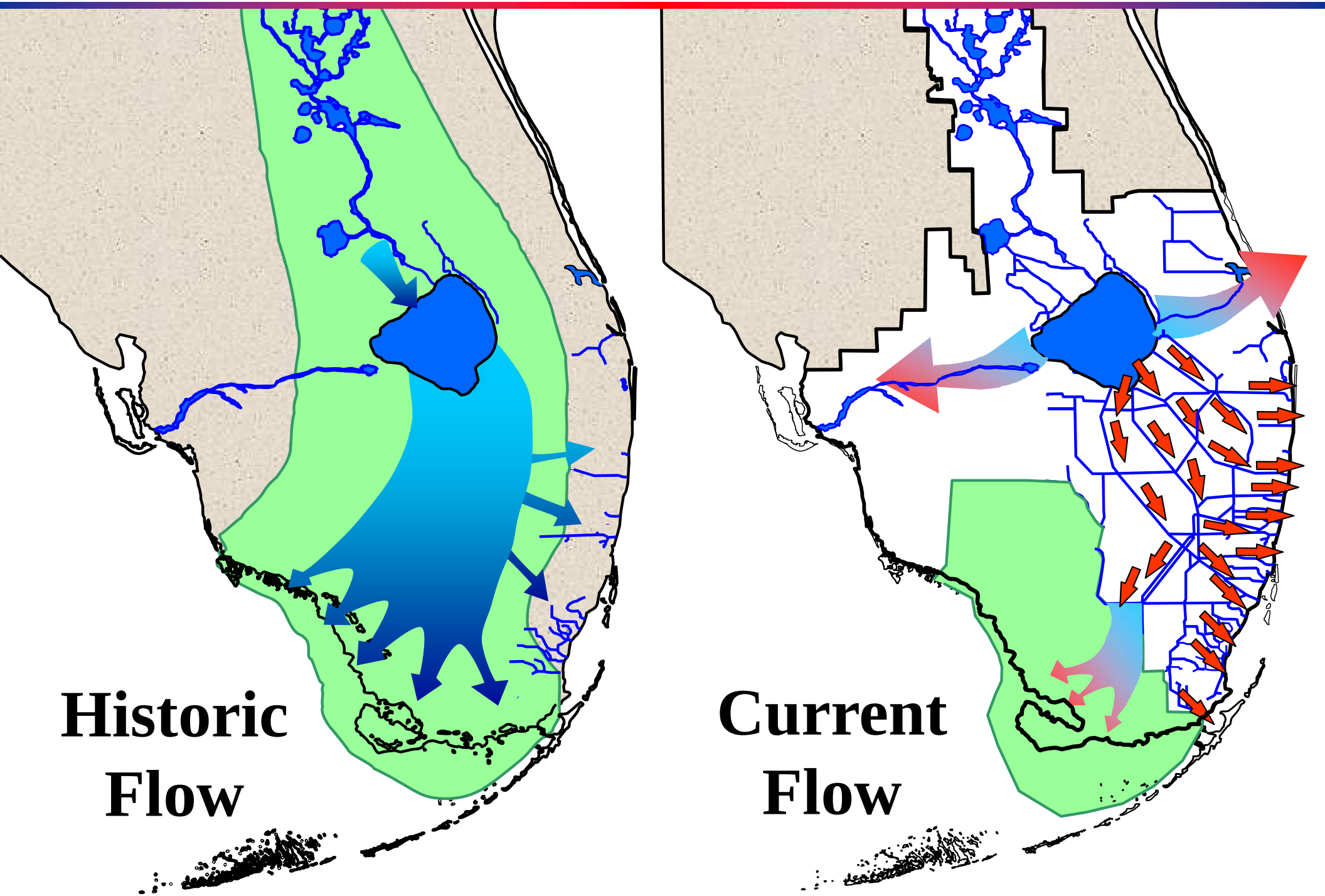

~2000
EVERGLADES AGRICULTURAL AREA
WCA-1
WCA-2
WCA-3
BIG CYPRESS BASIN
EVERGLADES NATIONAL PARK
LEC SVC. AREA 3
Biscayne Bay
Ocean

Central & Southern Florida Project
(1948 – present)

Purposes:

- **Flood control**
- **Water supply**
- **Navigation**
- **Prevent salt-water intrusion to Aquifers**
- **Fish & wildlife conservation**
- **Drain Marsh to Promote Agricultural Development**
- **“Everglades Reclamation”**

Natural vs. Altered Flow Patterns



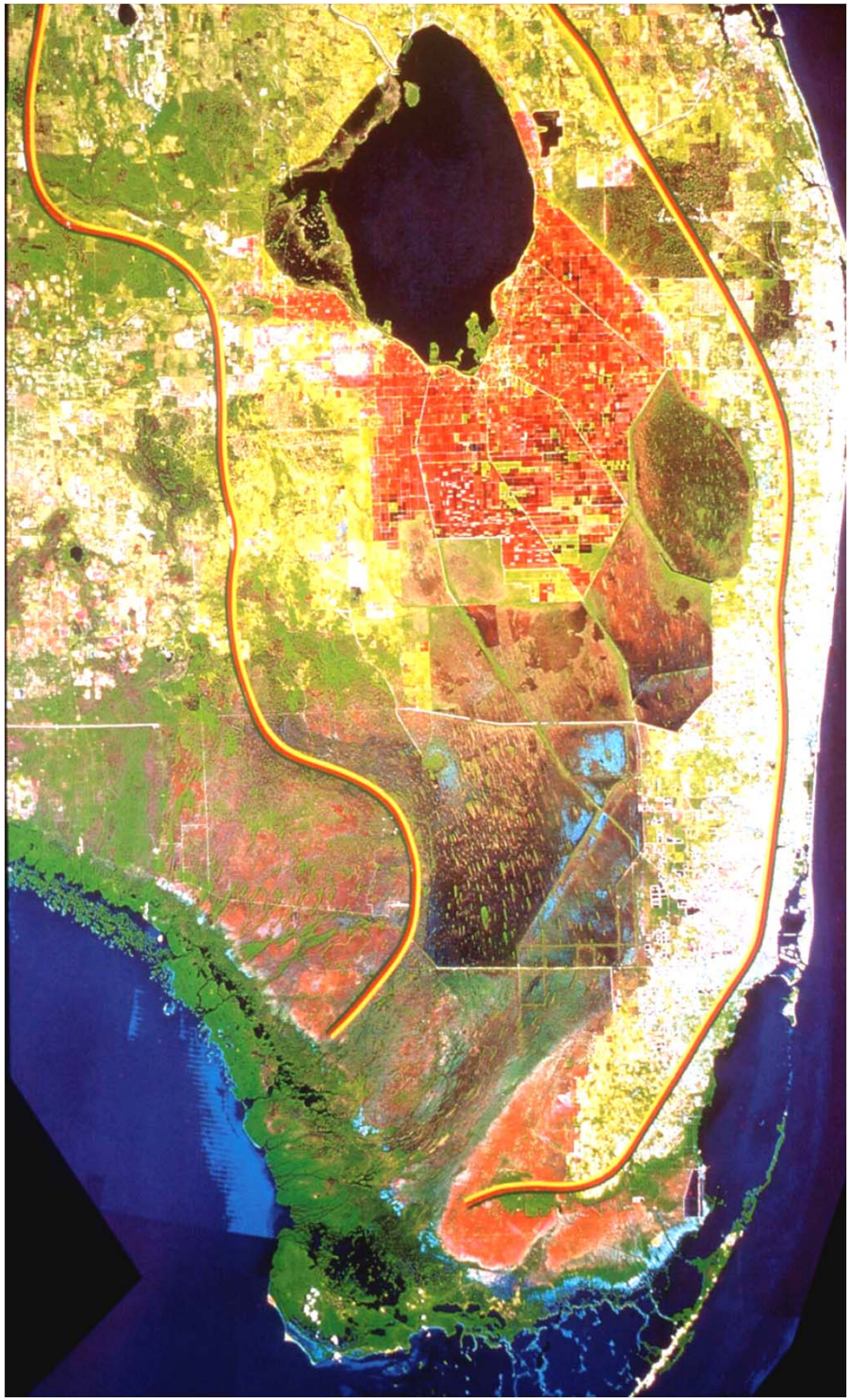
An Ecosystem in Trouble

- Too much/too little water
- Everglades half of original extent

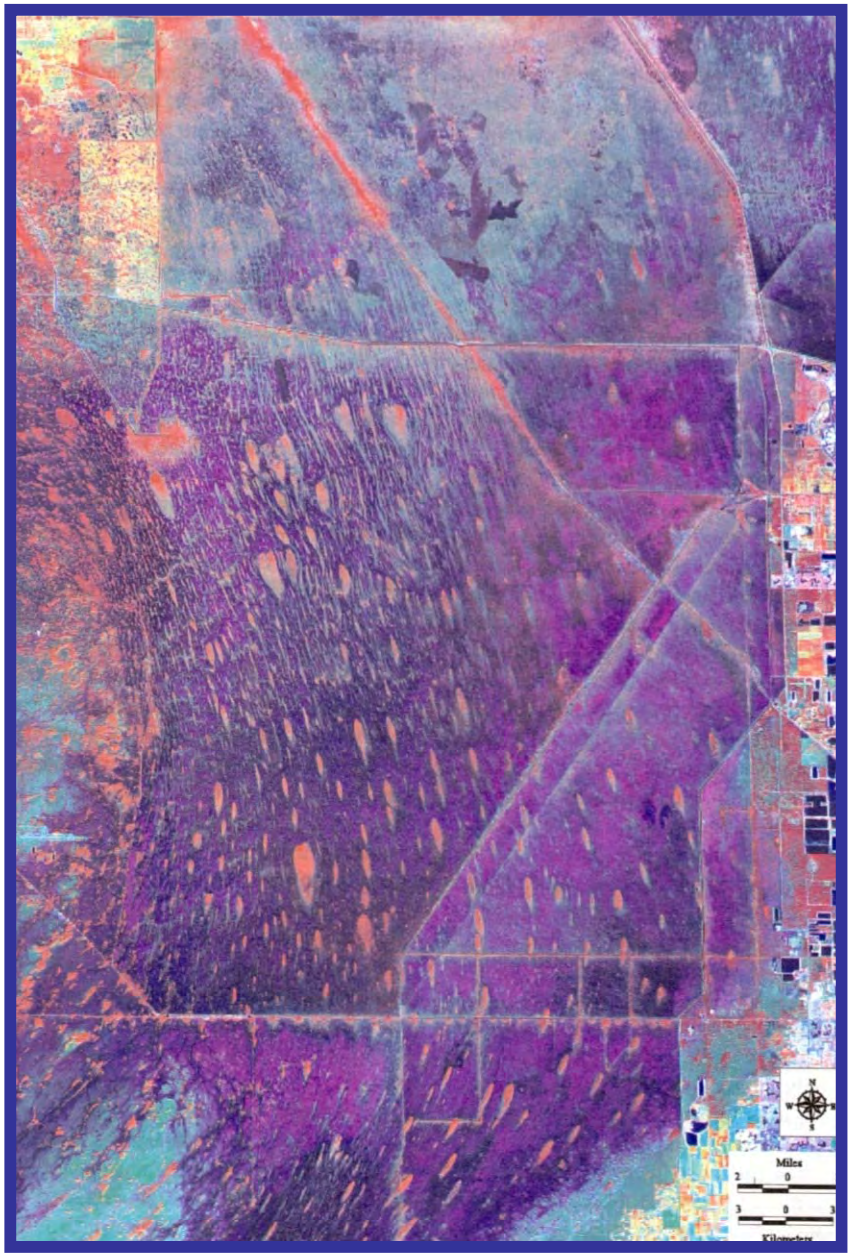
  – impoundments block flow
- Massive reductions in wading birds

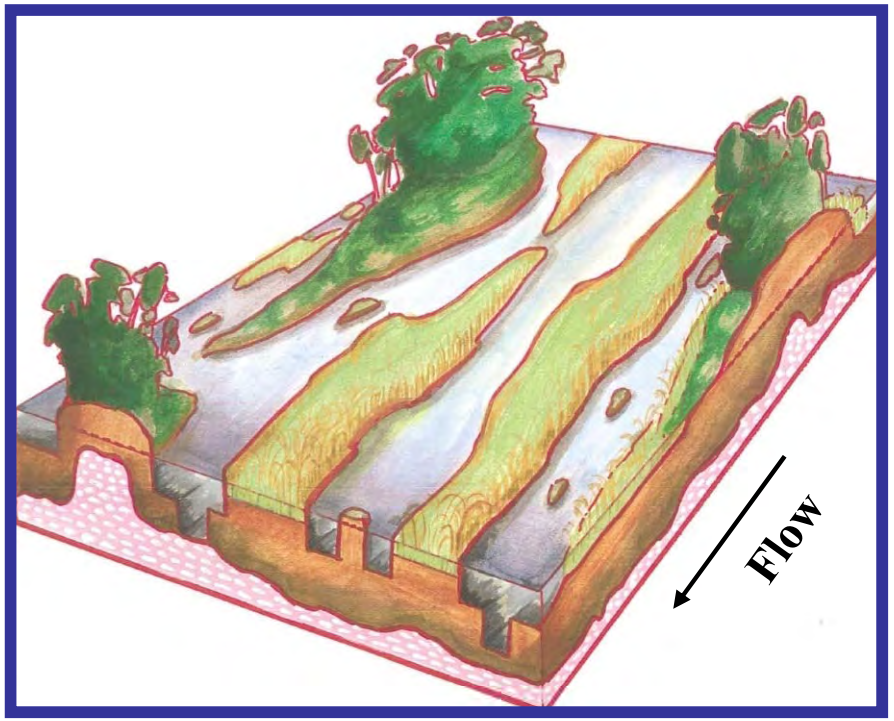
  – down 90-95%
- Degradation of water quality
- Extensive expansion of cattail

  – and 1.5M acres exotics infestation
- Repetitive urban water shortages and salt water intrusion to aquifers
- Declining estuary health
- 67 Threatened & Endangered species



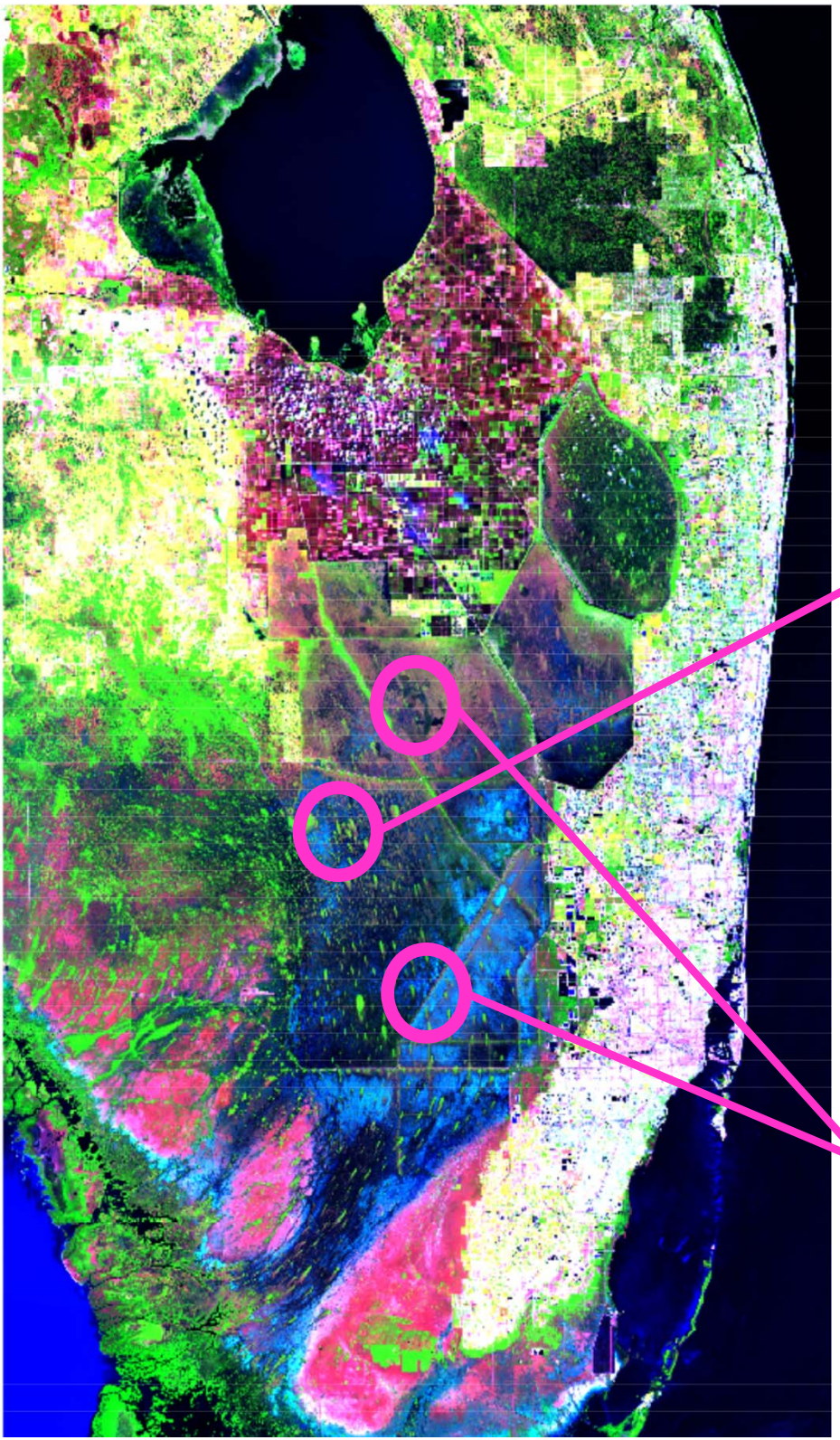
Predrainage landscape was a product of unimpeded flow





Source: Sklar et al., 1999

Landscape changes in the River of Grass Due to Impeded Flow

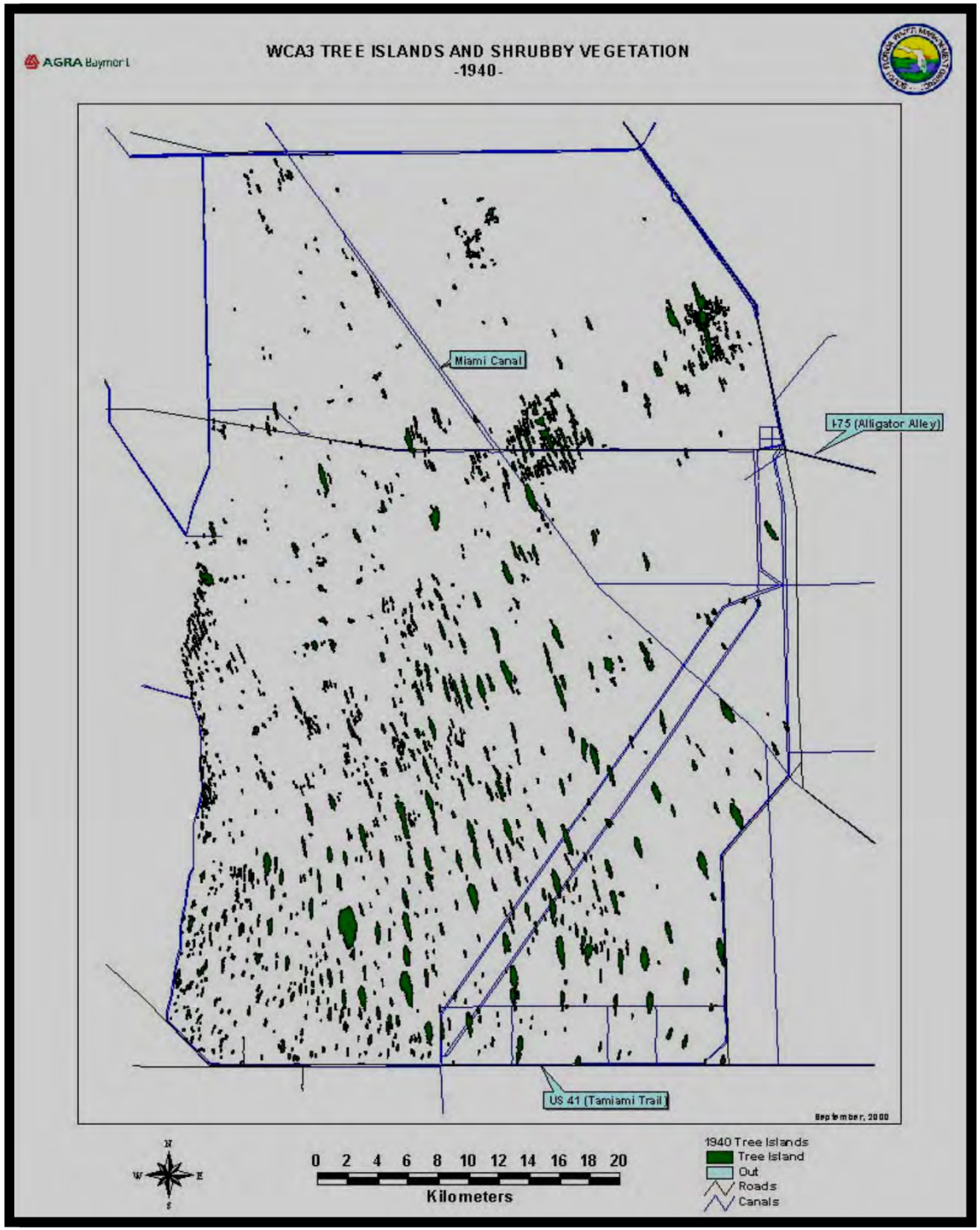


Intact ridge & slough

Degraded ridge & slough

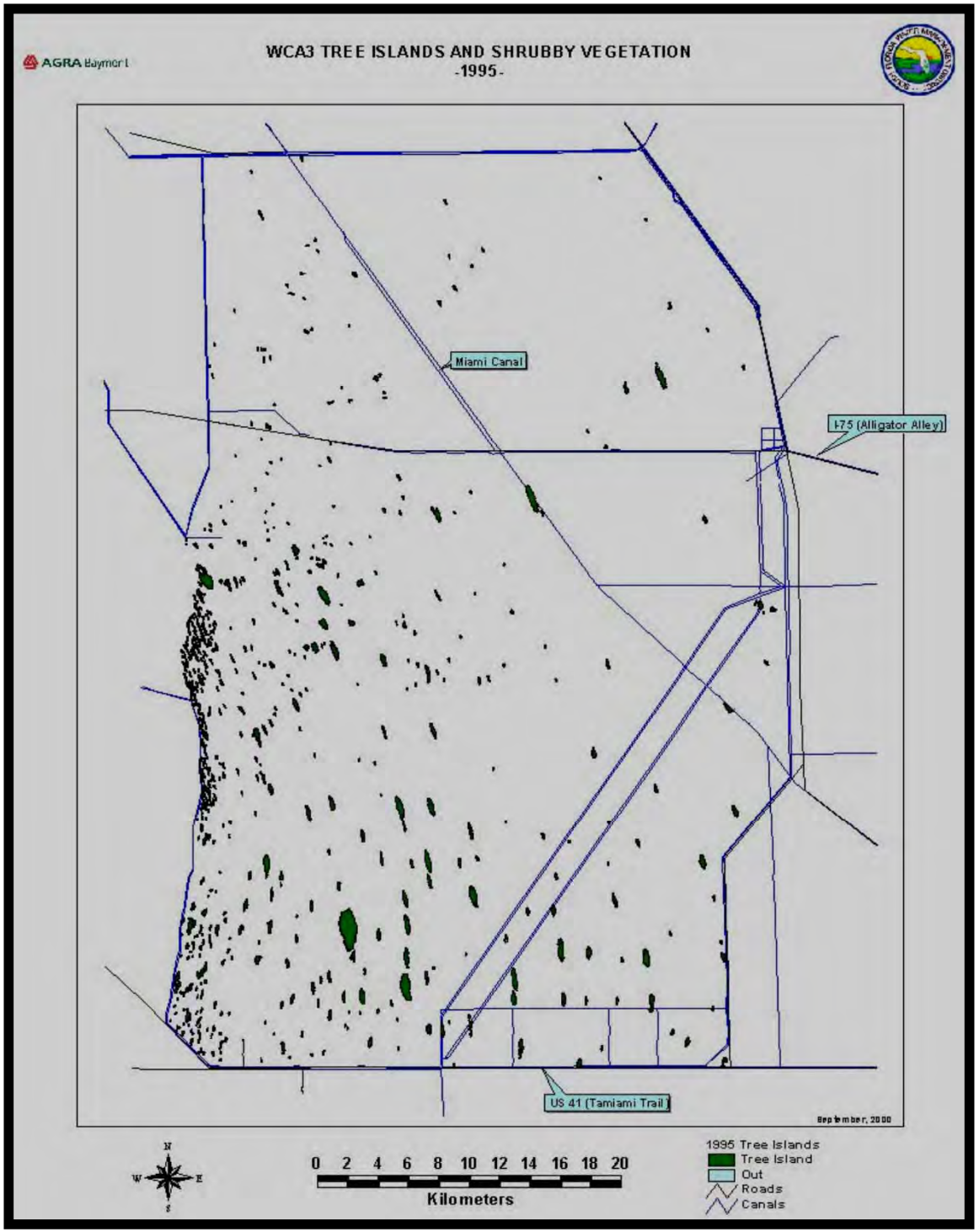
1940 Tree Island Map

22,000 acres of tree islands in WCA3

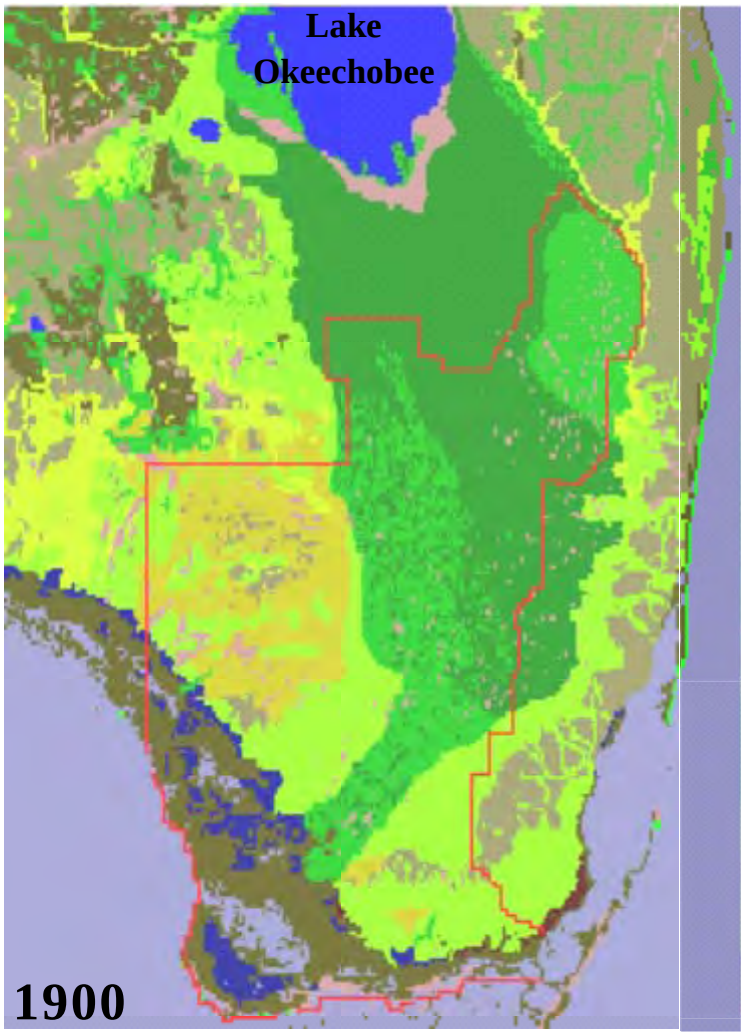


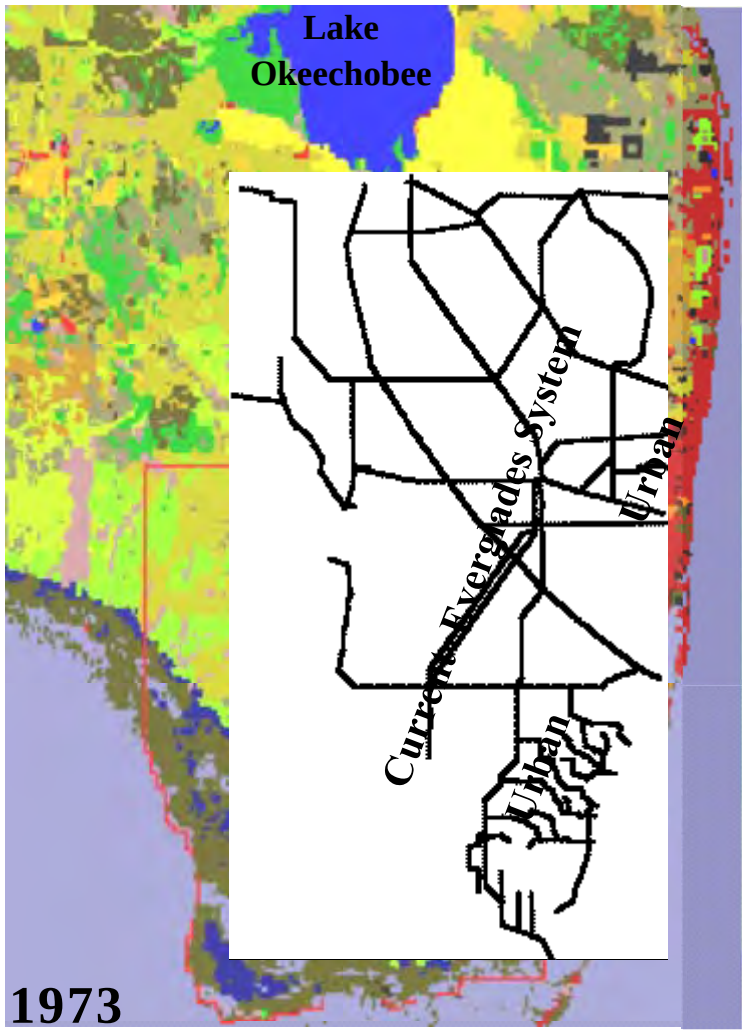
1995 Tree Island Map

More than 60% of the 1940 islands disappeared



The Central & Southern Florida Project





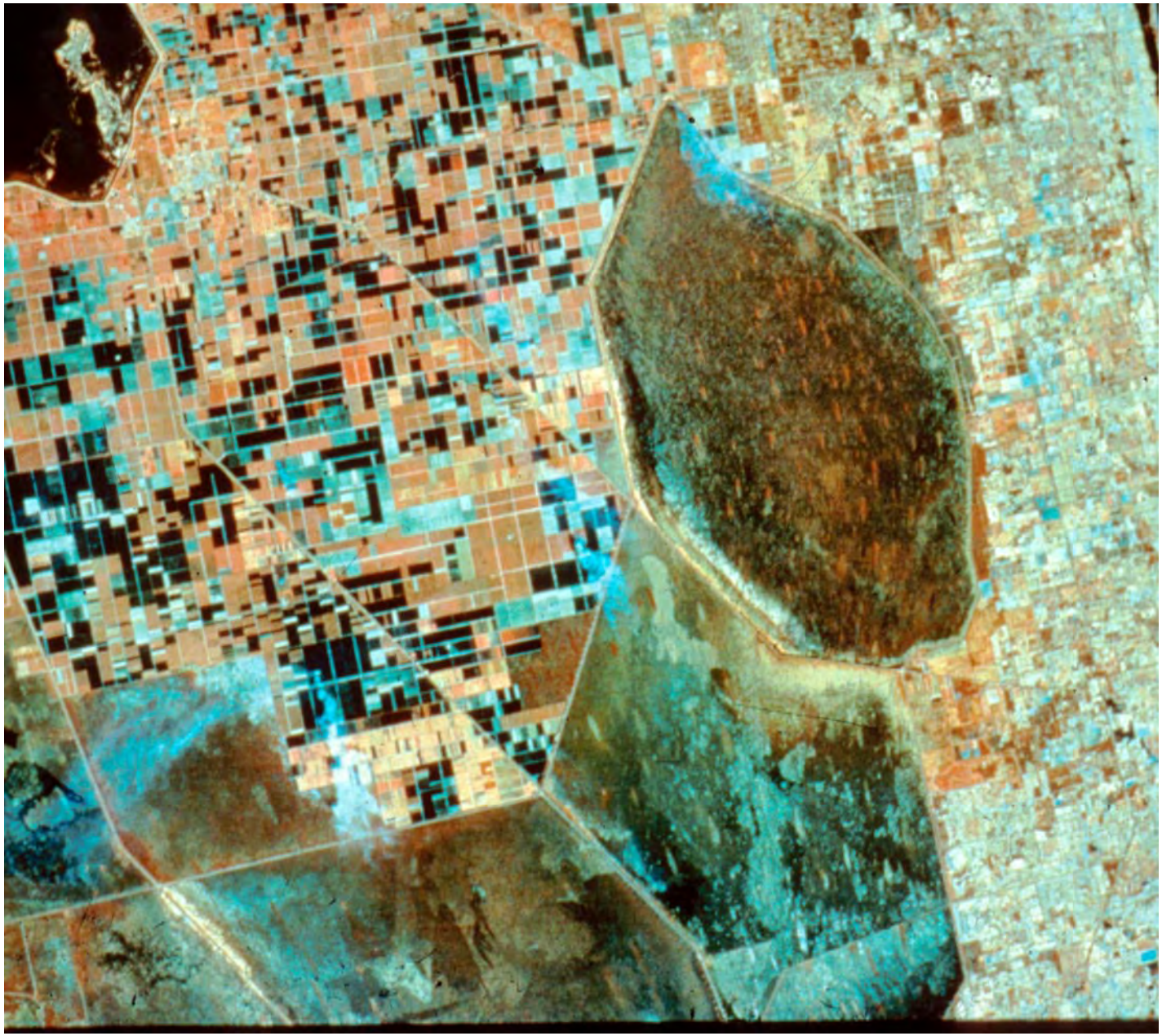
DETAILS:

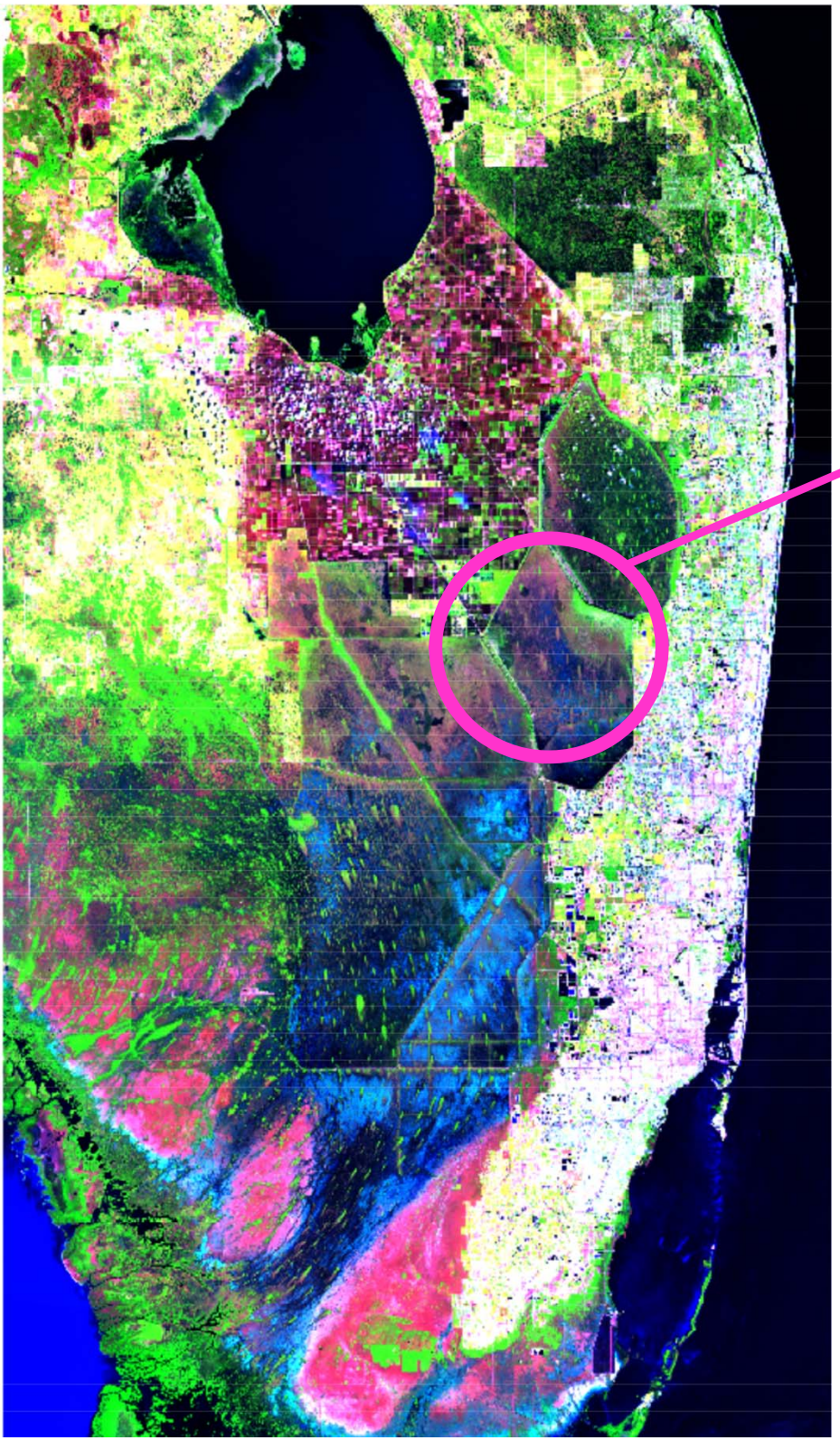
- 10 locks
- 200 water control structures & pump stations
- 720 miles of levees
- 1,000 miles of canals
- 700,000-acre Everglades Agricultural Are
- Water Can Flow in Both Directions

NOTE:

- System designed for 2 million people
- Currently there are <u>6.5 million</u> people in South Florida.

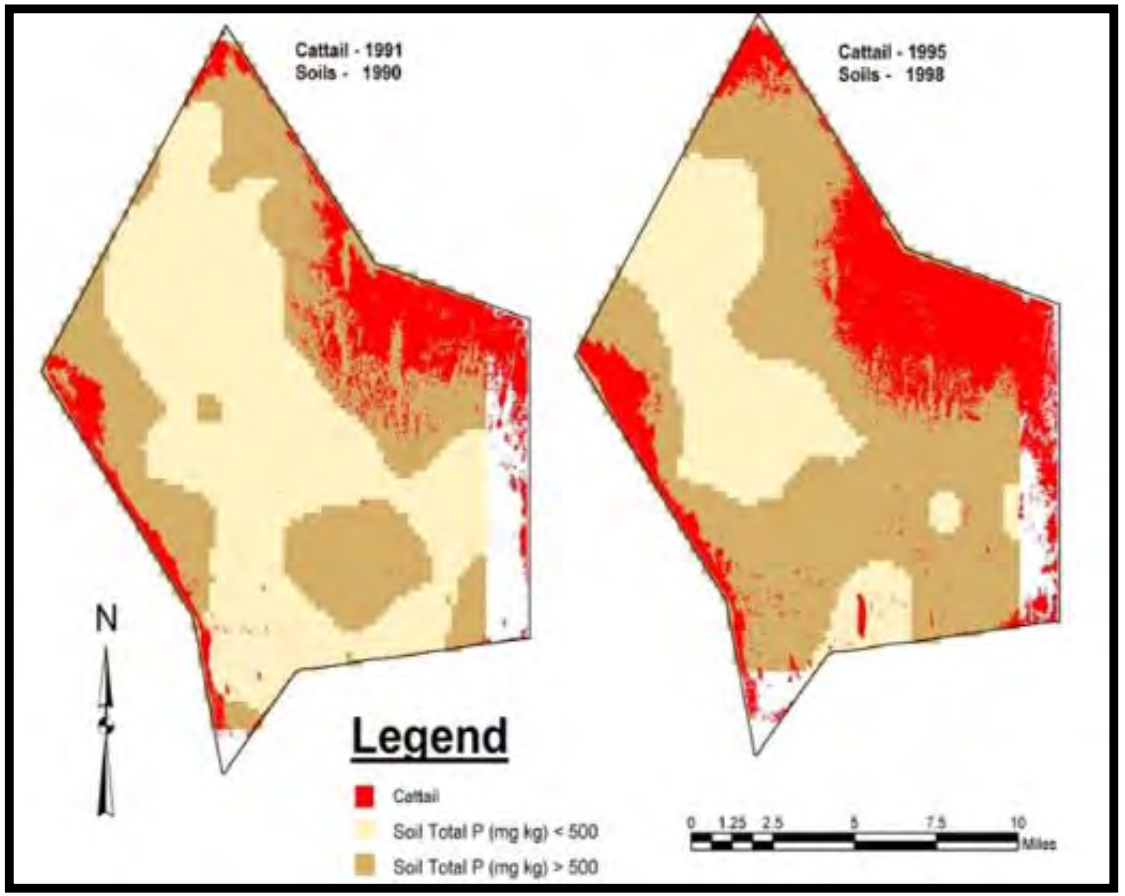
Wetlands Adjacent to Developed Areas Most Susceptible to Adverse Water Quality & Hydrologic Impacts





Landscape changes in the River of Grass Due to Nutrient Pollution

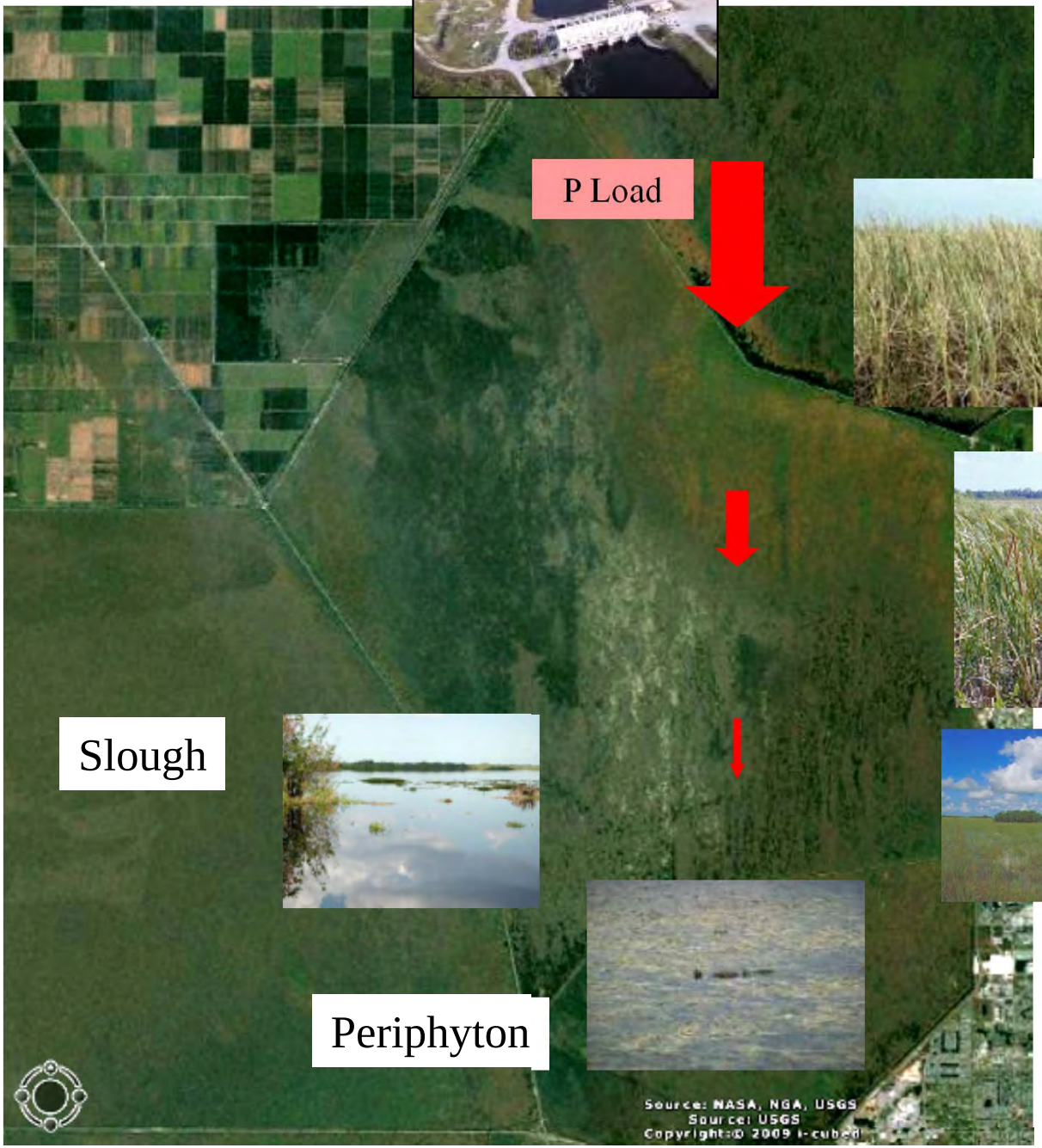
Cattail replacing sawgrass & slough (open-water) habitat in phosphorus-enriched areas



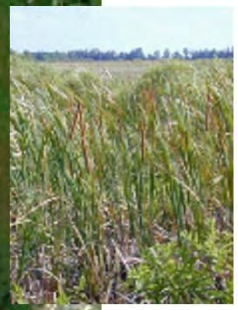
Native vs. Enriched Marsh
Loxahatchee Refuge Visitor Center Exhibit

Vegetation Along Phosphorus Gradient in WCA-2A

Runoff Pump Station

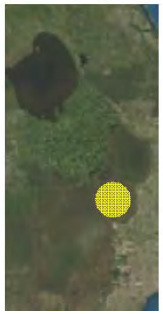


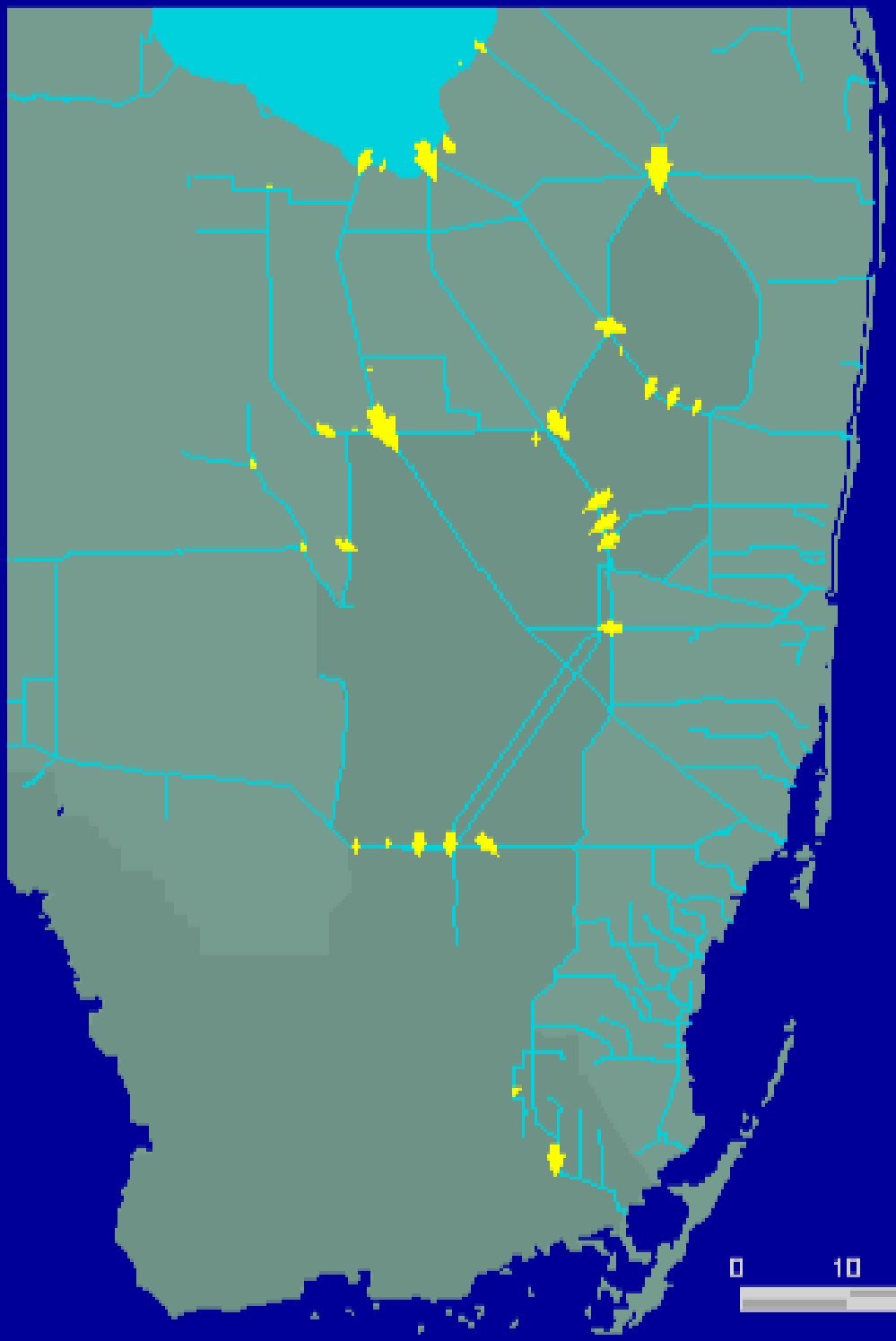
Cattail



Transition

Sawgrass





Structure Flows
WY 1978 - 1991

Lake Okee.

Farms

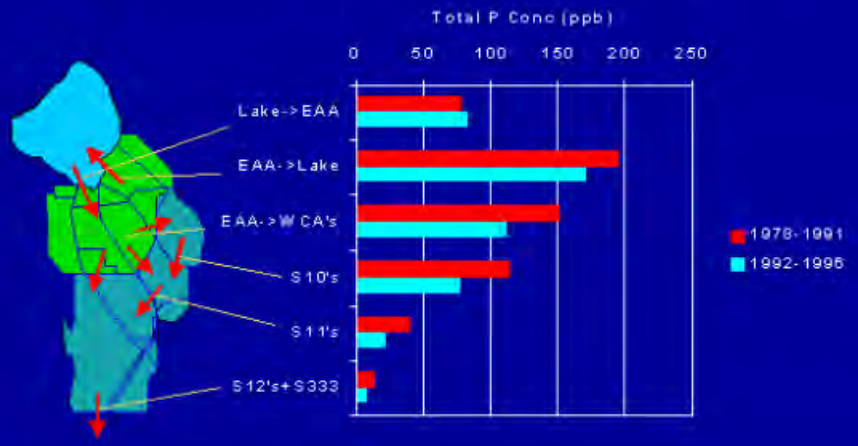
WCA Marsh

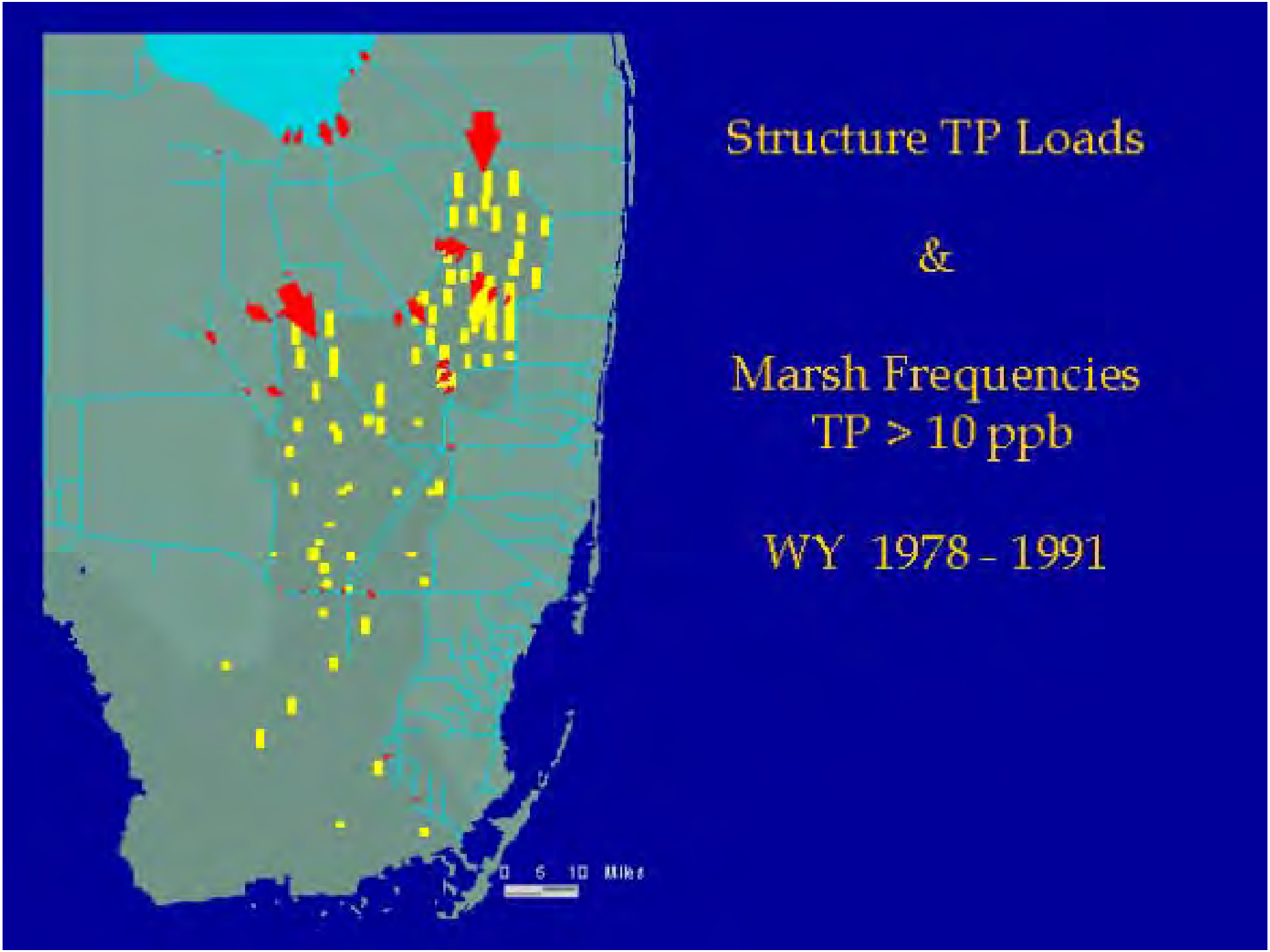
Everglades
National Park

0 10

Structure TP Loads
WY 1978 - 1991

Flow-Weighted-Mean P Concentrations
Water Years 1978-1991 vs. 1992-1996




Structure TP Loads
&
Marsh Frequencies
TP > 10 ppb
WY 1978 - 1991
0 5 10 Miles

Water Quality Restoration

Water Quality Restoration Triggered By Federal vs. State Lawsuit, 1988-Today Settlement Agreement 1991

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA

UNITED STATES OF AMERICA, et al.,

Plaintiffs,

vs. CASE NO. 88-1886-CIV-HOEVELER

SOUTH FLORIDA WATER MANAGEMENT DISTRICT; TIMER E. POWERS, Interim Executive Director, South Florida Water Management District; FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION; and CAROL M. BROWNER, Secretary, Florida Department of Environmental Regulation, et al.,

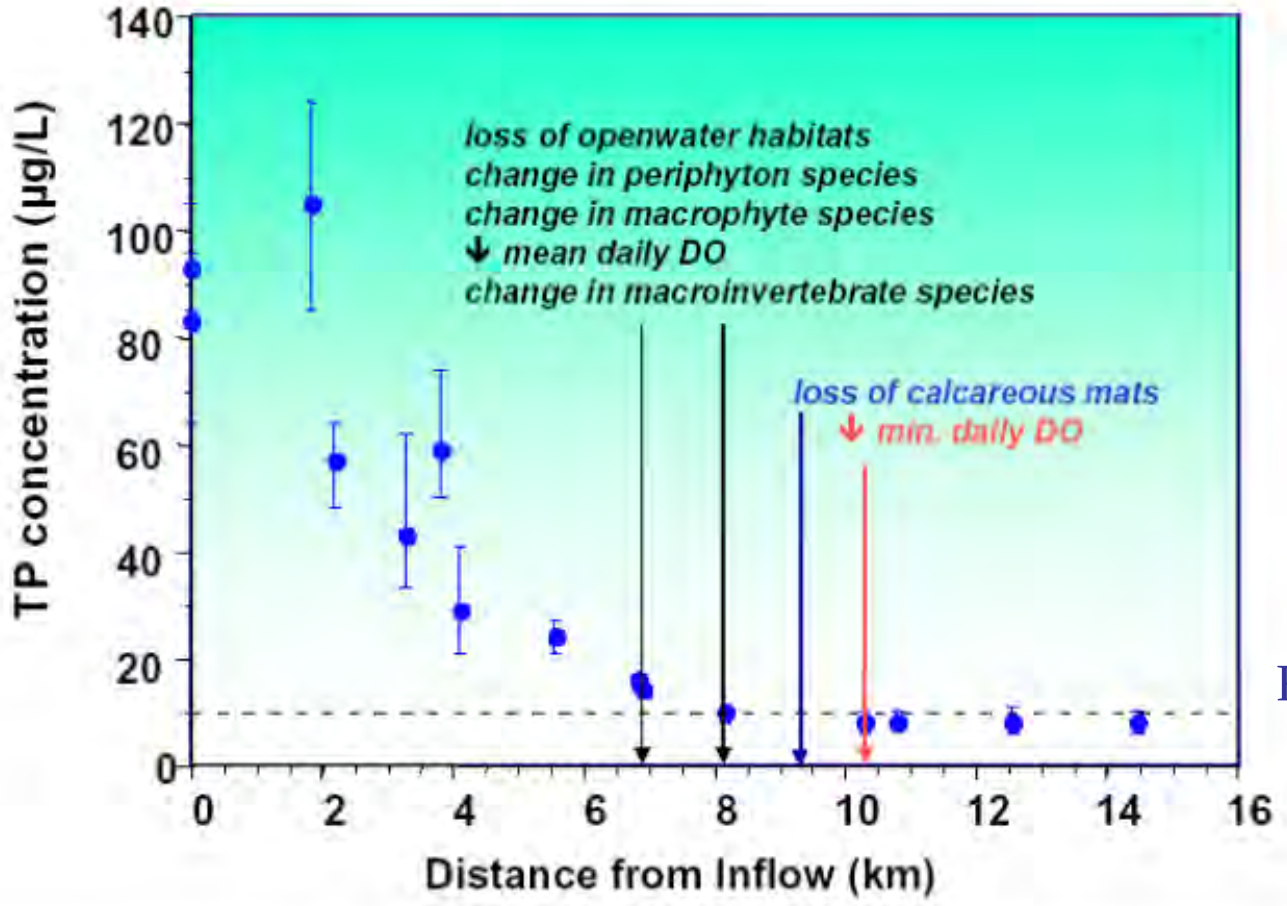
Defendants.

Agreement: "To restore, preserve and protect the unique flora and fauna of the Everglades National Park and the Arthur R. Marshall Loxahatchee National Wildlife Refuge, to maintain a cooperative relationship in accomplishing these goals, and to settle and resolve the disputes that have arisen between and among them without admitting or conceding liability"

1991 Settlement Agreement
Research, Monitoring, Compliance

- Interim (2001-2003) and Long-Term (2006) Restoration Requirements
- Monitored by Technical Oversight Committee Reporting to Legal/Policy Team
- Establish Numerical Phosphorus Criterion (10 ppb)
- Restore Federal Waters to 1978-1979 Conditions
    - Loxahatchee National Refuge Marsh
    - Everglades National Park Inflows
- Achieve Compliance with P Criterion Throughout the Marsh (Long-Term)
- Develop Technology, Modeling, Data Analysis Tools
- Monitor Ecological Responses – Balance Restored?
- Provide Clean Water to Allow Hydrologic Restoration without Adverse Water Quality Impacts

Ecological Changes along the WCA-2A Gradient



Florida TP Criterion = 10 ppb

Statistical Models For Measuring Progress & Compliance

EAA BMP Rule

C139 BMP Rule

Loxahatchee Refuge Marsh

STA Discharge Permits

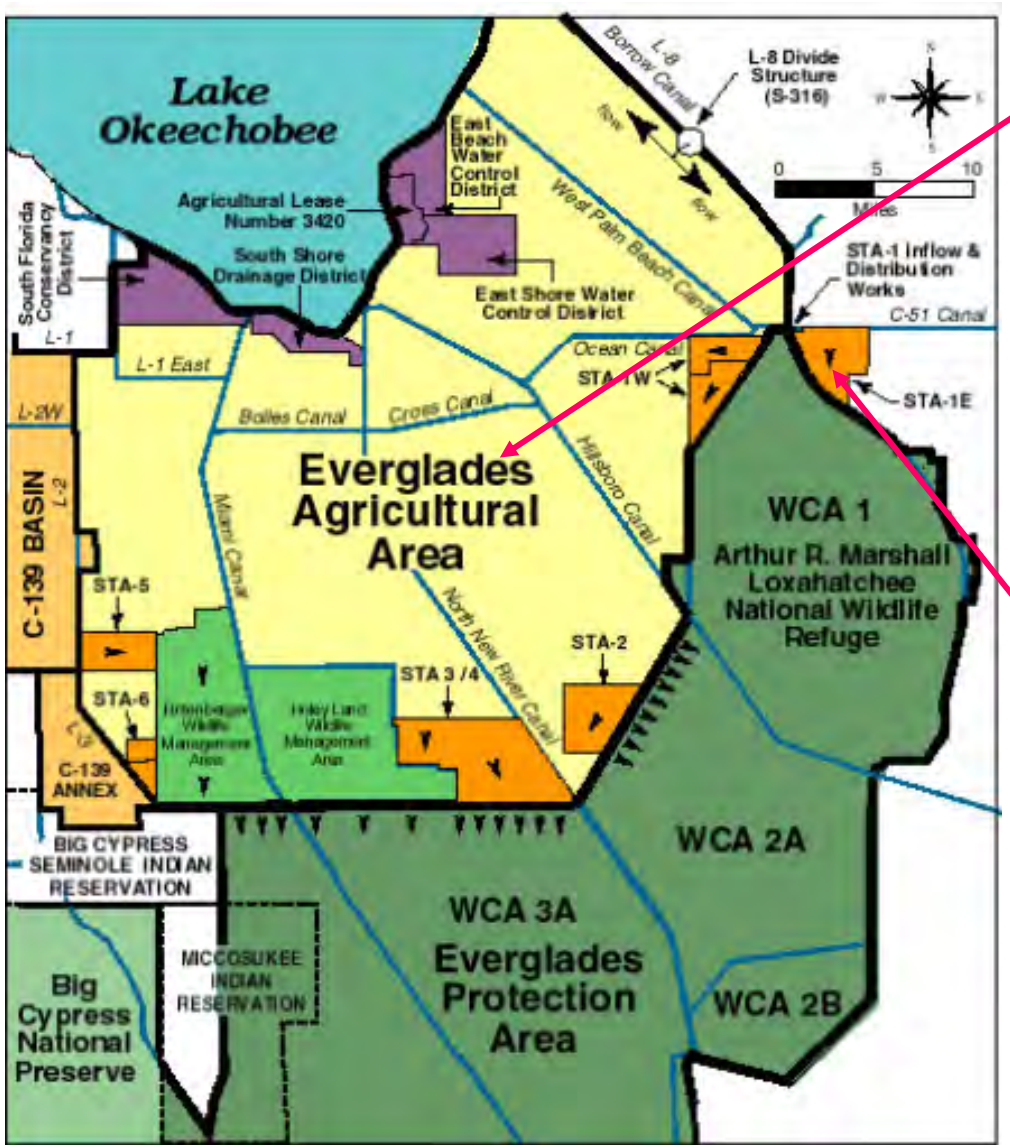
Overall Load Reduction

ENP Inflow P Limits

1991 Settlement Agreement Phosphorus Control Measures

- Phase I Phosphorus Controls to be Implemented by 2001-2003
  - Best Management Practices (BMPs) to Reduce Farm Runoff P Loads by 25%
  - Wetland Stormwater Treatment Areas (STAs) to Reduce Marsh Inflow TP Concentrations from 170 to 50 ppb (43,000 acres)
  - Achieve 80-85% Overall Reduction in P Load to Marsh
- Phase II P Controls to be Completed by Dec 2006 [Now ? >2016 ?]
  - Implement Additional Control Technology (BMPs, STAs, etc.)
  - Achieve Compliance with P Criterion Throughout Marsh
- Replace Reductions In Flow Caused by Implementation of BMPs

Phase I Control Program



Agricultural Best Management Practices (BMPs)

Regulatory Program
25% Reduction in Basin Runoff P Load
~250 Farms on ~500,000 acres
Implemented 1995
Achieving ~50% Reduction Overall
Varies from 0% to 70% by Basin

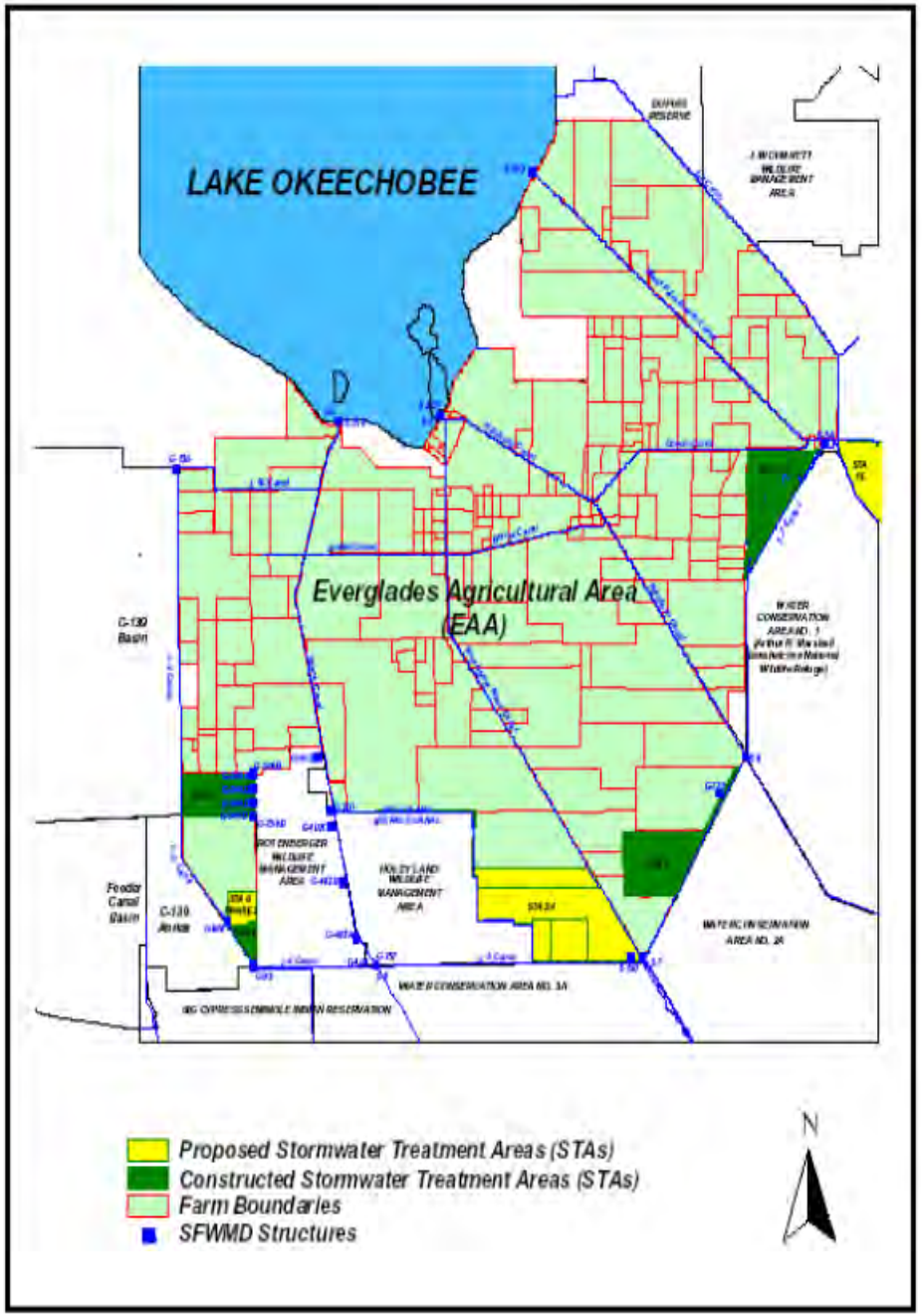
Stormwater Treatment Areas (STAs)

50 ppb Interim Target for Marsh Inflows
~43,000 acres, Constructed 1994 – 2006
Cost ~$700 Million State/Private Cost Share
Overall ~70% Load Reduction
Achieving 20 – 80 ppb vs. Baseline 170 ppb
Long-Term Requirement ~ 10 ppb
Planned Expansion to Total 57,000 acres
Additional Measures Needed to Achieve 10 ppb

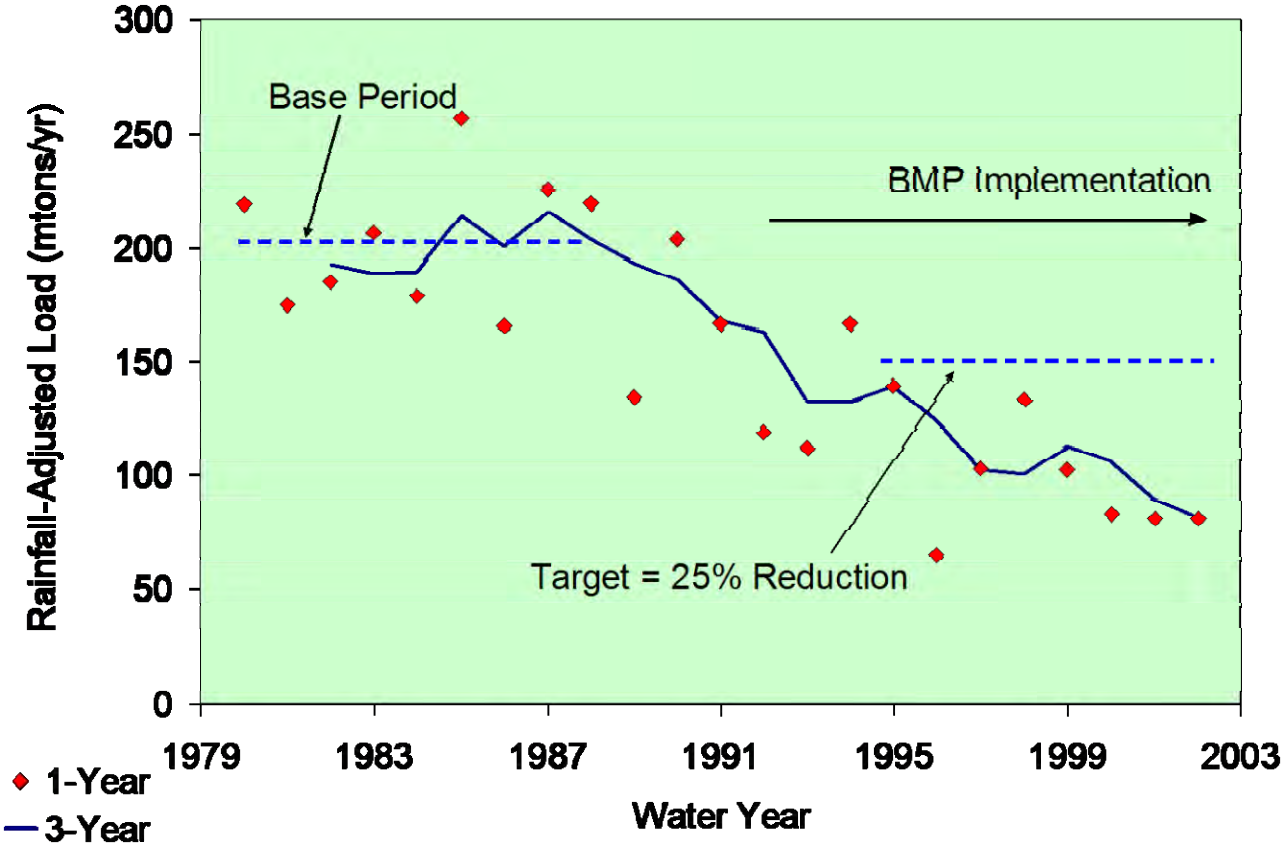
EVERGLADES
BEST MANAGEMENT PRACTICES
PROGRAM

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

- Basin Area ~500,000 Acres
- Objectives
  - Implement BMP's!
  - 25% Reduction in Basin P Load
  - 1979-1988 Baseline
- Regulatory Rule Effective 1995
- Monitoring Program
  - Farm Inspections
  - Weekly Composite Sampling
  - Basin-Scale ~35 Sites
  - Farm-Scale ~200 Sites



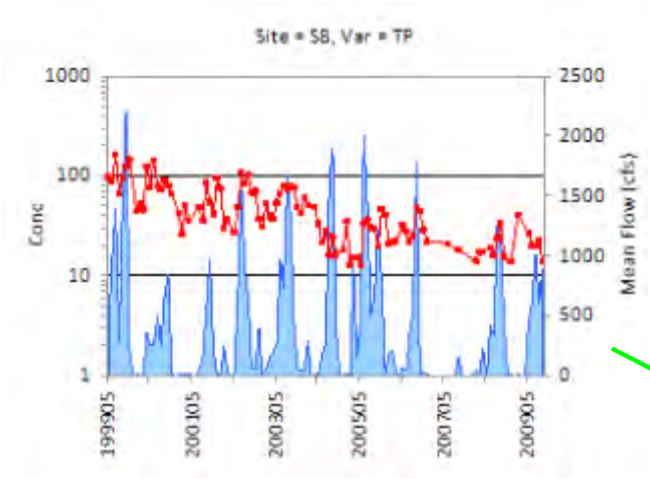
Tracking EAA Total P Loads

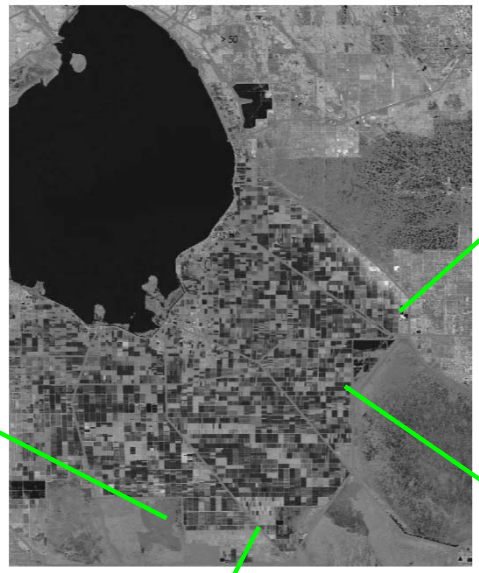


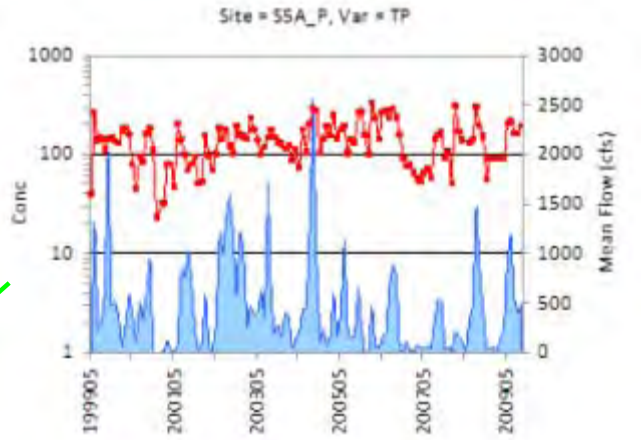
TP Loads Adjusted to Average Rainfall

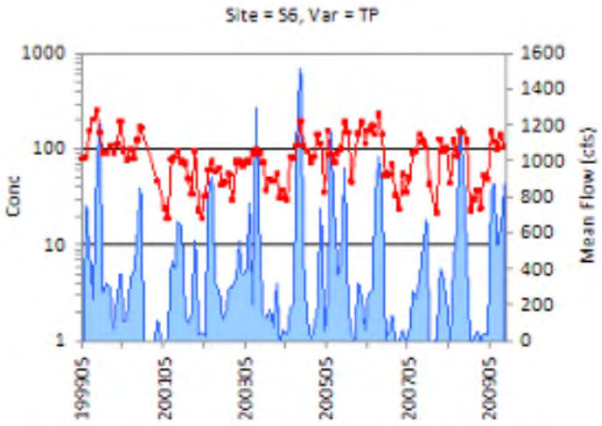
Objective: 25% Load Reduction vs. 1979-88

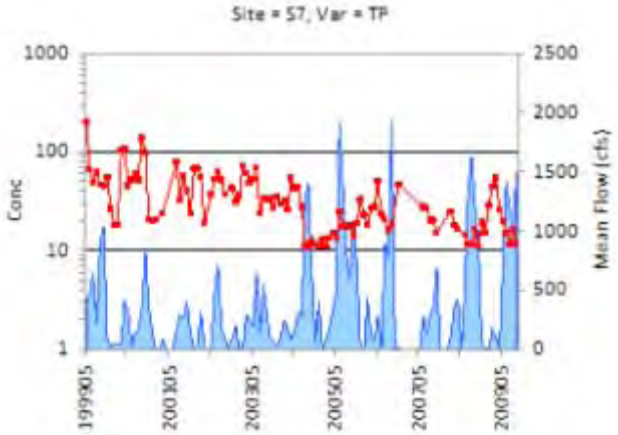
Monthly Outflows & TP Concentrations at 4 Major EAA Pump Stations, 2000-2009







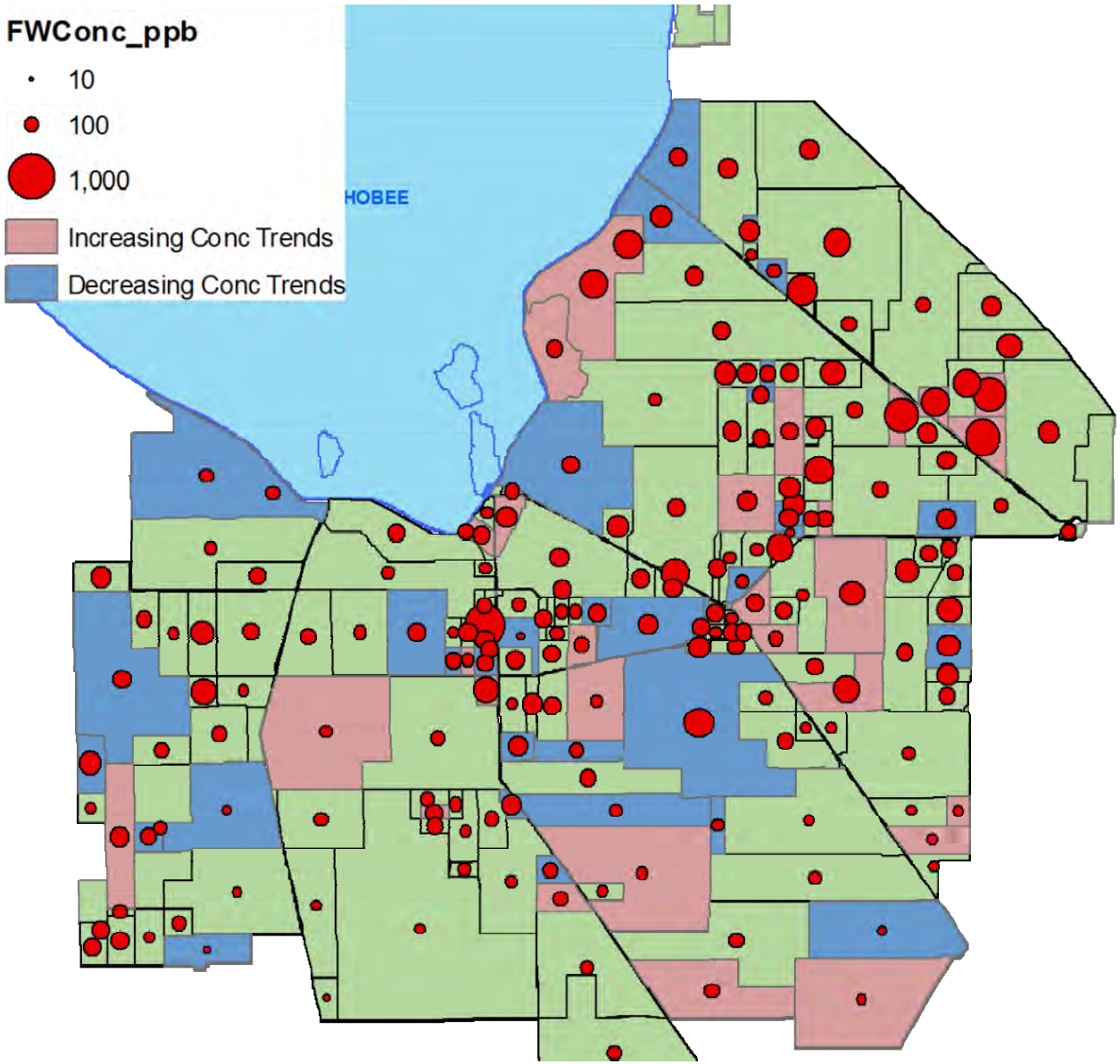




TP

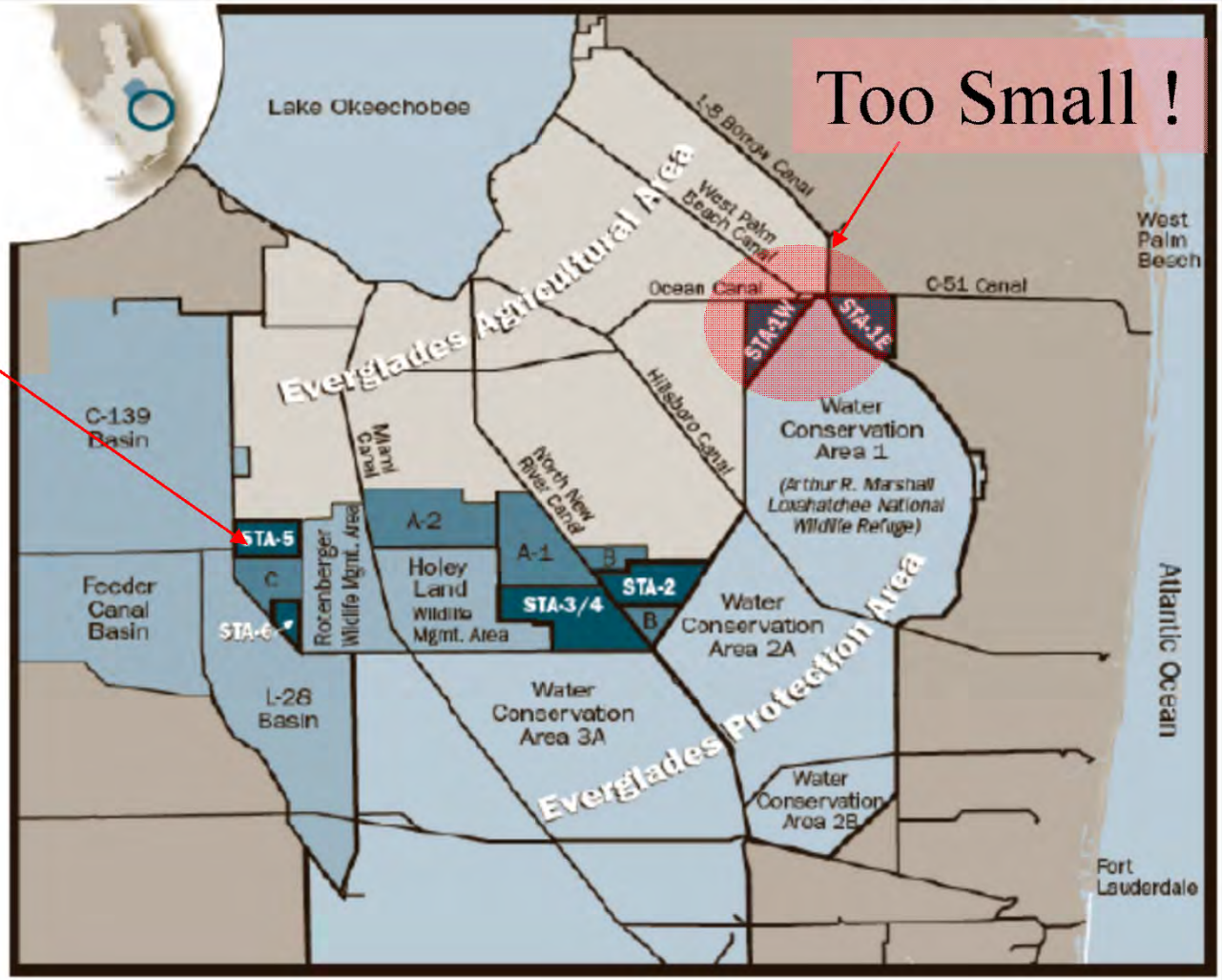
Flow

TP Concentrations & Trends in Runoff from Individual Farms

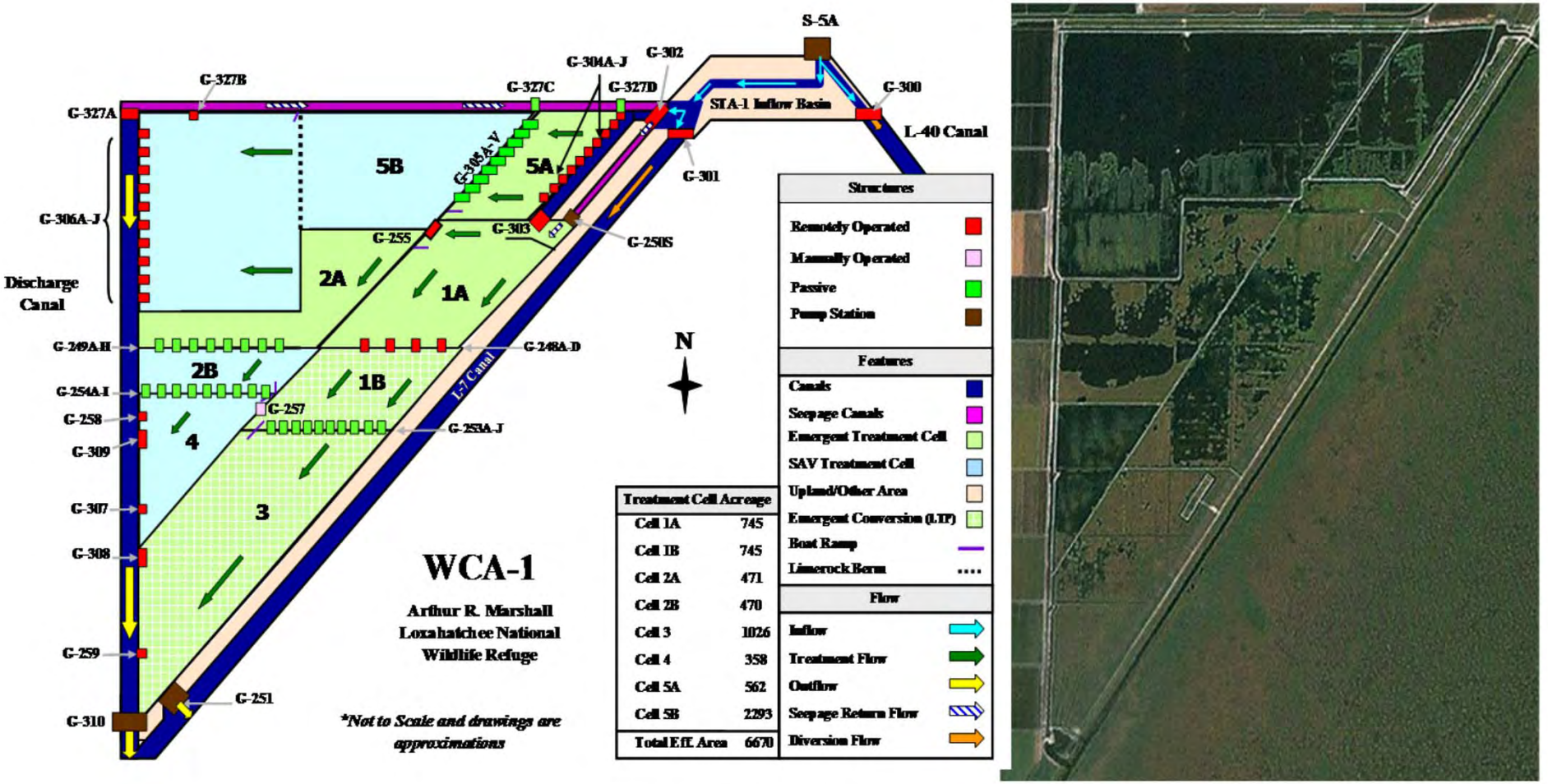


Background – Existing Treatment Areas

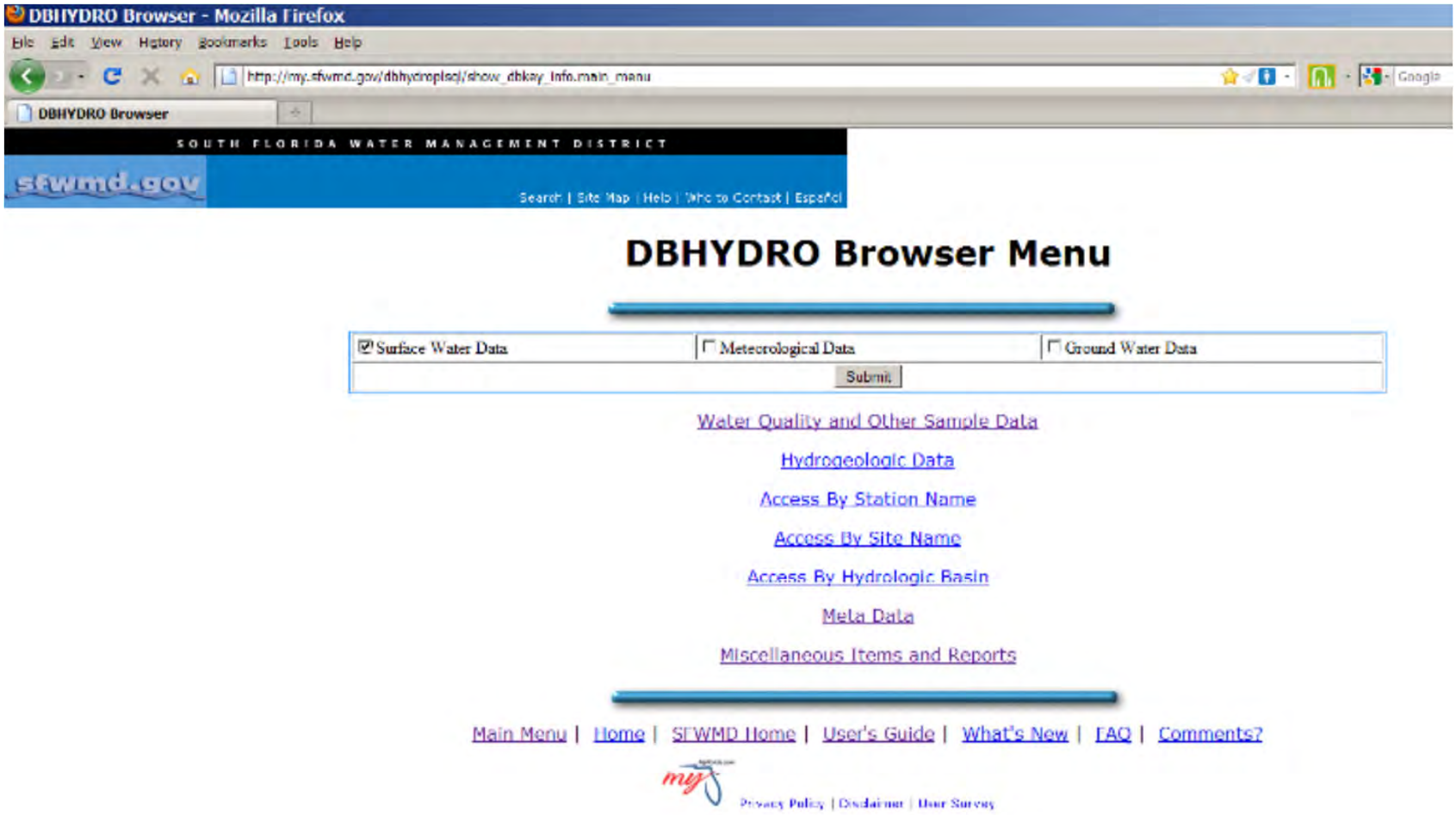
- Existing STAs: 44,900 acres, including 16,500 ac in STA-3/4
- Under construction: 11,500 ac
- Total: 56,500 ac Forecast flow ~1.7 million AF/yr into the Everglades (900,000 – 3 million AF/yr; with EAA Reservoir A1)
- Comp A ~34,000 ac



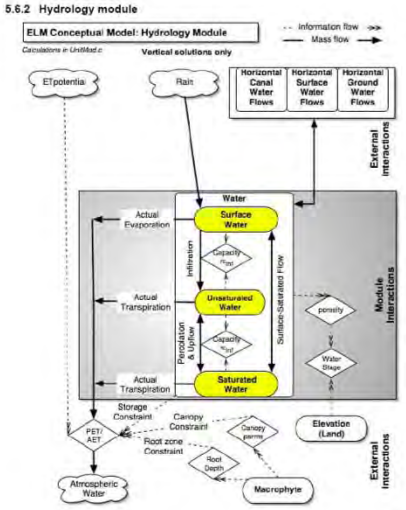
Stormwater Treatment Area 1 West
Constructed 1994-1999 Area 6,670 acres

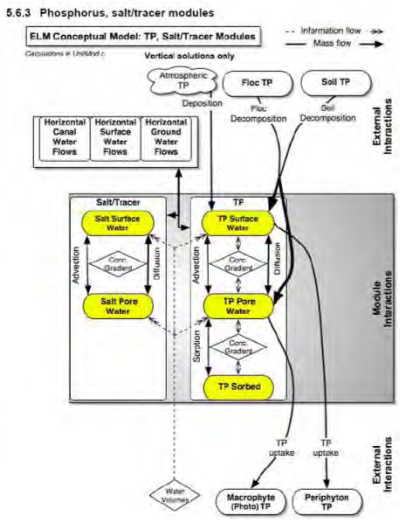


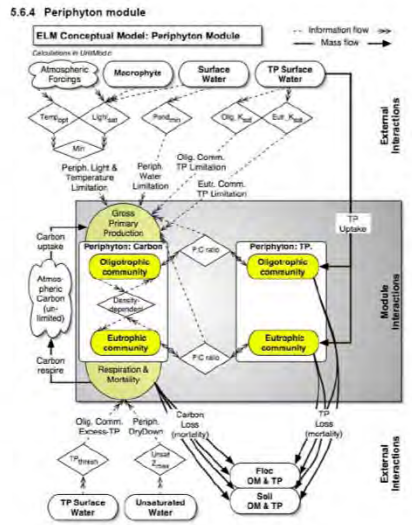
South Florida Water Management District
Regional Hydrologic & Water Quality Database

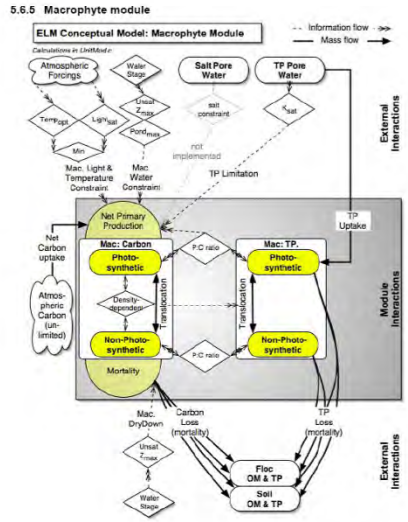


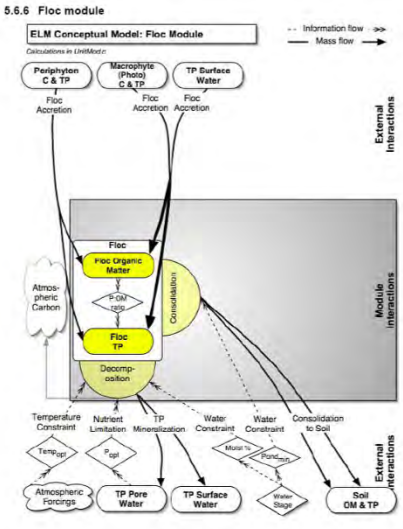
Complex Ecological Models for Research & Forecasting System-Wide Responses to Changes in WQ & Hydrology But Not for Design of P Remedies

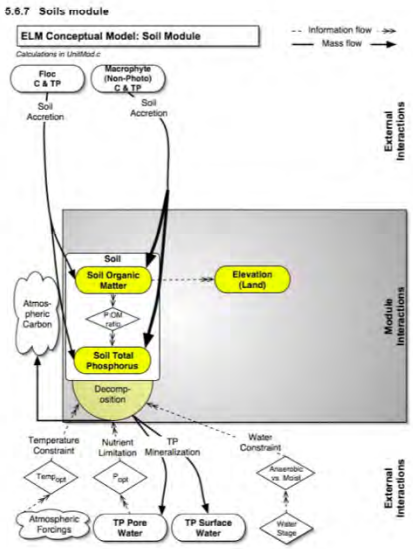




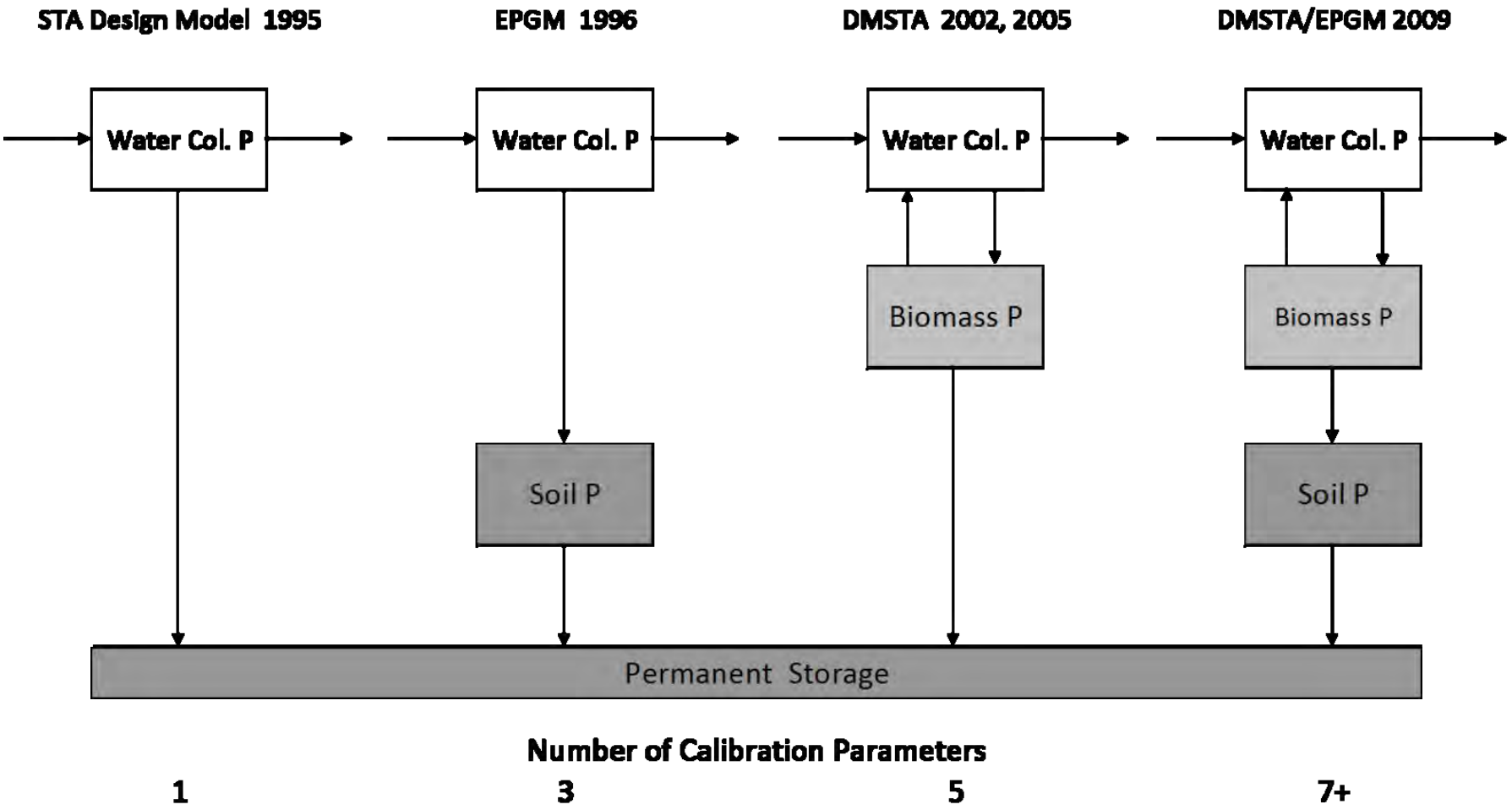




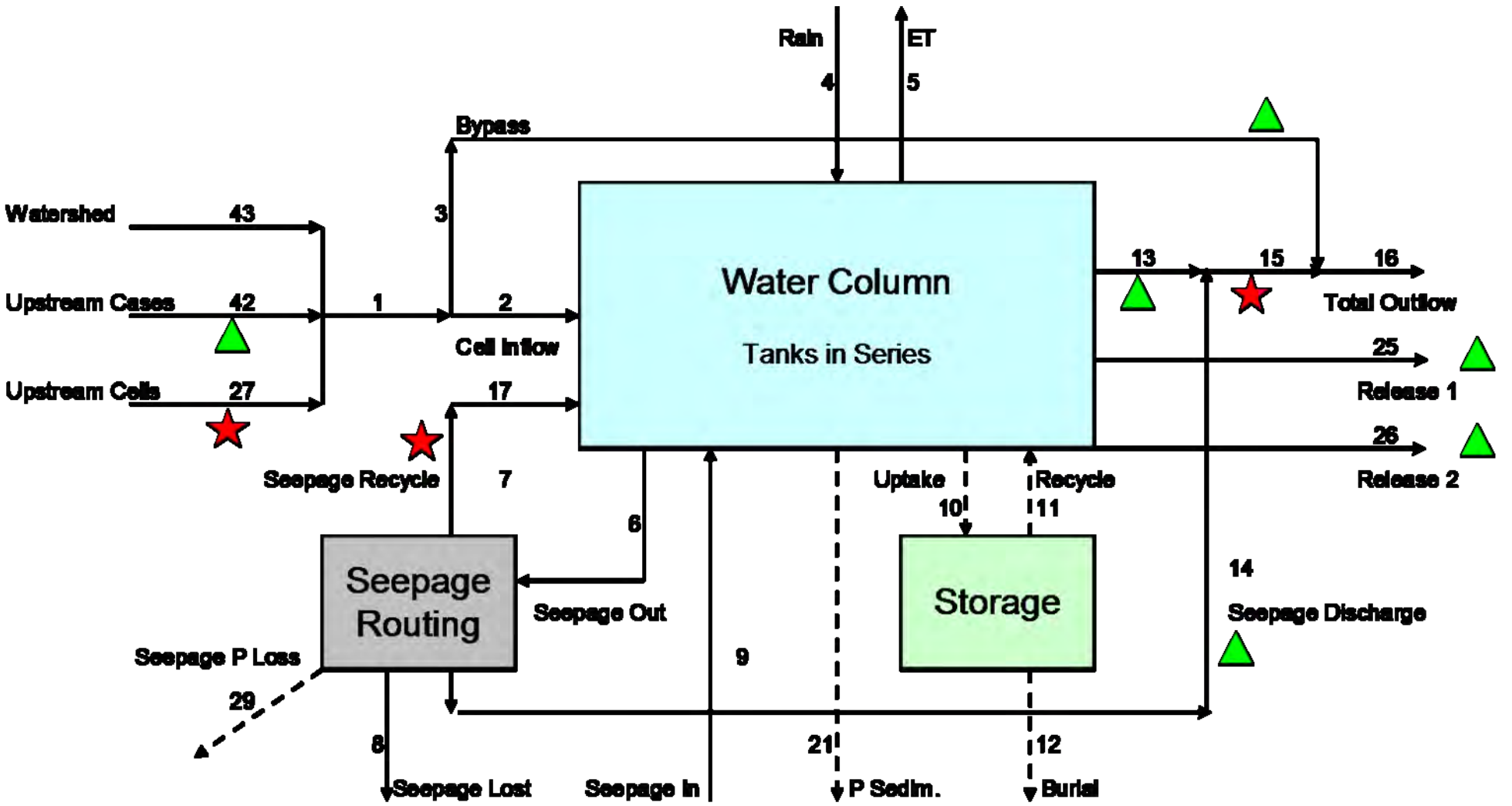




Simple P Mass Balance Models Have Been Useful For Designing STAs & Predicting Marsh Responses



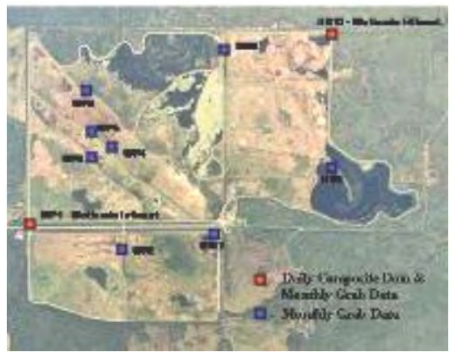
Treatment Area Model



Solid arrows are water and phosphorus fluxes. Dashed arrows are phosphorus fluxes only.

> 80 Platforms Used in Calibration & Testing

Daily Water & P Balances, .01-150 km^2, 1-30yrs



Treatment Area Vegetation Types

Emergent / Cattail

K ~ 10-15 m/yr

Enhanced P Removal

Submersed Aquatic Vegetation "SAV"

K ~ 30-60 m/yr

Periphyton / "PSTA"

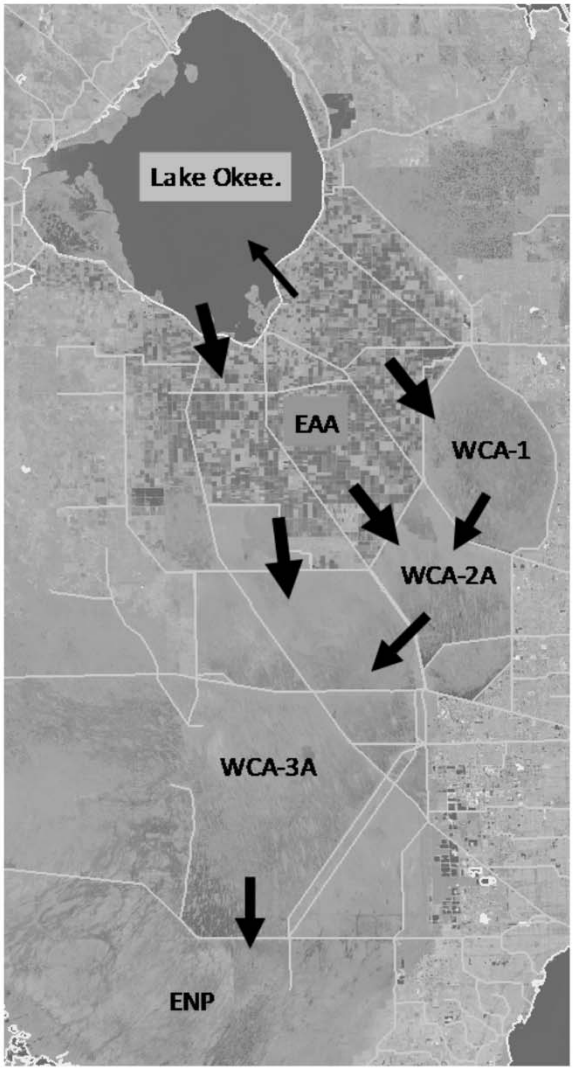
K ~ 20-30 m/yr

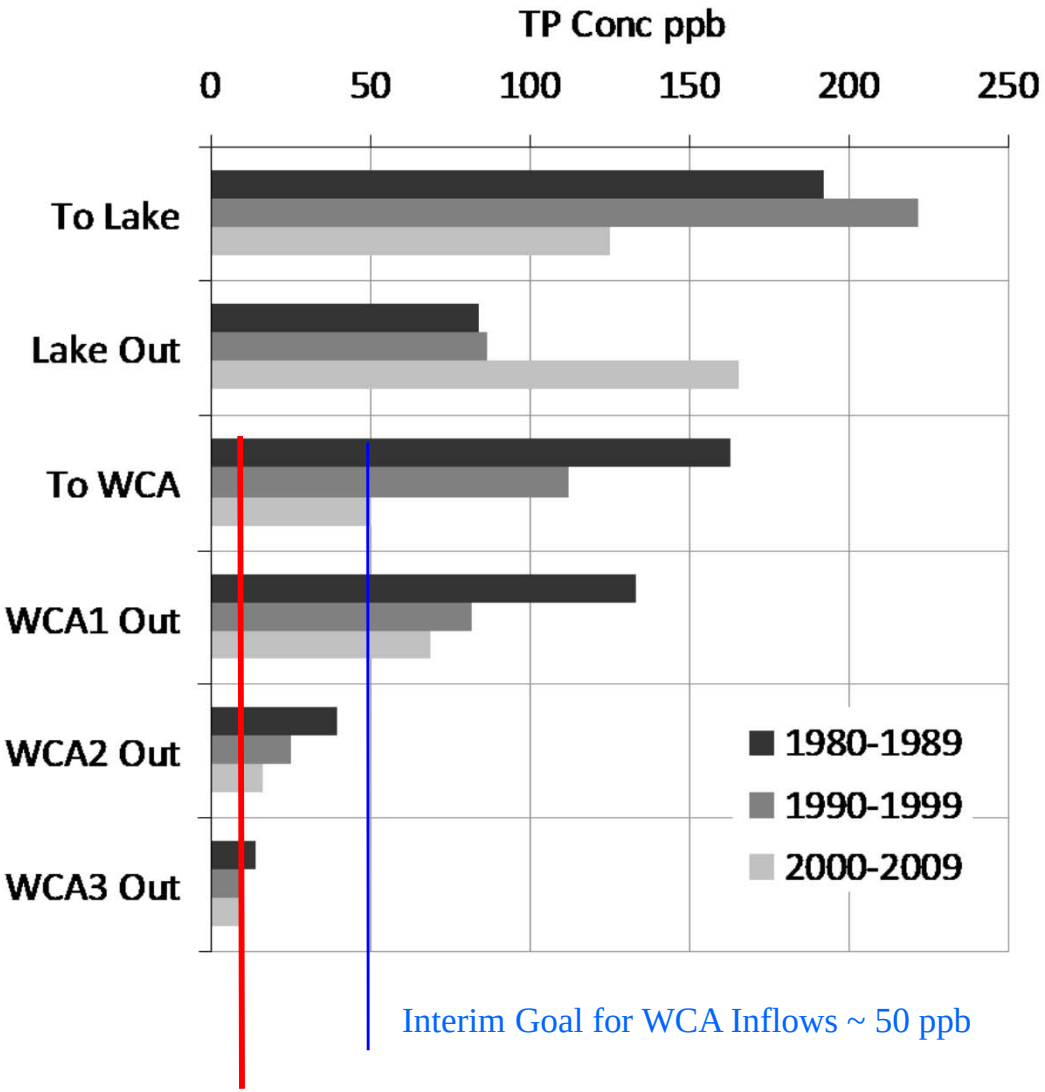
K= First-Order P Removal Rate

State's Long-Term Plan for Achieving Compliance with Phosphorus Criterion

- Time Frame 2003 – 2016+
- Adaptive Management Framework
- Integration with Hydrologic Restoration
- Monitoring / Research Components
- Modeling / Engineering Components
- Current Plans Not Projected to Meet Goals
- No Clear "Completion" Date
- The Legal Dispute Continues...

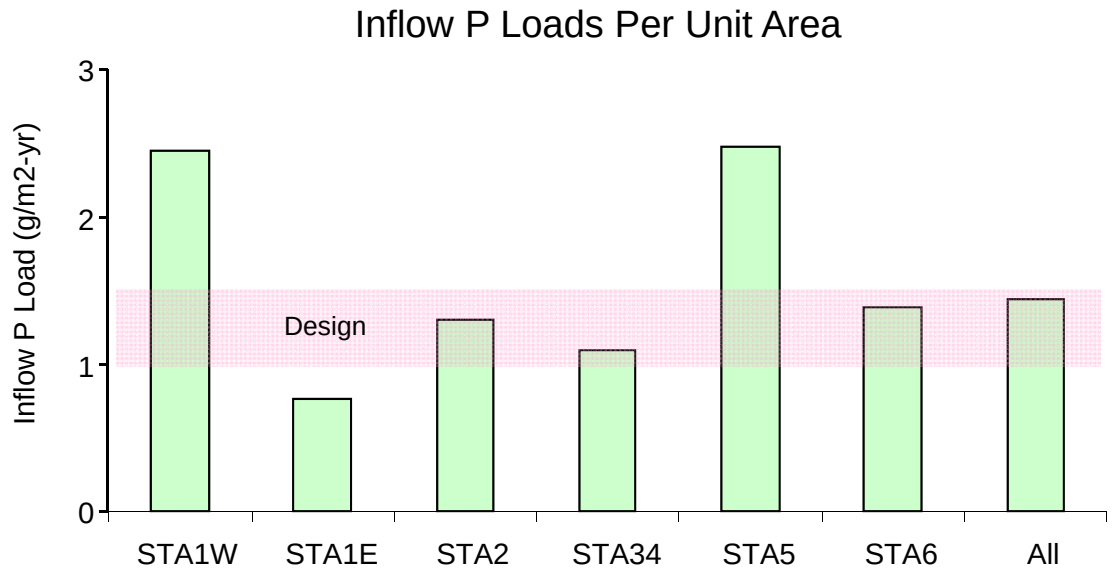
Long-Term Trends in Structure TP Concentrations
Flow-Weighted-Means, 1980-2009



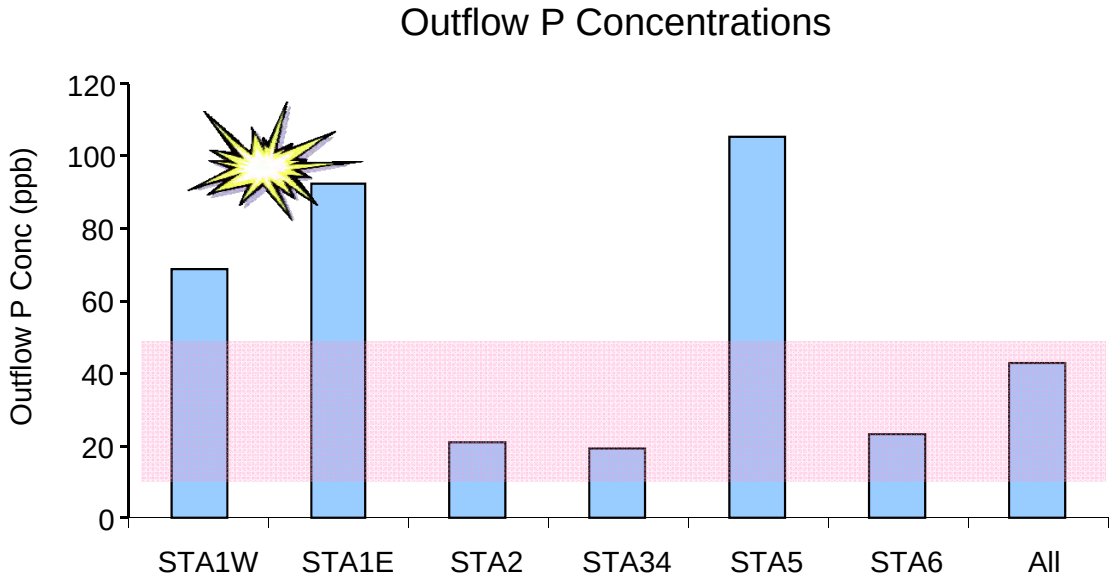


TP Concentrations & Trends at Long-Term Monitoring Sites, 2000-2009

Treatment Area Performance Thru June 2007



Mean Inflow Load
Design Range



Interim Goal = 50 ppb

Long-Term Goal = 10 ppb

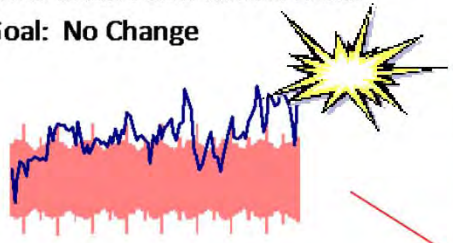
Tracking Responses to Everglades Phosphorus Controls, 2000-2009

Data Adjusted for Hydrologic Variations

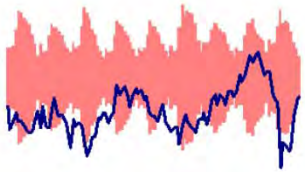
Data Shown vs. Target Zones (10th to 90th Percentiles) for Achievement of Management Goals

Target Zones Vary with Hydrologic Conditions (Rainfall, Flow, Water Level)

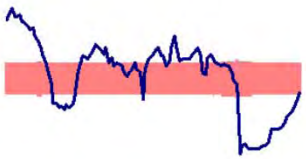
C139 Basin Farm Runoff Loads
Goal: No Change



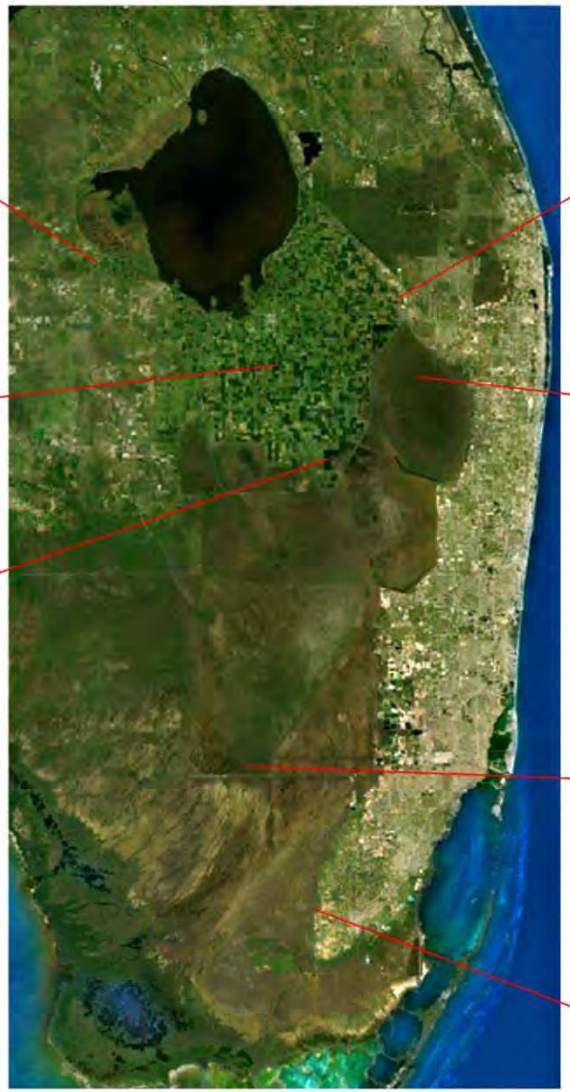
EAA Basin Farm Runoff Loads
Goal: 25% Reduction vs 1979-1988



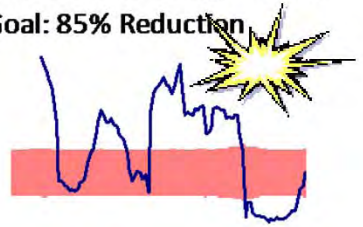
WCA Inflow P Load
Goal: 80% Reduction



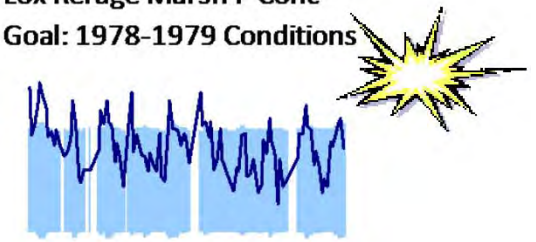
Exceeded Limits
Triggered Rounds of
Courtroom Drama



Loxahatchee Refuge P Load
Goal: 85% Reduction

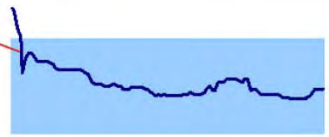


Lox Refuge Marsh P Conc
Goal: 1978-1979 Conditions



ENP Shark Slough Inflow P
Goal: 1978-1979 Conditions

ENP Taylor Slough Inflow TP
Goal: 1983-1984 Conditions



Settlement Agreement
Current Status

- Despite Substantial Progress, Consent Decree Requirements Not Met
  - Refuge Marsh TP Limits Exceeded on Several Occasions, 2003-2008
  - Refuge TP Load Reduction (85%) not Achieved by 2003
  - ENP Inflow Limits Barely Achieved (90^{th} vs. 50^{th} percentile)
  - Existing & Planned P Controls Inadequate to Restore Entire Marsh
- State Admits to Violation of Consent Decree in Federal Court (Dec 2009)
- Federal Push with New Administration
- Joint State-Federal Effort Ongoing to Develop Technical Plans for Additional Remedies within 6 months
- Judge is Impatient & Sometimes Confused
- Hearings Scheduled in May-July 2010
- May Foster or Derail Cooperative Technical Process to Develop New Plan

Today: Back to the Checkerboard
Framework for Evaluating Additional P Control Options
Probability of Achieving Objective vs.
Treatment Area Expansion &. Additional Farm BMPs

Farm Runoff TP Conc. ppb

Additional Treatment Area
1000 Acres

	0.97	75	100	125	150	175	Existing 200	225	250
	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1.5	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	3.0	0.49	0.12	0.01	0.00	0.00	0.00	0.00	0.00
	4.5	0.78	0.39	0.12	0.02	0.00	0.00	0.00	0.00
	6.0	0.92	0.68	0.36	0.14	0.04	0.01	0.00	0.00
	7.5	0.97	0.86	0.63	0.37	0.17	0.06	0.02	0.01
	9.0	0.99	0.94	0.82	0.61	0.39	0.21	0.10	0.04
	10.5	1.00	0.98	0.92	0.79	0.62	0.43	0.27	0.15
	12.0	1.00	0.99	0.96	0.90	0.79	0.64	0.47	0.32
	13.5	1.00	1.00	0.98	0.95	0.89	0.79	0.66	0.52
	15.0	1.00	1.00	0.99	0.98	0.94	0.88	0.80	0.69
	16.5	1.00	1.00	1.00	0.99	0.97	0.94	0.88	0.81
	18.0	1.00	1.00	1.00	0.99	0.98	0.97	0.93	0.89

Probability of Achieving Objective > 0.50 > 0.90

Options Focused on
1 - Farm Controls
2 - STA Expansion

Hydrologic Restoration

? Hydrologic Restoration ?
CERP Components, Conceived 1995 - ???

Aquifer Storage & Recovery

Surface Water Storage Reservoir

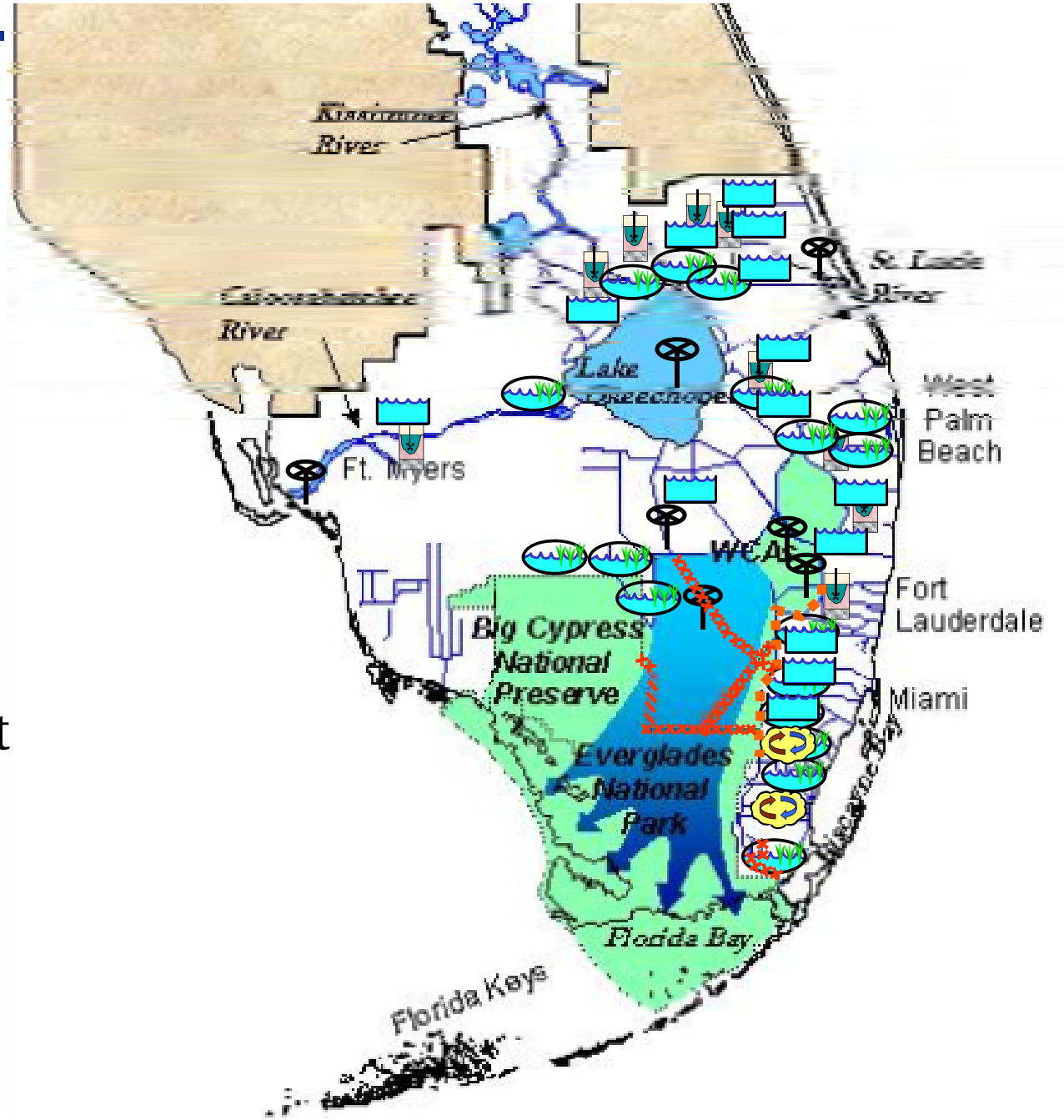
(STAs) Stormwater Treatment Areas

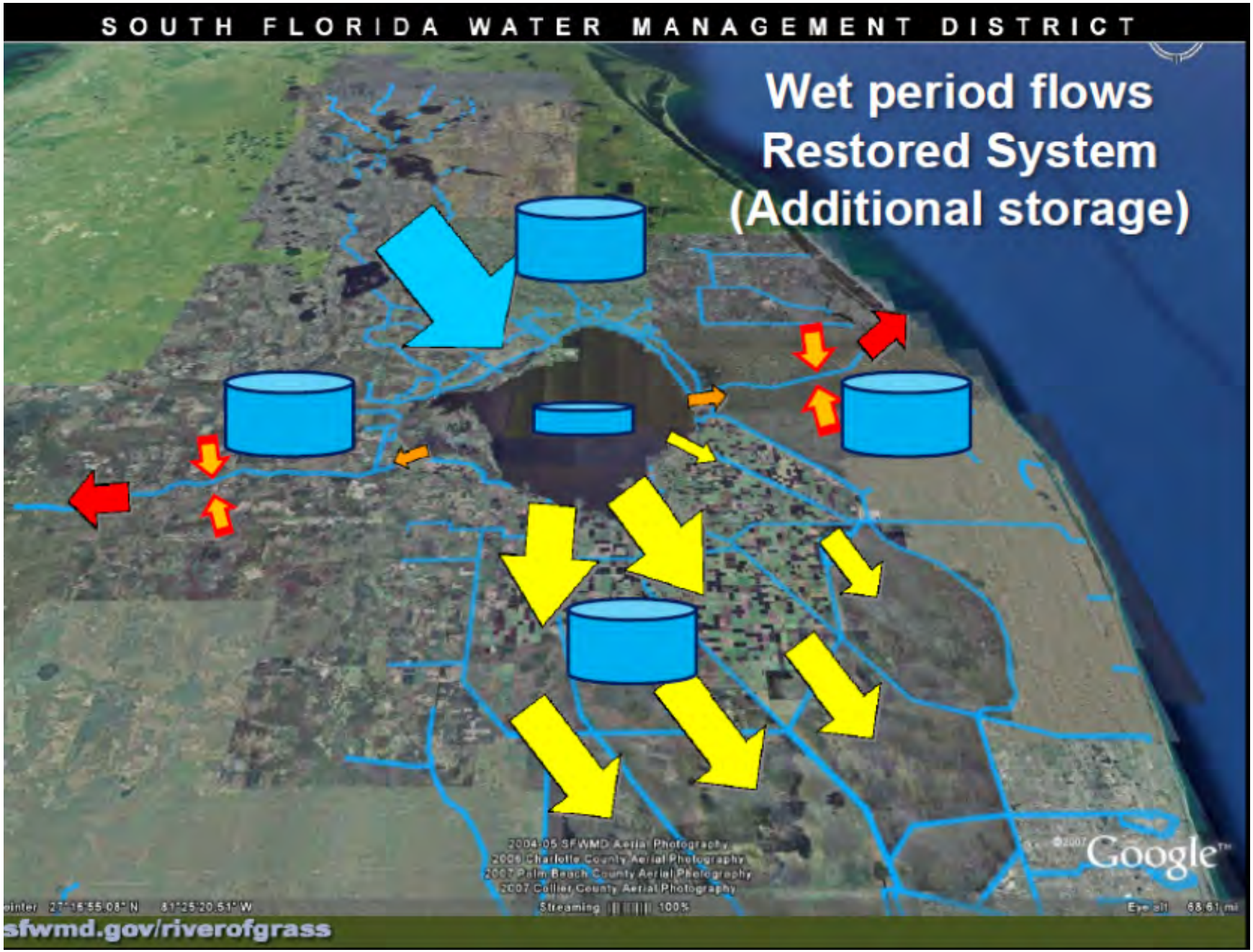
Reuse Wastewater

Seepage Management

Removing Barriers to Sheetflow

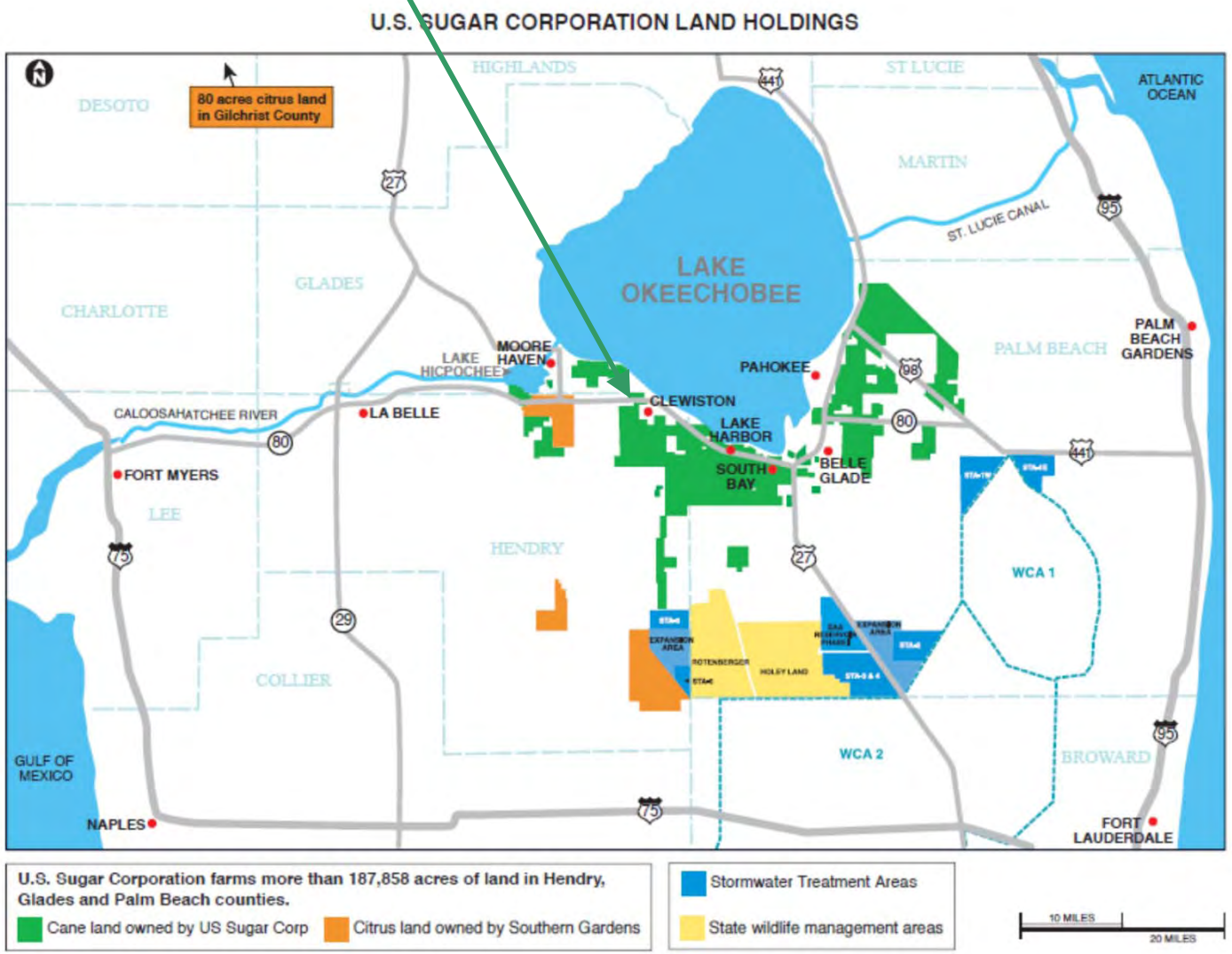
Operational Changes



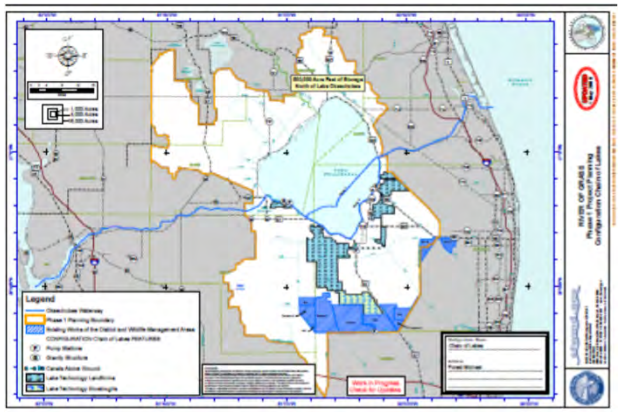

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
Wet period flows
Restored System
(Additional storage)
2004-05 SFWMD Aerial Photography
2006 Charlotte County Aerial Photography
2007 Palm Beach County Aerial Photography
2007 Collier County Aerial Photography
Google
sfwmd.gov/riverofgrass

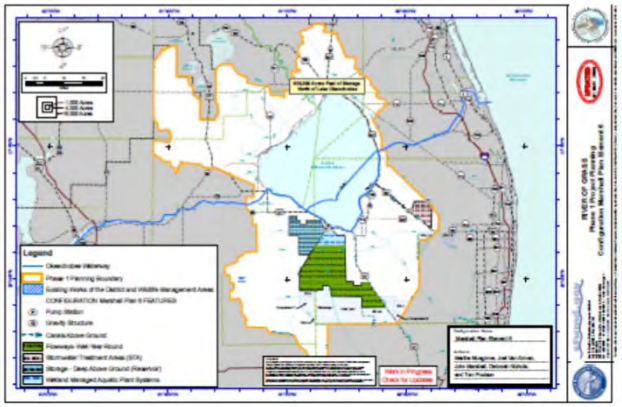
Potential State Purchase of U.S. Sugar Lands Initially187 K Acres Restoration Opportunities & Obstacles – “River of Grass” Initiative

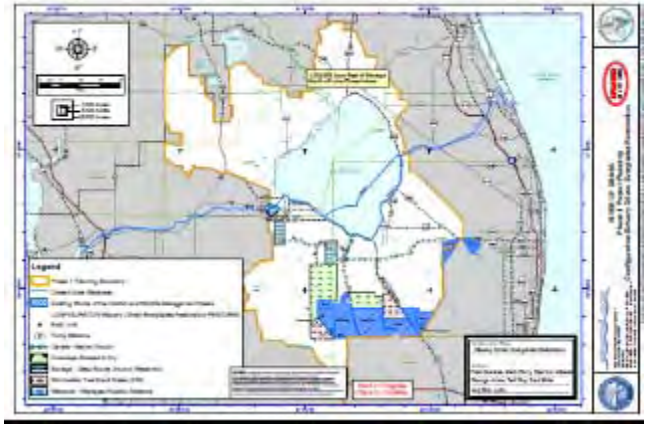
For Starters: Land is Generally in Wrong Place – Requires “Swaps”

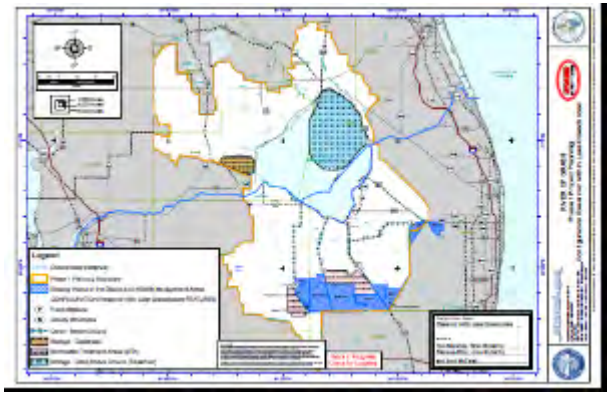


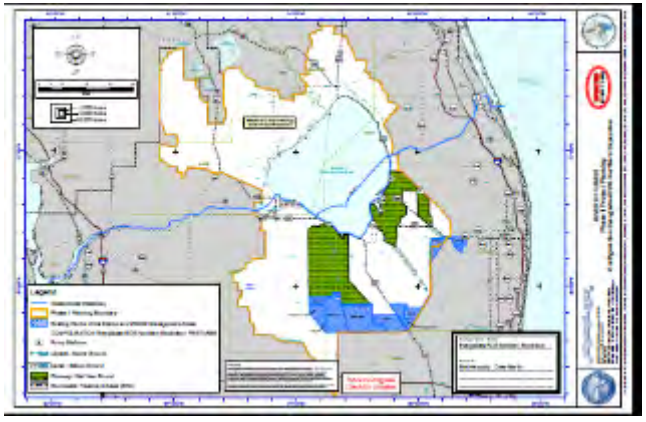
Restoration Plans Developed by Stakeholders
Phase I ROG Design Process

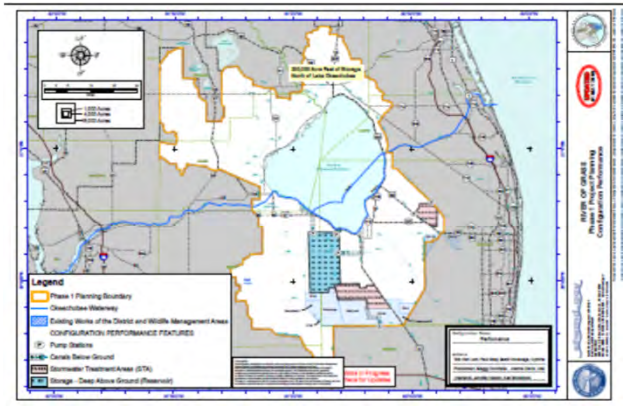








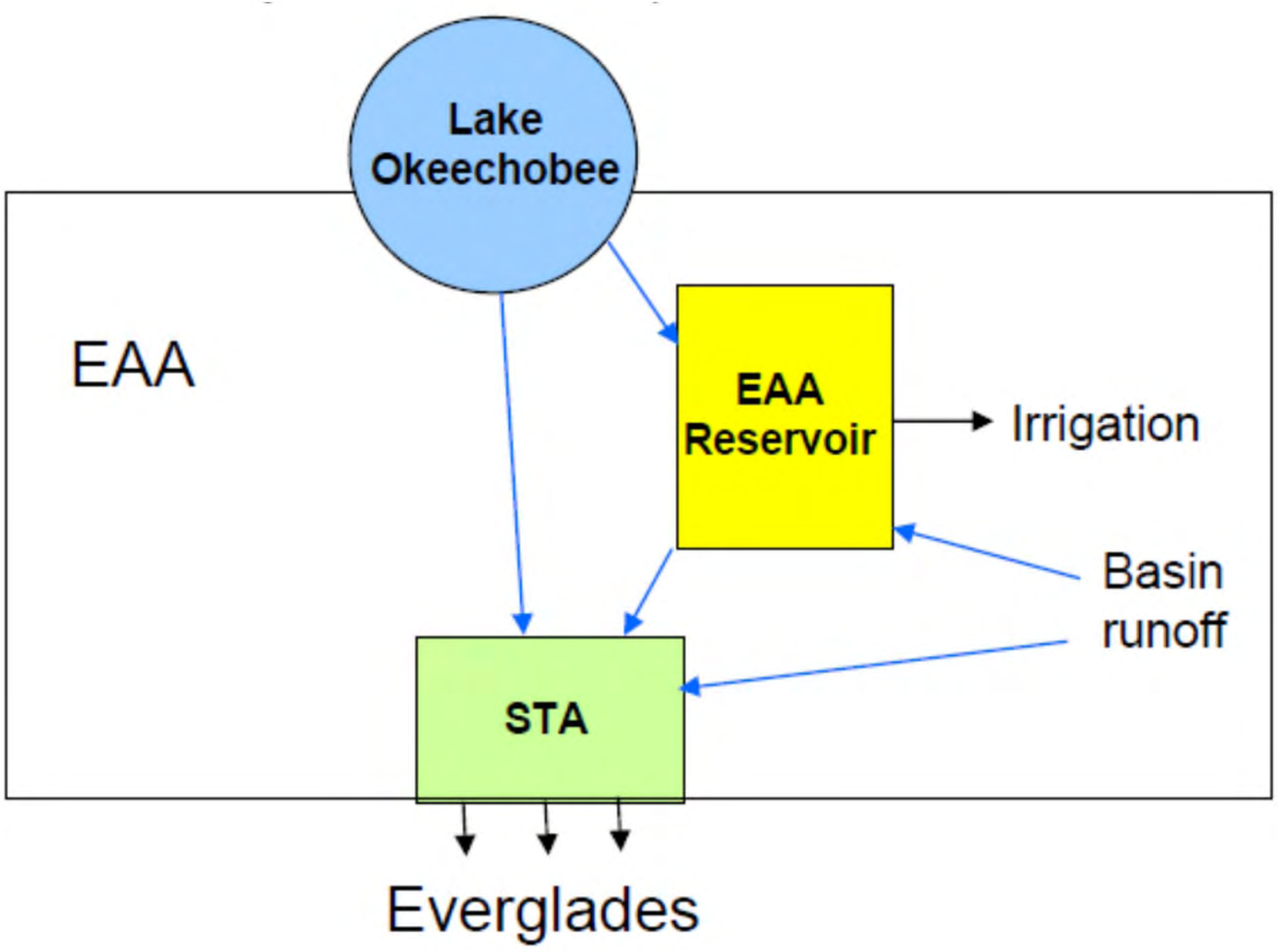


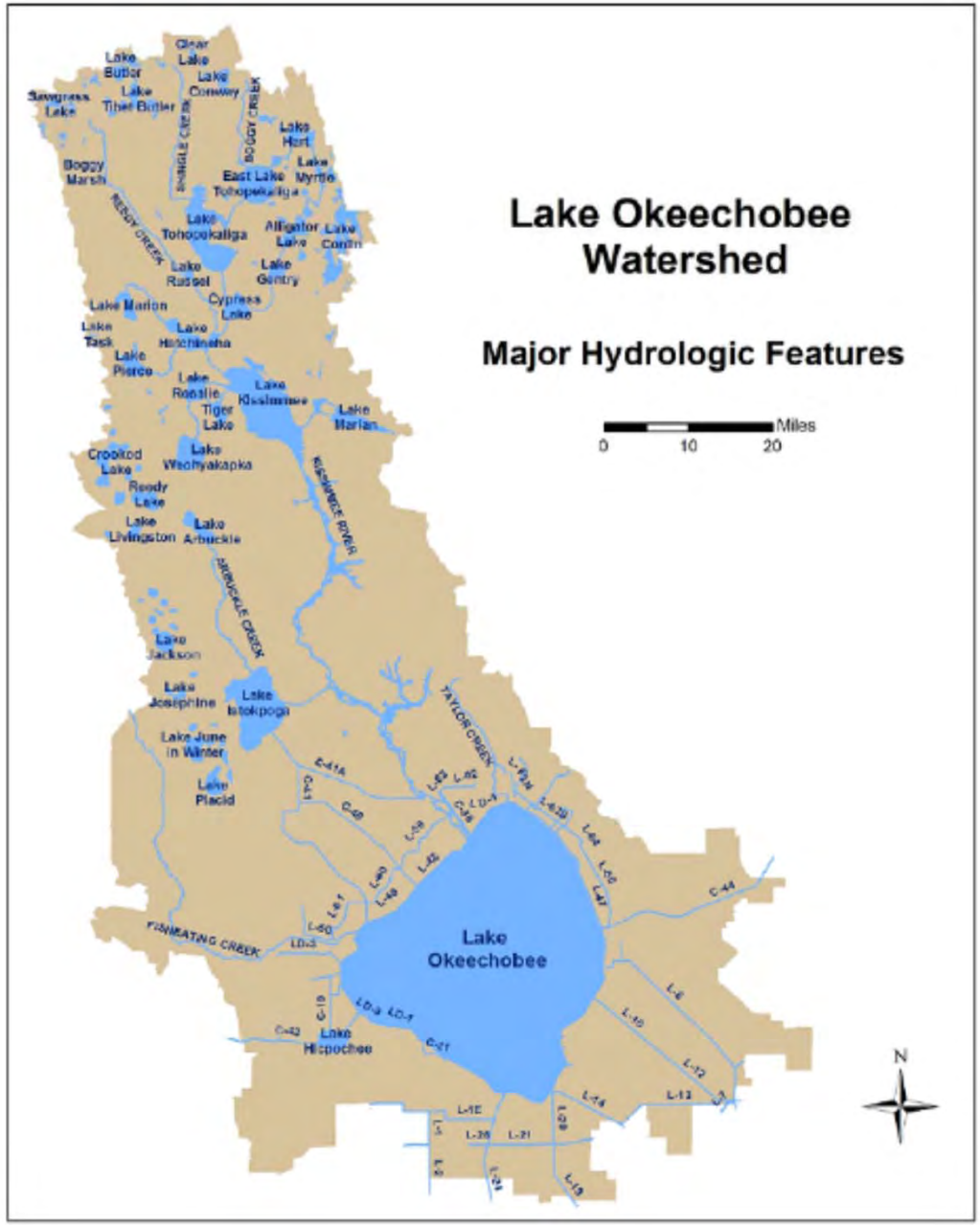


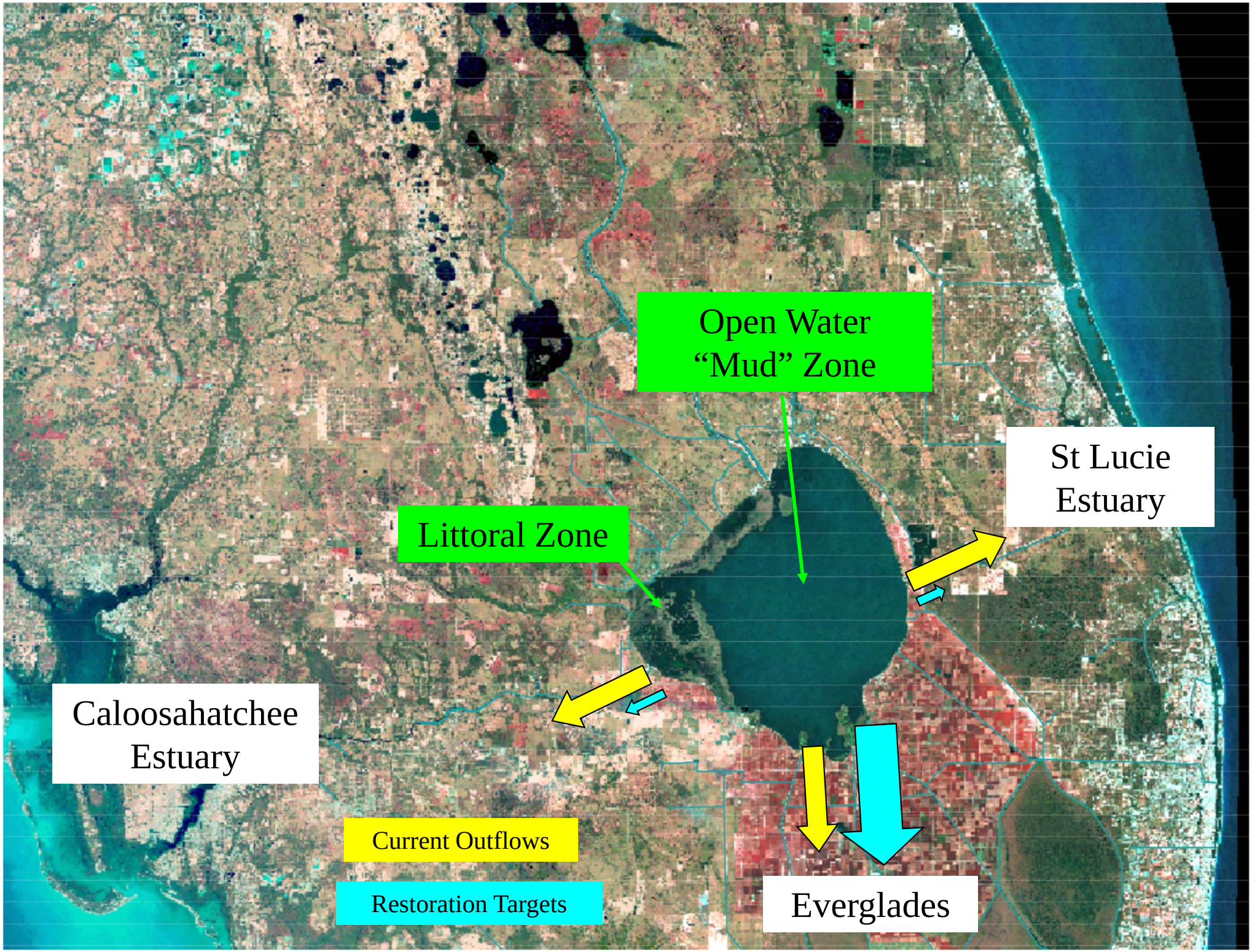
Achieving Long-Term Water Quality & Quantity Goals

- Integration with Hydrologic Restoration
  - Increases in Mean Flow
  - Changes in Seasonal & Annual Flow Variability
  - Reservoirs
- Additional Source Controls (BMPs)
- Additional Treatment Area
- Flow Equalization to Reduce Runoff Pulses
- Treatment Area Optimization
  - Internal Flow Distribution
  - Operation in Design Ranges
  - Vegetation Management
- Research, Monitoring, & Modeling
- Economics May Constrain Timeline – Not Goal ?

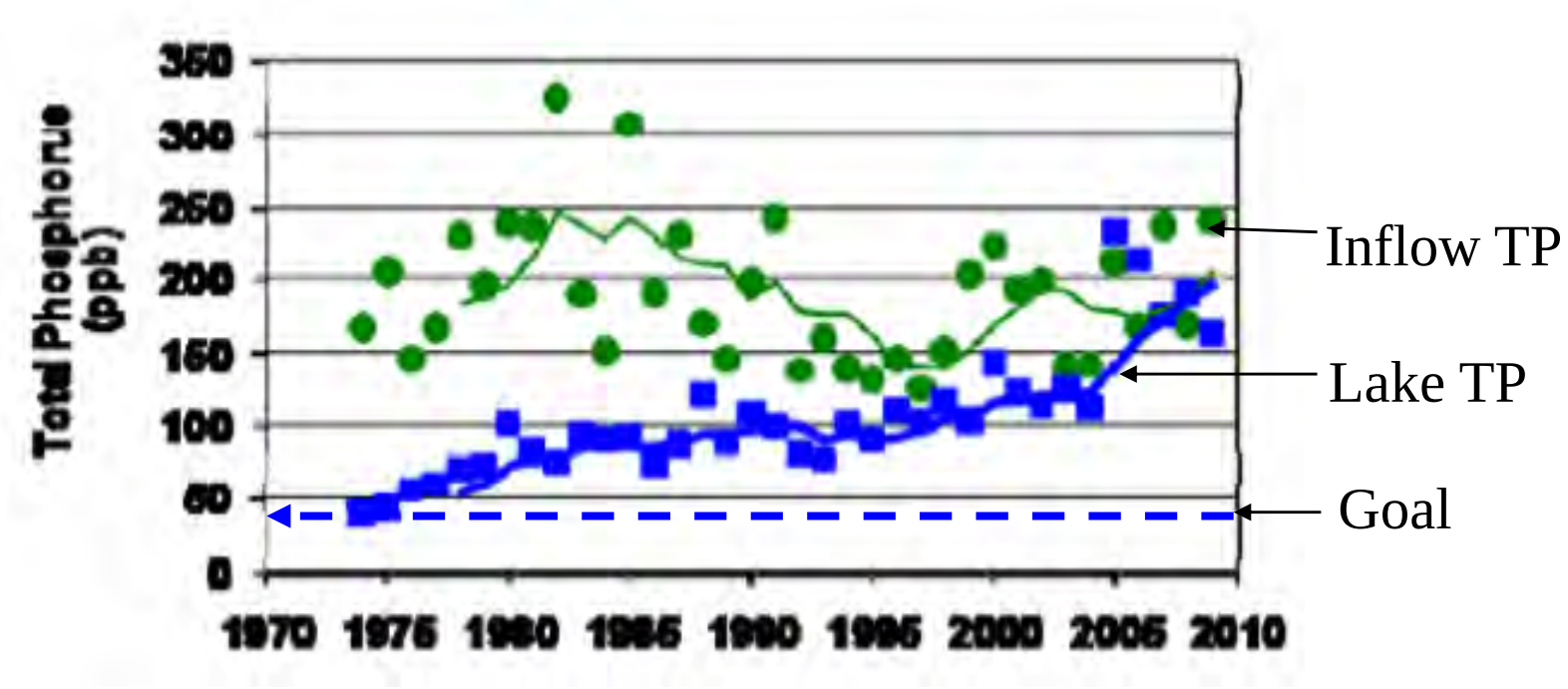
Engineering of Alternatives to Achieve Hydrologic & Water Quality Objectives




Lake Okeechobee Watershed
Major Hydrologic Features
Miles
0
10
20
N
Lake Okeechobee
Clear Lake
Lake Butler
Lake Conway
Lake Tibet Butler
Sawgrass Lake
Boggy Marsh
Lake Hart
Lake Myrtle
East Lake Tohopekaliga
Lake Tohopekaliga
Alligator Lake
Lake Cowin
Lake Russel
Lake Gentry
Cypress Lake
Lake Marion
Lake Tiger
Lake Hatchineha
Lake Pierce
Lake Rosalie
Lake Kissimmee
Lake Marian
Crooked Lake
Lake Weohyakapka
Reedy Lake
Lake Livingston
Lake Arbuckle
Lake Jackson
Lake Josephine
Lake Istokpoga
Lake June in Winter
Lake Placid
Lake Hicpochee
REEDY CREEK
BOGGY CREEK
KISSIMMEE RIVER
ARBUCKLE CREEK
TAYLOR CREEK
FISHEATING CREEK


Open Water
“Mud” Zone
St Lucie
Estuary
Littoral Zone
Caloosahatchee
Estuary
Current Outflows
Restoration Targets
Everglades

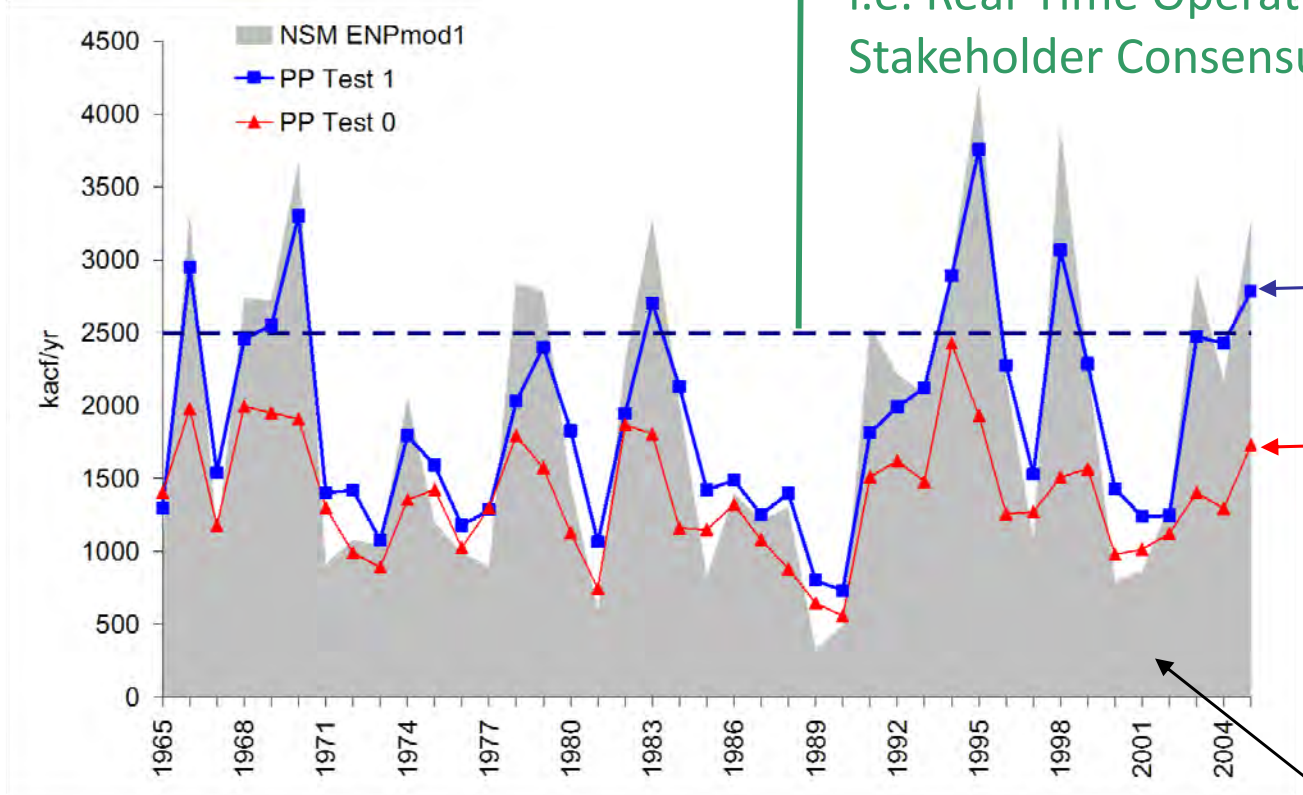
Long-Term Trends in TP Concentration



Factors Contributing to Increasing Lake P

- Excessive P Loads from Watershed
- Loss of P Assimilative Capacity
  - Sediment Enrichment
  - Decrease in Calcium Loads
  - Loss of Vegetation
  - High Water Levels & Fluctuations
  - Hurricanes - High Winds

Hydrologic Restoration Targets Call For Significant Increases in Inter-Annual Variations in Everglades Inflow Pose Special Problems for Design of Treatment Areas



Adaptive Management ?
i.e. Real-Time Operational Decision
Stakeholder Consensus ?

Runoff + Lake
Ideal Treatment

Runoff Only
Minimum Treatment

Restoration Target
Simulation of "Natural Flow"

Planning & Decision-Making Process

Players in Everglades Restoration, 1991-

(in no order)

Federal:
USACE
FWS
NPS
USGS
NOAA
USDA
EPA
FKNMS
NMFS
NOS
USDOJ

State:
SFWMD
DACS
DCA
DEP
FDOT
FFWCC
County

Others:
Miccosukee Tribe
Seminole Tribe
Audubon
FL Wildlife
NGOs
Academia

“No Restoration Plan Projects Have Been Completed”
National Academy of Science, 2008

Conducting Ecosystem Restoration ….
…. one meeting at a time*

***Disclaimer**: The opinions expressed herein do not necessarily reflect those of DOI.

Everglades Restoration Planning
What Doesn't Seem to Work

- Science Confused with Policy
- Uncertain & Conflicting Goals
- Unwieldy Forums & Fuzzy Boundaries
  - Too Many Chefs
  - Too Many Chiefs
  - Too May Chefs Who Act Like Chiefs
  - Too Many Chiefs Who Act Like Chefs
  - Too Many Topics at Once
- Unnecessary Complexity
- Agreements with Fuzzy Language + Short Institutional Memory
- "Predictably Irrational" Decisions (Ariely, 2008)

Everglades Restoration Planning
What Seems to Work

- Legal Clout & Political Will
- Reasonably Separate Technical vs. Policy Arenas
- Small Technical Workgroups
  - Define Problems in Simple Terms
  - Agree on Technical Assumptions & Methods
  - Develop & Evaluate Alternatives
  - Define Monitoring Needs & Performance Measures
- Air Out & Refine Options with Broad Stakeholder Input
- Decision-Makers Make Decisions
- Clear Milestones & Performance Measures
- Adaptive Implementation Framework

Synthesis of Freshwater Everglades Research

A Proposal Submitted to the

Critical Ecosystem Studies Initiative

November 4, 2009

“Analysis and synthesis ordinarily clarify matters for us about as much as taking a Swiss watch apart and dumping its wheels, springs, hands, threads, pivots, screws and gears into a layman's hands for reassembling, clarifies a watch to a layman.”9

EVER GLADES FOUNDATION

Challenges

Challenges for Ecosystem Management

- Lack of data on reference condition
- Identifying cause-effect linkages
- Implementing adaptive assessment when recovery times are long
- Separating “signal from noise”
- Technological challenges
- Maintaining political and public support when recovery times are long

Some Current Science and Policy Issues

(1) How do you handle “flashiness” of ecosystem?

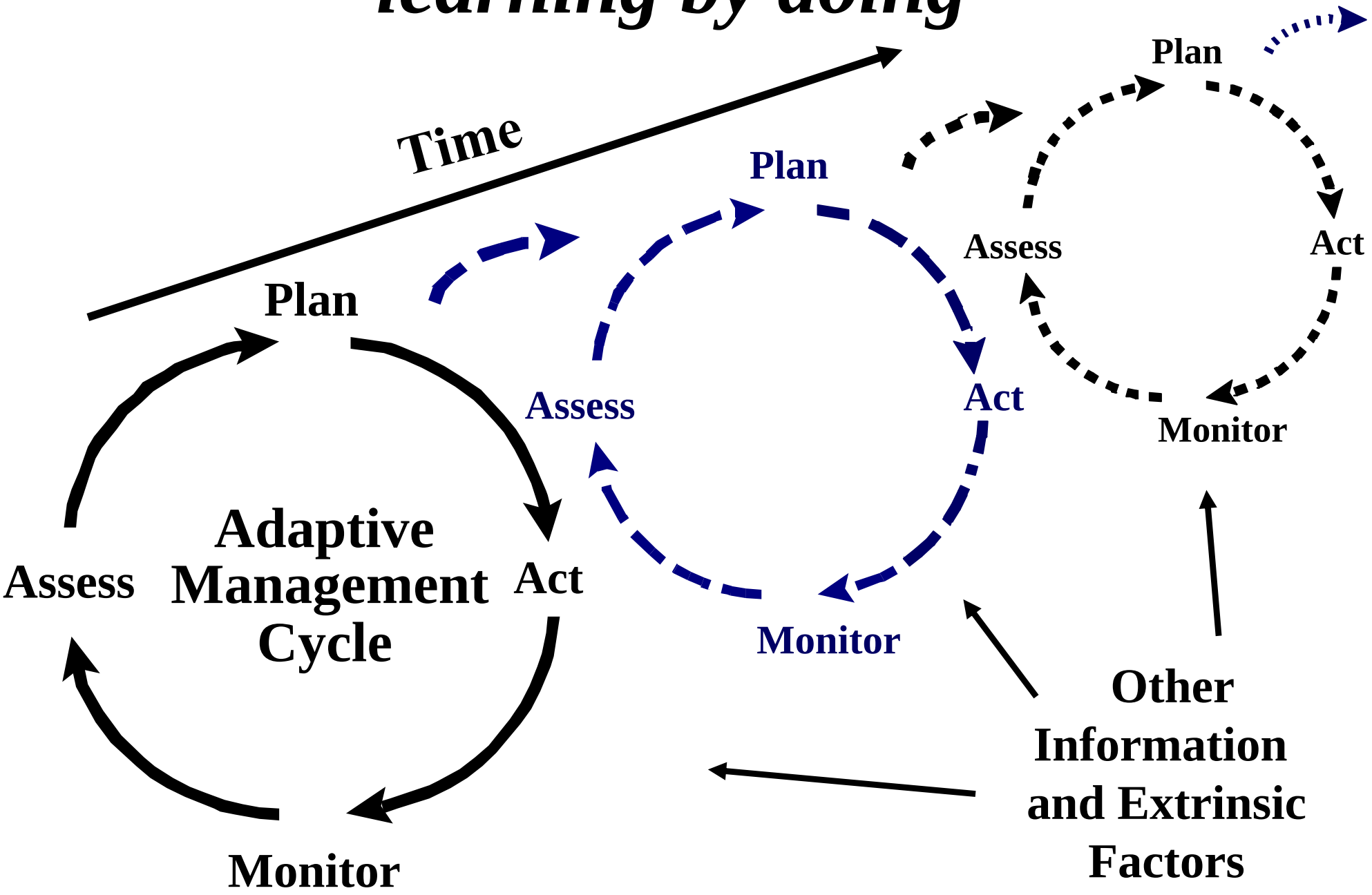
(2) Tradeoffs between water quality vs. restoring flow?

(3) Conflicts with Endangered Species Habitat

(4) How do you use “Adaptive Management”?

(5) What do you do with Climate Change?

AM is a structured process of learning by doing



Adaptive Management?

(1) Is there enough engagement to implement Adaptive Management?

(2) Even if a plan exists, how do you ensure all parties agree/enforce?

(3) If a project is a failure, what is the technical and policy level of comfort to kill a project?

Differing Forms of Adaptive Management

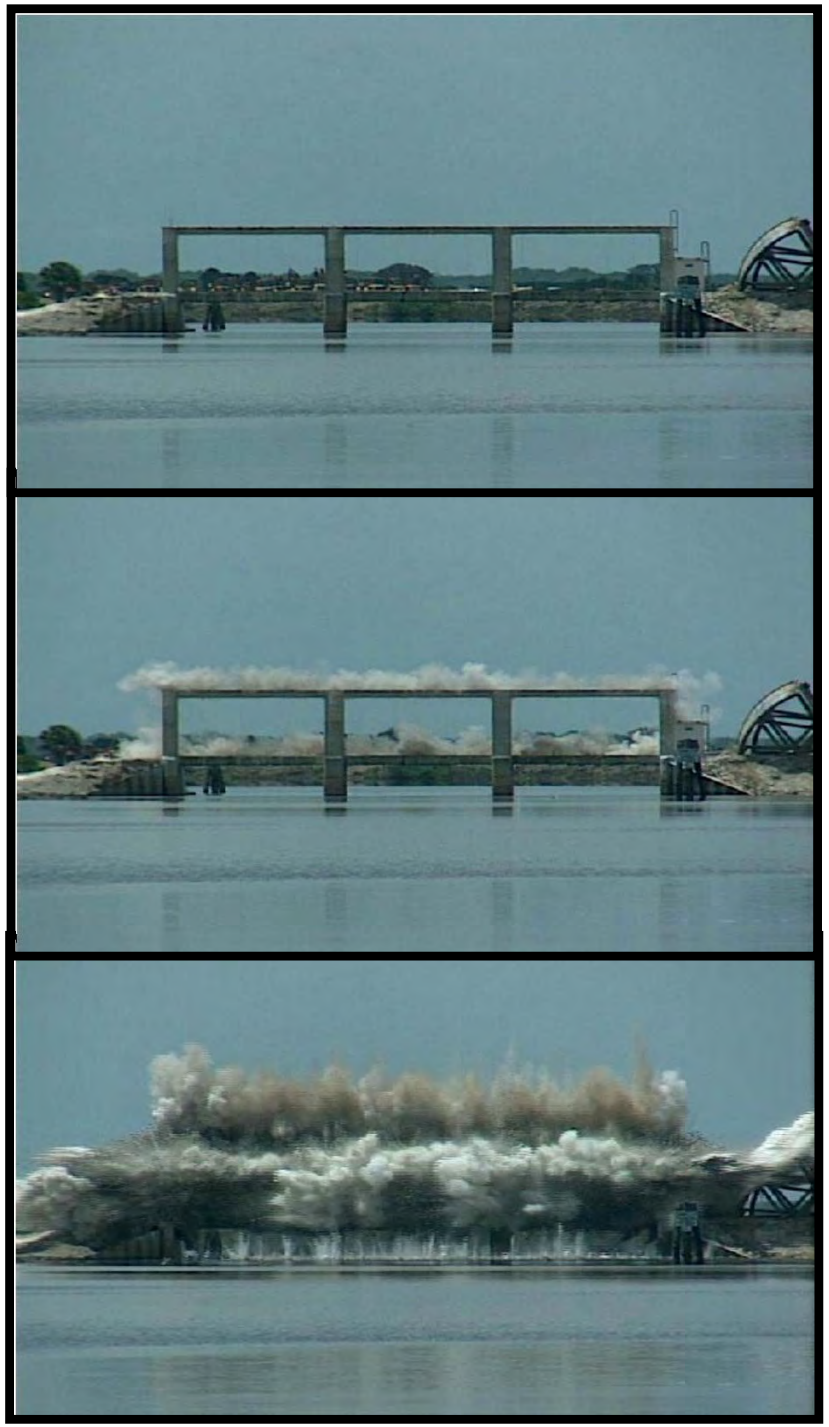
Active AM

management experiments

Passive AM

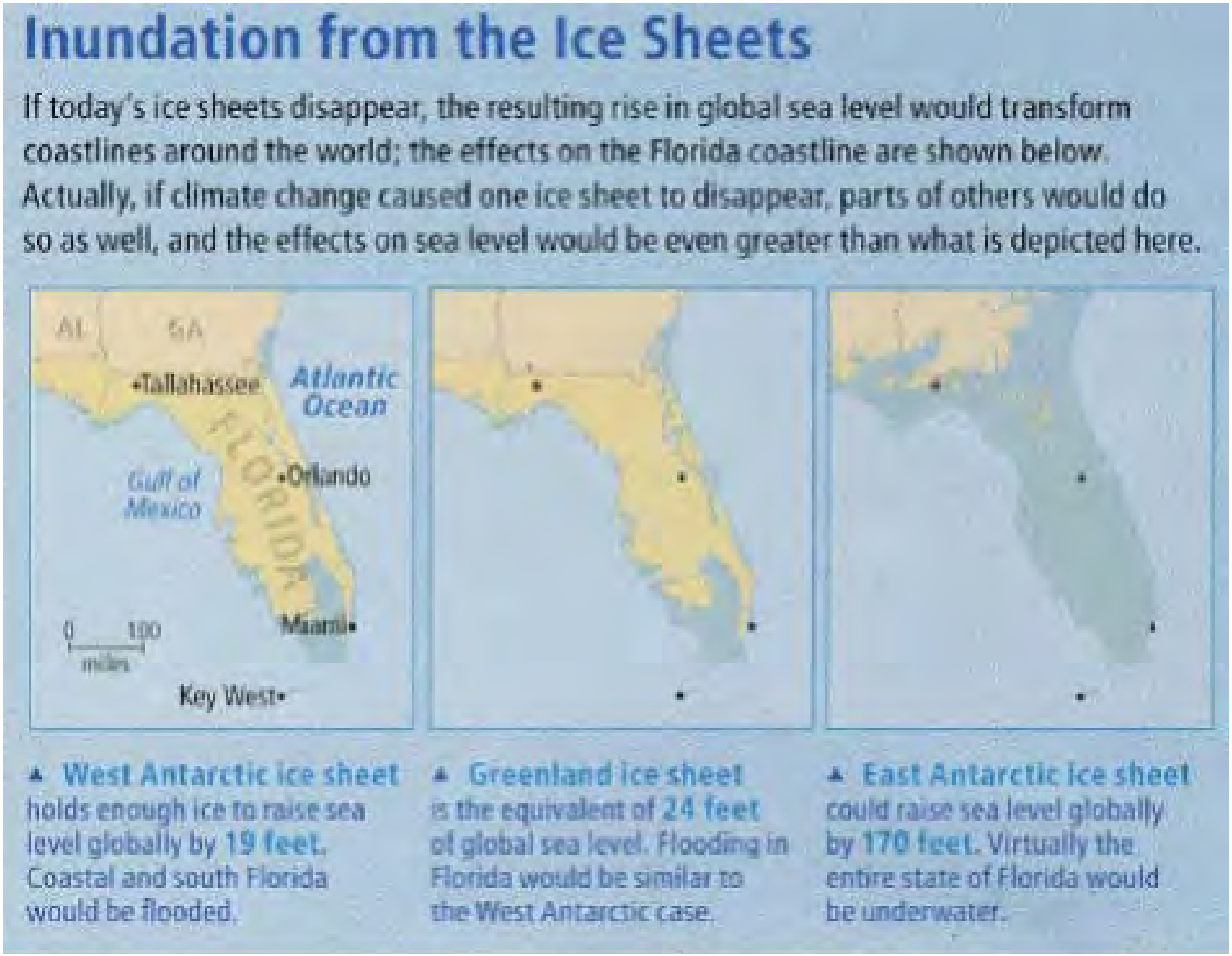
hypothesis-based monitoring

Not just “trial and error” or “flexible management,” but a deliberate, formalized approach to “learn by doing.”



Kissimmee River Restoration (Floodplain restoration)

Sea Level Rise – Problem or Red Herring?



Scientific American, ~2008

Climate Change?

(1) Do you throw up your hands at Climate Change?

(2) If pending Climate Change argues for continued restoration, how does this work?

(3) Should variability in Climate Change paralyze a process; push it forward with no changes; or something else?

Potentially Useful References

http://www.nps.gov/ever/index.htm

http://www.nps.gov/ever/naturescience/sfnrcpublications.htm

http://www.fws.gov/loxahatchee/

http://www.evergladesplan.org./index.aspx

http://www.fws.gov/verobeach/

http://www.sofia.usgs.gov/

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