

Everglades Restoration Using Large-Scale Treatment Wetlands

February 11, 2006

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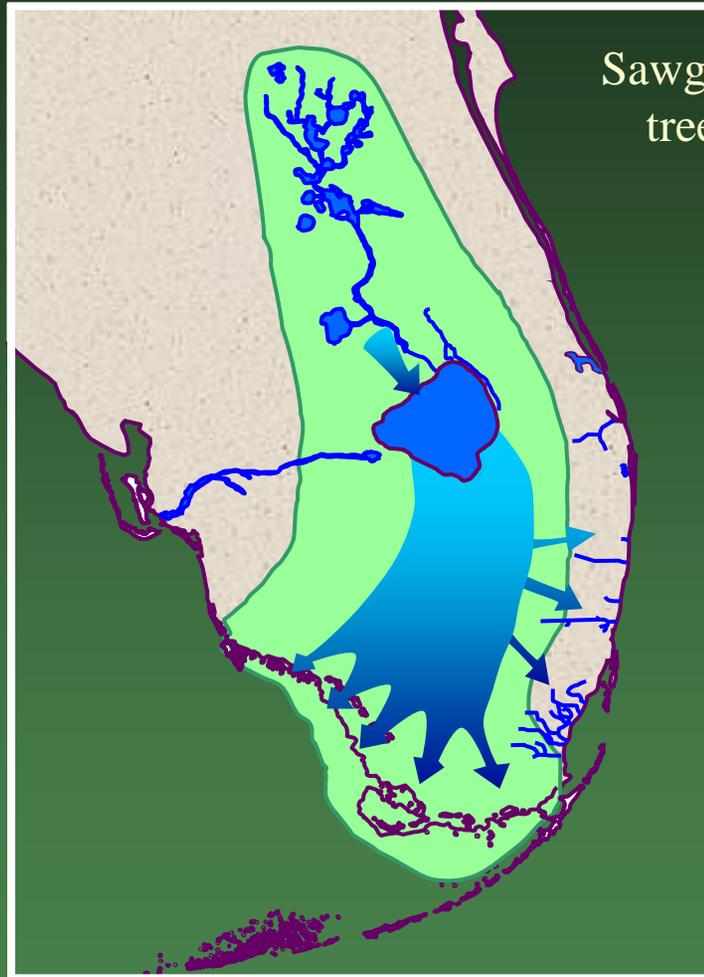
Overview

- **Everglades Restoration Background**
- **Stormwater Treatment Areas**
 - **Design and construction**
 - **Performance & Enhancements**
 - **Hurricane Impacts**



The Historic Everglades Ecosystem

"River of Grass"



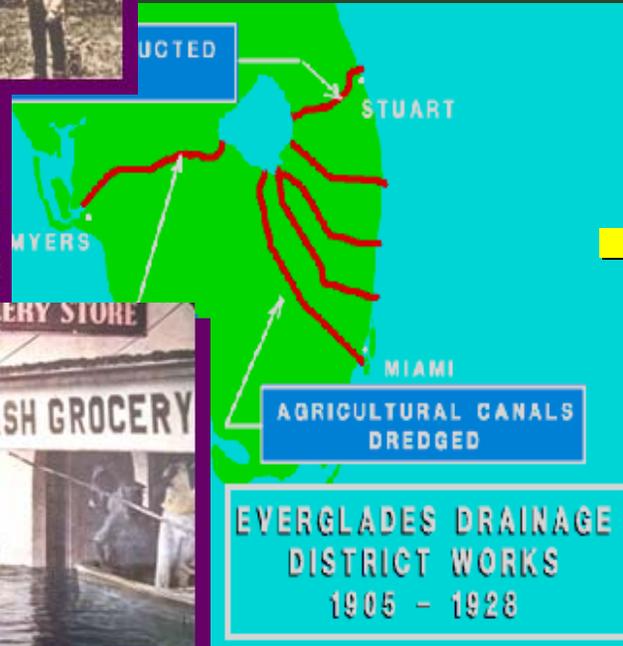
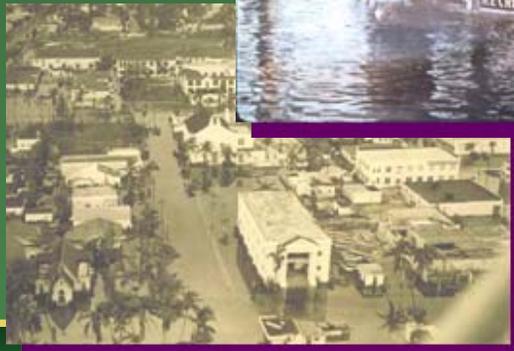
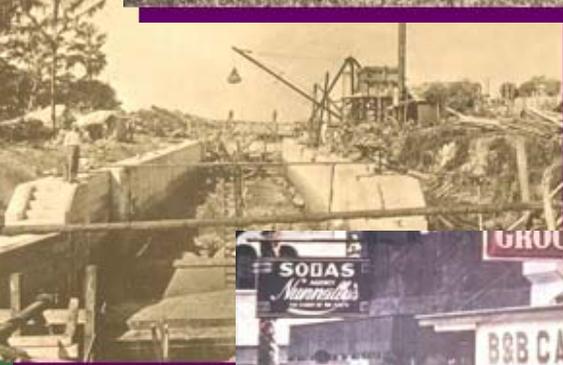
Sawgrass and
tree islands



Sawgrass prairie &
open water sloughs

History

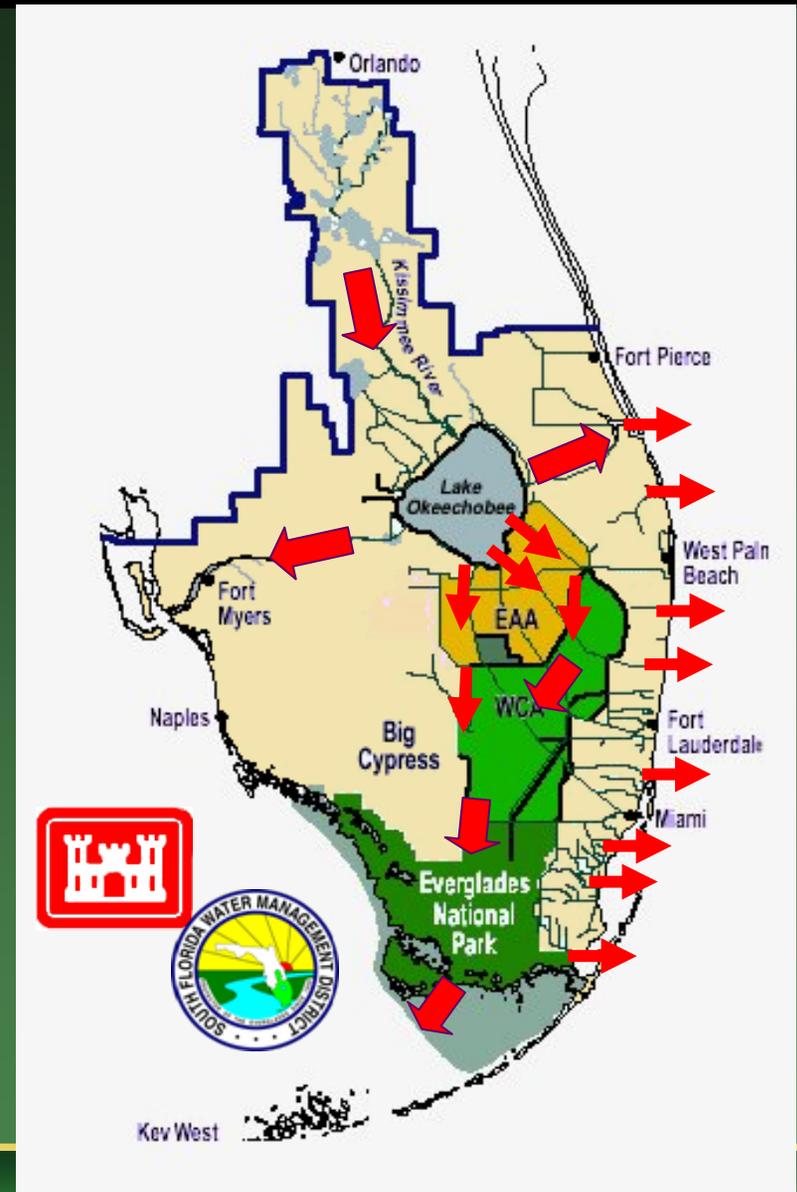
- Settlement in south Florida increased in the late 1800's
- Navigation Improvements
- Everglades Drainage District
- Initial drainage works improved development opportunities
- Severe floods & droughts persisted



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The Central and South Florida Project for Flood Control and Other Purposes

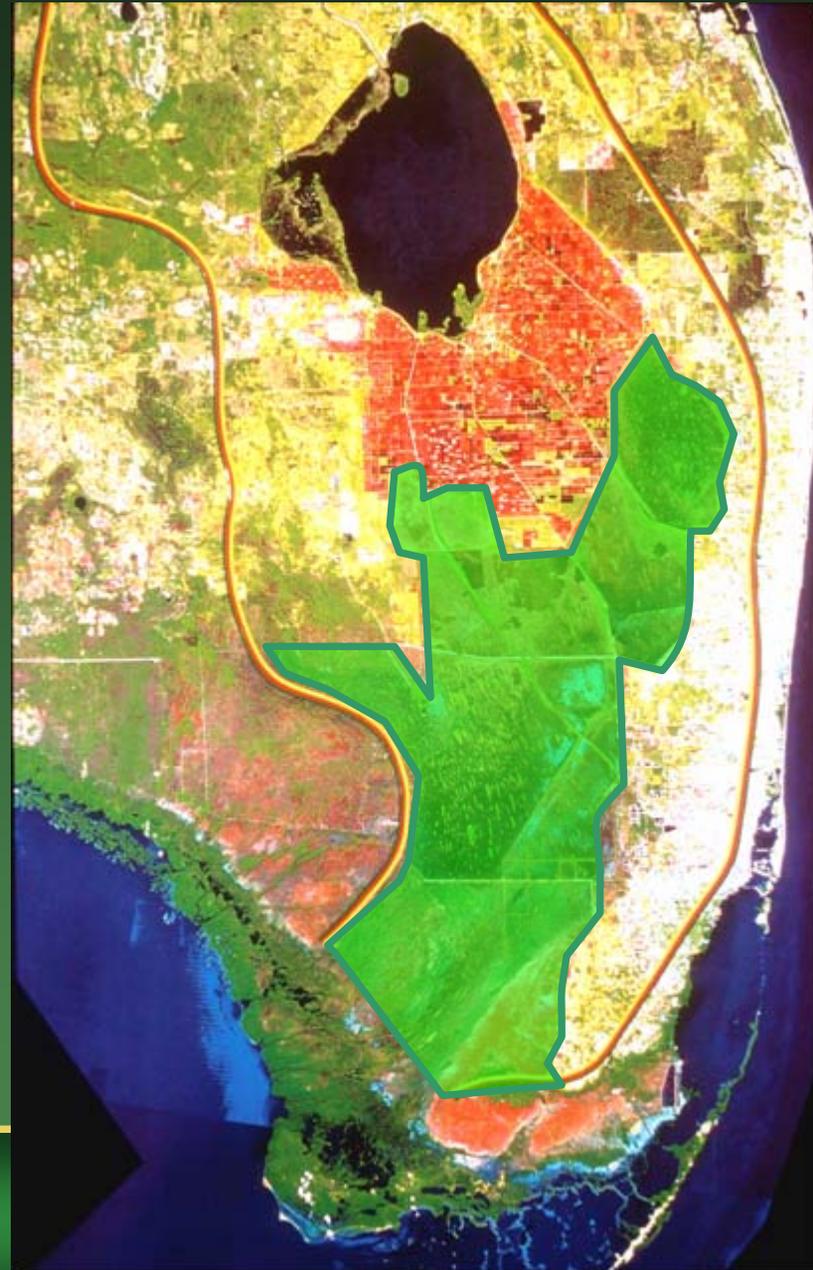
- Initially authorized in 1948
- Constructed between 1950's and 1970's
- Operated in accordance with USACE criteria



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Major Problems Facing Everglades

- Loss of Everglades habitat
- Disruption of hydropatterns (i.e., timing, volume & distribution)
 - Repetitive water shortages and salt water intrusion
 - 1.7 billion gallons of water a day wasted to tide
- Degradation of water quality
- Exotic plant species



Everglades Restoration

- **Two synchronized initiatives:**
 - **Everglades Forever Act – primary focus is water quality, with some quantity and distribution features**
 - **Comprehensive Everglades Restoration Plan – primary focus is water quantity and distribution, with some water quality features**
- **This presentation will cover the Everglades Forever Act restoration program**



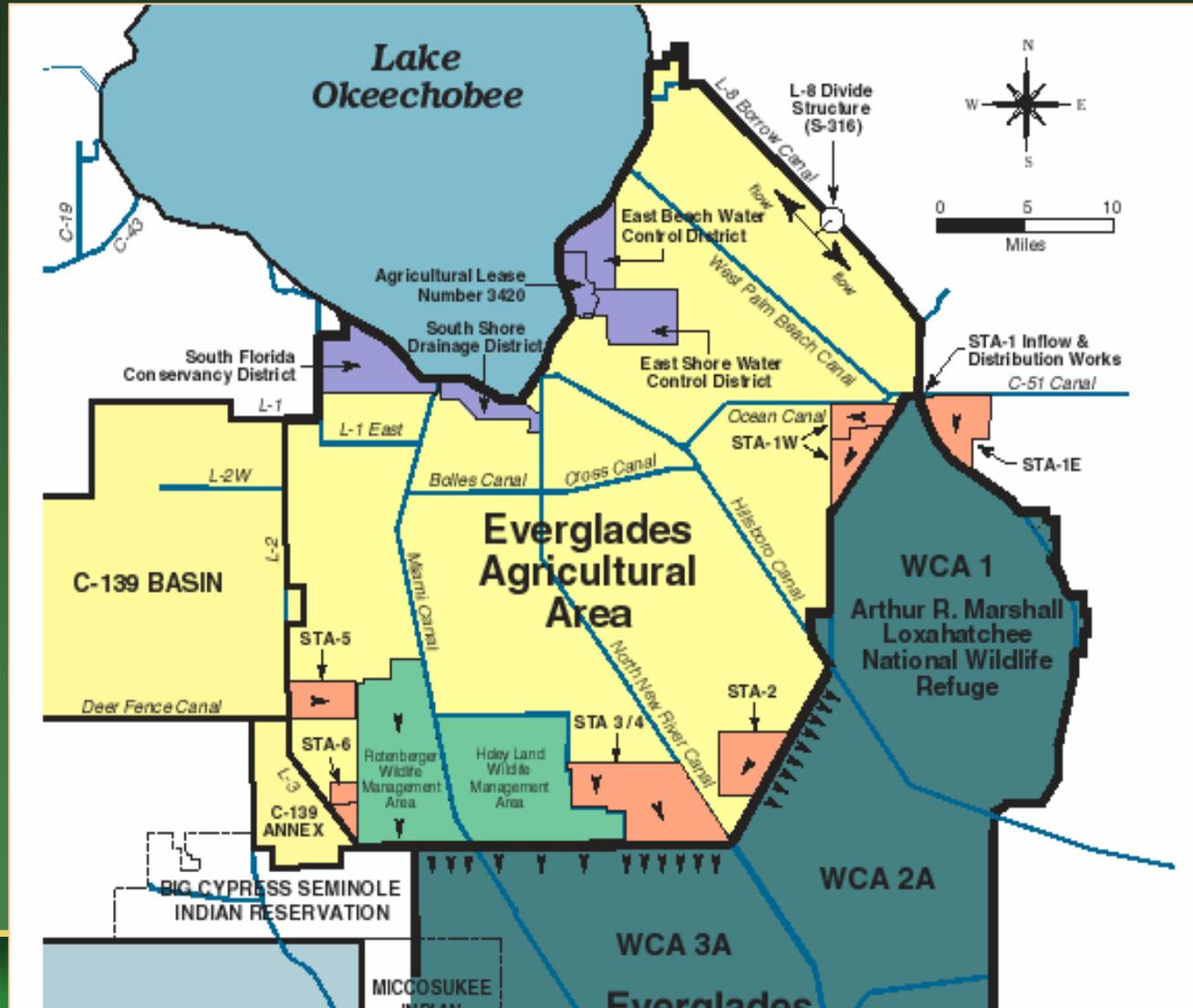
Everglades Forever Act

- 1991, amended 1994 and 2003
- Achieve state water quality standards by 12/31/06
- Construction
 - *Stormwater Treatment Areas*
 - Diversion and hydropattern restoration
- Research
 - Phosphorus criterion research
 - Advanced treatment technology research
- Regulation
 - *Best Management Practices (BMPs)*



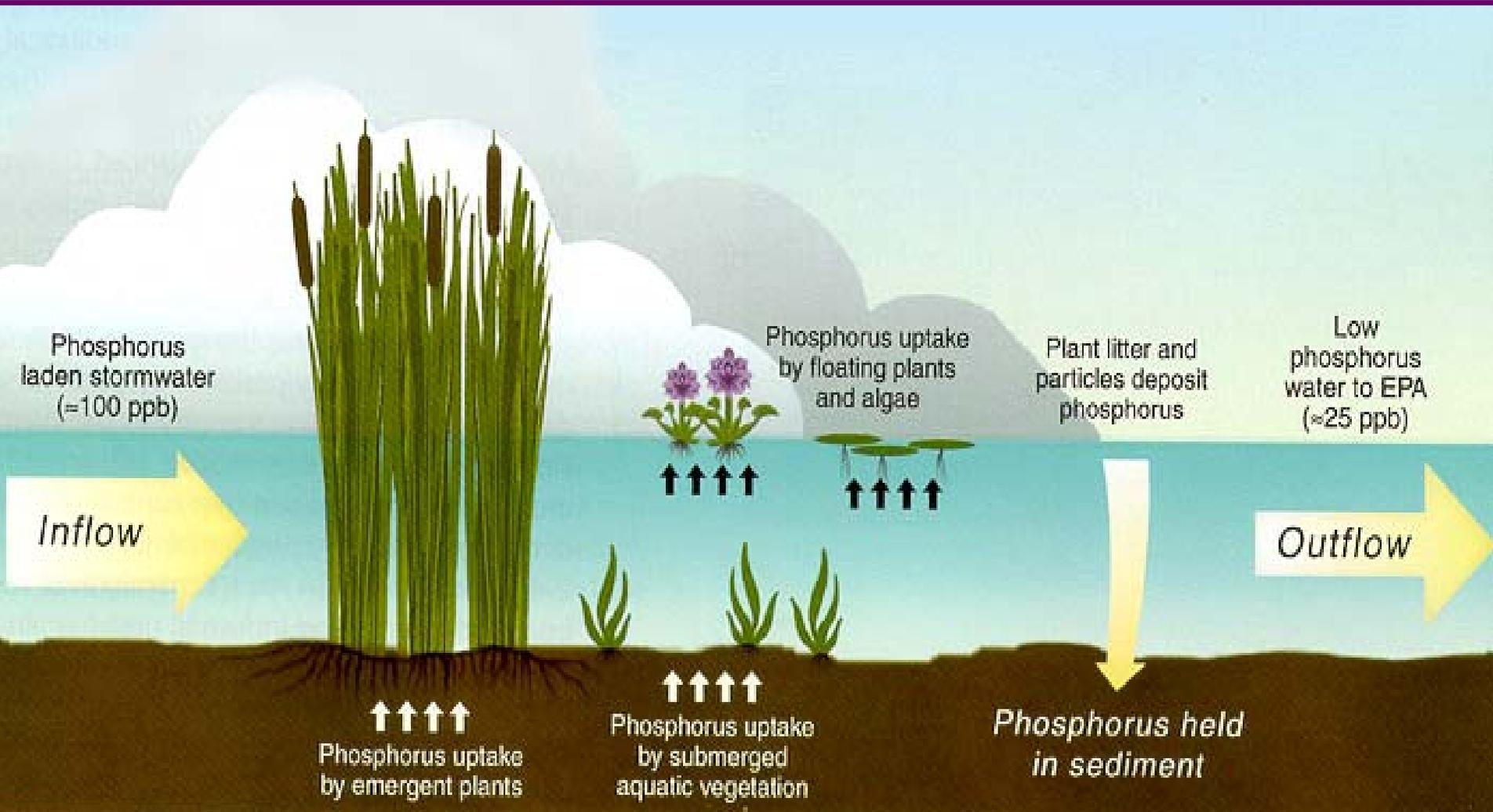
Everglades Construction Project

Multiple objectives:
Nutrient reduction,
Water supply,
Hydropattern restoration,
Reduce freshwater discharges to estuaries



Stormwater Treatment Areas

STAs are constructed wetlands that remove and store nutrients through plant growth and the accumulation of dead plant material in a layer of peat.



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Emergent Vegetation

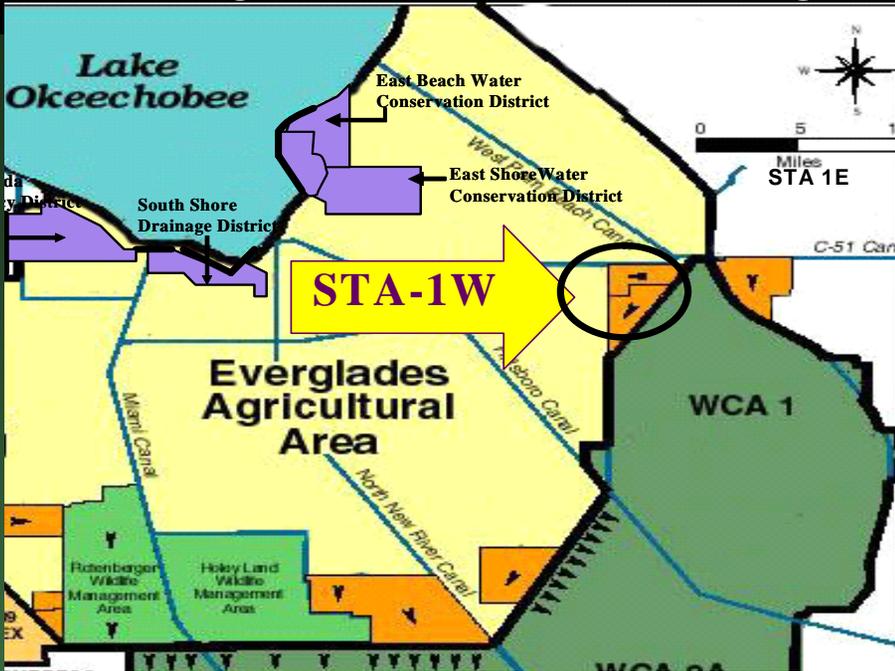


Submerged Aquatic Vegetation

Periphyton-based Stormwater Treatment Area (PSTA)



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**Inflow structure
for STA 1W**



Limerock berm



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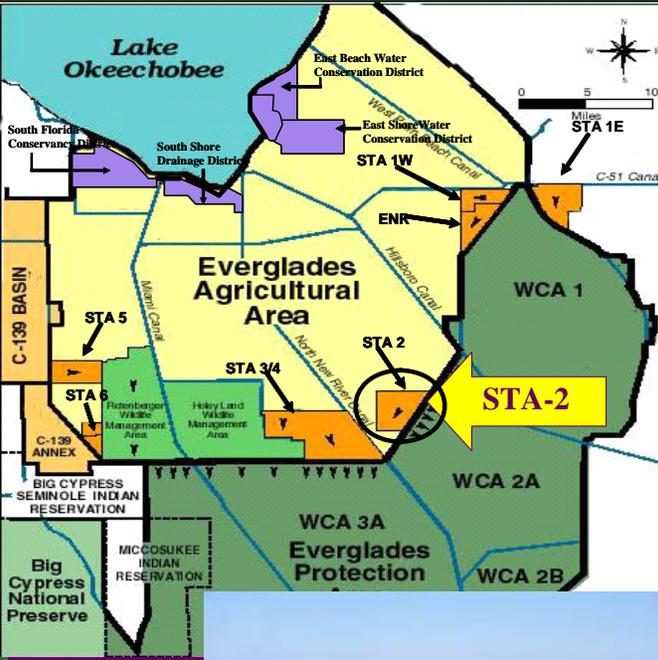
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STA-2



- 6,430 acres of effective treatment area
- Parallel flow-ways: emergent followed by SAV



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STA-2 has a mixture of emergent & submerged vegetation



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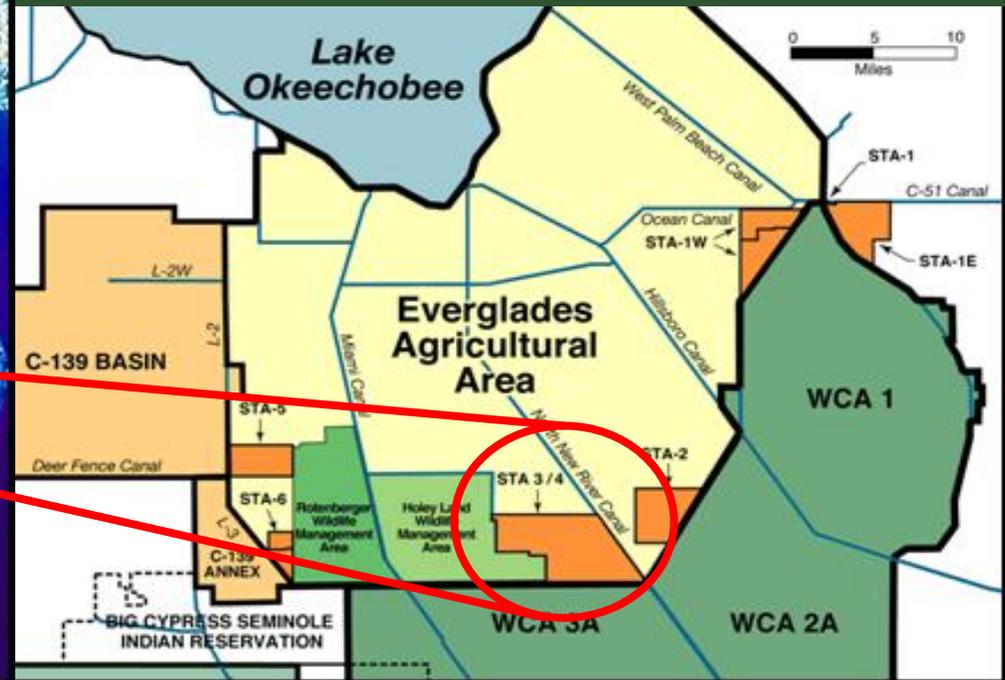


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Stormwater Treatment Area 3/4

is the world's largest constructed wetland:
over 16,500 acres of former agricultural land.
77 tons of phosphorus removed in WY2005



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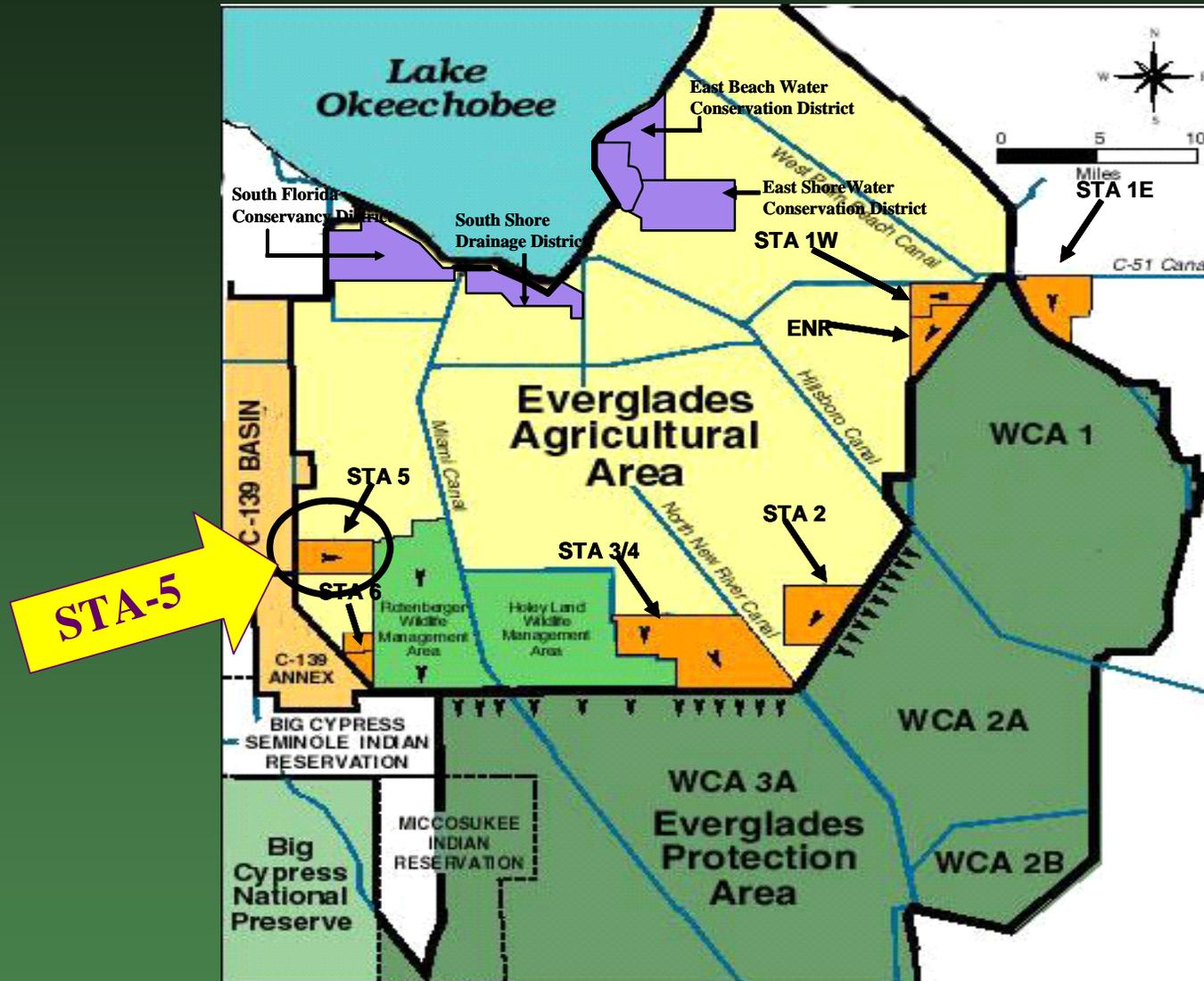
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STA-5

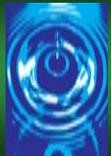
- 4,118 acres
- **Parallel flowways: emergent and the emergent followed by SAV**
- **Treated water helping to restore hydroperiod of Rotenberger WMA**



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Treatment areas are susceptible to drought ...



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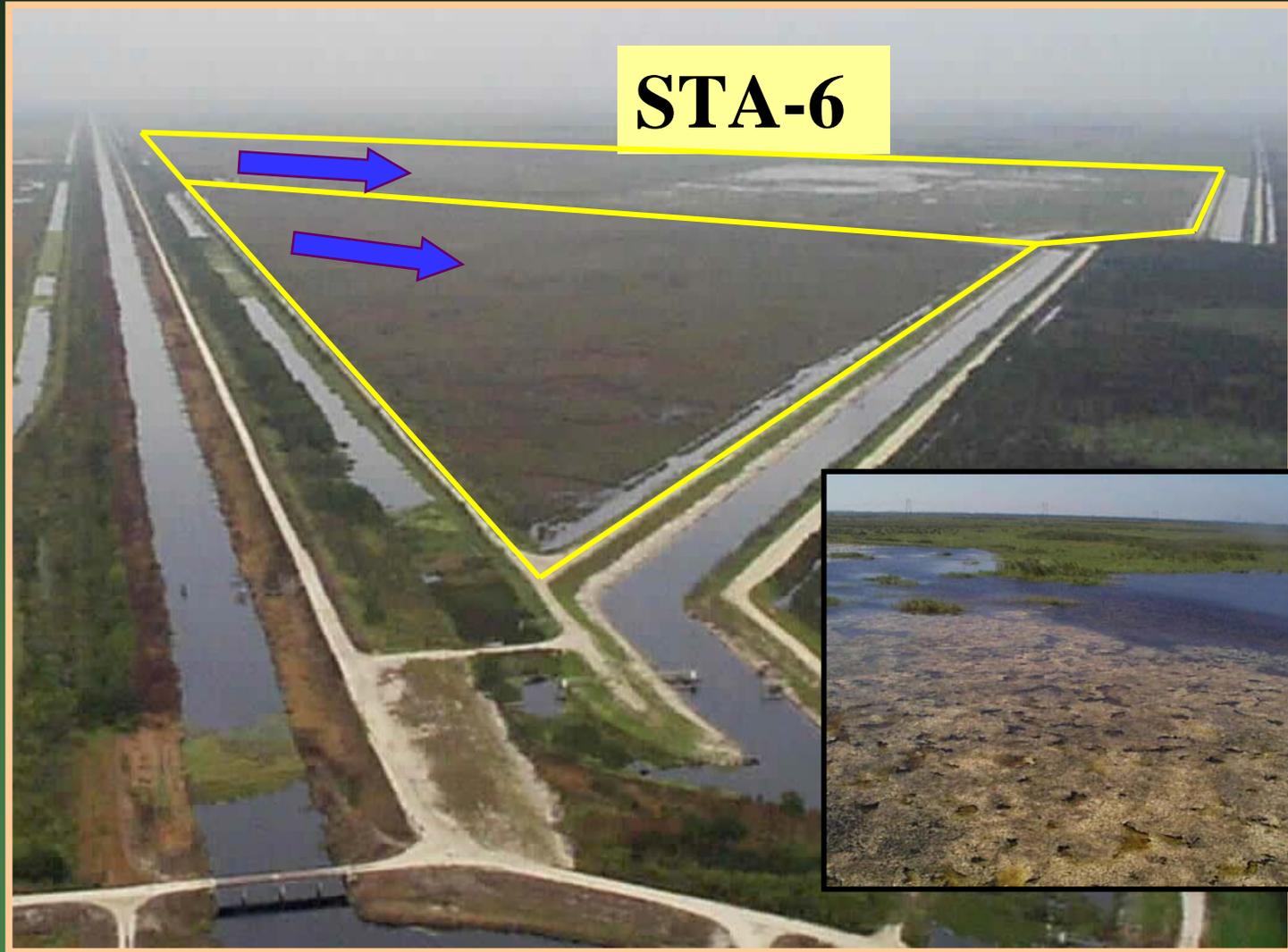
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... but they are resilient



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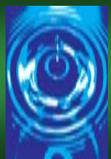
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Corps of
Engineers
constructed
STA-1E



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**Public
Access –
Bird
Watching
tours
available in
cooperation
with
SFWMD,
USFWS and
FFWCC**



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Hurricane Impacts – SAV uprooted



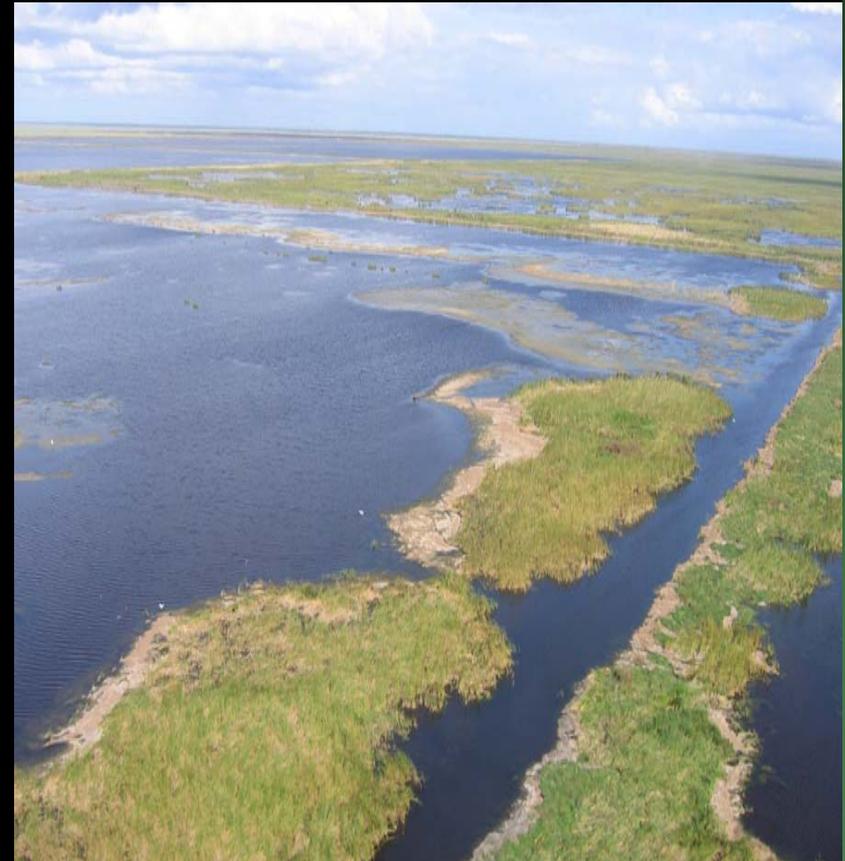
Emergent Vegetation flattened



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To minimize disruption

Vegetation Strips (STA-3/4 & 2)



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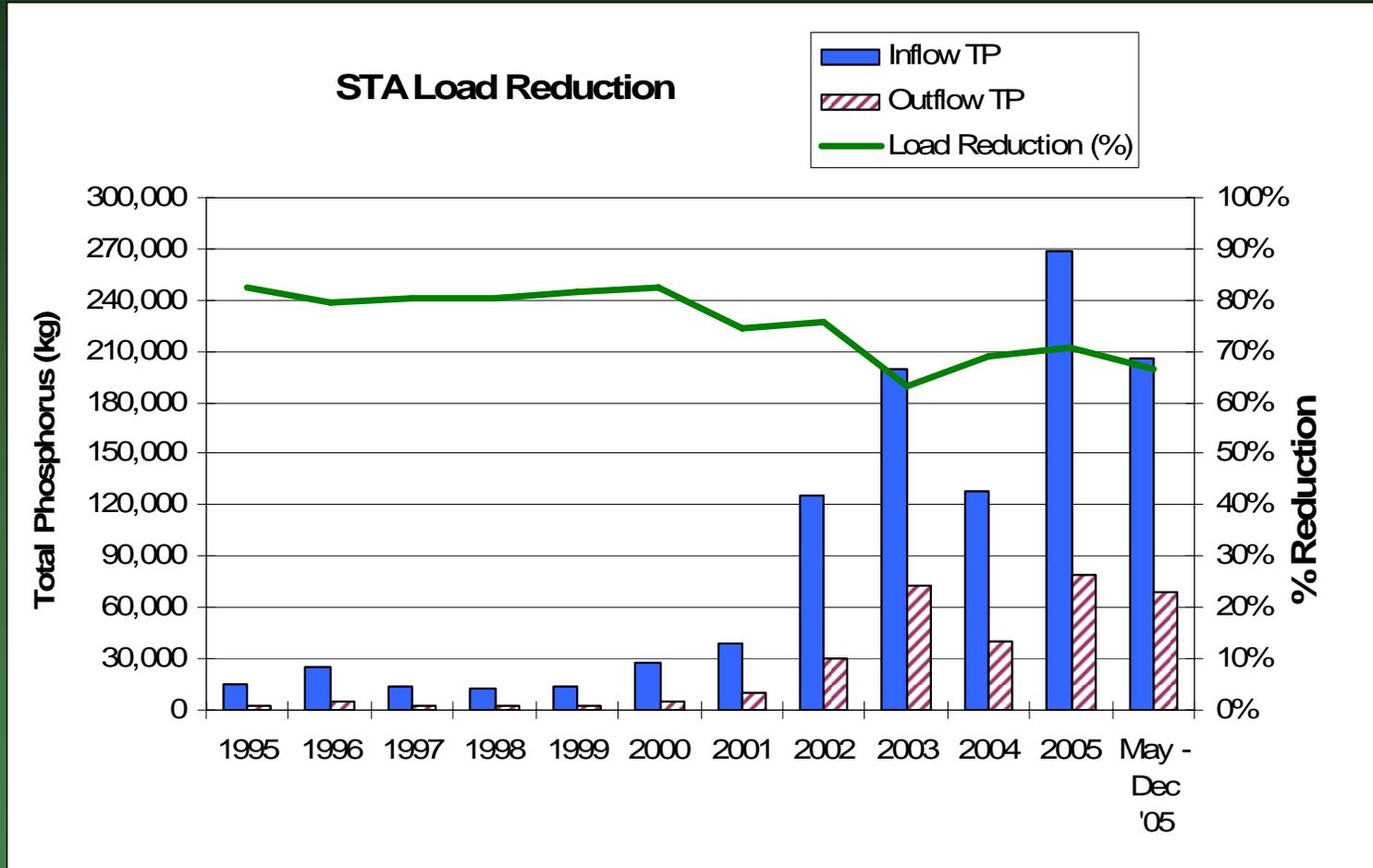
Mixed Marsh (STA-1E)



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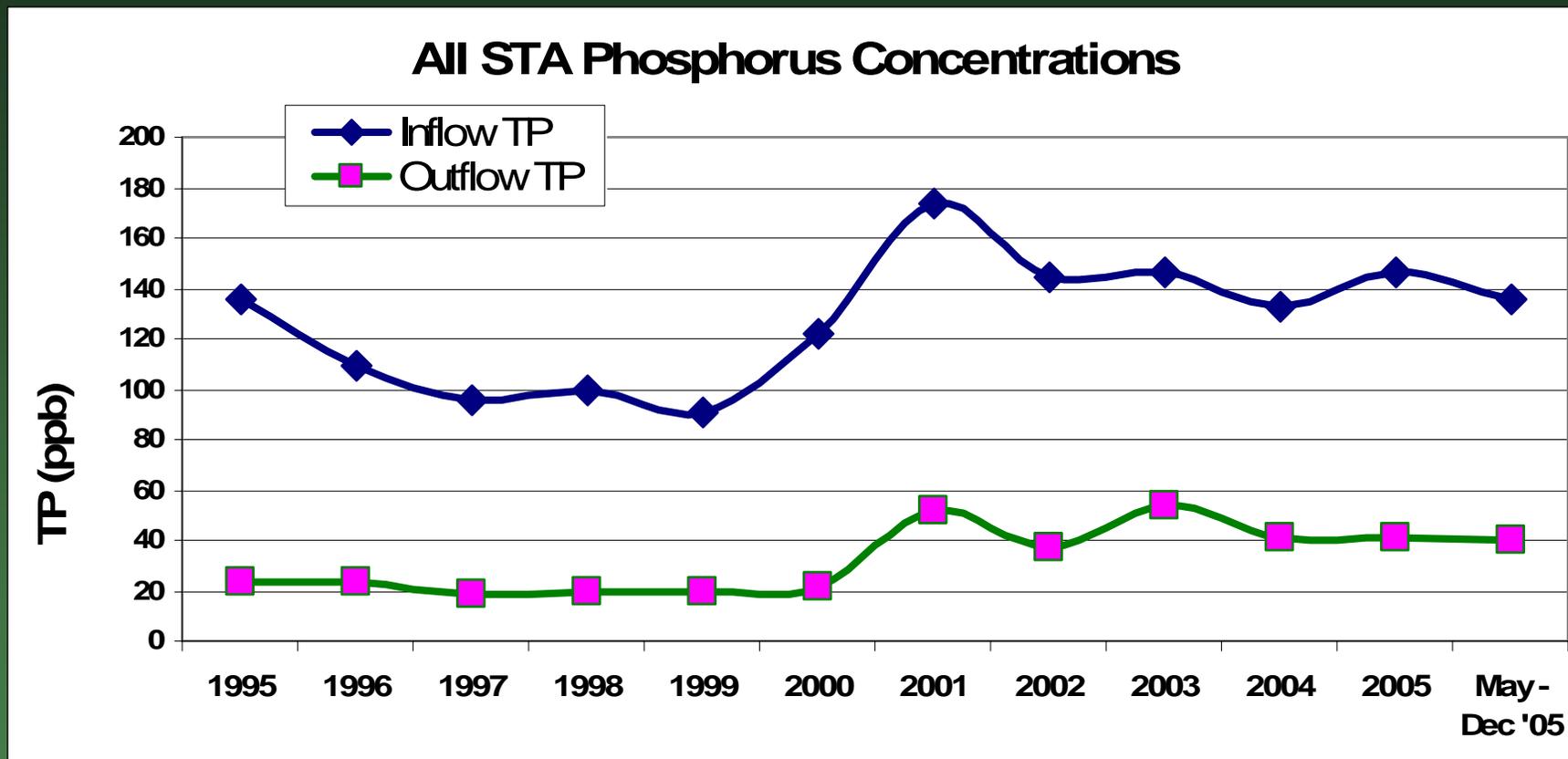
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Treatment performance has exceeded expectations



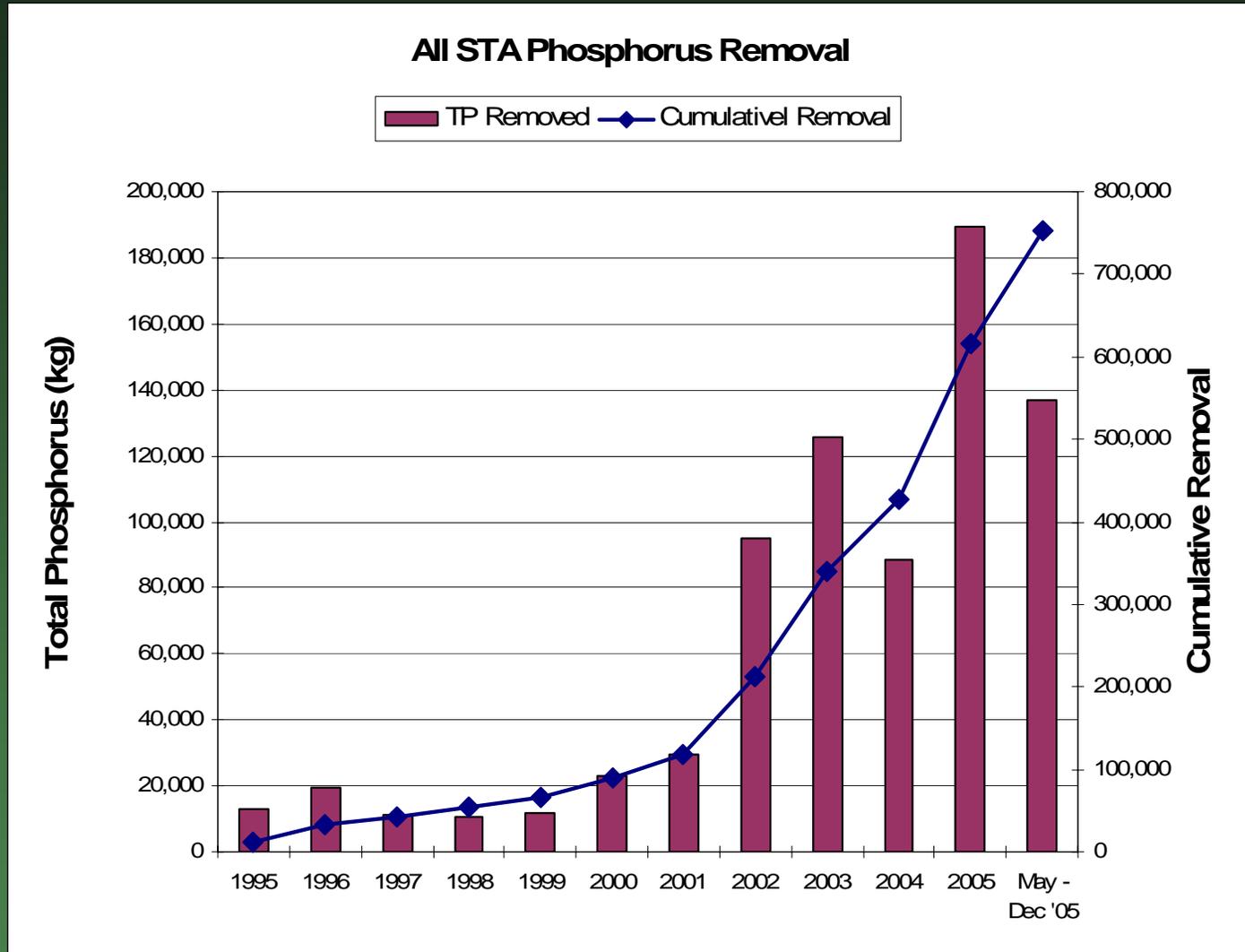
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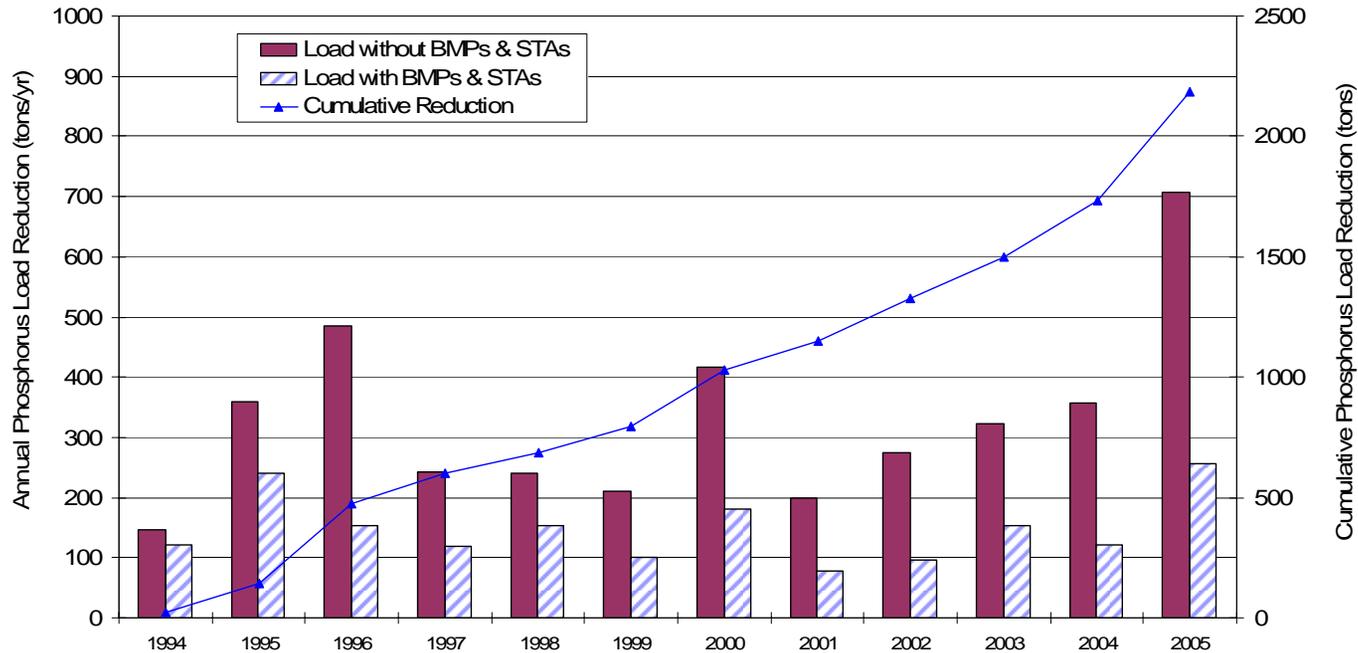
Summary of Performance

- In general, performance has exceeded expectation – outflow has averaged 41 ppb
 - *STA-1W: 50 ppb*
 - STA-2: 18 ppb
 - STA-3/4: 18 ppb
 - *STA-5: 99 ppb*
 - STA-6: 19 ppb
- 753 metric tons removed; 70% removal
- Combined with EAA BMPs, over 2,000 tons of phosphorus removed



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Phosphorus Reduction Due to BMPs and STAs



Despite success of EAA BMPs and STAs, need additional water quality improvement measures to achieve compliance with phosphorus standard by Dec. 31, 2006



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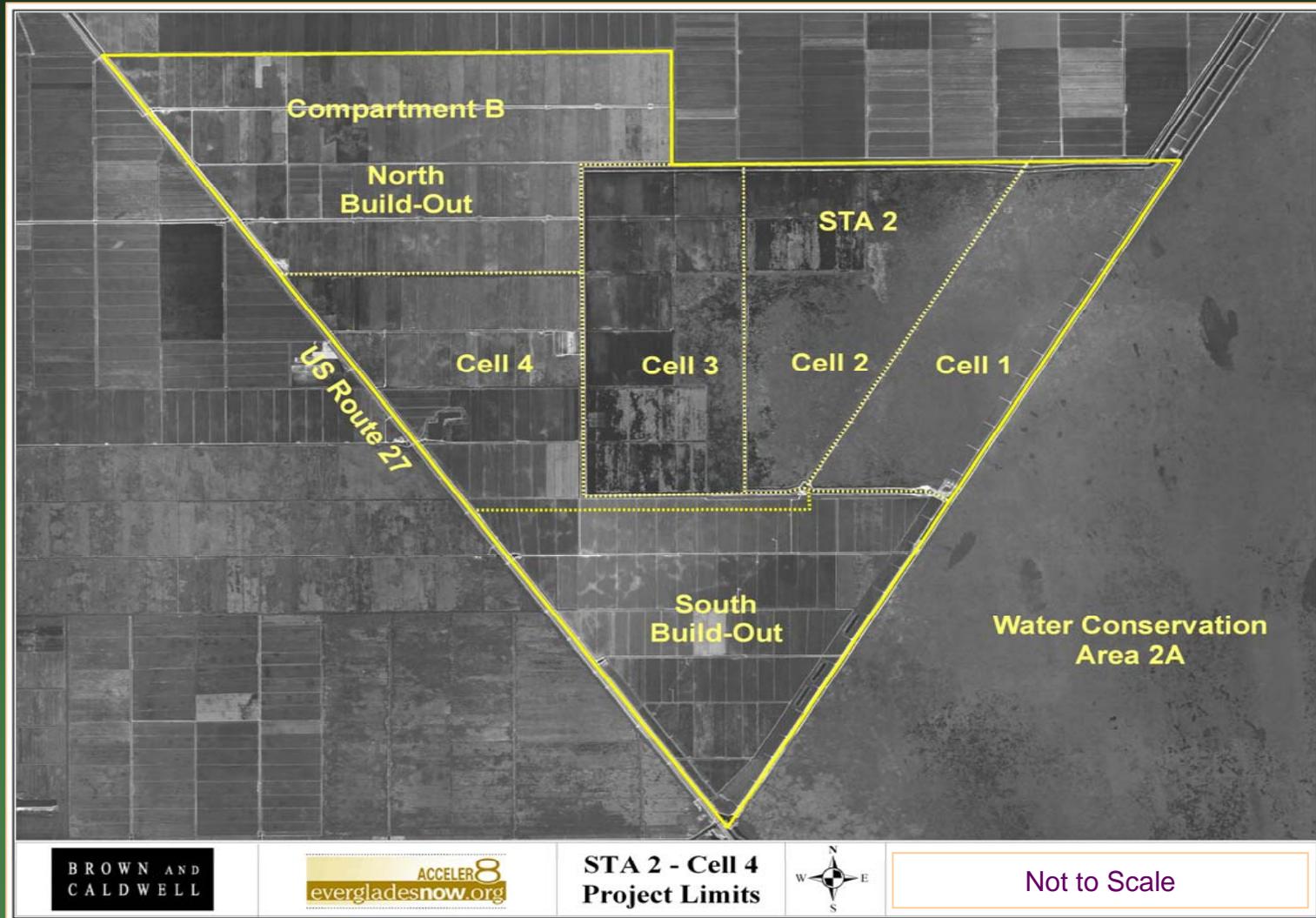
Long-Term Water Quality Solutions

- Expansion of BMPs (esp. urban basins)
- Expansion of STAs – Additional 19,000 acres
- Enhancement of STAs
 - Continue strong science-based program to optimize performance
- Synchronization with CERP projects
- ***ADAPTIVE MANAGEMENT***



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8,800 acre expansion of STA-2



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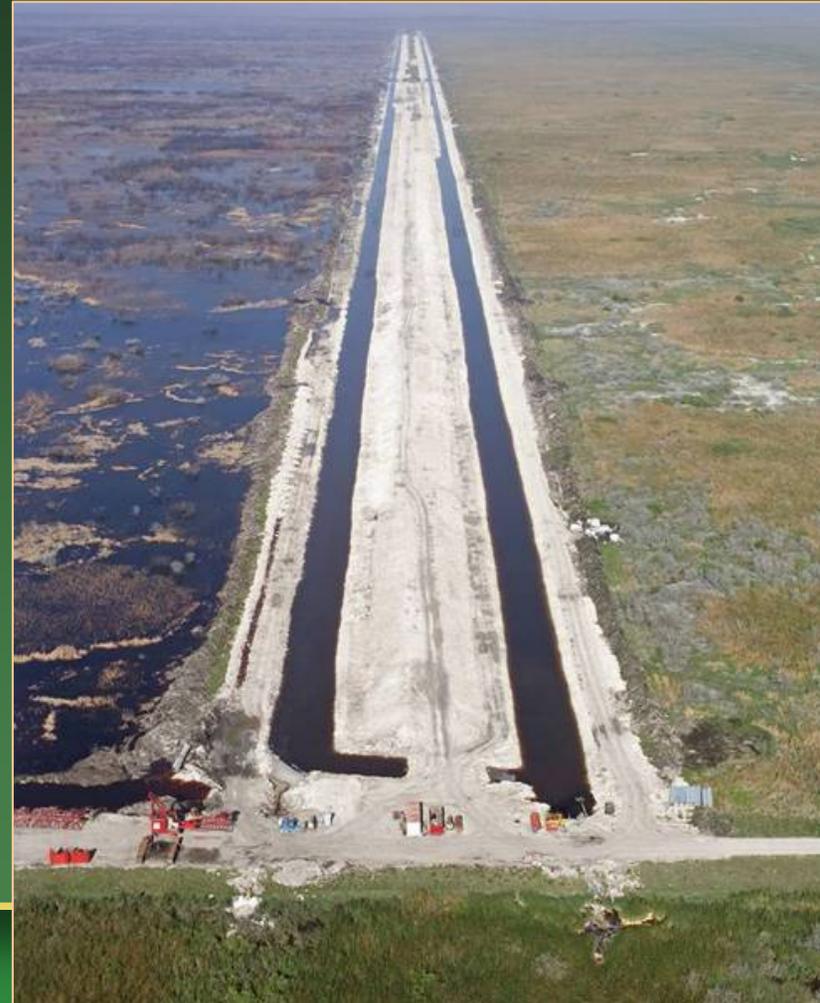


Compartmentalization improves water movement leading to improved treatment



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Large-scale conversion from cattails to submerged aquatic vegetation



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Any questions?



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For More Information:

- **www.sfwmd.gov**
 - Everglades Restoration
 - Everglades Construction Project
 - Long-Term Water Plan
- **South Florida Environmental Report**
 - Summary of all available data
 - <http://www.sfwmd.gov/org/ema/everglades/index.html>
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