

# **Everglades Agricultural Area Storage Reservoir Feasibility Study**

Government Agency Coordination Meeting November 29, 2017

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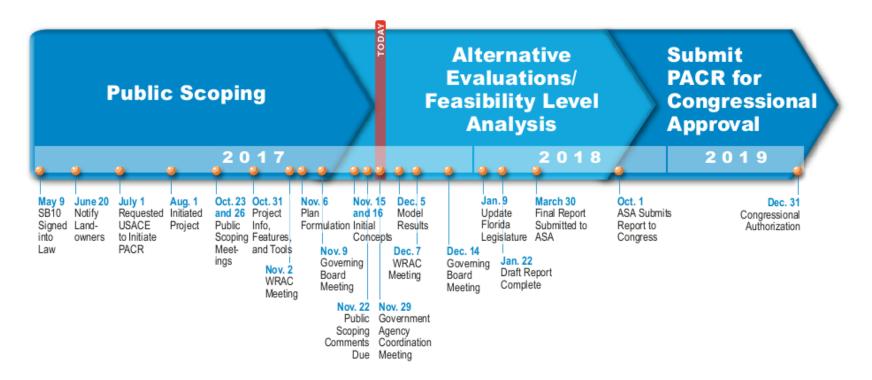
# **Meeting Agenda**

- Welcome and Introductions
- Project Study, Scope and Schedule
- Plan Formulation Review
- Initial Concepts
- Next Steps
- Public Comment





### EAA Storage Reservoir Feasibility Study Timeline







### EAA Storage Reservoir Feasibility Study **PROJECT STUDY, SCOPE AND SCHEDULE**





# **South Florida Ecosystem Restoration**

NON-CERP & FOUNDATION PROJECTS

- Modified Water Deliveries to Everglades National Park
- Kissimmee River Restoration
- C-111 South Dade
- C-51/Storm Water Treatment Area (STA) 1E
- Storm Water Treatment Areas/Restoration Strategies
- Tamiami Trail Bridging & Roadway Modifications
- Herbert Hoover Dike (HHD)Rehabilitation
- Seminole Big Cypress Critical Project

#### CERP GENERATION 1 PROJECTS

- Indian River Lagoon (IRL) South
- Picayune Strand
- Site 1

ST. LUCIE

ESTUARY

BISCAYNE

LAKE

WCA

FLORID

CALOOSAHATCH

ESTUARY

**SOUTH FLORIDA** 

ECOSYSTEM

RESTORATION

A NOT TO SCALE

Restoration Areas

Melaleuca Annex Facility

#### CERP GENERATION 2 PROJECTS

- C 43 Reservoir
- Broward County Water Preserve Areas (WPA)
- C-111 Spreader Canal Western Project
- Biscayne Bay Coastal Wetlands Phase 1

#### **DECEMBER 2016 AUTHORIZATION**

Central Everglades Planning Project (CEPP)

#### PLANNING EFFORTS

- Loxahatchee River Watershed Restoration
- Western Everglades Restoration
- Lake Okeechobee Watershed Restoration

#### EVERGLADES AGRICULTURAL AREA STORAGE RESERVOIR 💢

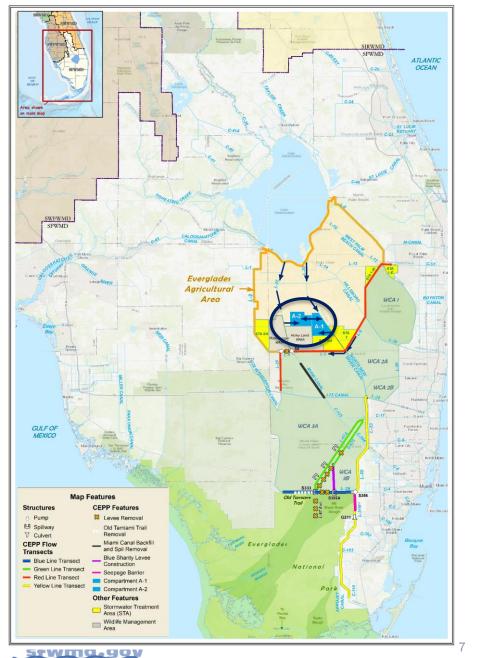


### Moving Water South-Existing Conditions

- Water flows out of Lake Okeechobee to the south through the lake outlet structures to the major canals
  - L-8 Canal
  - West Palm Beach Canal
  - Hillsboro Canal
  - North New River Canal
  - Miami Canal







#### **CEPP Recommended Plan ALT 4R2**

- PPA New Water
  - A-1 & A-2 Flow Equalization Basin
  - Seepage Barrier, L-31N Levee
- PPA North
  - L-6 Canal Flow Diversion
  - L-5 Canal Conveyance Improvements
  - S-8 Pump Station Complex Modifications
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  - L-29 Levee Degrade
  - L-67 Extension Levee Degrade and Canal Backfill
  - Old Tamiami Trail Removal
  - S-356 Pump Station Modifications
  - System-wide Operations Refinements



### **Project Opportunities and Objectives**

- Reduce the high-volume freshwater discharges from Lake Okeechobee to the Northern Estuaries
- Identify storage, treatment and conveyance south of Lake
   Okeechobee to improve flows to the Everglades system
- Reduce ongoing ecological damage to the Northern Estuaries and Everglades system



St. Lucie Inlet





# **Constraints**

WRDA 2000 Sec. 601(h)(5); Sec. 373.1501, F.S.

- Elimination or transfer of existing legal sources of water must be addressed
- Maintain existing level of flood protection
- Meet applicable water quality standards
  - Will not cause or contribute to a violation of state water quality standards, permit discharge limits or specific permit conditions
  - Reasonable assurances exist that adverse impacts
     on flora and fauna will not occur
- Remain within federal authorities (CERP)

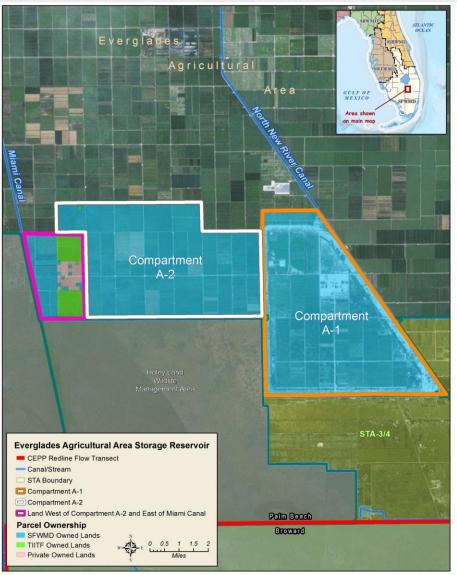




### **Florida State Law**

Chapter 2017-10 Requirements as it Relates to Post-Authorization Change Report

- Engage landowners on a 'willing seller' basis
- 240,000 acre-feet of storage and necessary treatment on A-2 Parcel plus conveyance improvements
- 360,000 acre-feet of storage and necessary treatment on A-1 and A-2 Parcels plus conveyance improvements
- Report to State Legislature by January 9, 2018
- Submit Post-Authorization Change Report to Congress for approval by October 1, 2018



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# Planning Process & Schedule

 Section 203 of the Water Resources Development Act (WRDA) of 1986, as amended

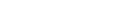
### Key Activities and Target Dates:

- Update to Florida State Legislature by January 9, 2018
- Draft Report complete by January 30, 2018
- Final Report and submittal to Assistant Secretary of the Army for Civil Works – March 30, 2018
- ASA(CW) submit report to Congress October 1, 2018
- Anticipated Congressional authorization by December 31, 2019





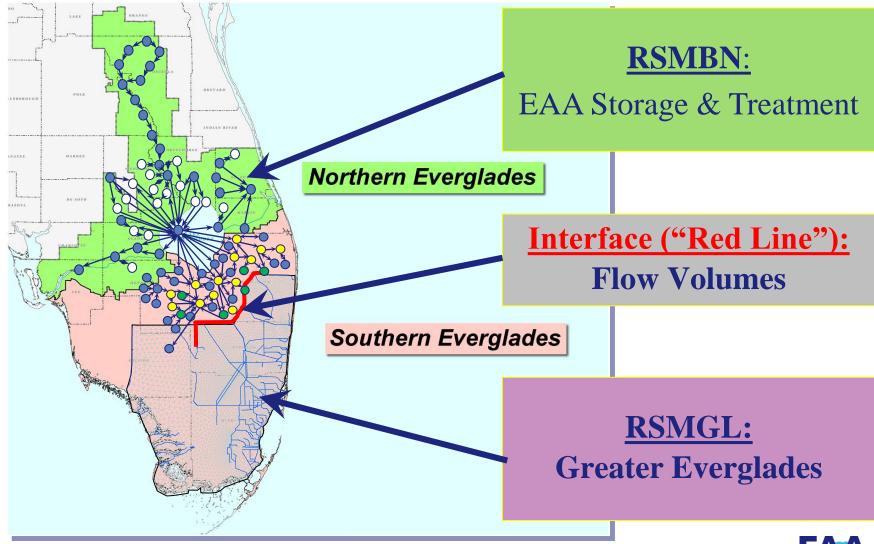
# EAA Storage Reservoir Feasibility Study PLAN FORMULATION REVIEW



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### **Decoupled Regional Modeling Approach**

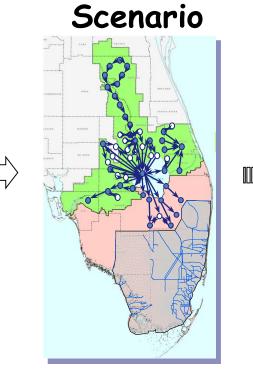




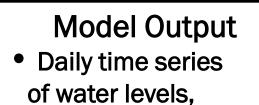
# **Regional Modeling Approach**

- Climatic Input
   Rainfall
  - ET
  - Boundary Conditions

Period of record: 1965-2005



- Project Features
- Land Use/Land Cover
- Water Demands
- Operating Criteria



- flows
- Demands not met

Evaluation (Environmental, Water Supply, etc...)





### **Baseline Modeling**

- Modeling of "Baseline" scenarios helps to provide reference points for comparison. These scenarios show how current conditions or "No Action" future conditions will perform so that the potential benefits of suggested infrastructure changes can be evaluated.
- Guiding principle in developing baseline modeling for the EAA Storage Reservoir planning effort:

### Maintain consistency with Central Everglades Planning (CEPP)



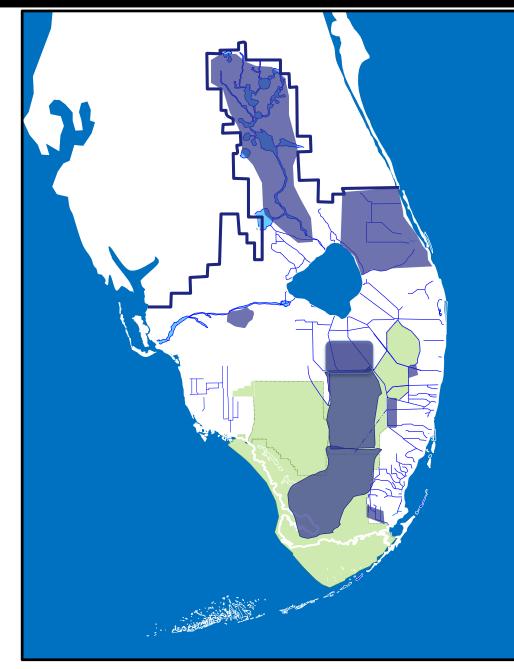


# **Baseline Modeling Assumptions (cont)**

- Existing Condition Baseline (EARECB) attempts to represent onground conditions circa 2017
  - Assumptions per CEPP RSMBN ECB and IORBL1 simulations (depending on sub-basin) and CEPP RSMGL 2012EC (Scenarios defined in CEPP Project Implementation Report)
- Future Without Project Baseline (EARFWO) attempts to represent the projected future conditions circa 50 years in the future if there was no EAA Storage Reservoir Project
  - Assumptions per RSMBN ALT4R2 and RSMGL ALT4R2 (CEPP Selected Plan + Other Authorized Projects)
- Today's presentation will review a system-wide comparison of Current EARECB and Future EARFWO Baselines.

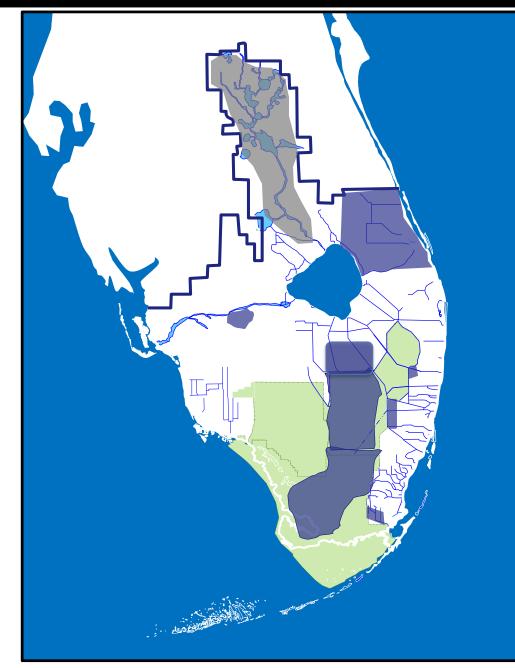






### Key System Changes From ECB to FWO

- Kissimmee Headwaters Revitalization
- Indian River Lagoon-South
- C-43 Phase 1 Reservoir
- Other 1<sup>st</sup> and 2<sup>nd</sup> Generation CERP & Foundation Projects
- Restoration Strategies / Central Everglades Project Features in the Everglades Agricultural Area
- Central Everglades Project Features in the Greater Everglades



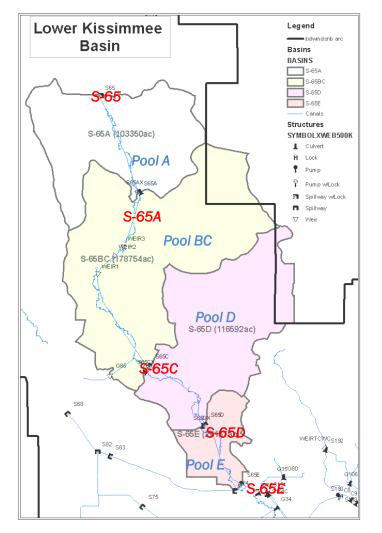
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# **Kissimmee River Restoration in RSMBN**

### EARECB & EARFWO

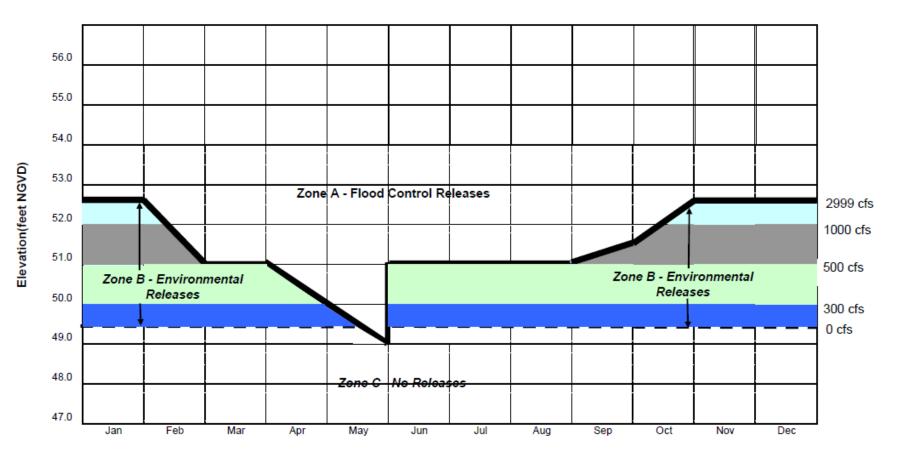
- The Lower Kissimmee Basin is partitioned into three major subwatersheds: Pools A, BCD (Pool BC & Pool D combined into Pool BCD), and E
- Stage-volume and stagearea relationships updated for Pool BCD
- Structure S-65C is removed

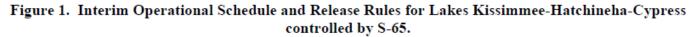






#### Upper Kissimmee Basin S65 Operational Schedule: Current System (EARECB)





Source: SFWMD. 2007 South Florida Environmental Report, Appendix 11-1





#### **Upper Kissimmee Basin**

#### **S65 Operational Schedule: Headwaters Revitalization (EARFWO)**

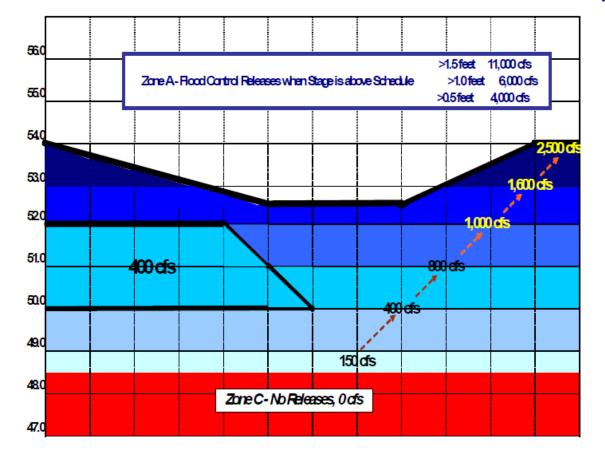


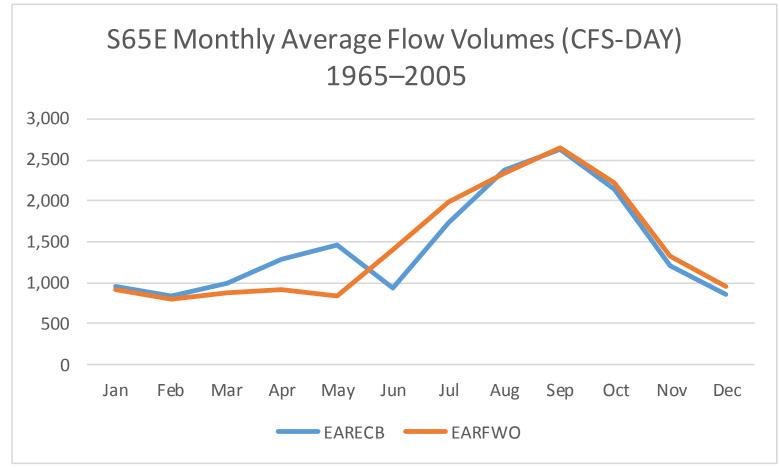
Figure 11-10. Revised regulation and operational schedule for the Upper Basin Kissimmee Chain of Lakes (KCOL) including lakes Kissimmee, Hatchineha, Cypress, and Tiger, controlled by S-65.

Source: SFWMD. 2007 South Florida Environmental Report, Chapter 11: Kissimmee River Restoration and Upper Basin Initiatives

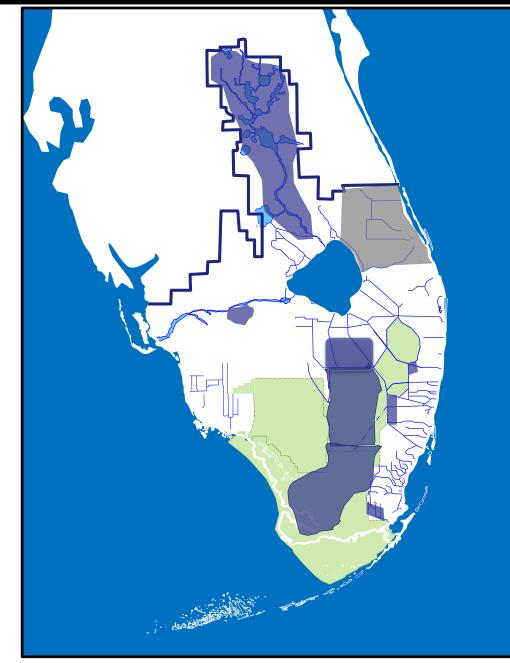


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# Seasonal Change in Flow at S65E due to Headwaters Revitalization in EARFWO



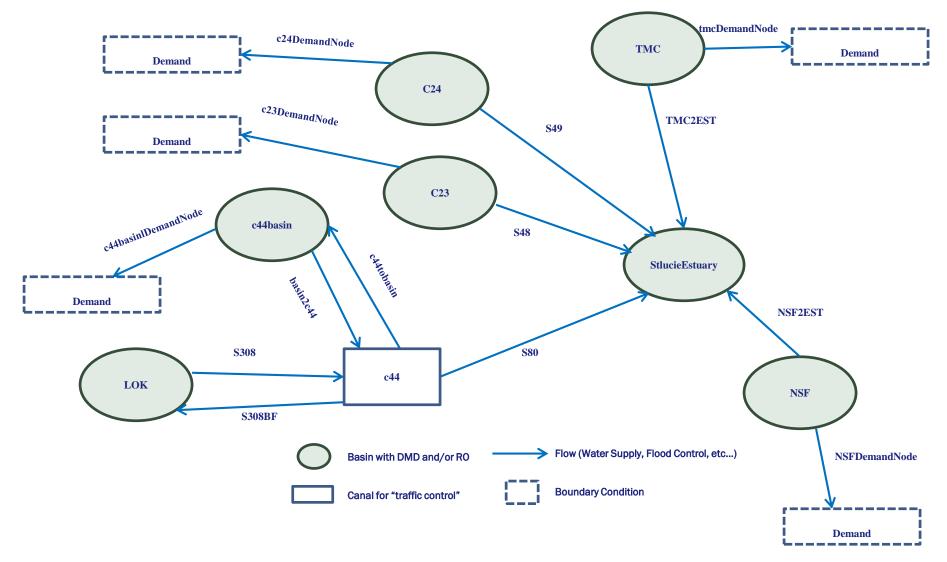




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# Indian River Lagoon EARECB in RSMBN





# Indian River Lagoon EARECB in RSMBN C44 Basin

- S-80 discharges into the St. Lucie Estuary.
- C44 Basin runoff has potential to backflow into Lake Okeechobee when Lake stage is below 14.5 feet NGVD.
- C44 Basin supplemental demands for surface water irrigation are met by Lake Okeechobee.

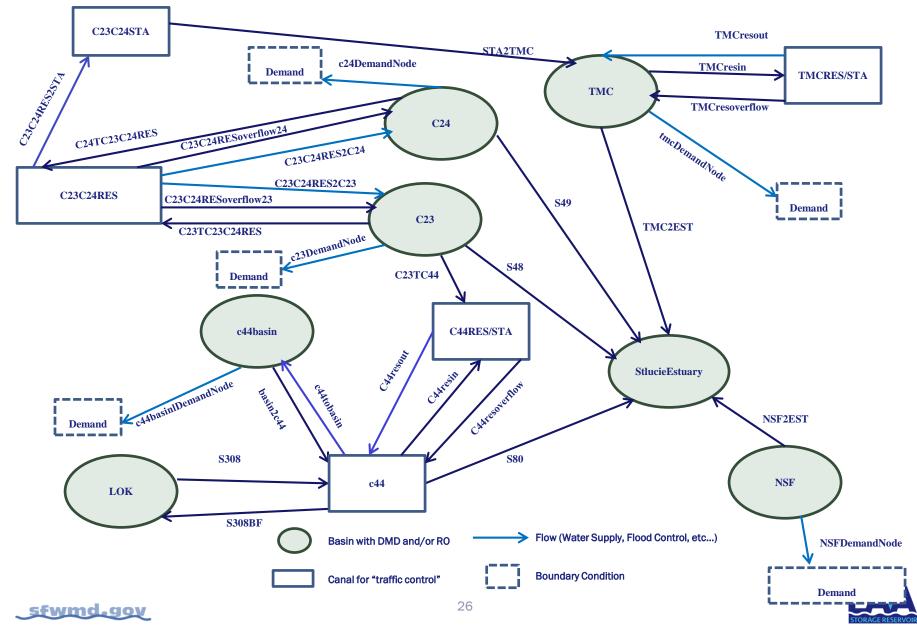
### C23, C24, TMC and NF-SF-B456 (NSF) Sub-watersheds

- Three outlet structures discharge from each of the basins into the St. Lucie Estuary.
- Structure capacity is assumed to be limited only by available basin runoff.
- No regional deliveries to meet demands.





### Indian River Lagoon EARFWO in RSMBN



# Indian River Lagoon EARFWO in RSMBN

### **FWO Project Features**

- Consistent with CERP Indian River Lagoon South DDRs updates to the authorized 2004 PIR.
- Includes operational intent (Opti6) per St Lucie River Watershed Protection Plan (January 2009).
- Basin demands can be met by project features.

### C44 Reservoir and STA

- Storage capacity: 50,246 acre-feet
- Footprint: 12,125 acres (assumed 9700 effective acres / 80%)





### Indian River Lagoon EARFWO in RSMBN (cont)

### C23/24 Reservoir

- Storage capacity: 92,094 acre-feet
- Footprint: 8675 acres (assumed 6940 effective acres / 80%)

### C23/C24 STA

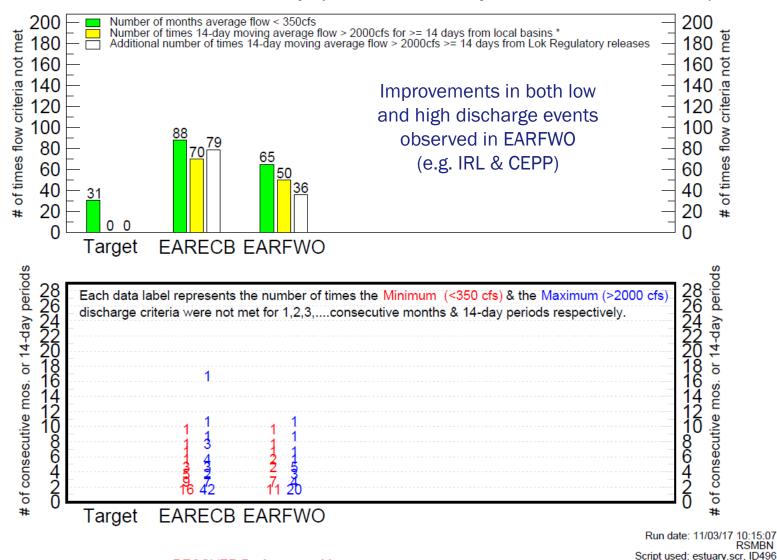
- Storage capacity: 3852 acre-feet
- Footprint: 3323 acres (assumed 2568 effective acres / 80%)

### Ten Mile Creek Reservoir and STA

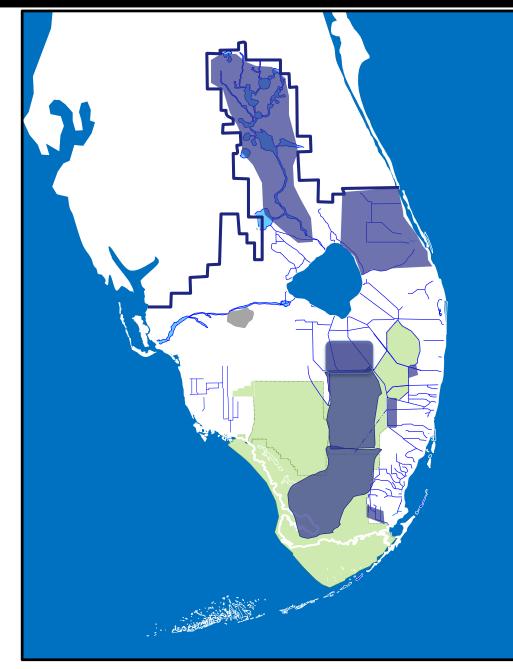
- Storage capacity: 7078 acre-feet
- Footprint: 820 acres (assumed 656 effective acres / 80%)



#### Number of times Salinity Envelope Criteria NOT Met for the St. Lucie Estuary (mean monthly flows 1965 - 2005)



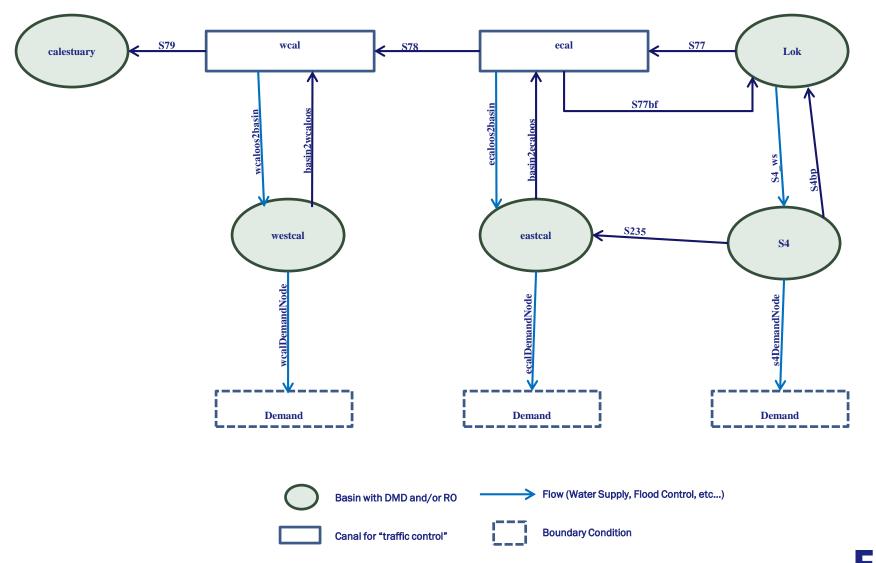
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### **Caloosahatchee Basin EARECB in RSMBN**





# Caloosahatchee EARECB in RSMBN

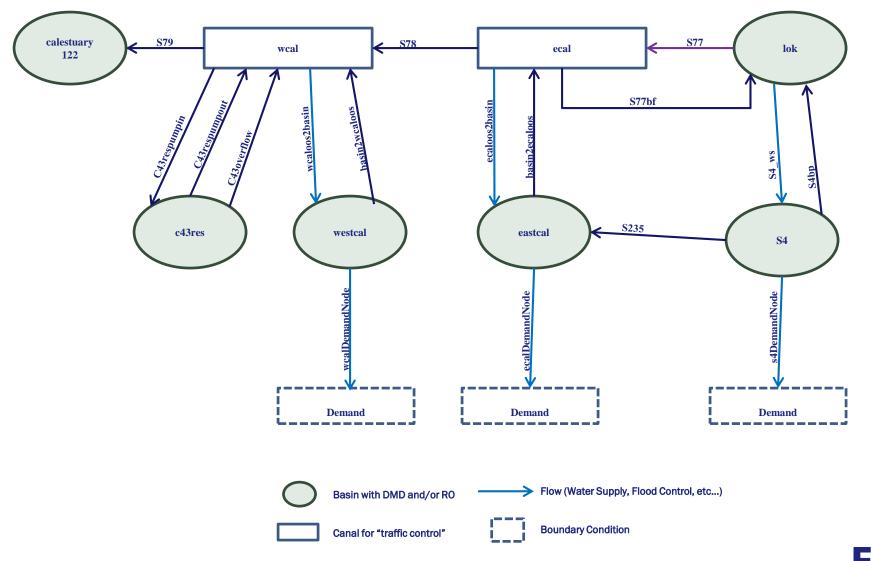
### C43 Basin

- S-79 discharges into the Caloosahatchee Estuary.
- C43 Basin runoff has potential to backflow into Lake Okeechobee when Lake stage is below 11.1 feet NGVD.
- C43 Basin supplemental demands for surface water irrigation are met by Lake Okeechobee.





### **Caloosahatchee Basin EARFWO in RSMBN**





# Caloosahatchee EARFWO in RSMBN

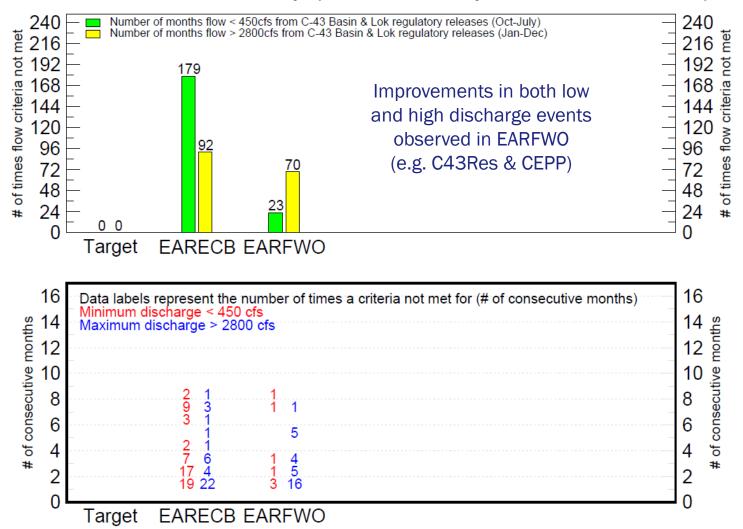
### C43 Reservoir

- Modeled consistent with September 2007 PIR
- Storage capacity: 175,800 acre-feet
- Maximum footprint: 9,379 acres
- Operates to meet estuary environmental target time-series (EST05)



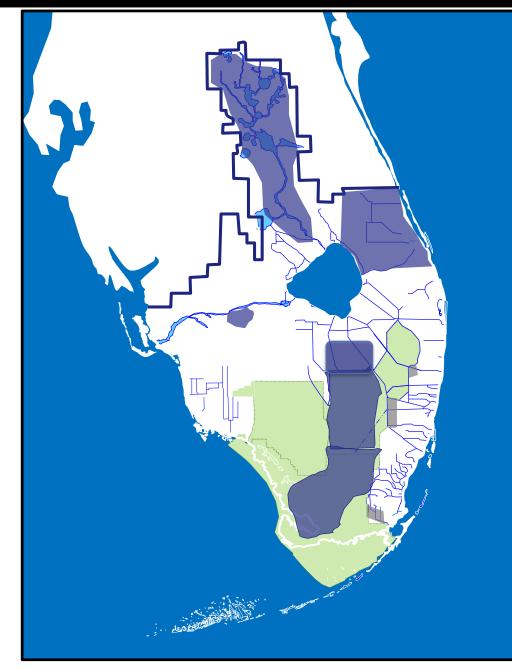


# Number of times Salinity Envelope Criteria NOT Met for the Calooshatchee Estuary (mean monthly flows 1965 - 2005)



RECOVER Performance Measure

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## Other 1st and 2nd Generation **CERP & Foundation Projects**

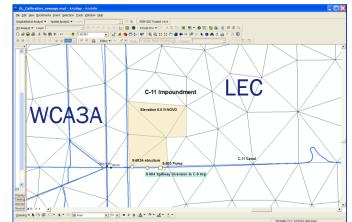
Modeled in a manner consistent with **CEPP for EARFWO (examples)** 

- Broward County WPAs: C11 = 1355 acres, C9 = 1970 acres
- Full construction of C111 South Dade
- S-200 inflow pumps
  - Three 75 cfs pumps divert water to Frog Pond Detention Area (590 Acres)
- S-199 inflow pumps
  - Three 75 cfs pumps divert water to **Aerojet Canal**

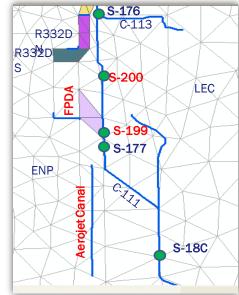
### These features not included in EARECB

Partial construction of C111 South Dade <u>sfwmd.gov</u>

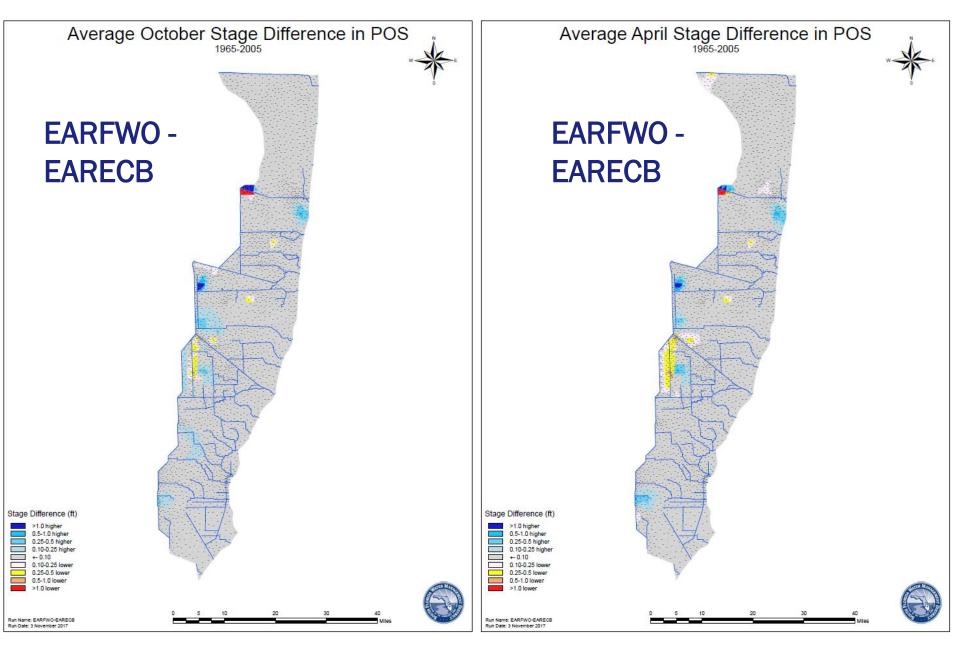
### Example: C-11 Broward WPA



Example: C111 South Dade and C111 Spreader **Canal Features** 







## Other 1st and 2nd Generation CERP & Foundation Projects

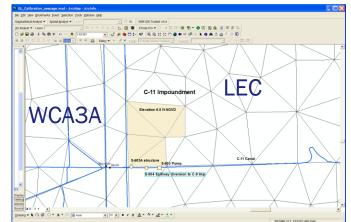
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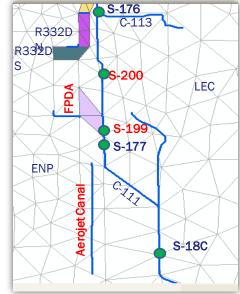
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### These features not included in EARECB

 Partial construction of C111 South Dade
 Stwmd-gov Example: C111 South Dade and C111 Spreader Canal Features

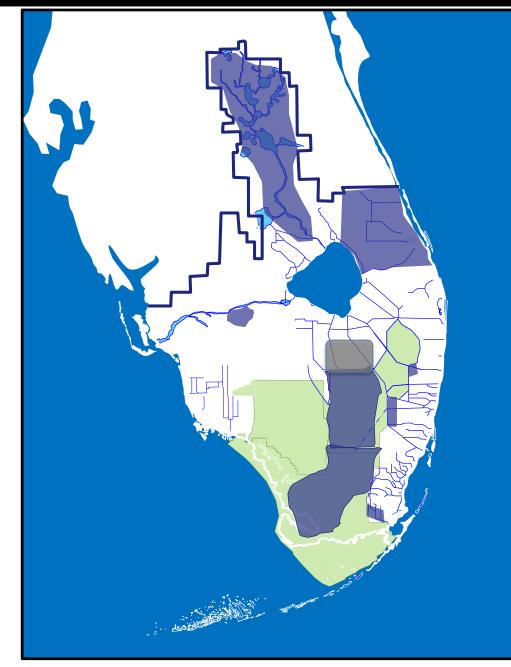
### Example: C-11 Broward WPA







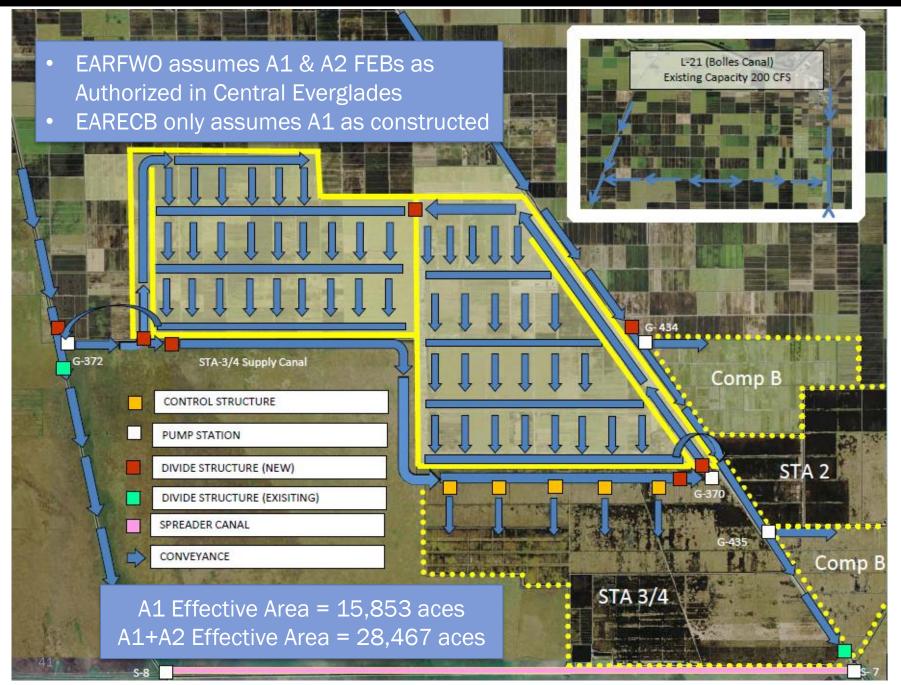
### SOUTH FLORIDA WATER MANAGEMENT DISTRICT



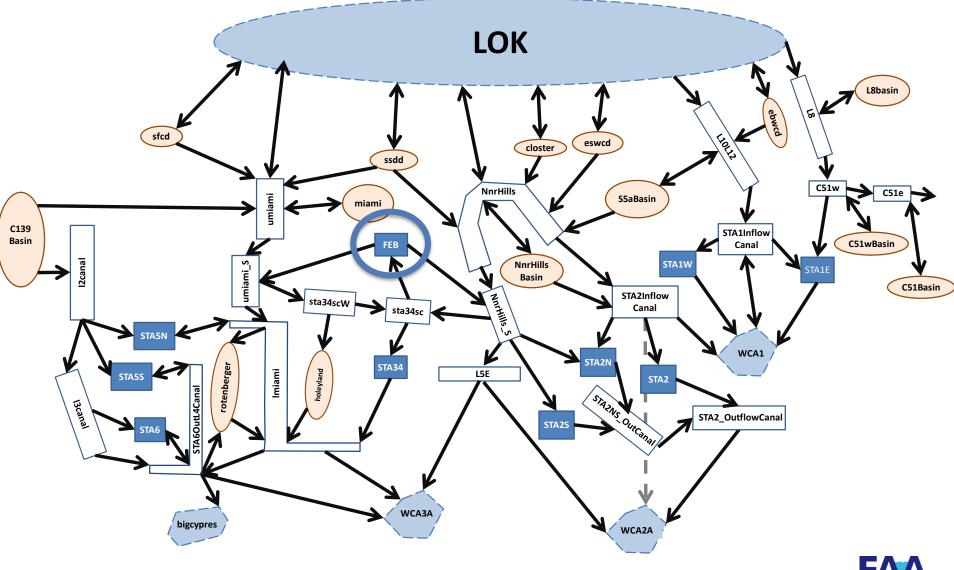
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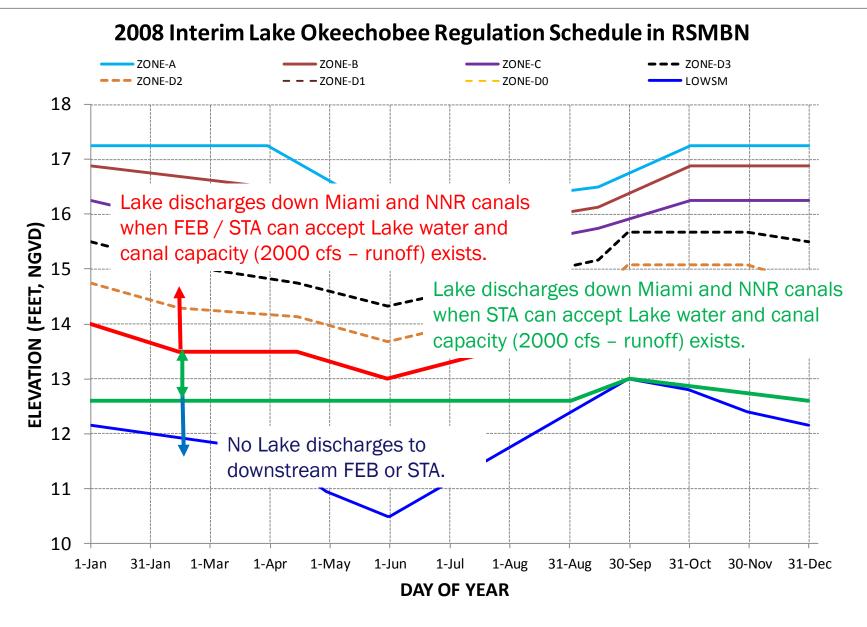
#### SOUTH FLORIDA WATER MANAGEMENT DISTRICT



## **Everglades Agricultural Area in RSMBN**



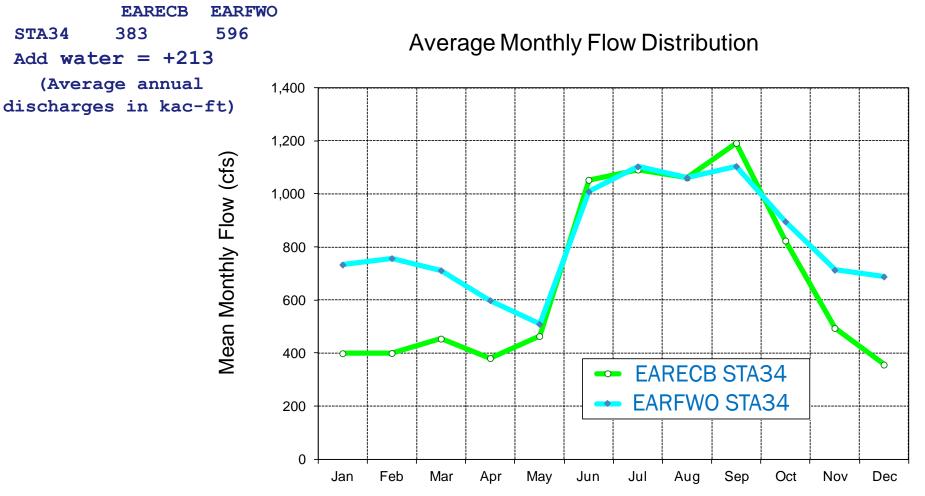








## **EARFWO (CEPP) Promotes Additional Flow South**







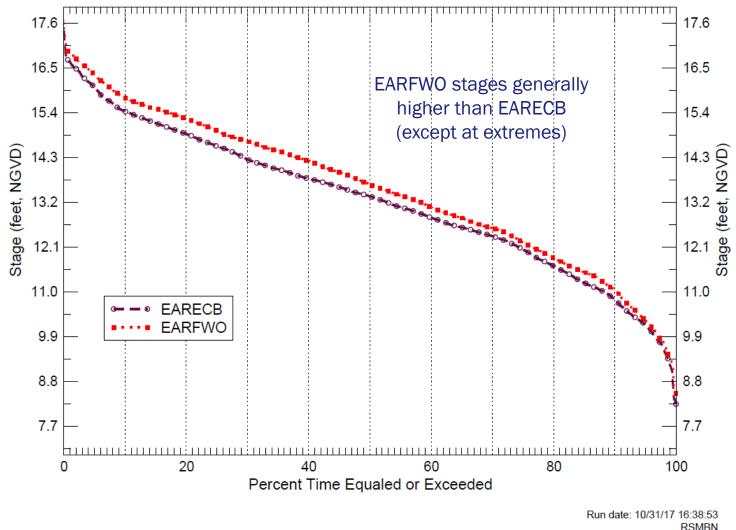
EARECB

383

STA34

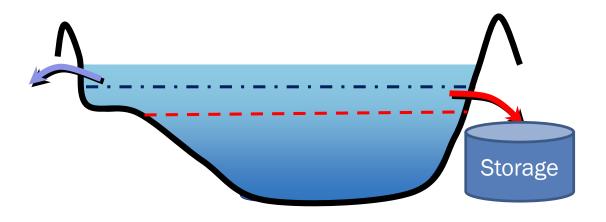


### Stage Duration Curves for Lake Okeechobee



RSMBN Script used: hyd\_dur.scr, ID456 Filename: lok\_dai\_stgdur.agr

### Recall 10/31 Baselines Presentation: One Challenge to Consider



Existing Lake Okeechobee regulatory release protocols balance multiple objectives for Lake and system management.

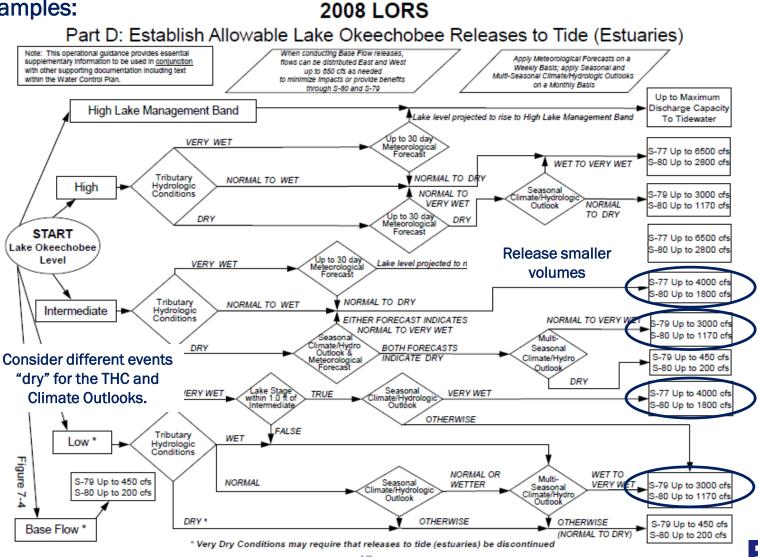
Simply adding discharges to storage in addition to existing regulatory protocols may over-drain the Lake and impact system performance.



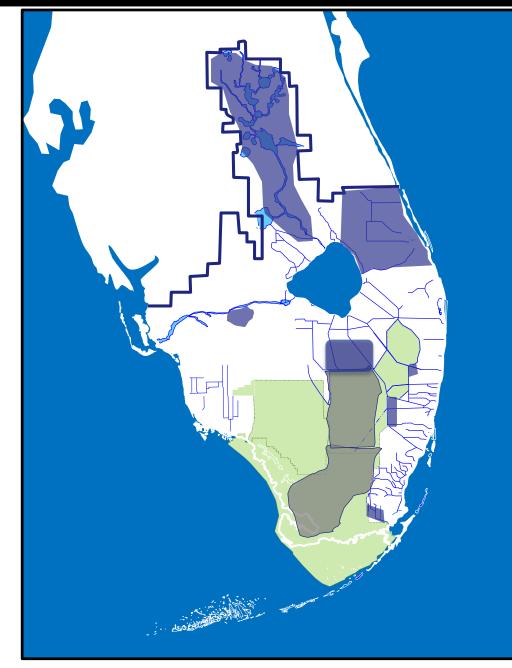


### **CEPP Utilizes Operational Flexibility within the Existing Lake Okeechobee Regulation Schedule:**

**Examples:** 



### SOUTH FLORIDA WATER MANAGEMENT DISTRICT



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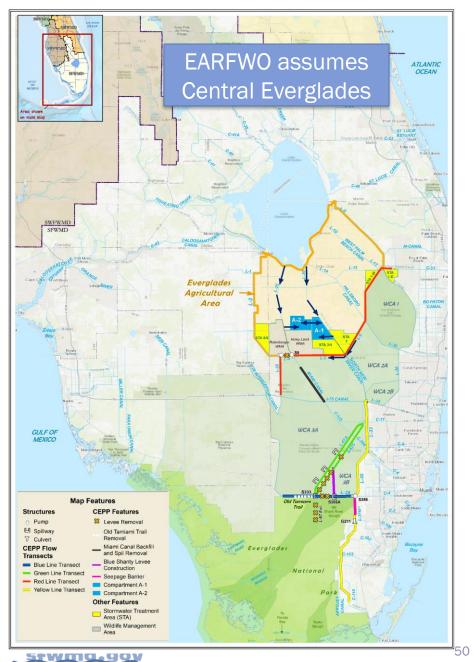
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# **Greater Everglades EARECB in RSMGL**

- Assumptions Consistent with the CEPP 2012 Existing Condition (2012EC) Baseline
- Water Conservation Area 3A and Everglades National Park Inflow Operations per 2012 Everglades Restoration Transition Plan (ERTP)



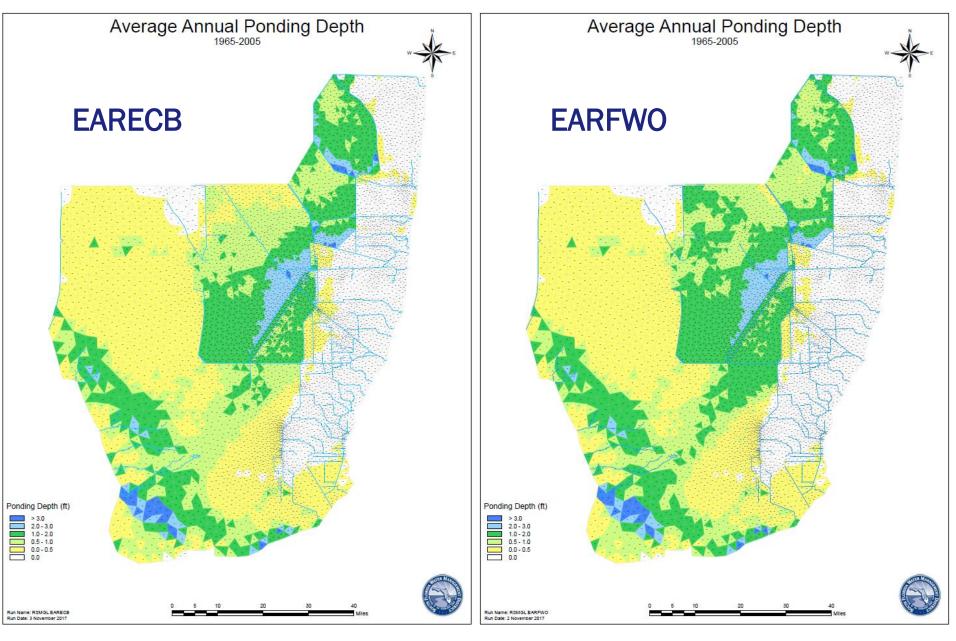


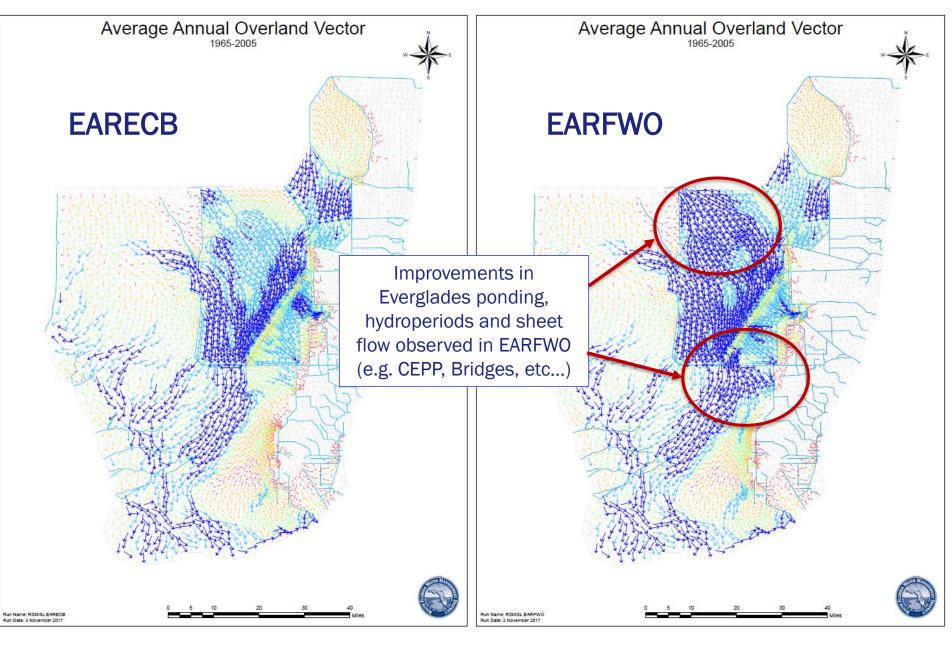


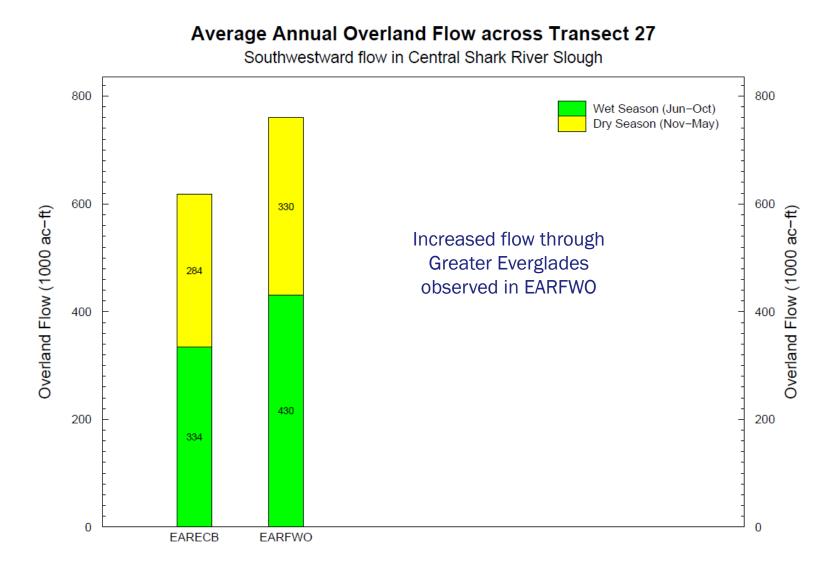
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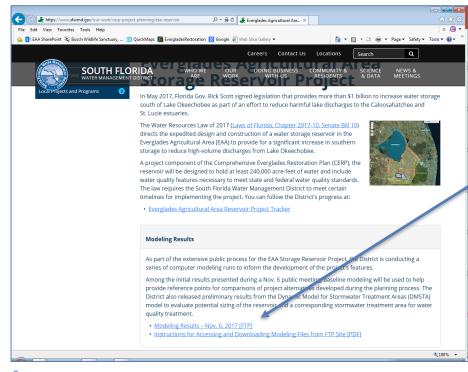




# EAA Storage Reservoir Modeling Data

Modeling data is available via ftp at:

ftp://ftp.sfwmd.gov/pub/EAASR/



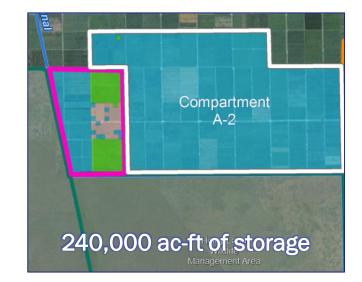
Link can also be found on <u>www.sfwmd.gov/EAAreservoir</u>

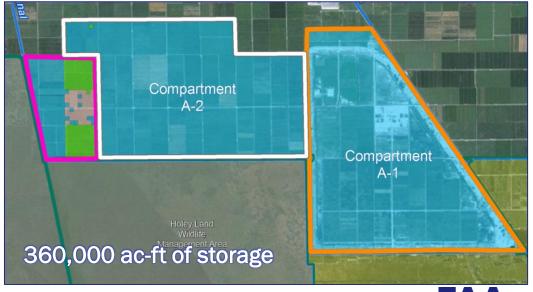




# **Important Considerations**

- Initial analyses to identify performance potential for the facility (Reservoir, STA and associated infrastructure)
- Project alternatives will be modeled to honor physical and legal constraints
  - Potential for reduced performance
  - Other CERP components may enhance performance
- Detailed modeling of alternatives will identify reduction in undesirable discharges and additional flow south
- Must meet State and Federal laws









## Informing the EAA Storage Reservoir Study: Defining the CERP Goal

- The following scenarios represent the with- and without- CERP conditions:
- Pre-CERP Baseline (PCB1) per RECOVER, 2005
- Full CERP (CERPA) per RECOVER 2005

These scenarios combined with the original Plan report (Restudy, 1999) help to inform EAA Storage Reservoir planning

		а <b>у.</b>	
PROGRA	COMPREH	ERN FLORIDA PROJECT IENSIVE REVIEW STUDY FINAL ASIBILITY REPORT AND AL IMPACT STATEMENT	1
10 E 1	Final Draft	April 2005	
	CENTRAL AND SOUTHERN FLORIDA PROJECT COMPREHENSIVE EVERGLADES RESTORATION PLAN		
		FINAL DRAFT	October 26, 2005
	U.S. Army Corps of I Jacksonville District	RECOVER's Initial Compu Everglades Restoration Plan Up Note: Sector of Secto	
		RESTORATION COORDINATION AN (RECOVER)	VD VERIFICATION
		COMPREHENSIVE EVER RESTORATION PL4	
		CENTRAL AND SOUTHERN FLO	RIDA PROJECT



# **CERP Vision for EAA Storage Reservoir**



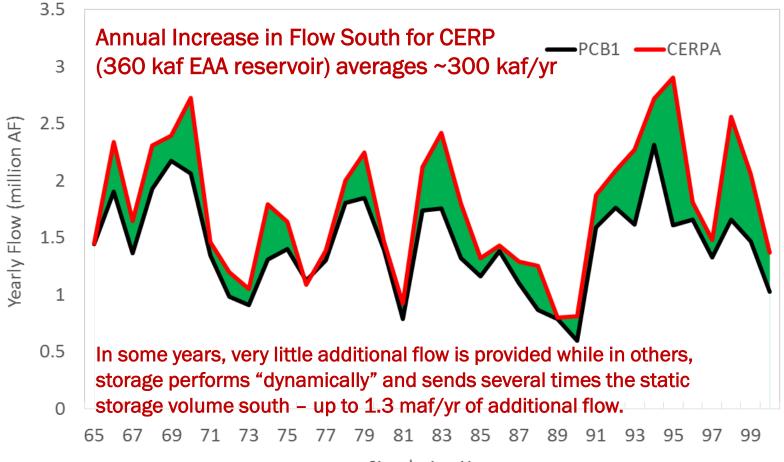
- CERP defined a 360 k-acft, multi-purpose storage reservoir in the EAA
  - Received both Lake Okeechobee discharge and EAA runoff
  - Supplied Flow to both the Greater Everglades and EAA Agriculture
- CERP also contemplated improvements to the Miami and North New River Canals in the EAA to help convey Lake water south.
- EAA Storage worked with other CERP storage (also North, East and West of Lake O.) to reduce damaging discharges to the Northern Estuaries





## **Characteristics of Additional Flow South in CERP**

**Annual Flow to the Everglades Protection Area** 



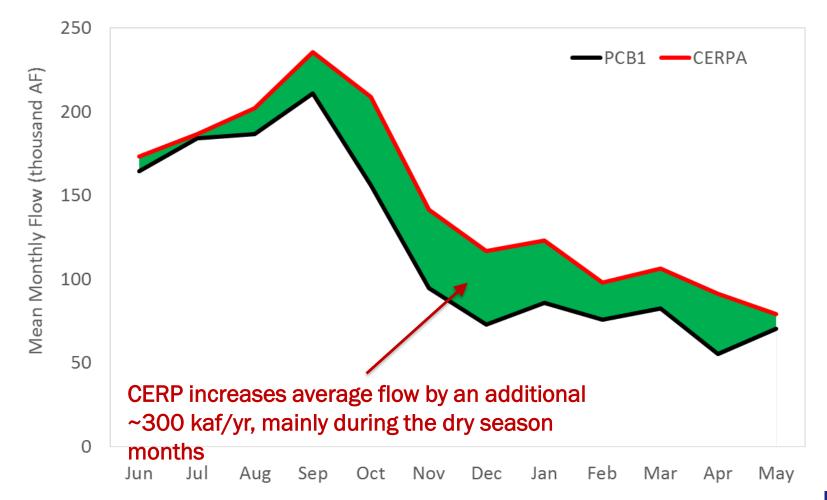
Simulation Year





### **Characteristics of Additional Flow South in CERP (cont)**

Distribution of Average Monthly Flow to the Everglades Protection Area





SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# EAA Storage Reservoir Feasibility Study





# **Project Features**

- Reservoirs
- Stormwater
   Treatment
   Areas (STAs)
- Conveyance
   Improvements







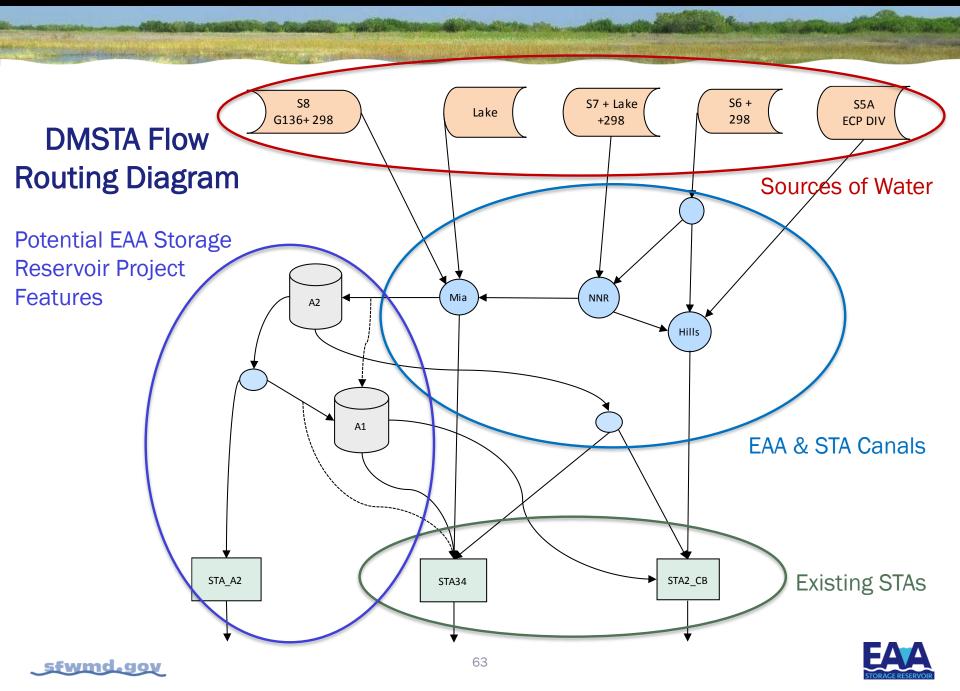
# **Screening Process Strategy**

- Use the DMSTA model (as used in CEPP and Restoration Strategies) to evaluate potential sizing of reservoir and stormwater treatment area (STA) footprints that meet water quality standards
- Provide DMSTA evaluation for the range of flows observed between CEPP and CERP
- Public input used to identify initial concepts

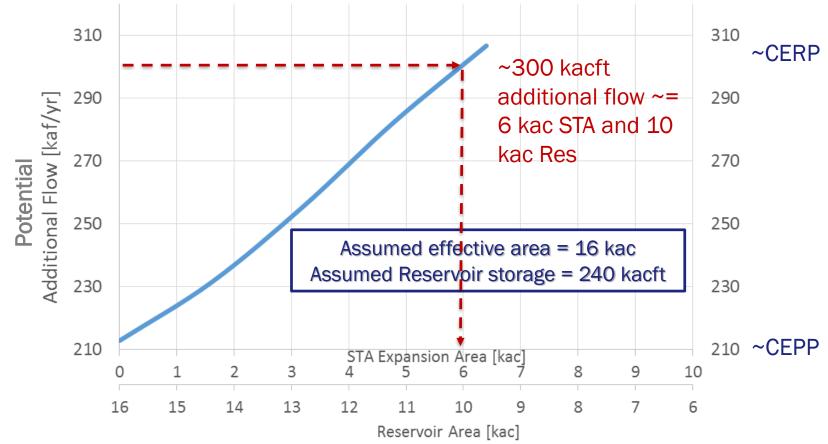




### SOUTH FLORIDA WATER MANAGEMENT DISTRICT



### Initial DMSTA Modeling Results: Potential Additional Flow South vs Reservoir & STA Acreage for 240,000 ac-ft of Storage

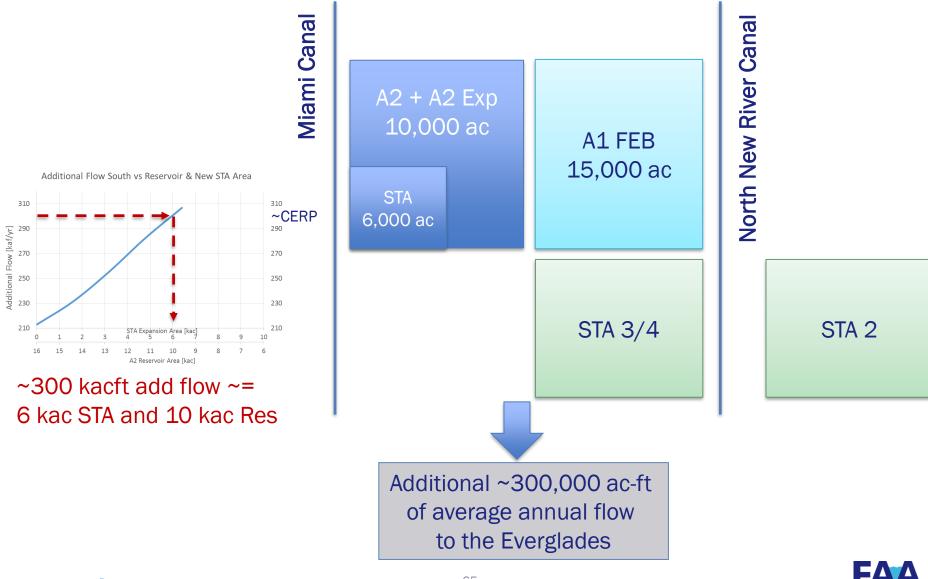




Note: Any point on the line can meet water quality standards

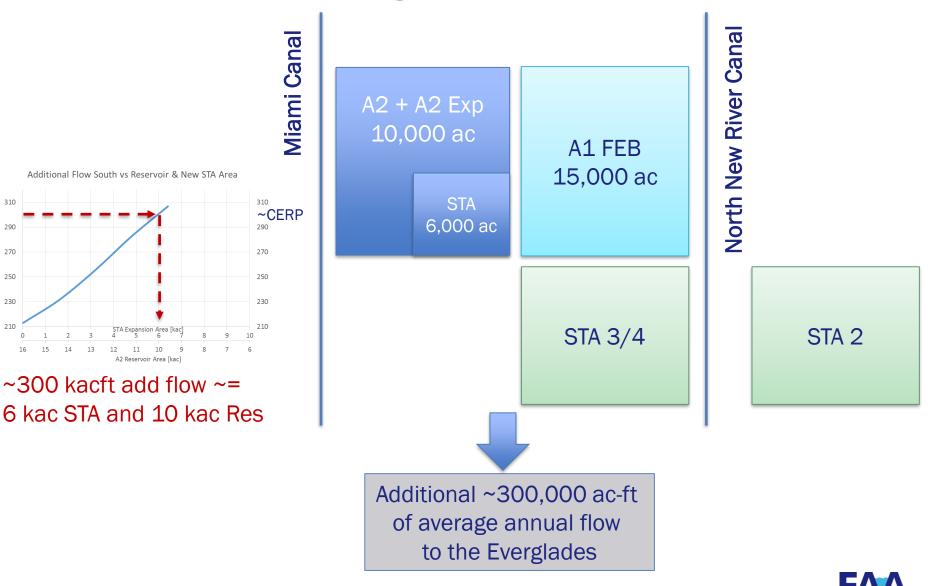


## 240,000 ac-ft of Storage Initial Concept



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## 240,000 ac-ft of Storage Initial Concept





310

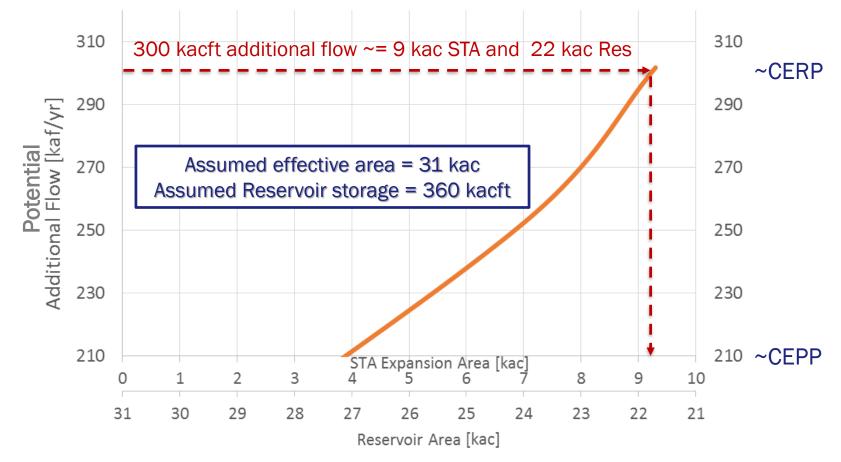
210

16

14 15

13

### Initial DMSTA Modeling Results: Potential Additional Flow South vs Reservoir & STA Acreage for 360,000 ac-ft of Storage

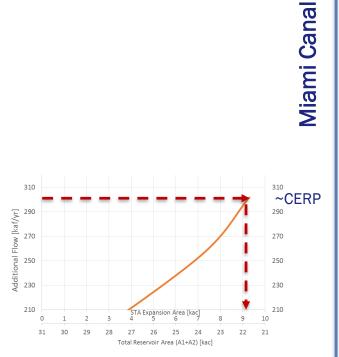




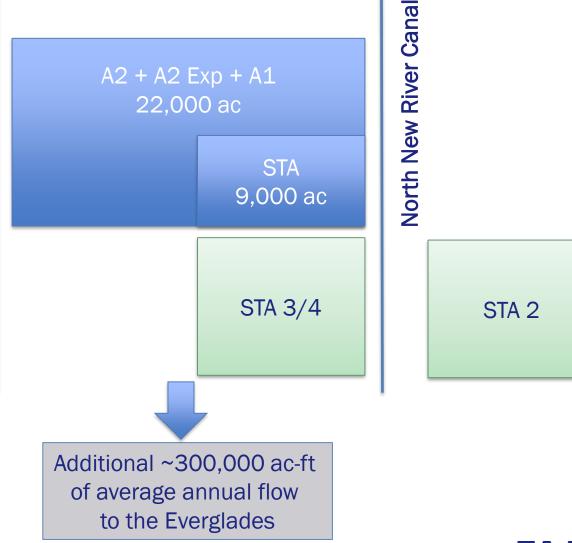
Note: Any point on the line can meet water quality standards



## 360,000 ac-ft of Storage Initial Concept

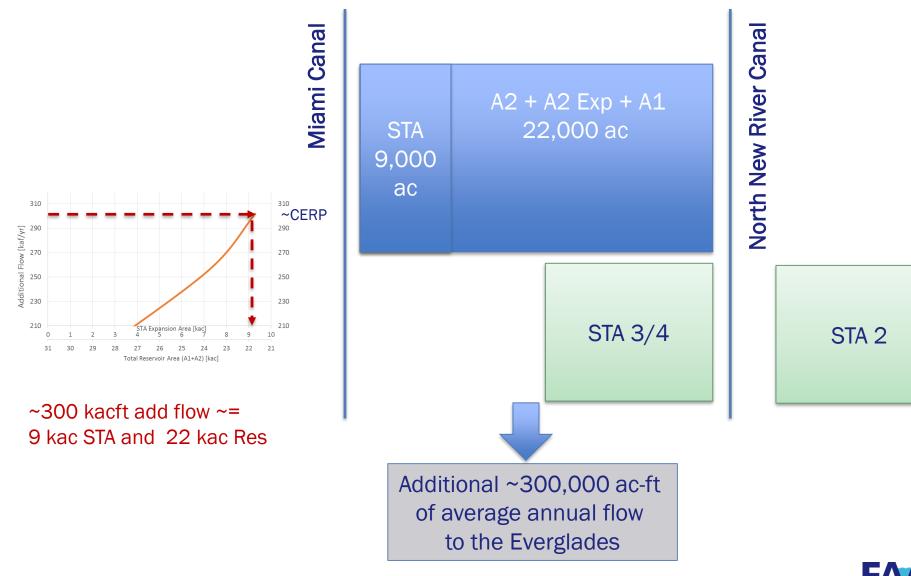


~300 kacft add flow ~= 9 kac STA and 22 kac Res





## 360,000 ac-ft of Storage Initial Concept



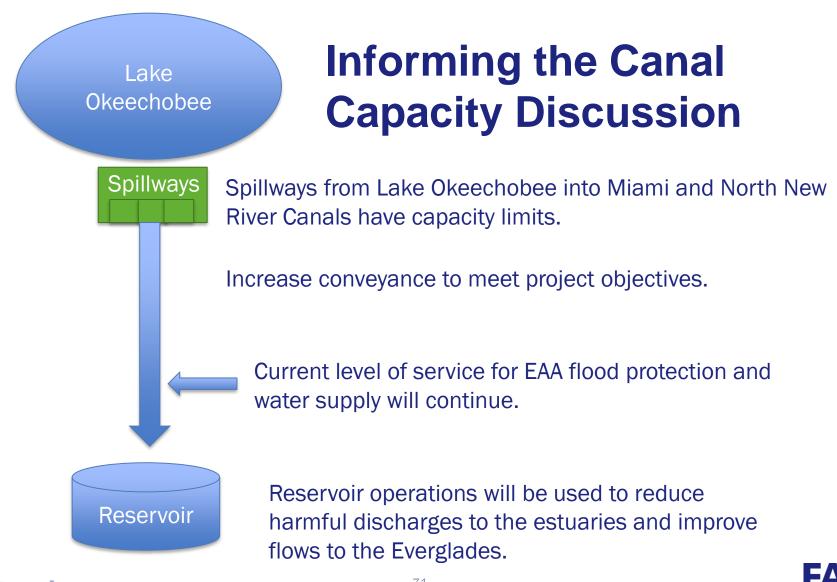
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# **Project Features: Initial Concepts**

- Storage reservoir
  - 240,000 ac-ft of storage
  - 360,000 ac-ft of storage
- STAs
  - 6,000-6,500 acres (associated with 240,000 ac-ft storage)
  - 9,000-9,500 acres (associated with 360,000 ac-ft storage)
- Conveyance improvements
  - Canal and structure improvements in Miami and North New River Canals



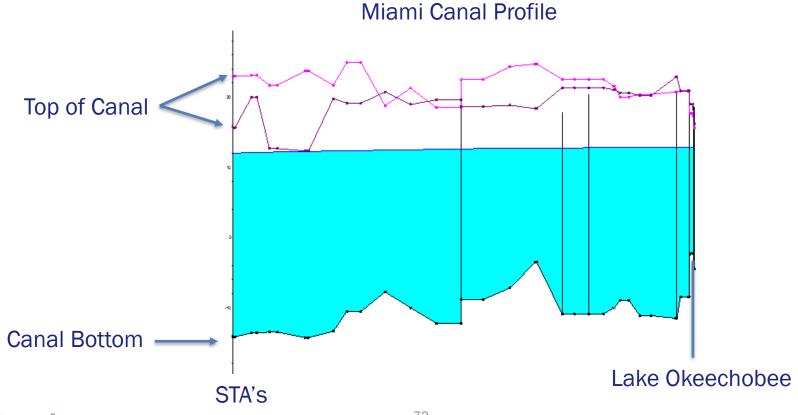






## Conveyance

 Goal is to capture additional harmful discharges to the estuaries above what CEPP was able to achieve







### SOUTH FLORIDA WATER MANAGEMENT DISTRICT

# EAA Storage Reservoir Feasibility Study **NEXT STEPS**





# **Development of Alternative Configurations** from Initial Concepts

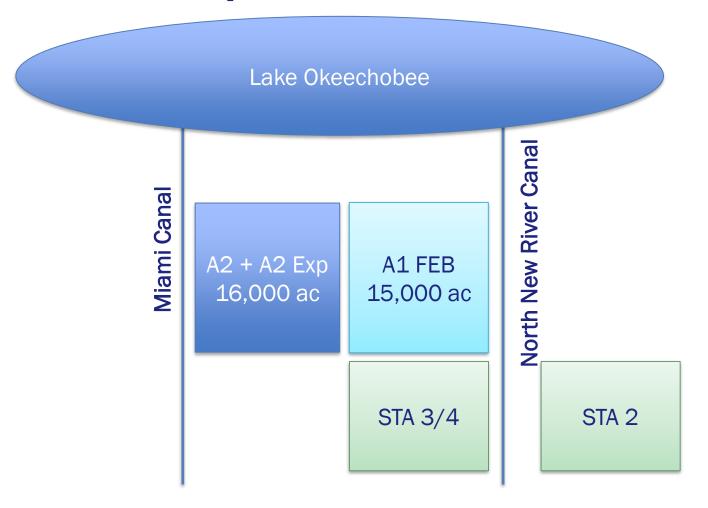
For each reservoir size, configurations will be developed to optimize performance by considering:

- STA location and operation
- Pump Station(s)
- Water Control Structures
- Canal conveyance
- Cost





## **Concepts** Alternatives









# **Public Meetings**

- Project Meetings:
  - November 29<sup>th</sup> Government Agency Coordination Meeting (virtual)
  - December 5<sup>th</sup> Modeling Results West Palm Beach

### Other Public Meetings:

- December 7<sup>th</sup> Water Resources Analysis Coalition (WRAC) Meeting - West Palm Beach
- December 14<sup>th</sup> Governing Board Meeting West Palm Beach





# **Public Comment Opportunities**

- Public Comments Cards
- Email Address <u>EAAreservoir@sfwmd.gov</u>
- Mailing address:

Mike Albert, Project Manager South Florida Water Management District 3301 Gun Club Road, MSC 8312 West Palm Beach, FL 33406

 Additional information available at <u>www.sfwmd.gov/EAAreservoir</u>





# DISCUSSION

### www.sfwmd.gov/EAAreservoir

