EAA STORAGE RESERVOIR

# Everglades Agricultural Area Storage Reservoir Feasibility Study

November 6, 2017

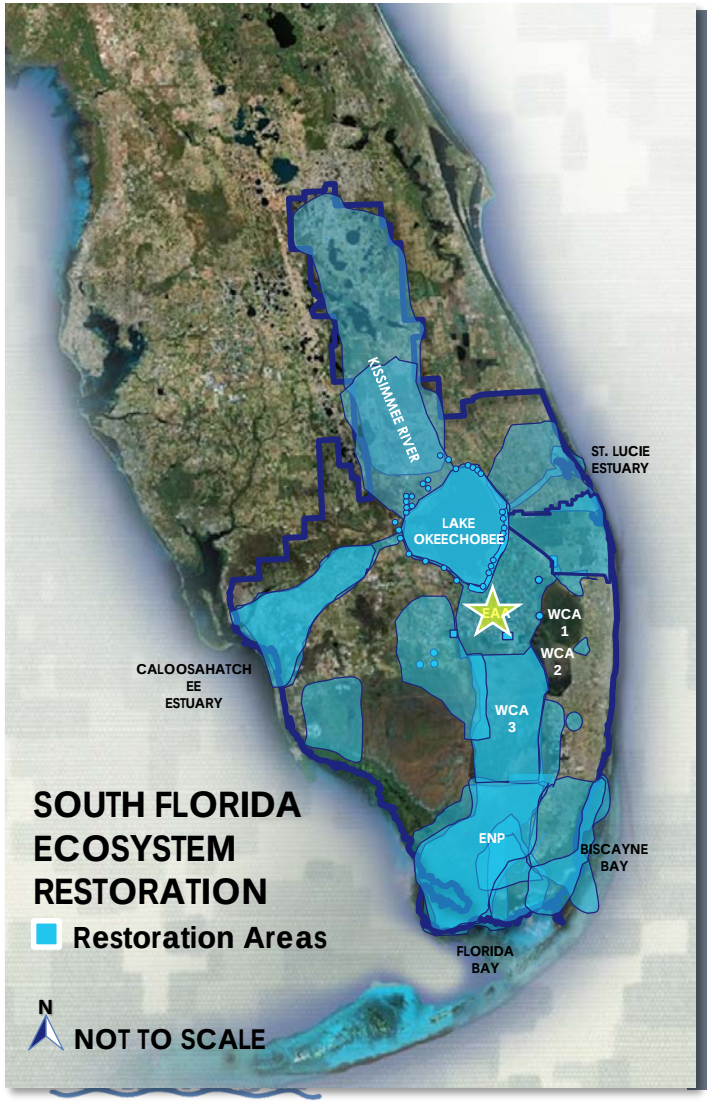
# Meeting Agenda

- Welcome and Introductions
- Project Study, Scope and Schedule
- Baseline Condition Modeling Results
- Initial Alternatives Scoping
- Next Steps
- Public Comment

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
- 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

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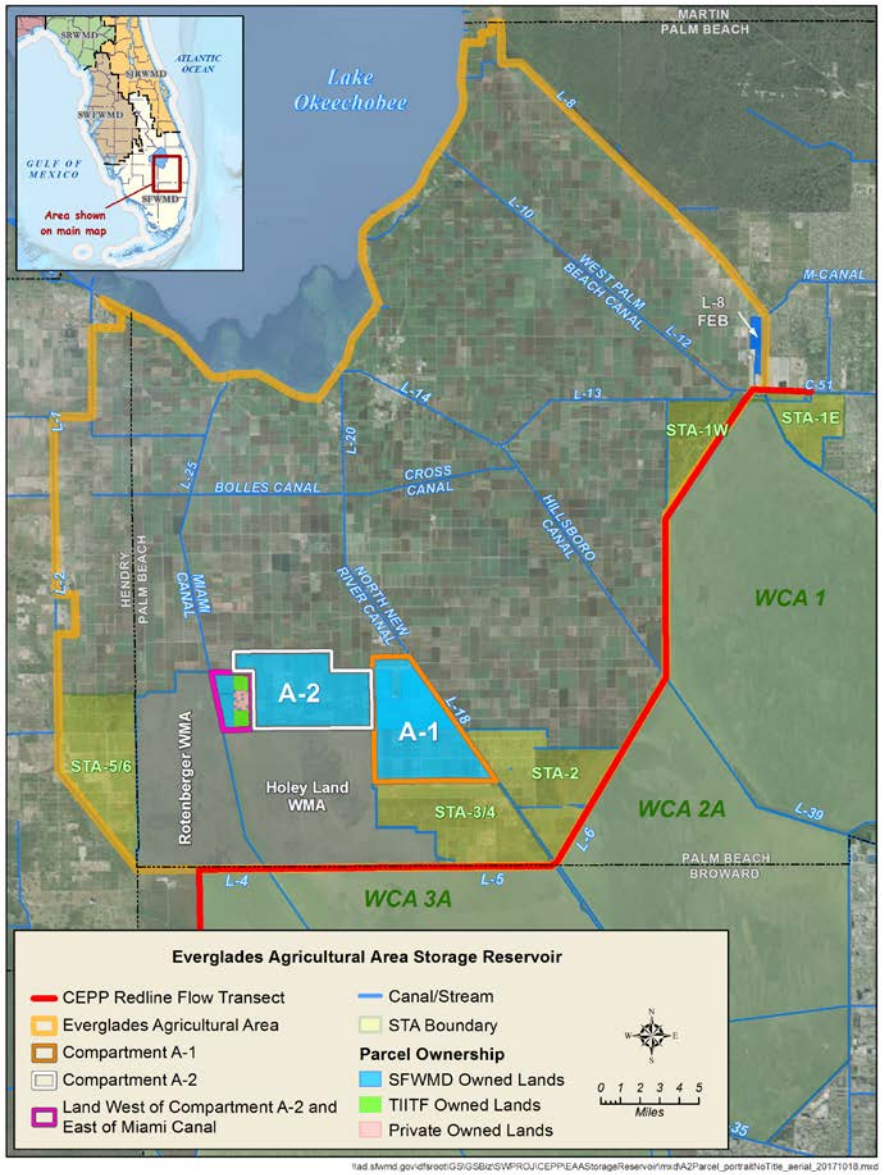
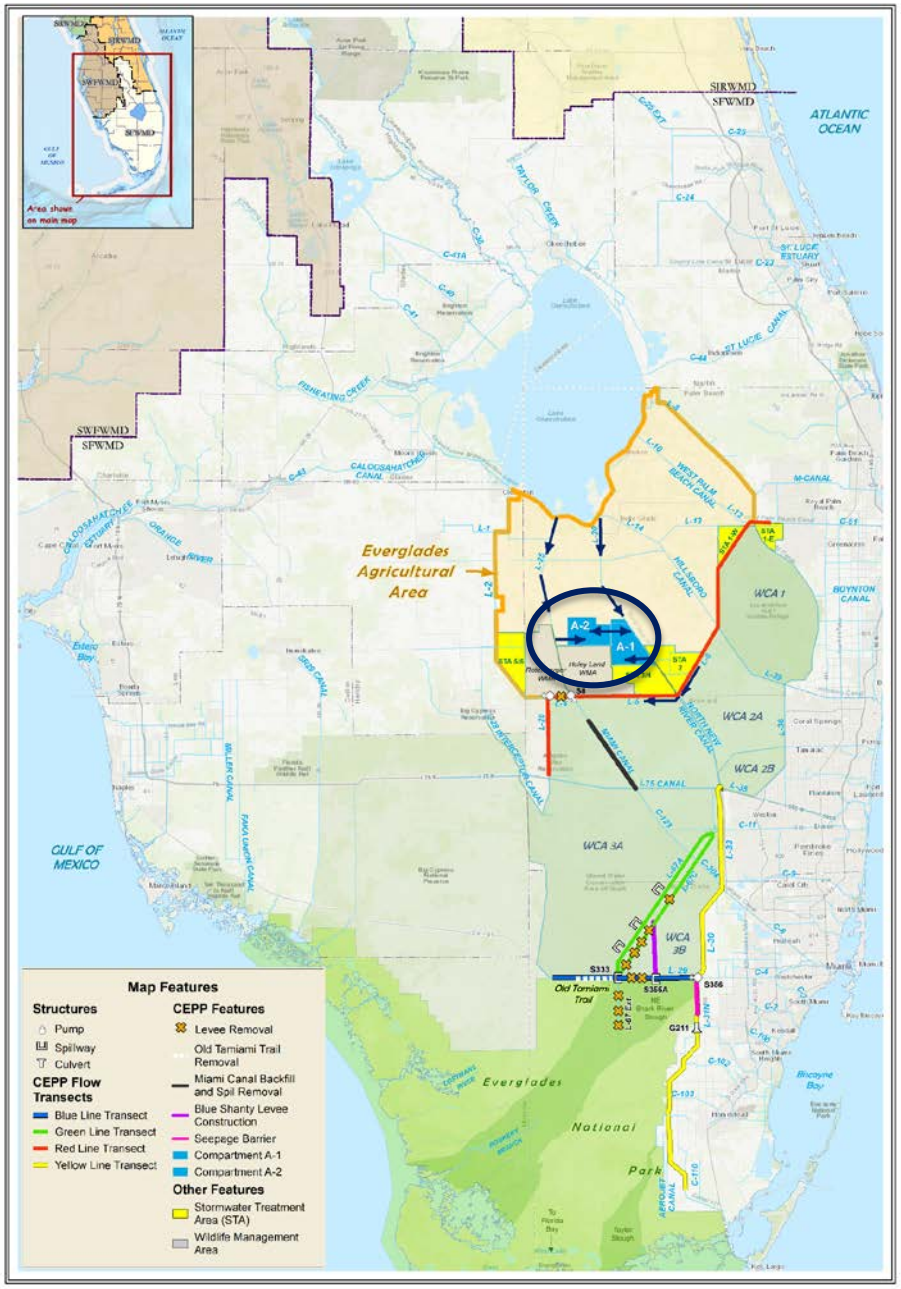
# Moving Water South- Existing Conditions

- 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-2 Flow Equalization Basin (FEB)
  - Seepage Barrier, L-31N Levee
- PPA North
  - L-6 Canal Flow Diversion
  - L-5 Canal Conveyance Improvements
  - S-8 Pump Station Complex Modifications
  - L-4 Levee Degrade and Pump Station
  - Miami Canal Backfill
- PPA South
  - S-333 Spillway Modification
  - L-29 Canal Gated Spillway
  - L-67A Conveyance Structures
  - L-67C Levee Gap
  - L-67C Levee Degrade
  - Blue Shanty Levee, WCA 3B
  - 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

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# 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

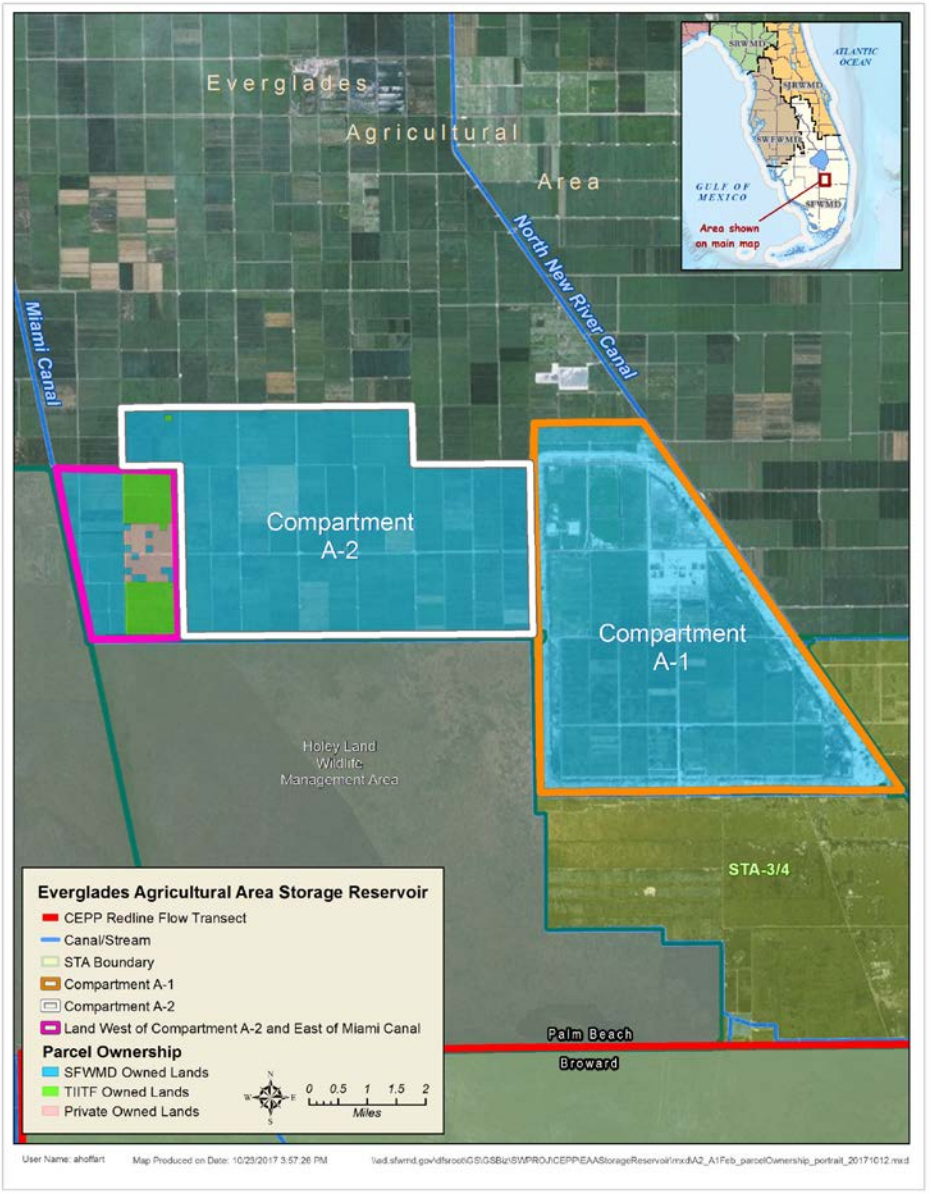
# Constraints

- **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



# 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

# BASE CONDITION MODELING RESULTS

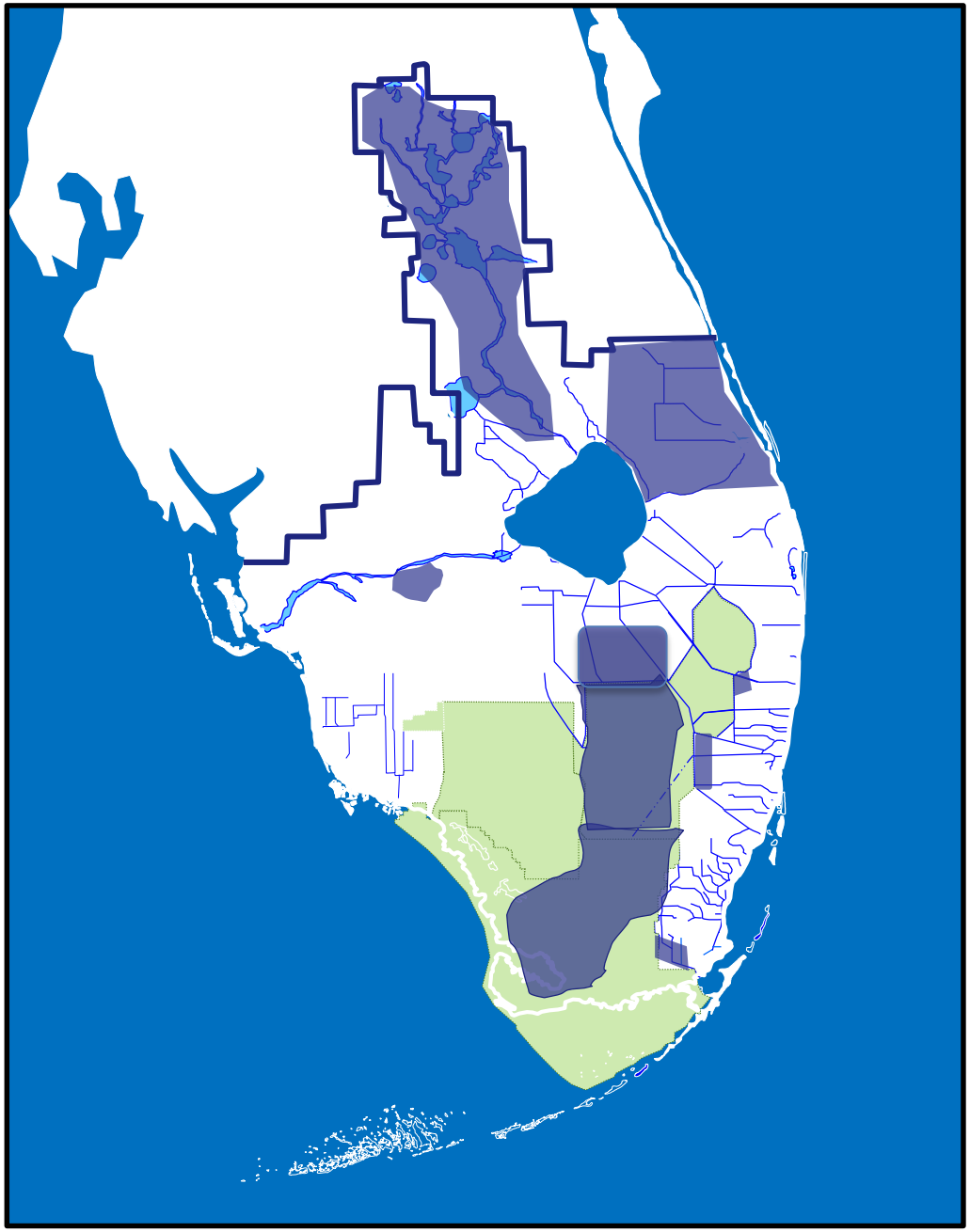
# Baseline Modeling

- 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:

**Try to maintain consistency with Central Everglades Planning (CEPP)**

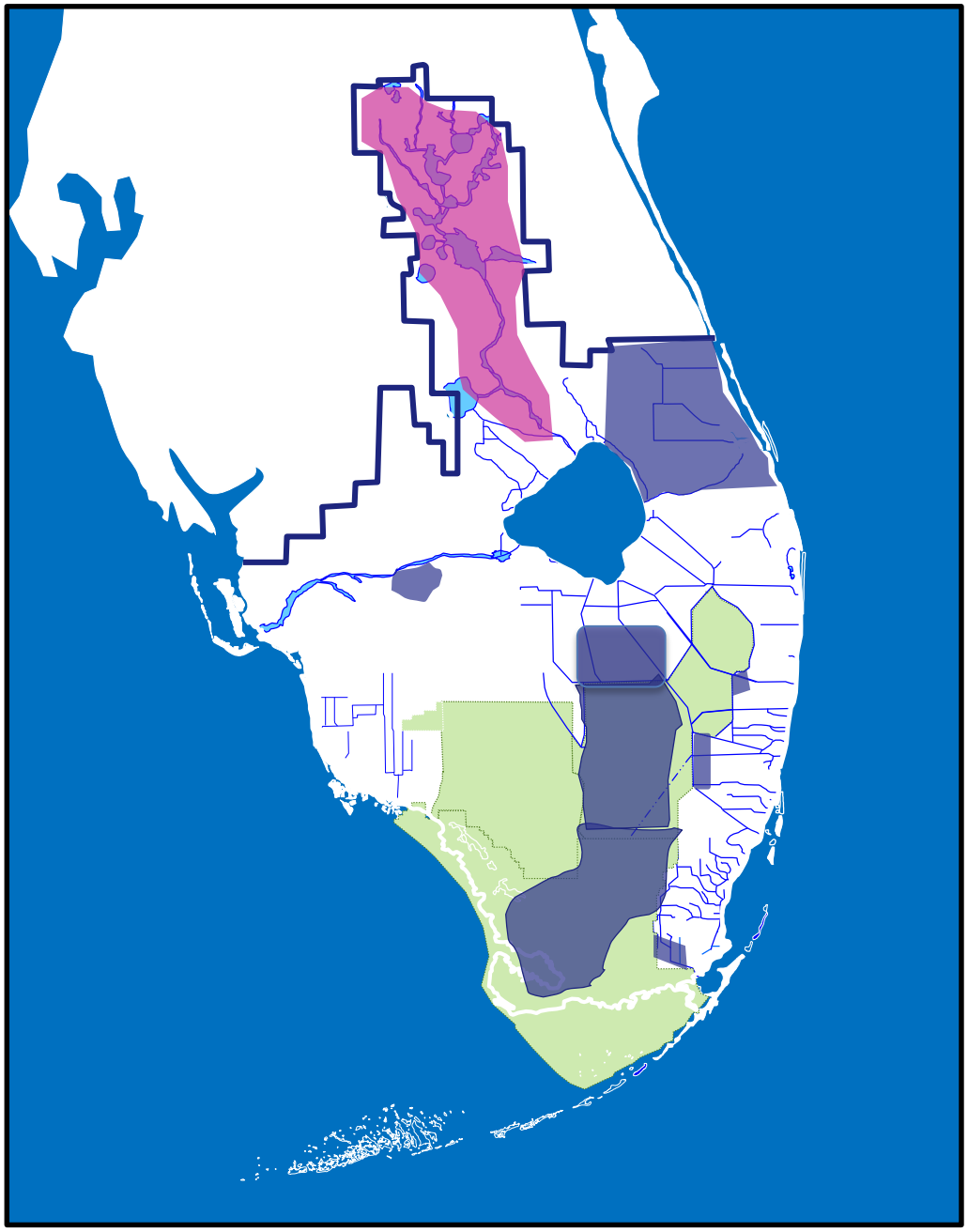
# Baseline Modeling Assumptions (cont)

- Existing Condition Baseline (EARECB) attempts to represent on-ground 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 1st and 2nd 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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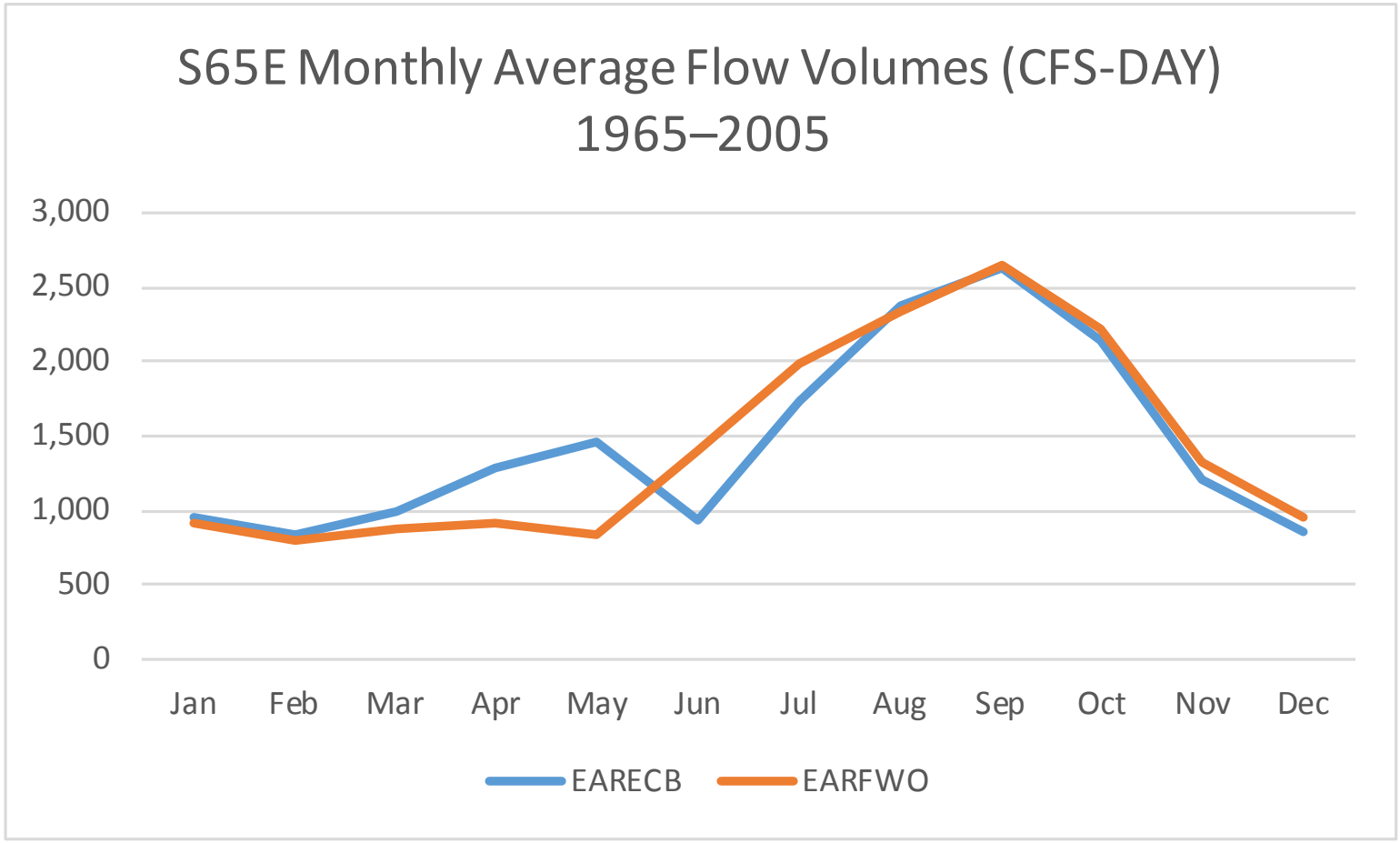
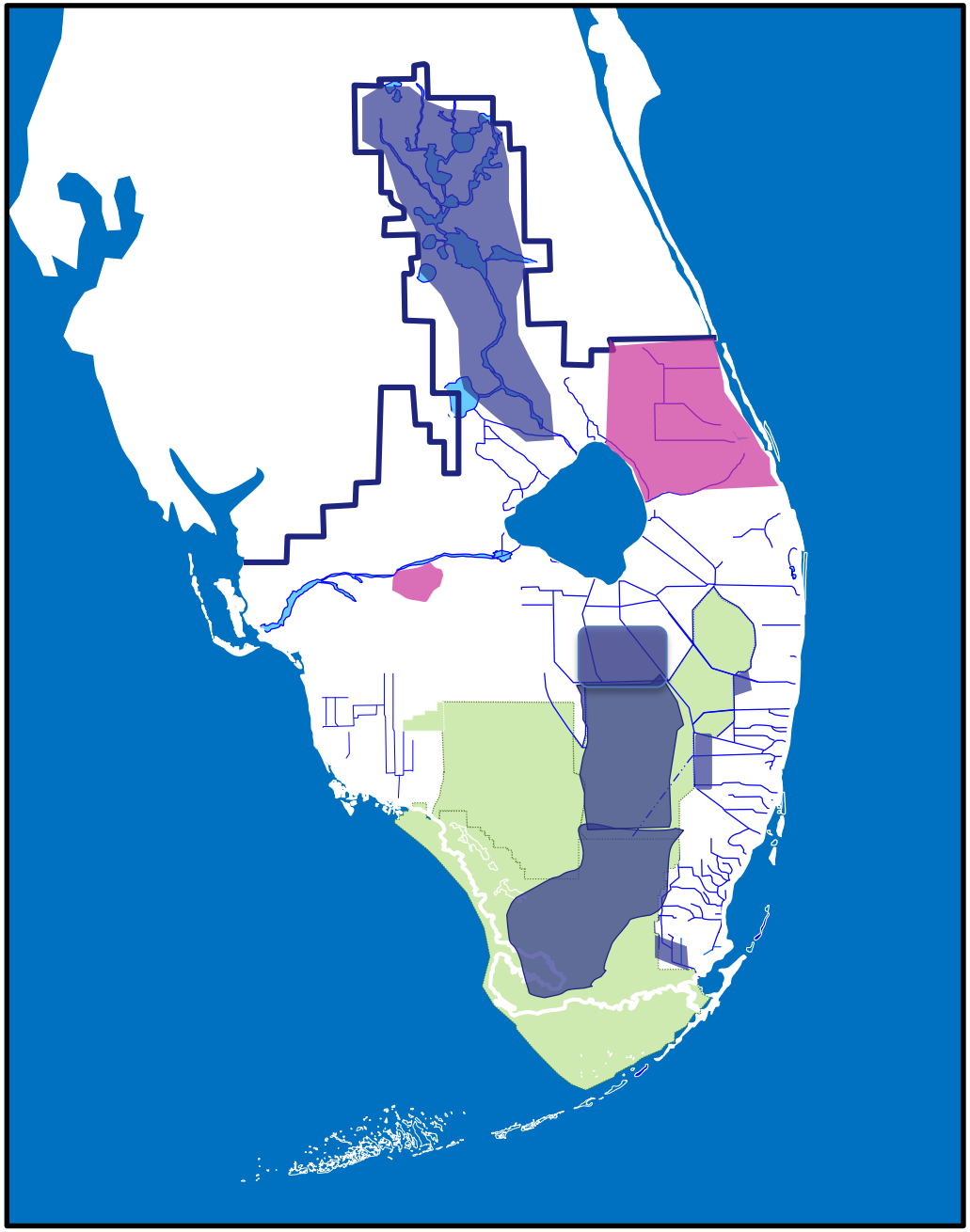
# Seasonal Change in Flow at S65E due to Headwaters Revitalization in EARFWO





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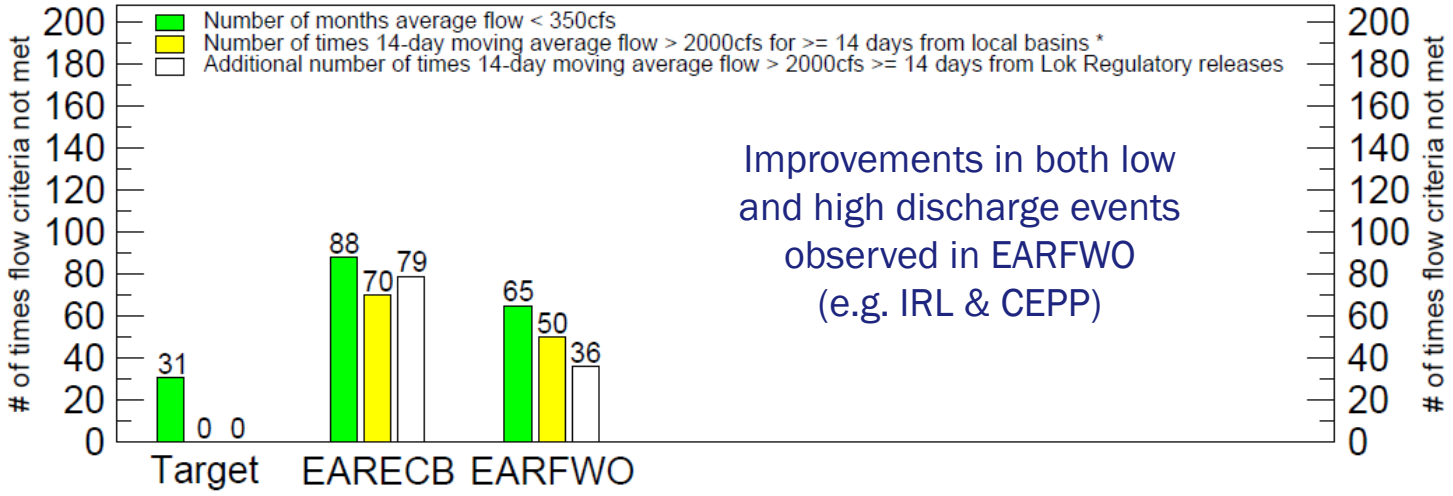
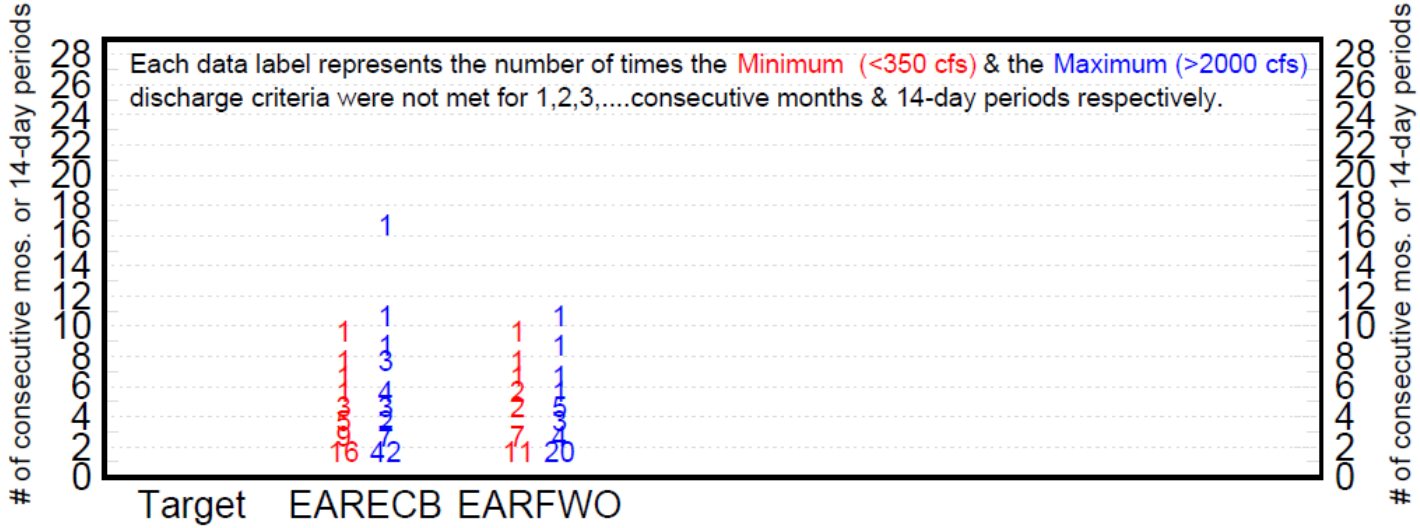
# Number of times Salinity Envelope Criteria NOT Met for the St. Lucie Estuary (mean monthly flows 1965 - 2005)




RECOVER Performance Measure

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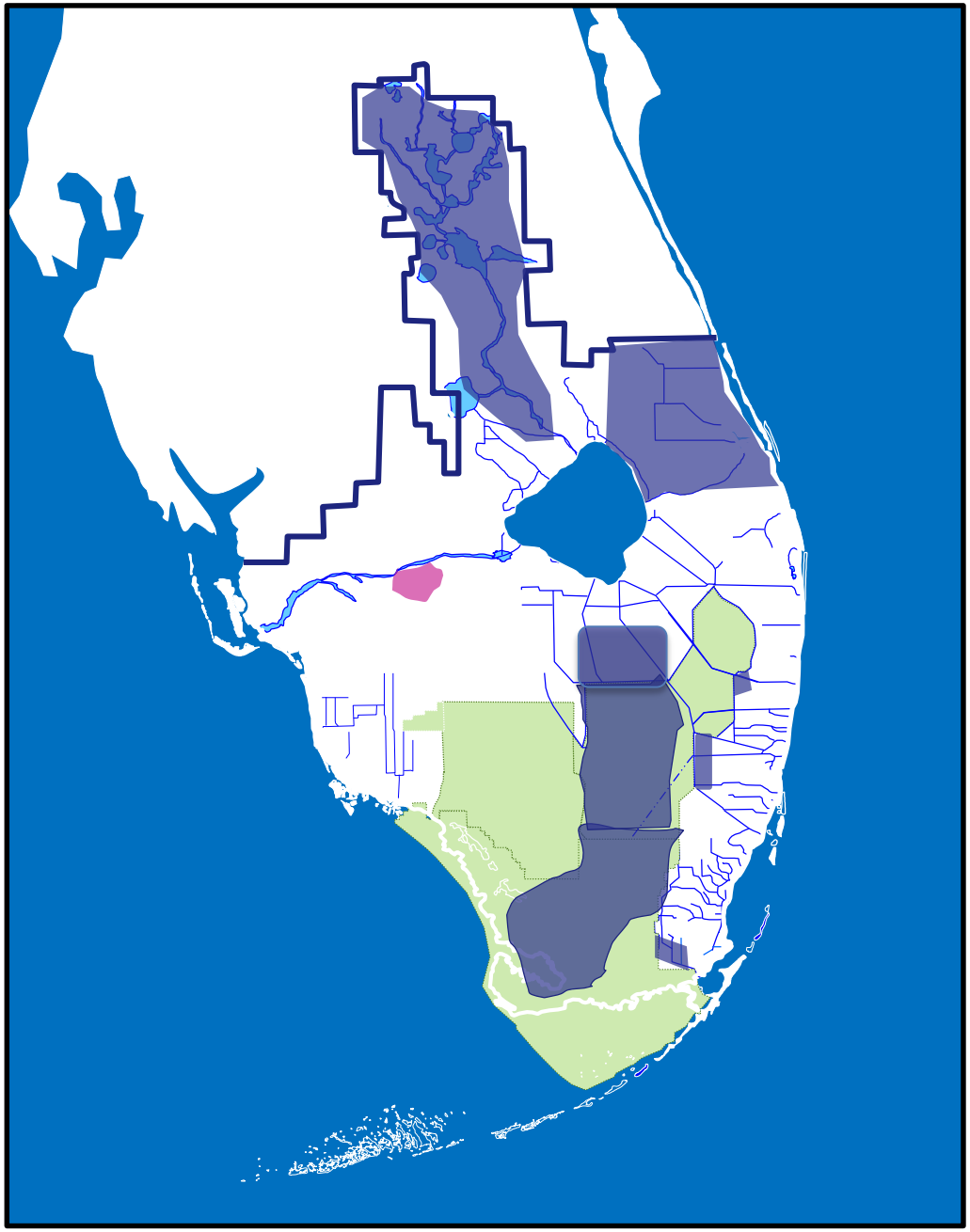

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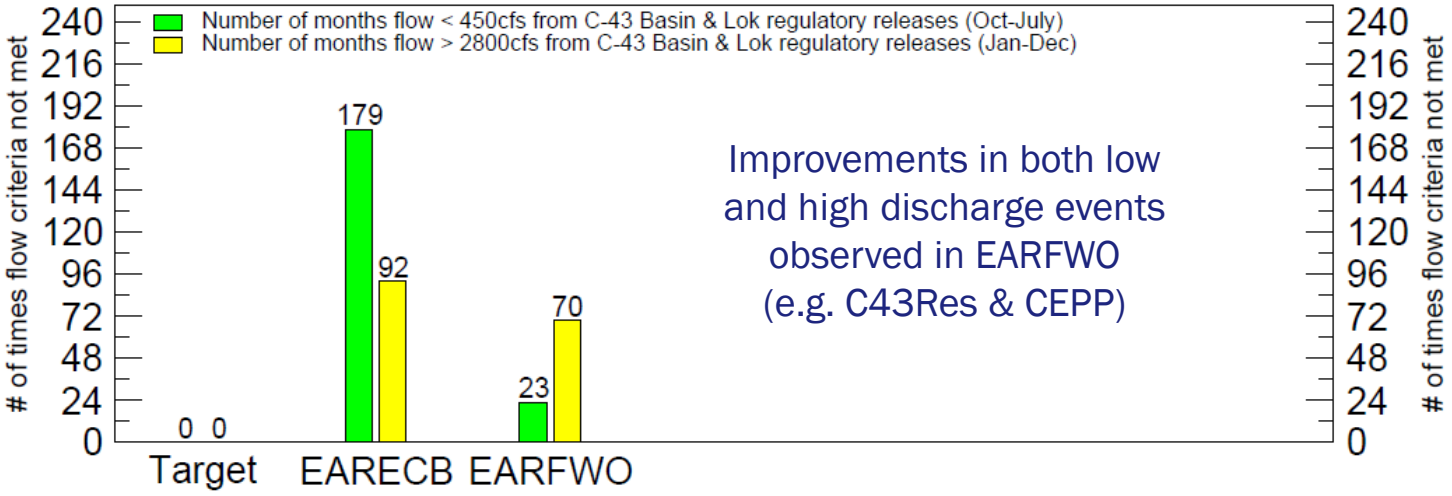
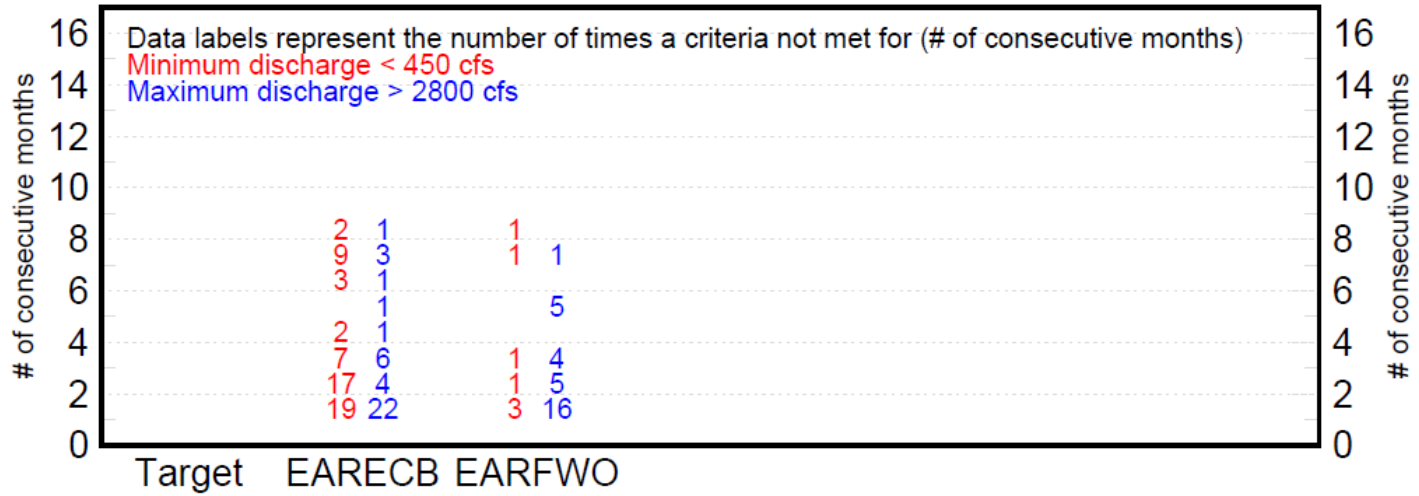
# Number of times Salinity Envelope Criteria NOT Met for the Calooshatchee Estuary (mean monthly flows 1965 - 2005)

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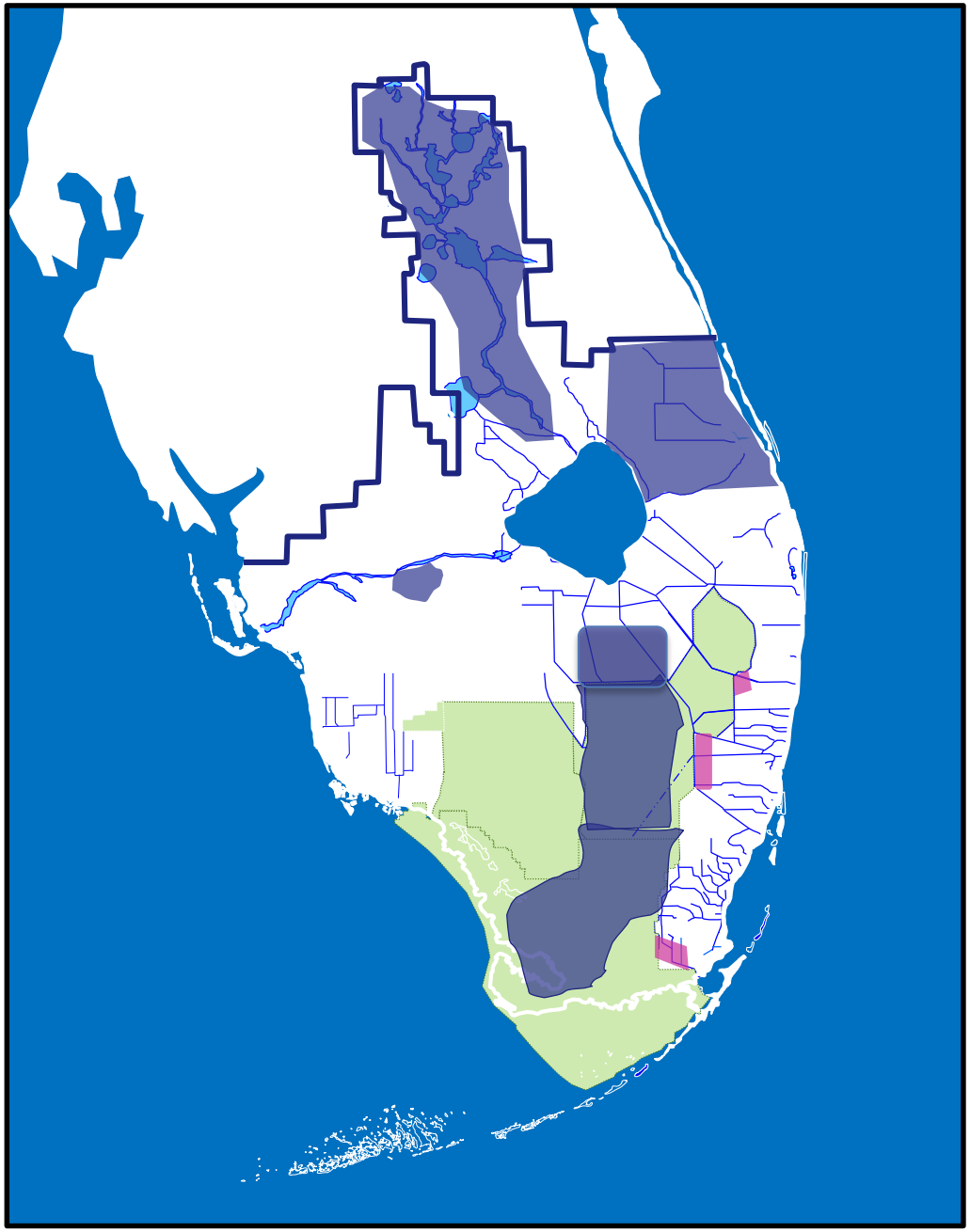

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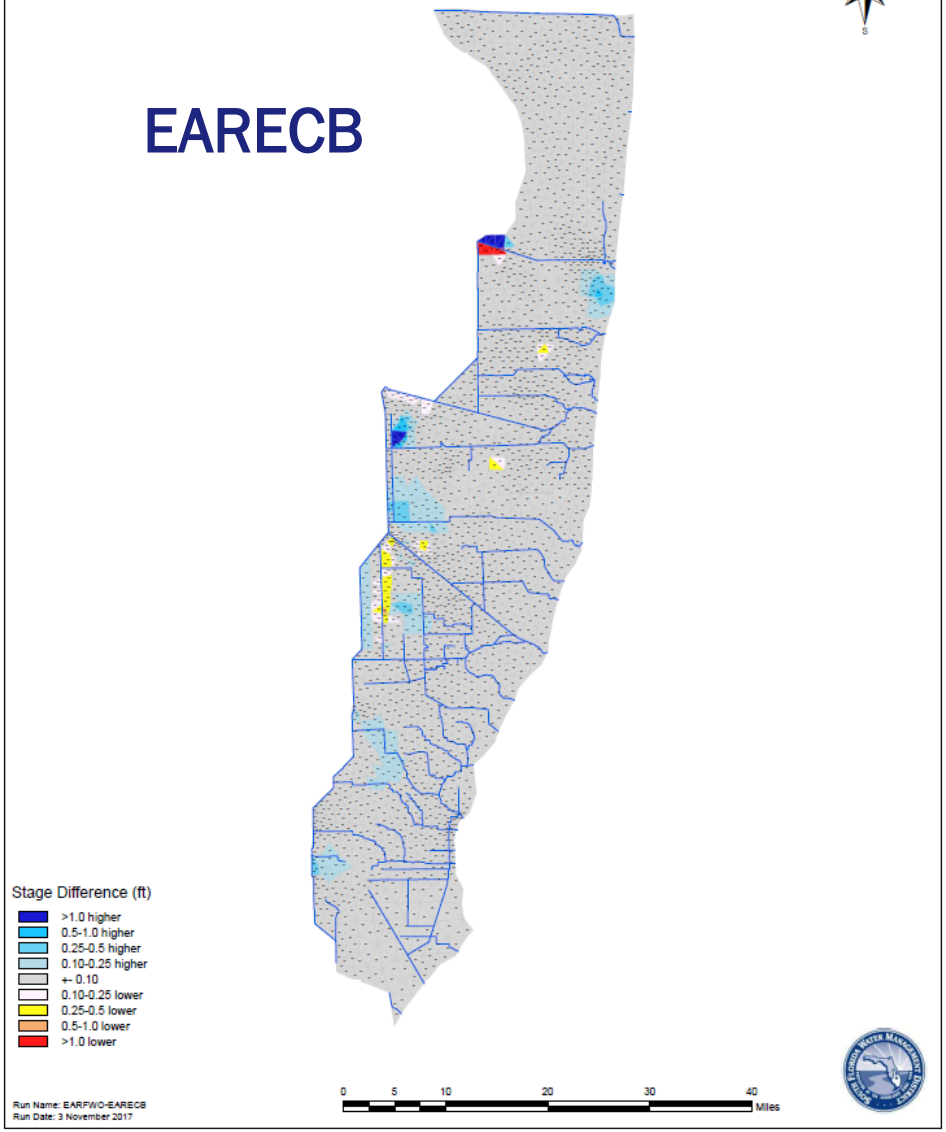
## Average October Stage Difference in POS

1965-2005

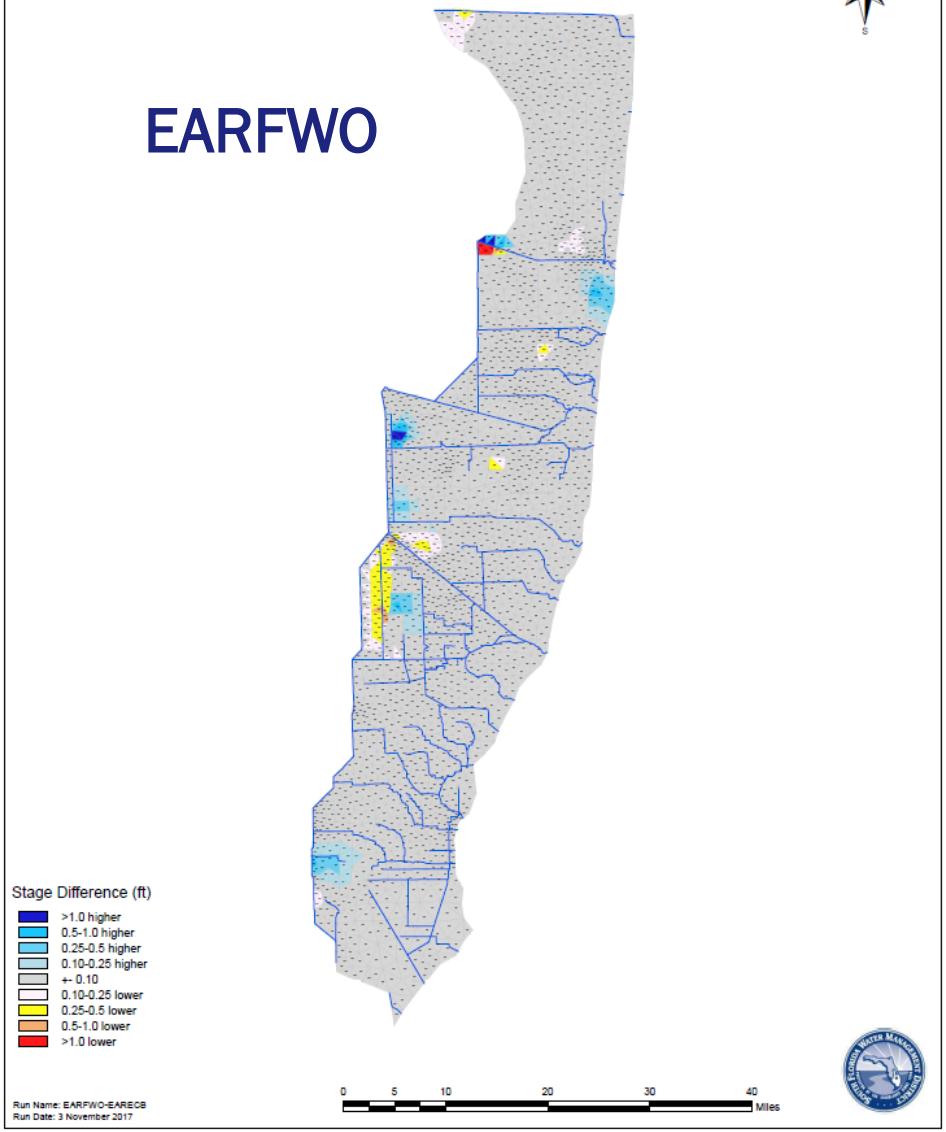
EARECB

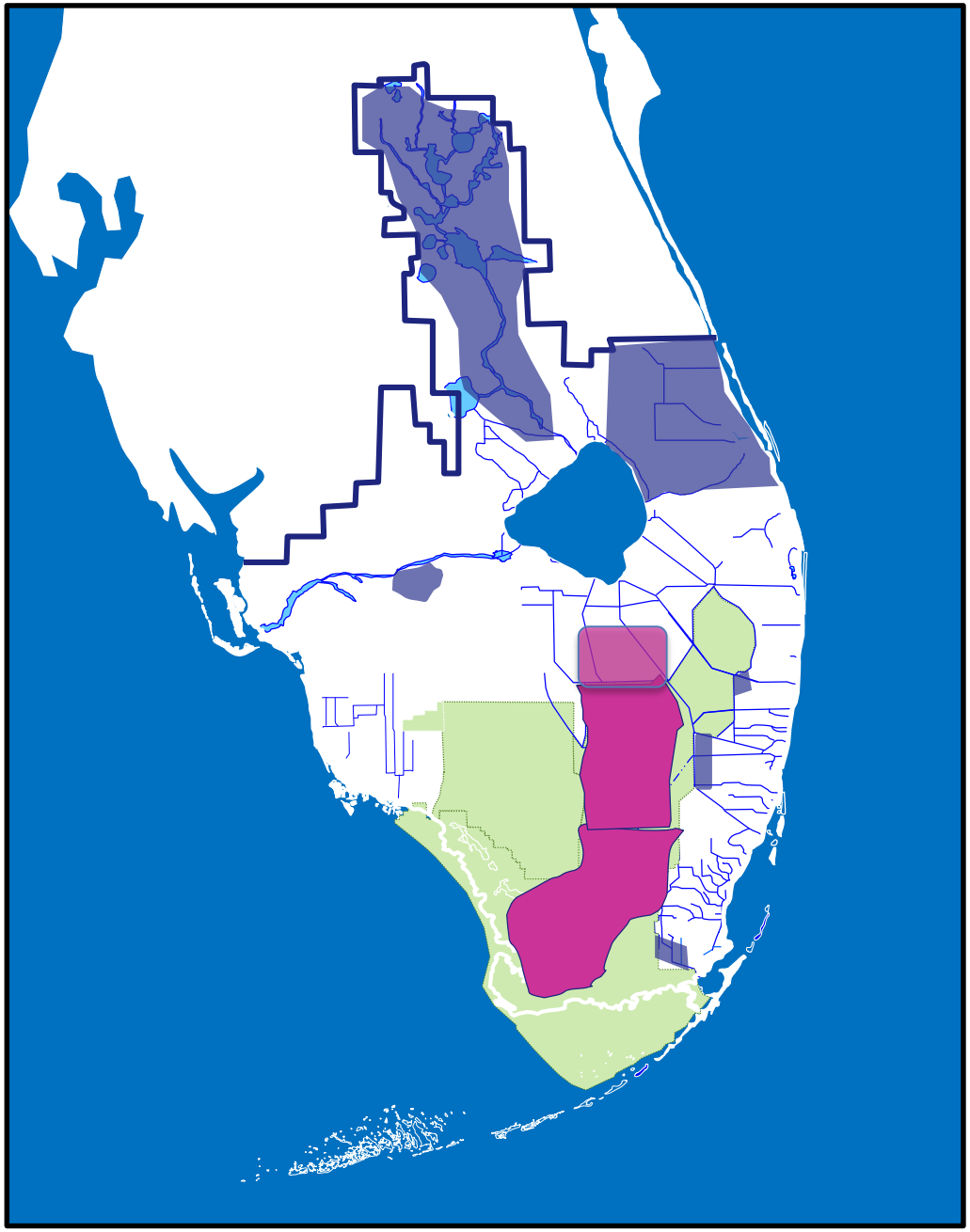



## Average April Stage Difference in POS

1965-2005

EARFWO





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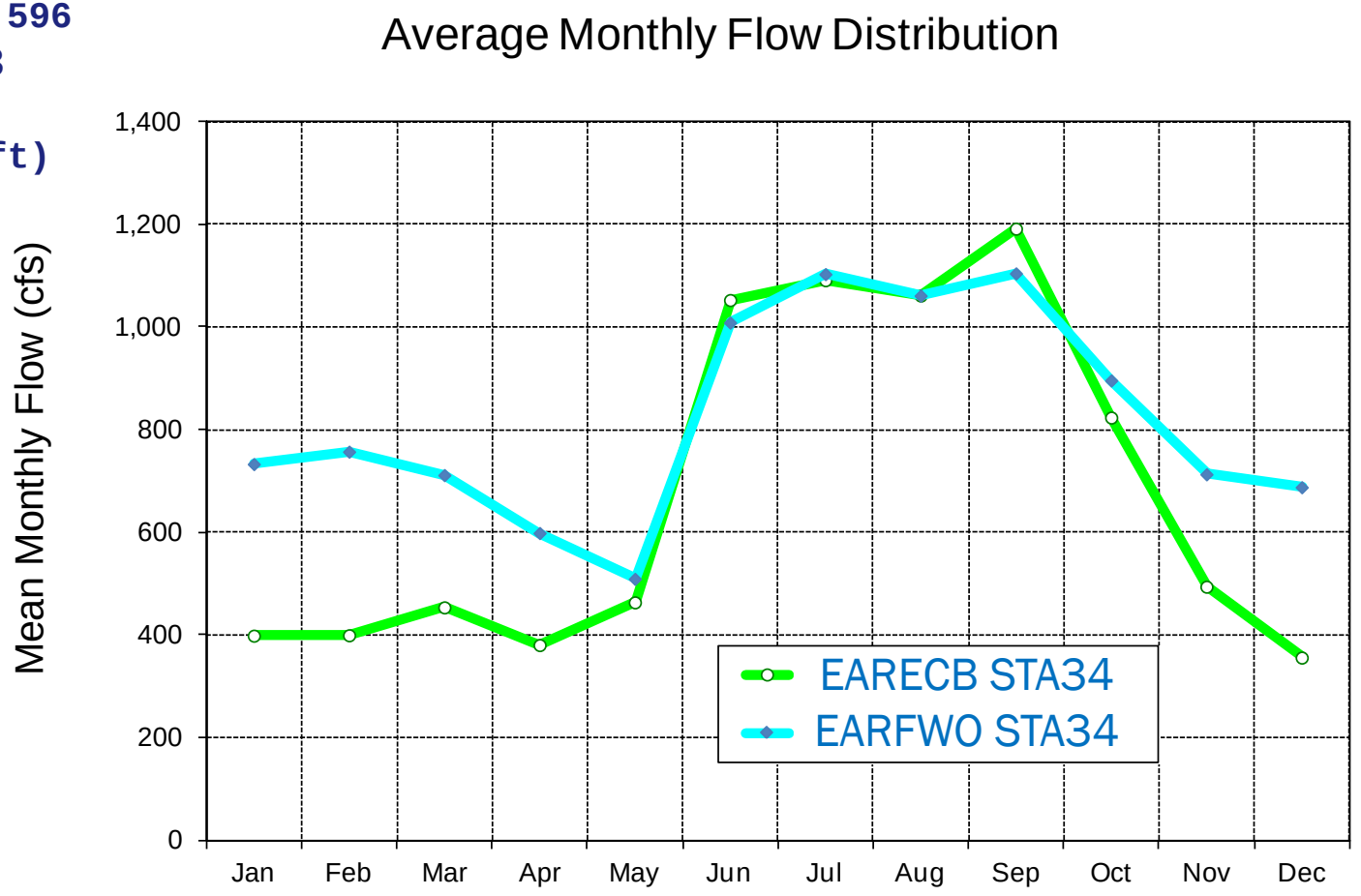
# EARFWO (CEPP) Promotes Additional Flow South

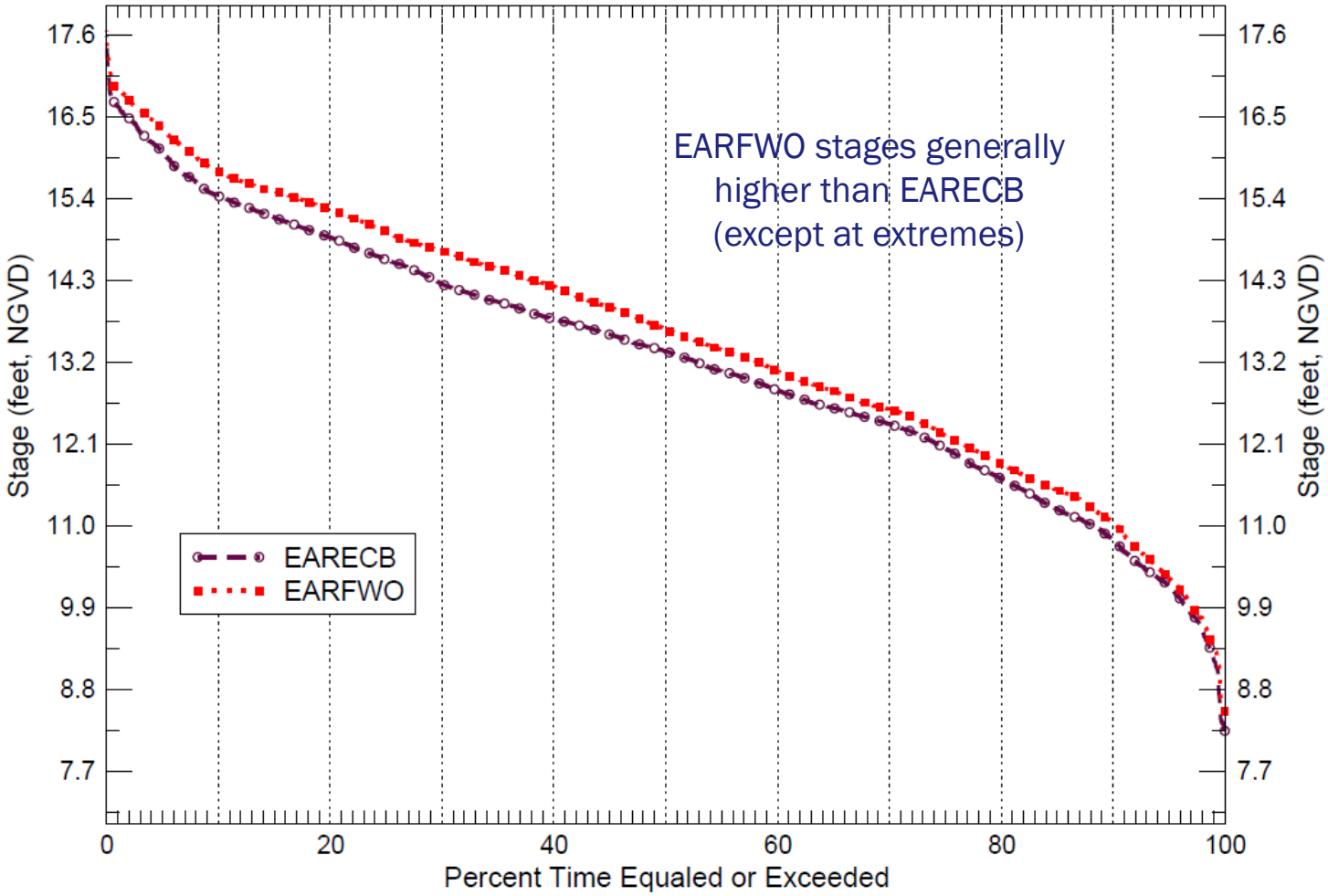
| | EARECB | EARFWO |
|---|---|---|
| STA34 | 383 | 596 |

Add water = +213

(Average annual discharges in kac-ft)



# Stage Duration Curves for Lake Okeechobee




RSMBN P.O.S. 1965 - 2005

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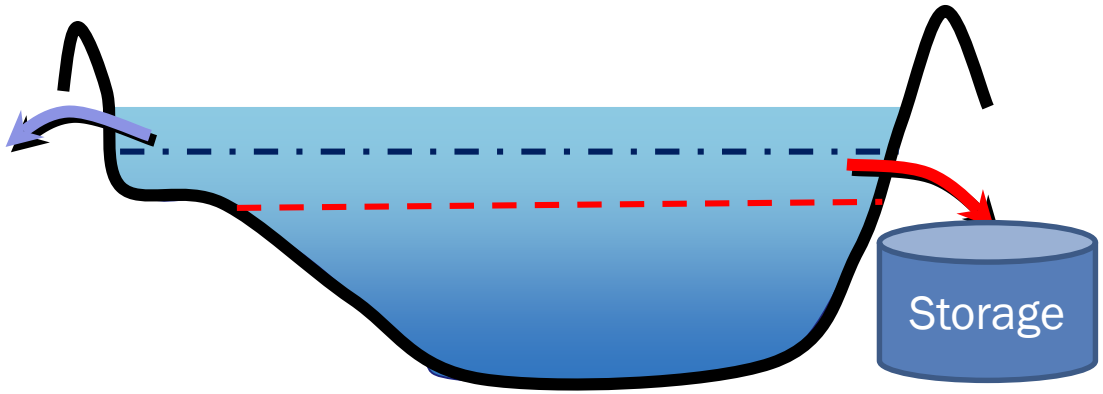
# Recall 10/31 Baselines Presentation: One Challenge to Consider




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.



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

Examples:

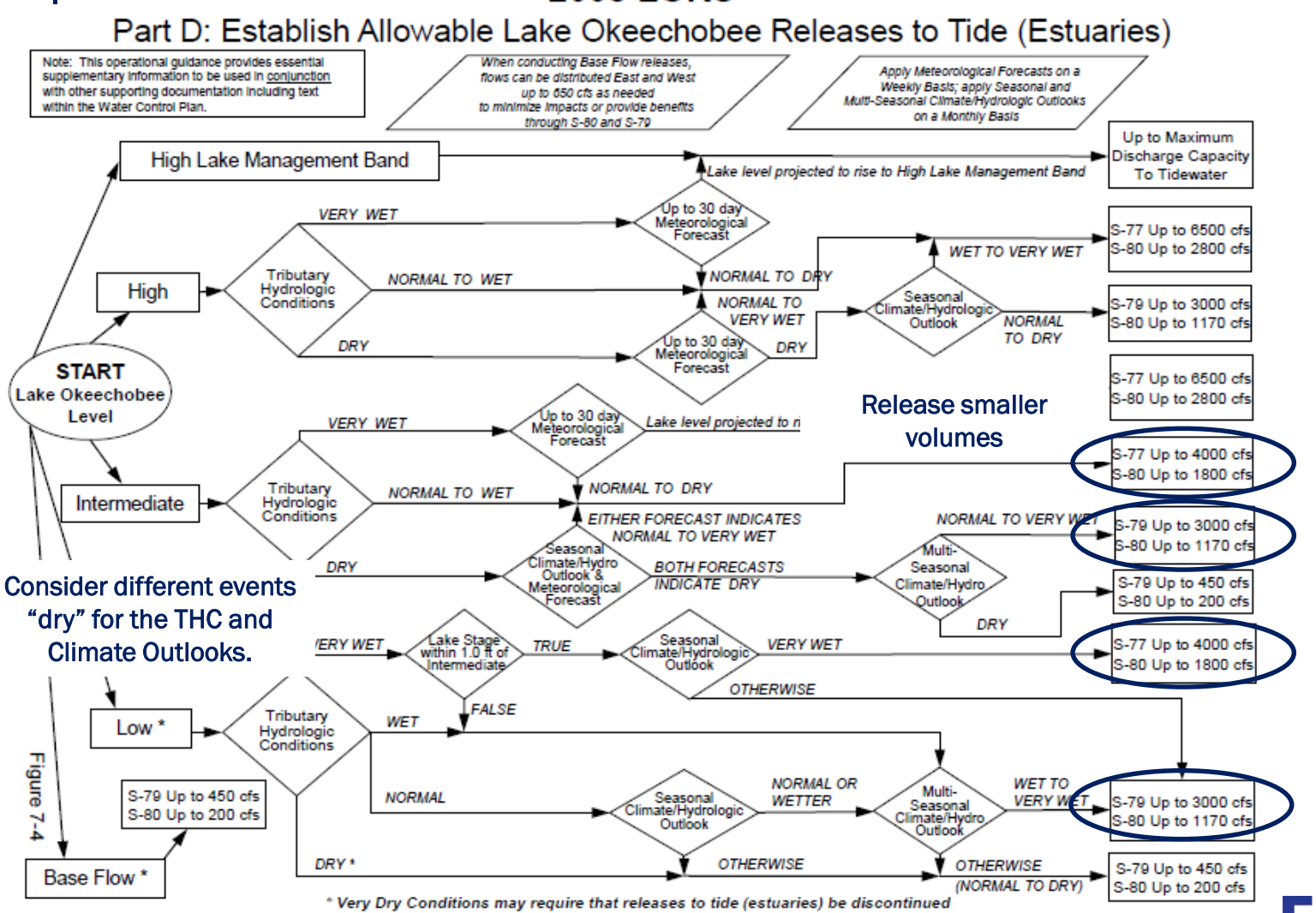
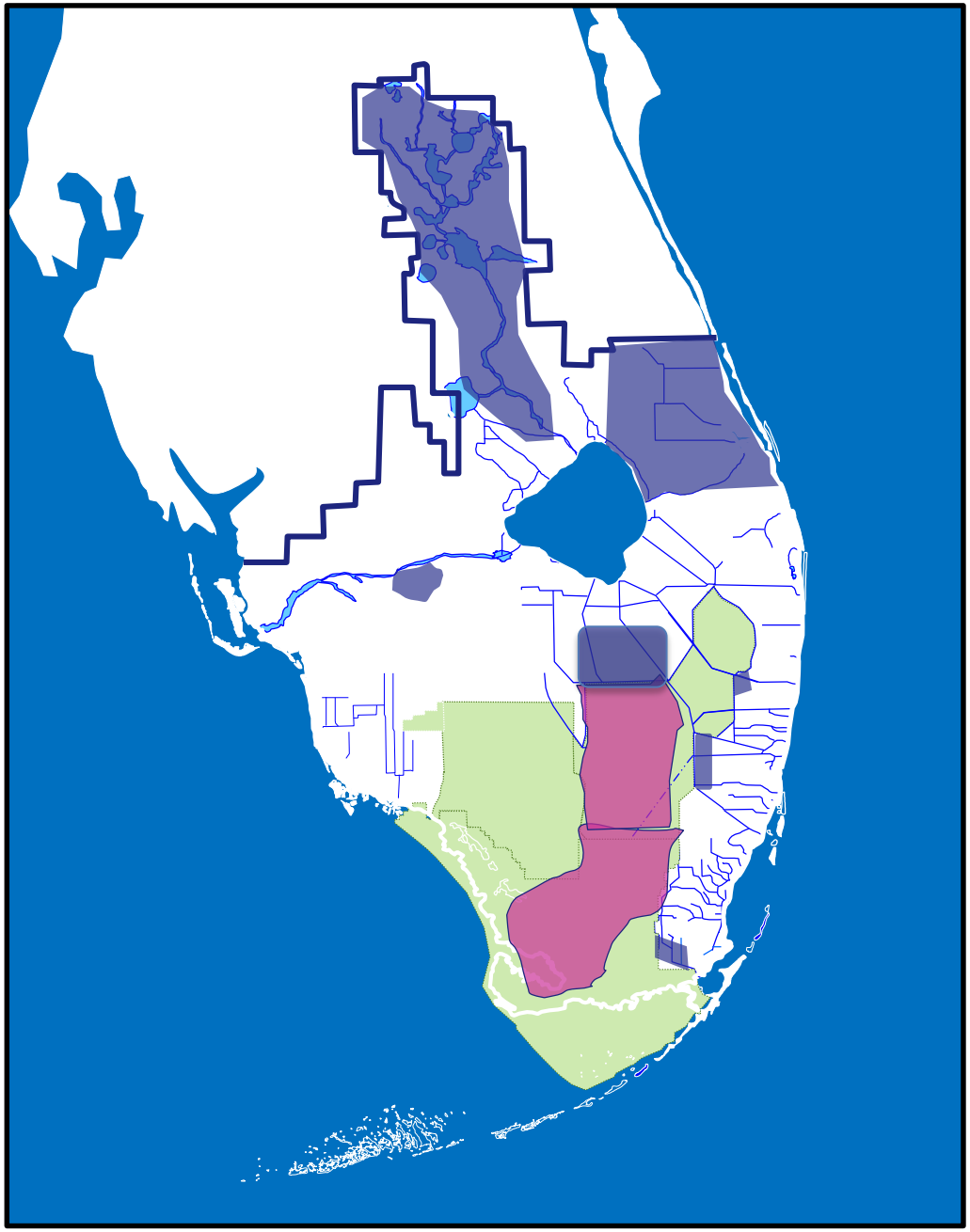



Figure 7-4



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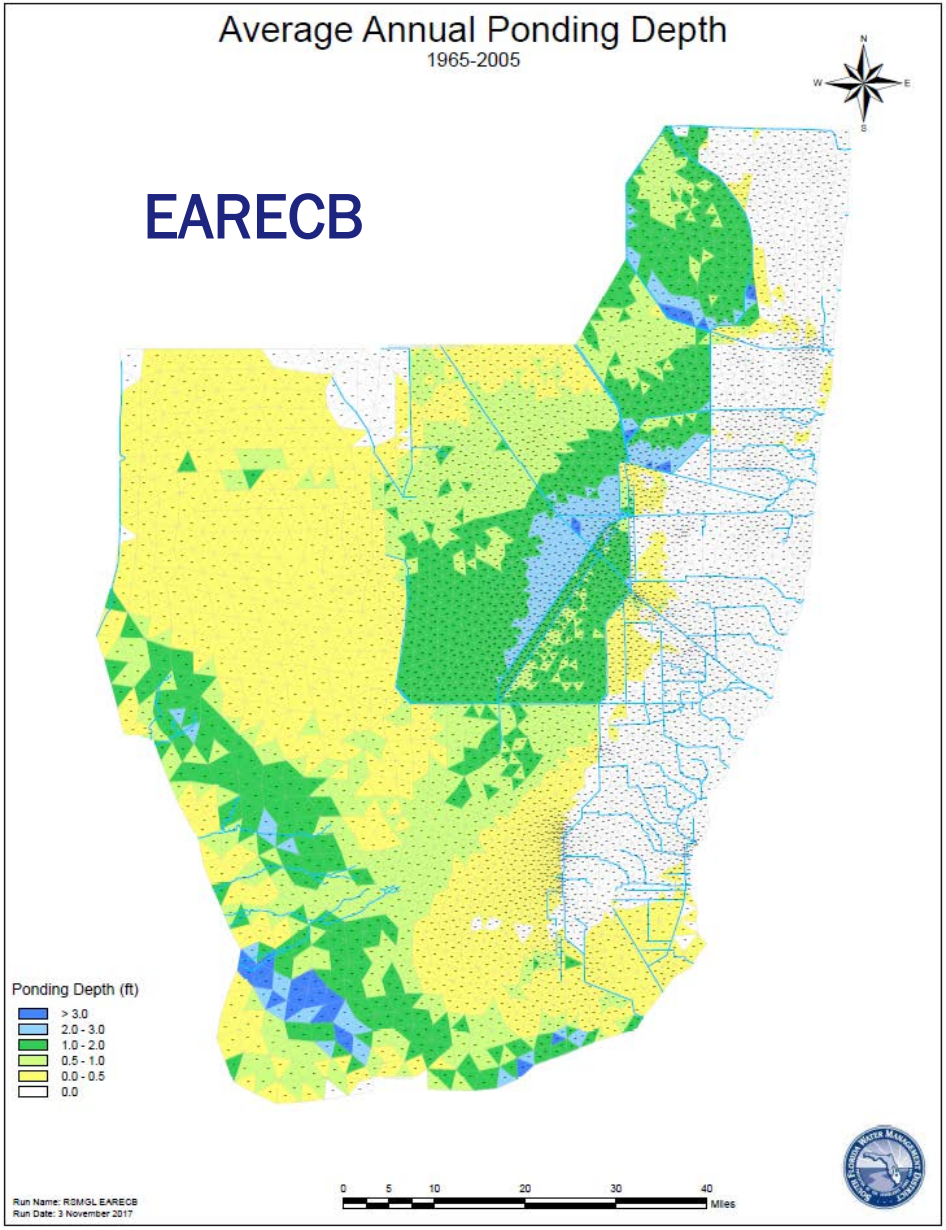
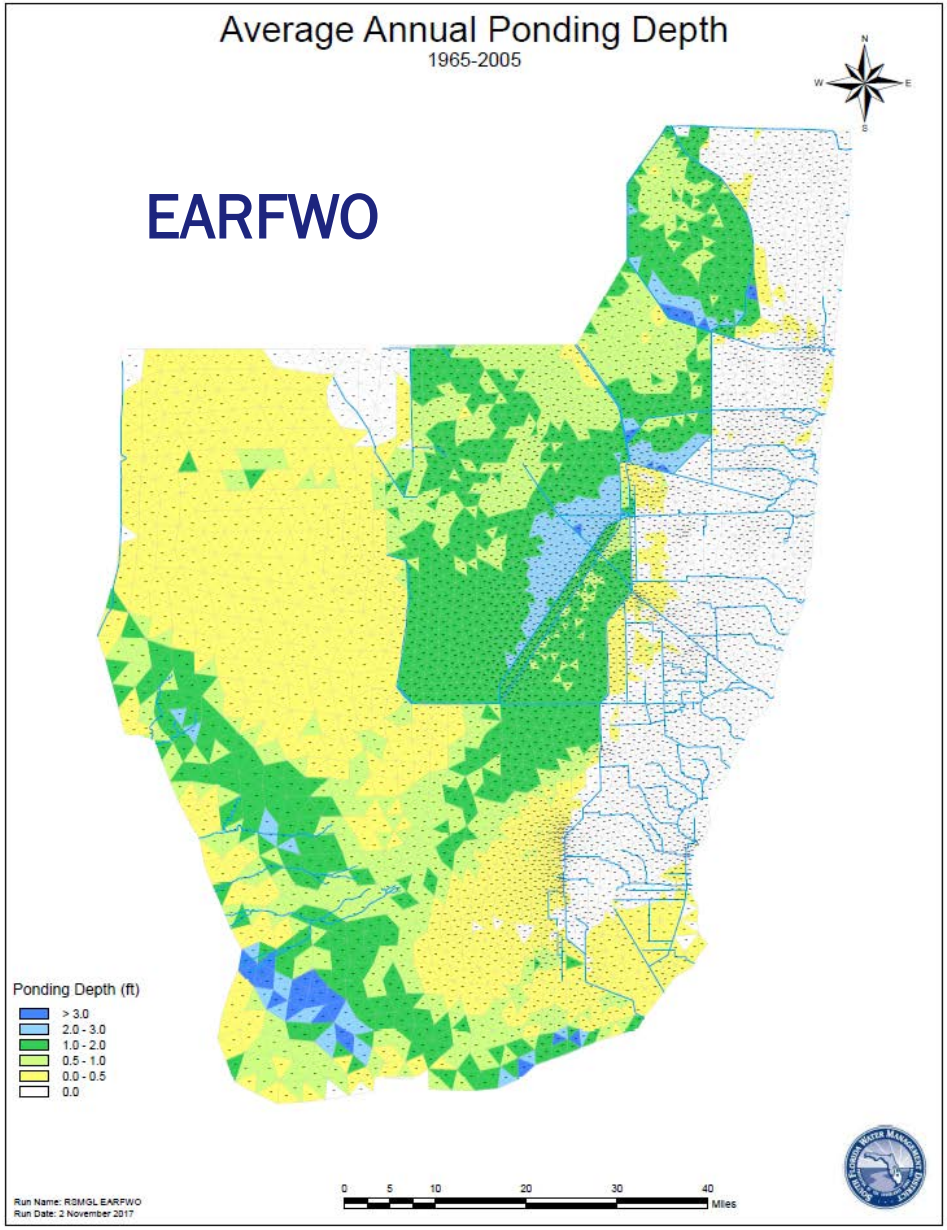
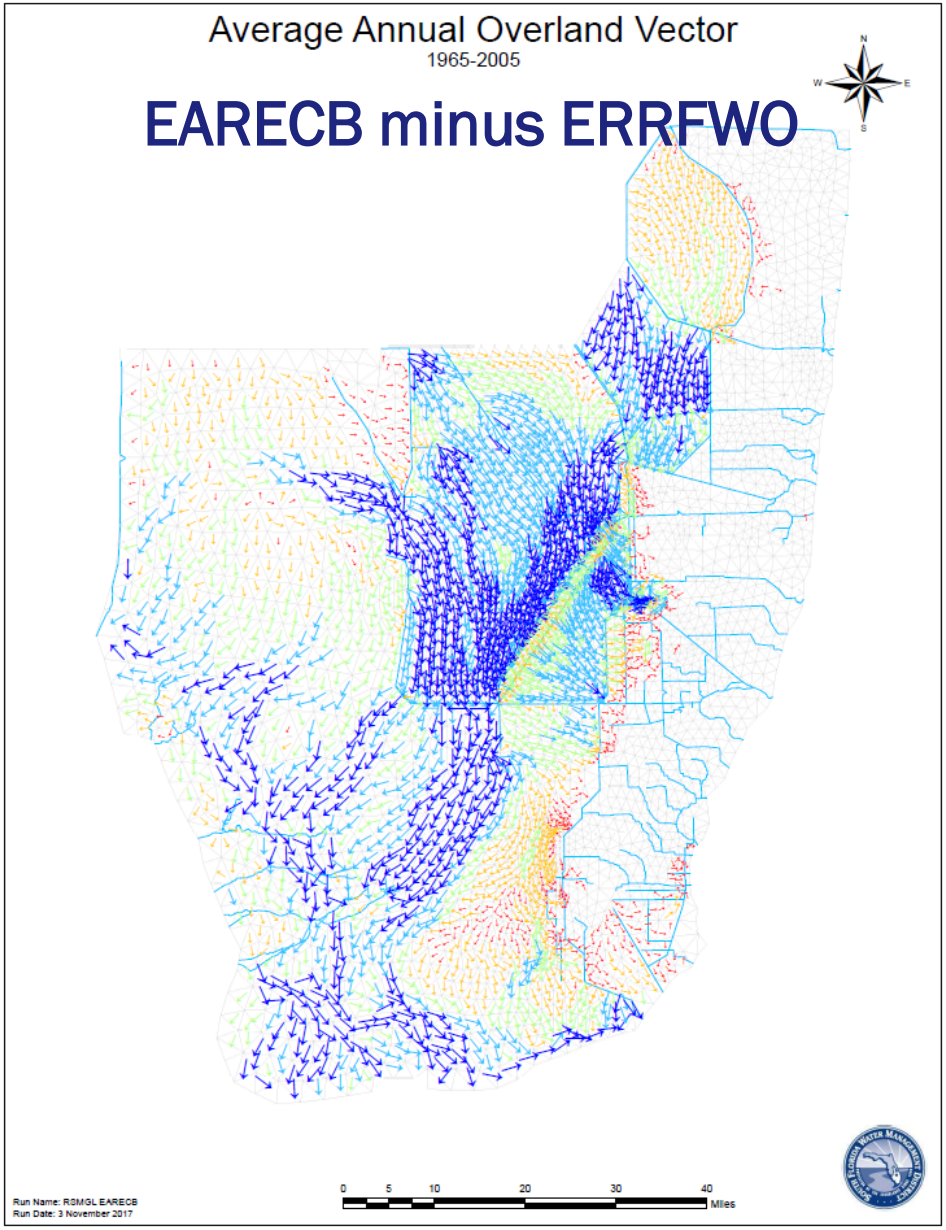
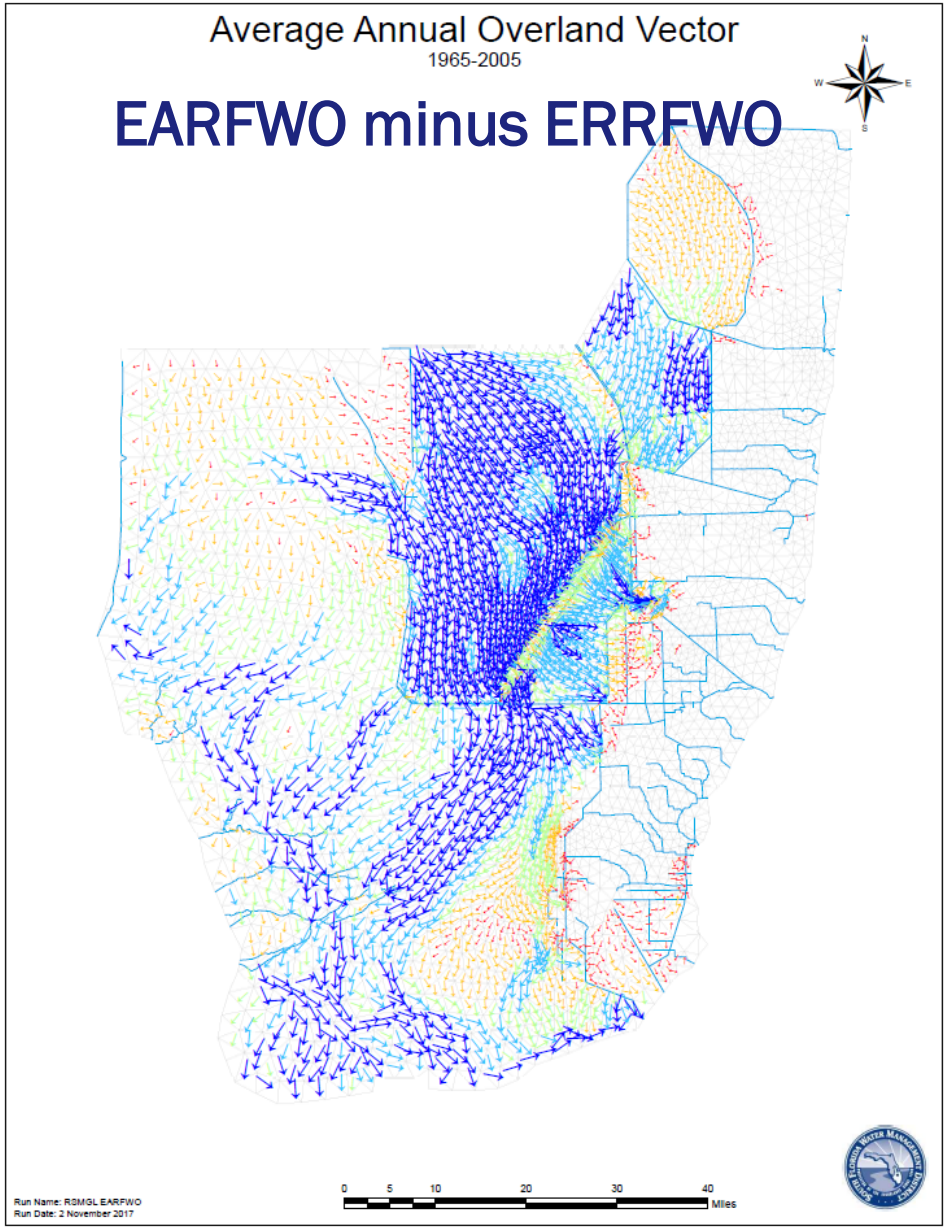

Average Annual Ponding Depth
1965-2005
EARECB
Ponding Depth (ft)
> 3.0
2.0 - 3.0
1.0 - 2.0
0.5 - 1.0
0.0 - 0.5
0.0
0 5 10 20 30 40
Miles
Run Name: RSMGL EARECB
Run Date: 3 November 2017

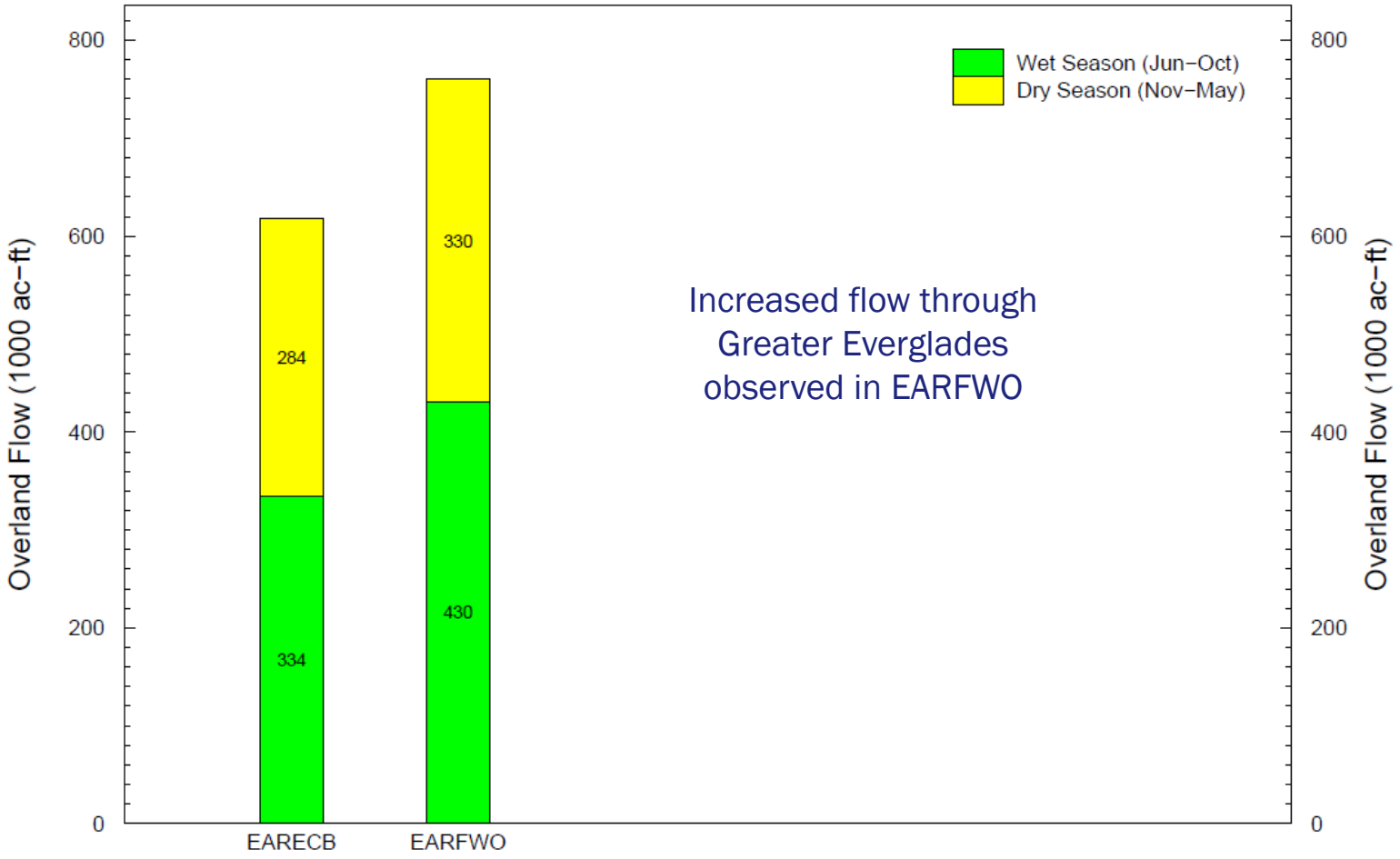

Average Annual Ponding Depth
1965-2005
EARFWO
Ponding Depth (ft)
> 3.0
2.0 - 3.0
1.0 - 2.0
0.5 - 1.0
0.0 - 0.5
0.0
0 5 10 20 30 40
Miles
Run Name: RSMGL EARFWO
Run Date: 2 November 2017


Average Annual Overland Vector
1965-2005
EARECB minus ERRFWO
N
W
E
S
0 5 10 20 30 40
Miles
Run Name: R0MGL EARECB
Run Date: 3 November 2017


Average Annual Overland Vector
1965-2005
EARFWO minus ERRFWO
N
W
E
S
0 5 10 20 30 40
Miles
Run Name: R0MGL EARFWO
Run Date: 2 November 2017

## Average Annual Overland Flow across Transect 27

Southwestward flow in Central Shark River Slough




Increased flow through Greater Everglades observed in EARFWO

# EAA Storage Reservoir Modeling Data

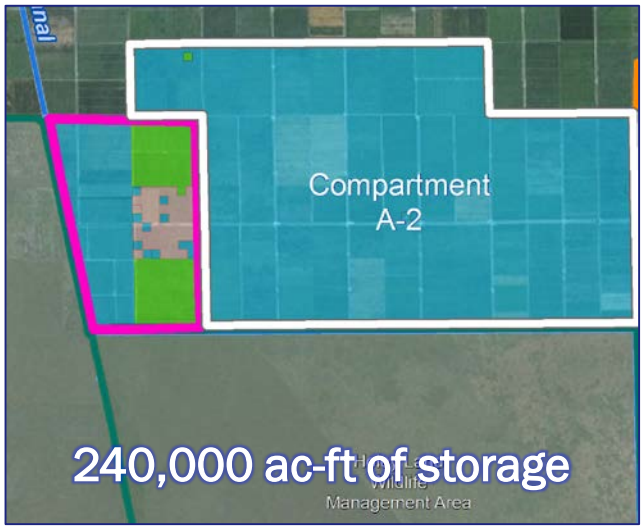
- Modeling data is available via ftp at:
  ftp://ftp.sfwmd.gov/pub/EAASR/

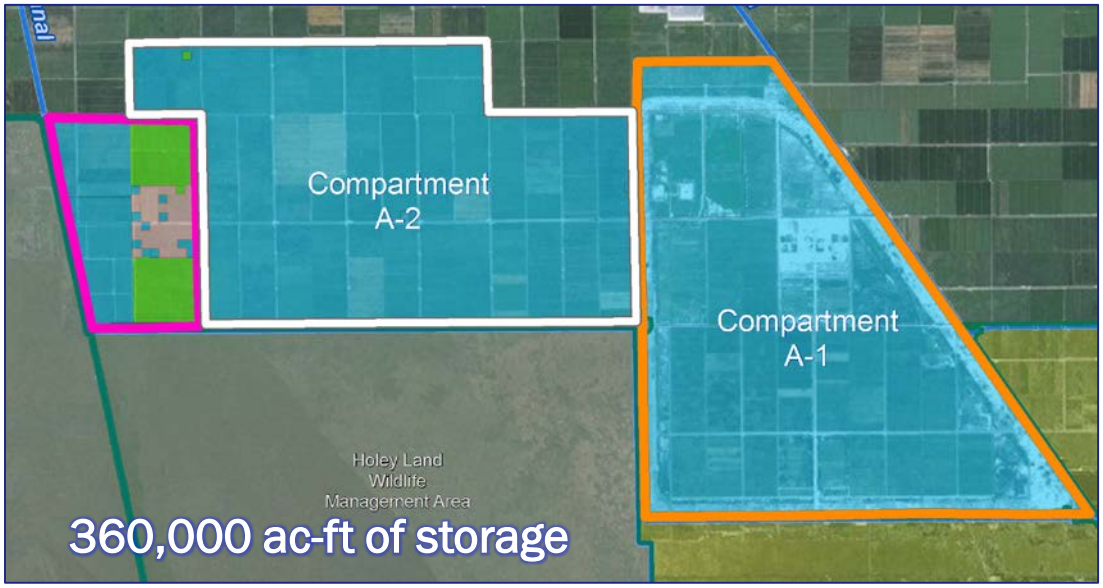
EAA Storage Reservoir Feasibility Study

# INITIAL ALTERNATIVES SCOPING

# Important Considerations

- Initial analyses identify performance potential for the facility (Reservoir, STA and associated infrastructure)
- Once identified, project alternatives to be evaluated will be modeled to honor physical and legal considerations
- Performance will be reduced from potential but approach potential as more CERP components come online
- Detailed modeling of alternatives will establish reduction in estuary releases and flow south that can be achieved consistent with various State and Federal laws, and agreements.



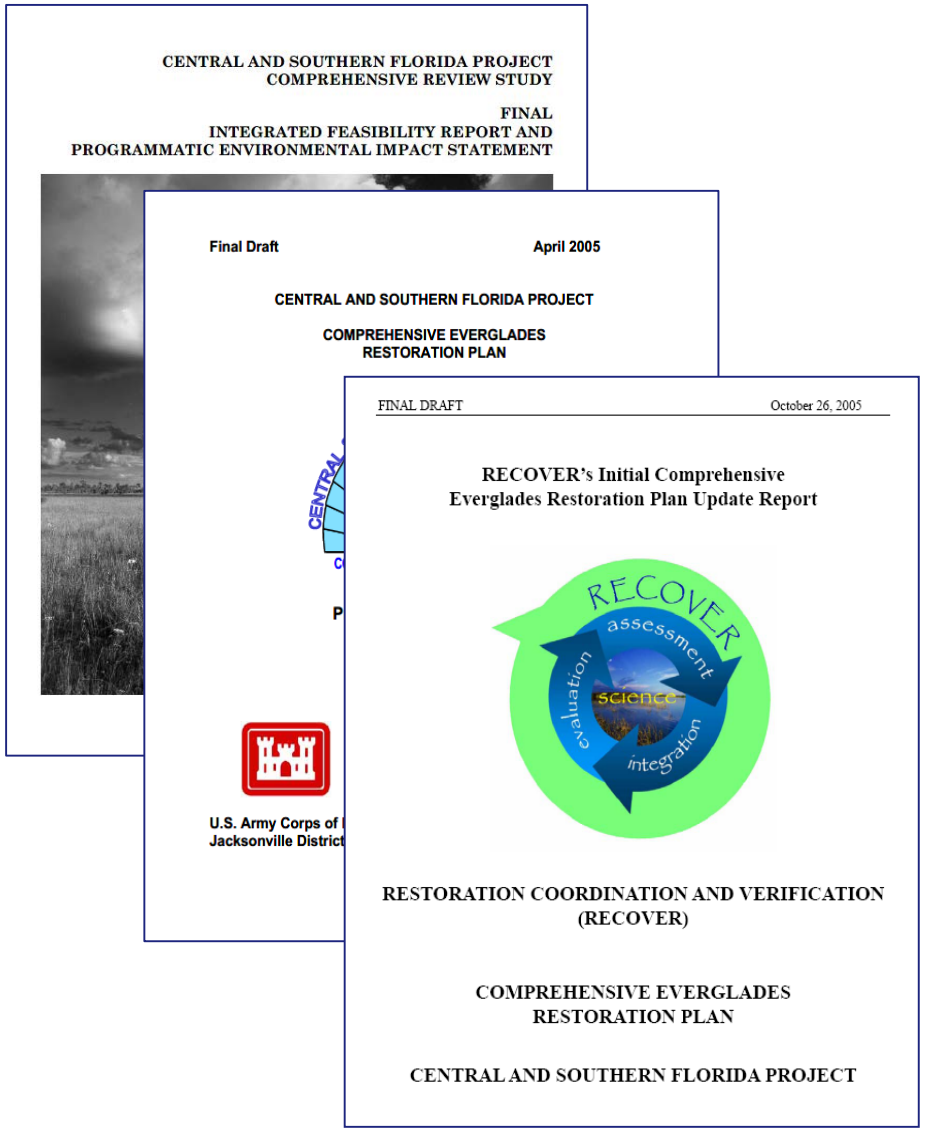



# Informing the EAA Storage Reservoir Study: Defining the CERP Goal

The following scenarios represent the with- and without- CERP conditions:

- Pre-CERP Baseline (PCB1) per RECOVER, 2005
- Full CERP (CERPA) per RECOVER 2005

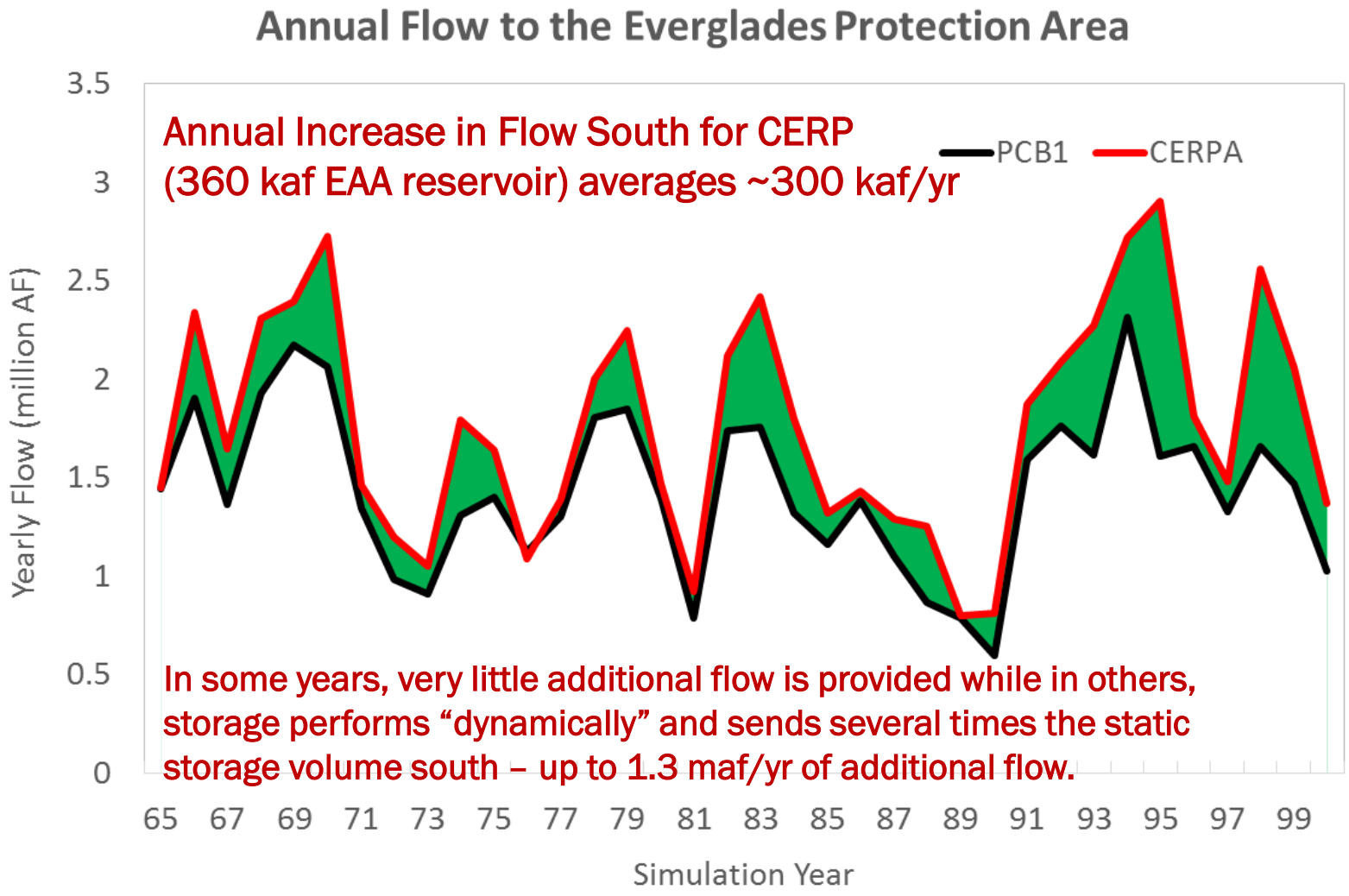
These scenarios combined with the original Plan report (Restudy, 1999) help to inform EAA Storage Reservoir planning



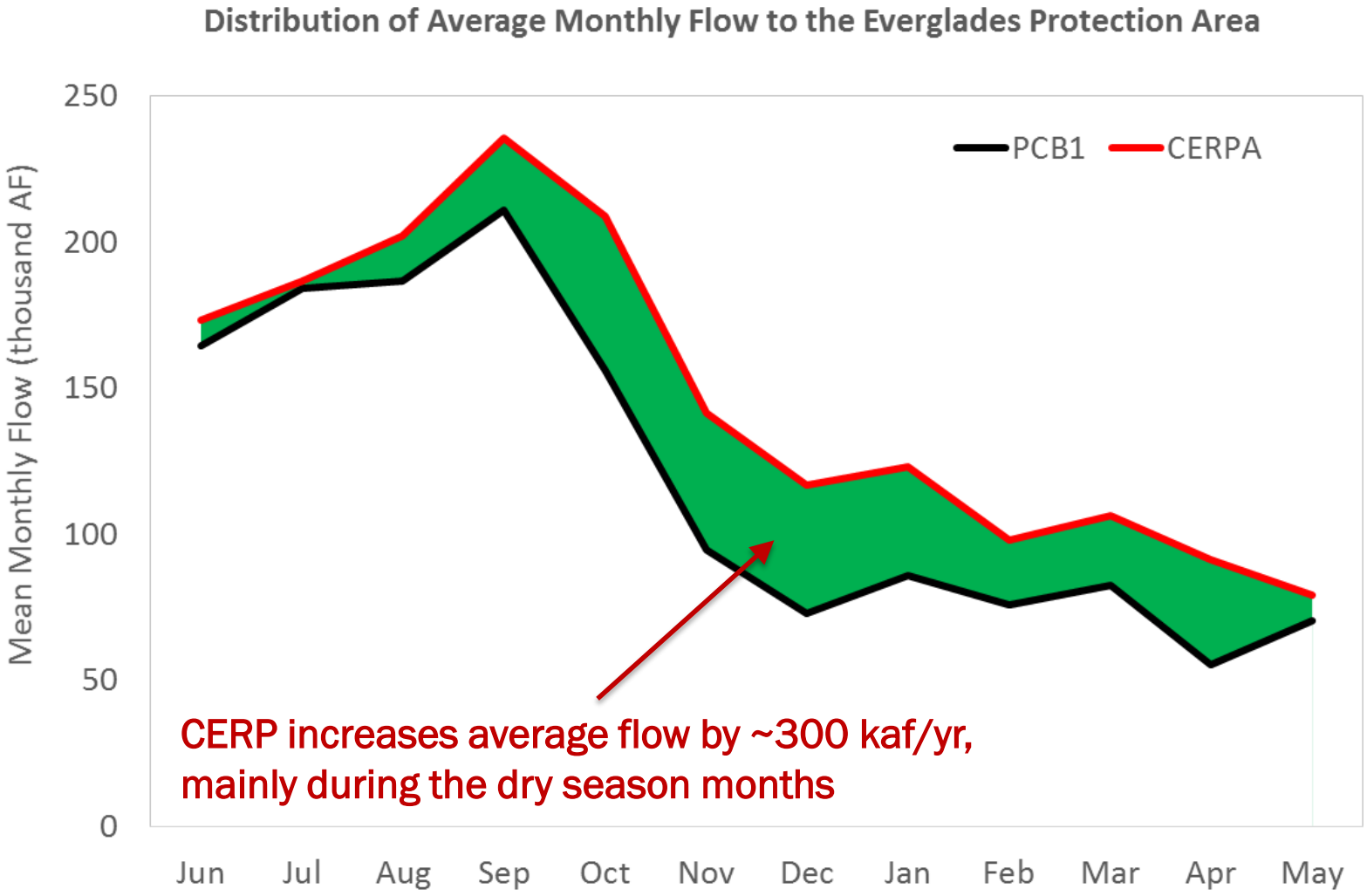
# CERP Vision for EAA Storage Reservoir


- 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



# Characteristics of Additional Flow South in CERP (cont)



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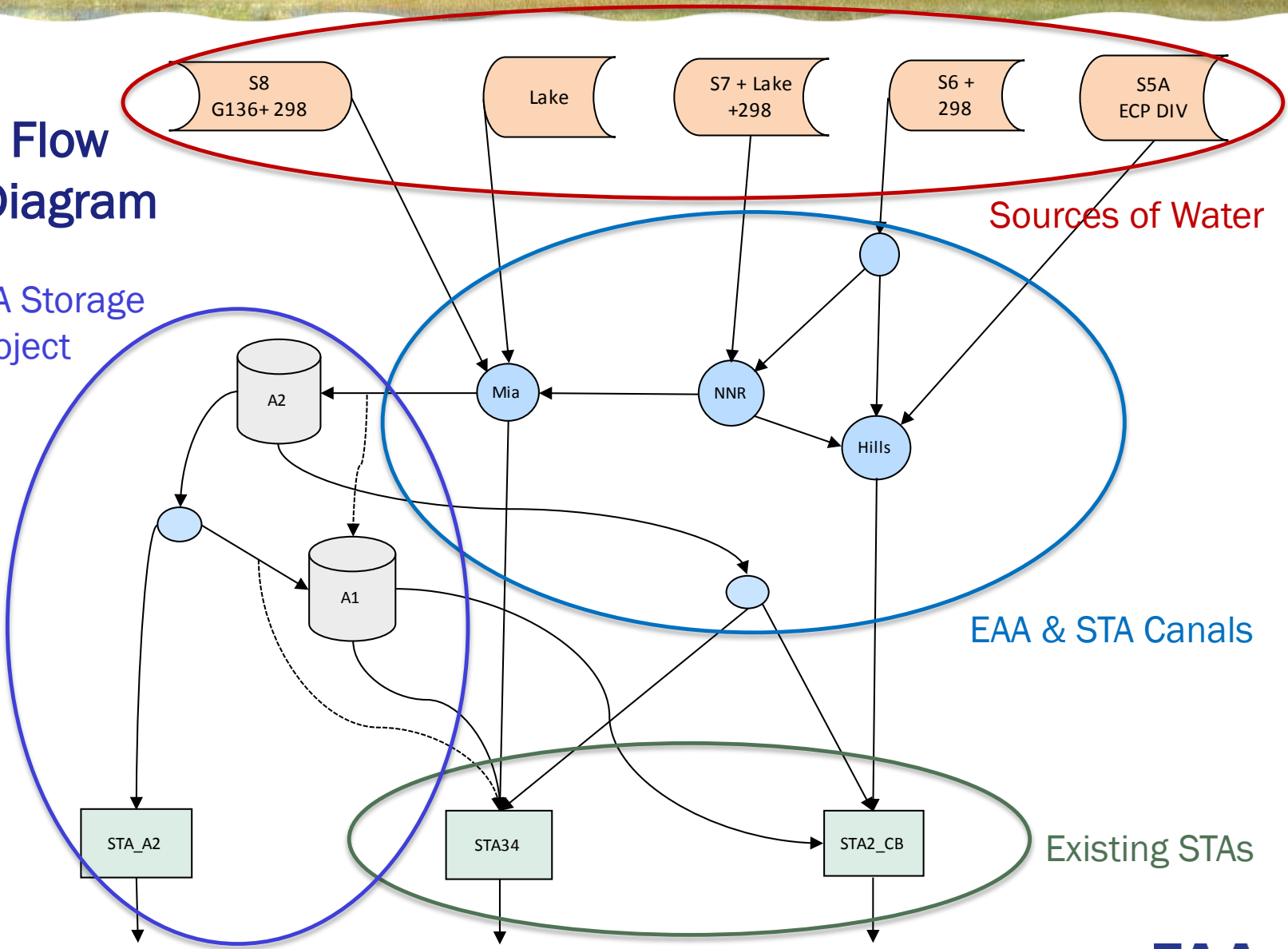
# SIZING OF MANAGEMENT MEASURES

# Informing Management Measure Sizing

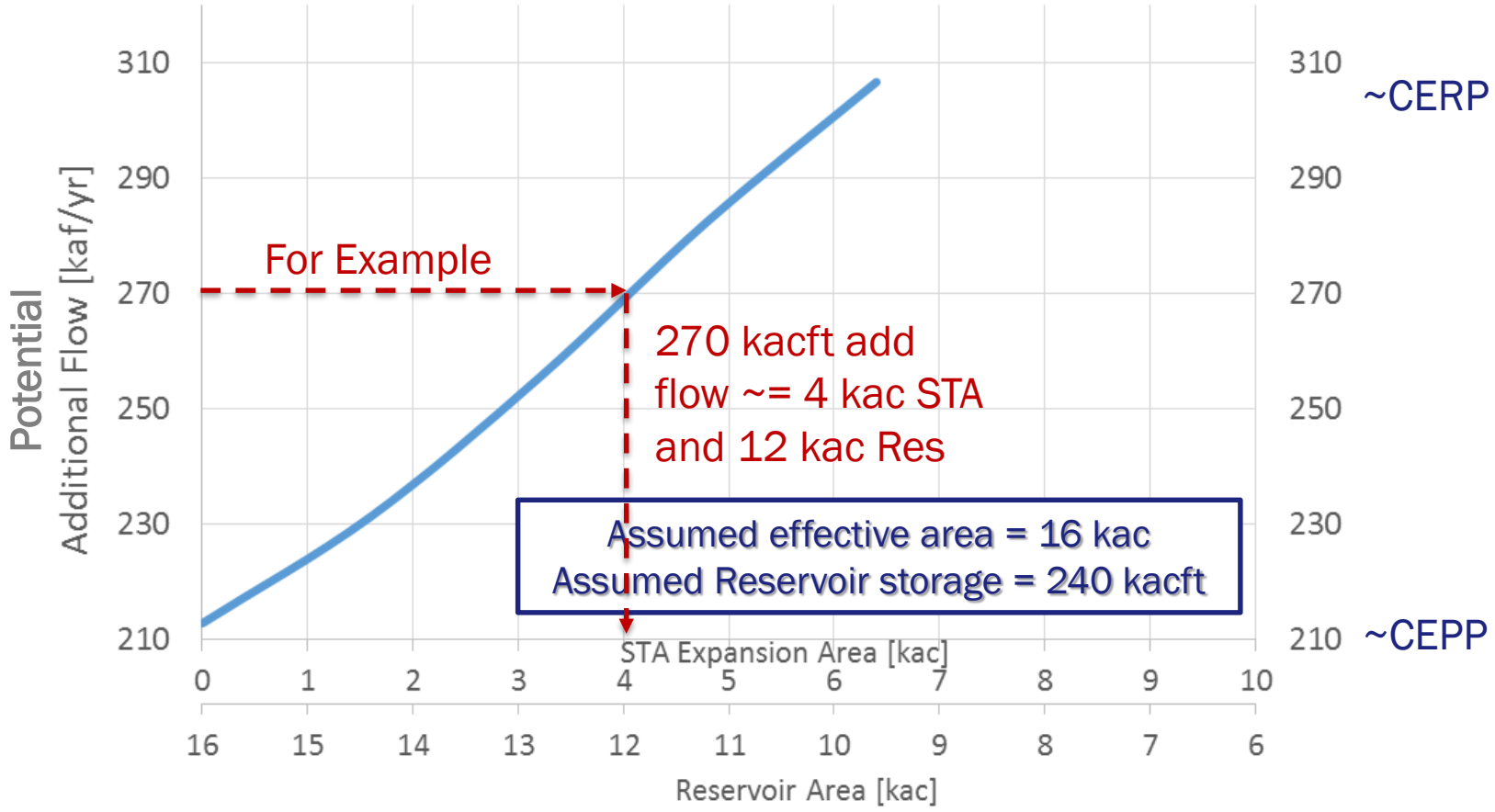
- To inform alternative scoping, it is helpful to identify feasible options that have the potential to meet the goal of increasing flow through the EAA (thereby reducing Northern Estuary discharges) while meeting water quality standards
- Strategy: Use the DMSTA model (as used in CEPP and Restoration Strategies) to evaluate potential sizing of reservoir and stormwater treatment area (STA) footprints
- Provide DMSTA evaluation for the range of flows observed between CEPP and CERP.

# DMSTA Flow Routing Diagram

Potential EAA Storage Reservoir Project Features



# Preliminary DMSTA Modeling Results: Potential Additional Flow South versus Reservoir & STA Acreage

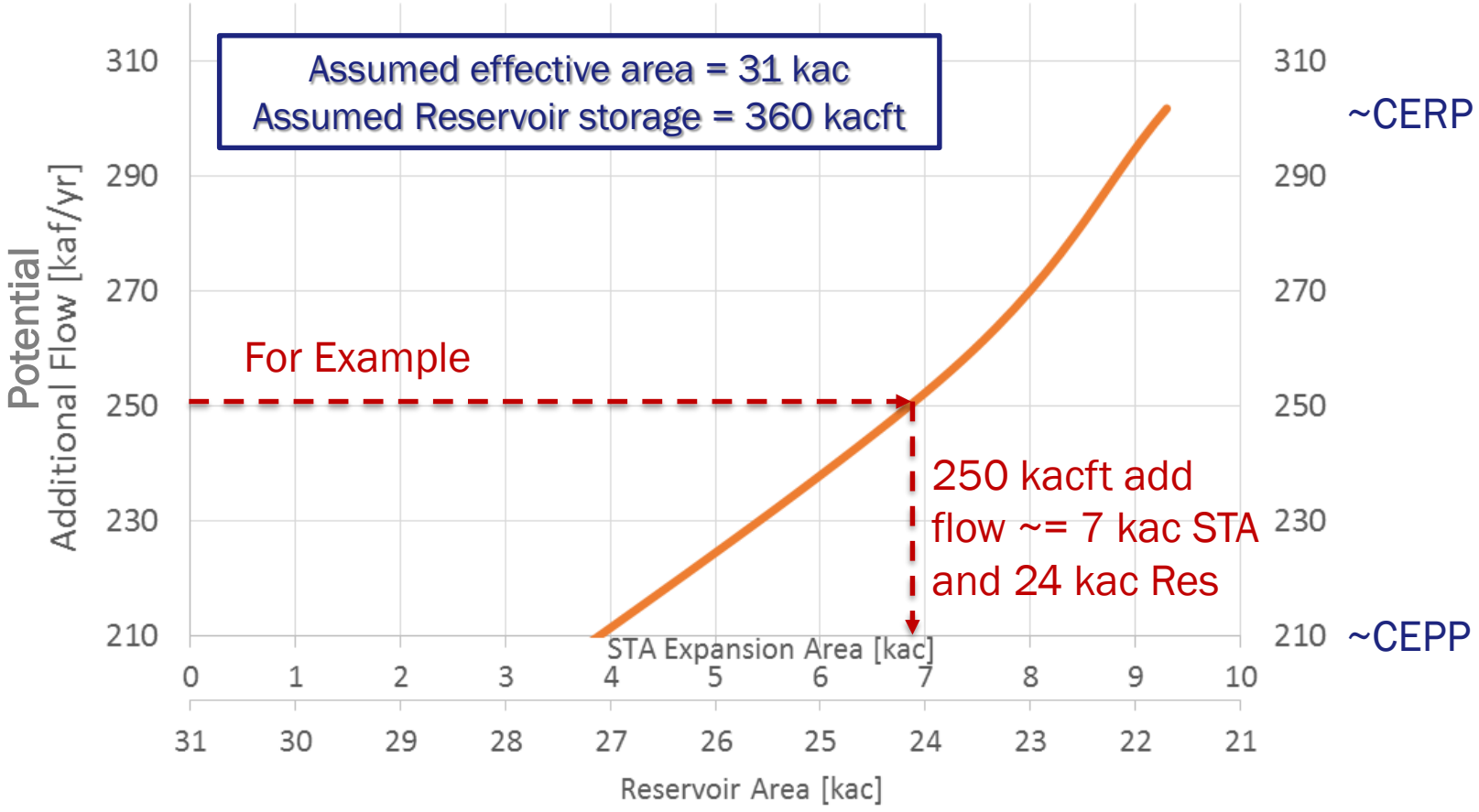



Note: Any point on the line can meet water quality standards



EAA STORAGE RESERVOIR

# Preliminary DMSTA Modeling Results: Potential Additional Flow South versus Reservoir & STA Acreage




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



EAA STORAGE RESERVOIR

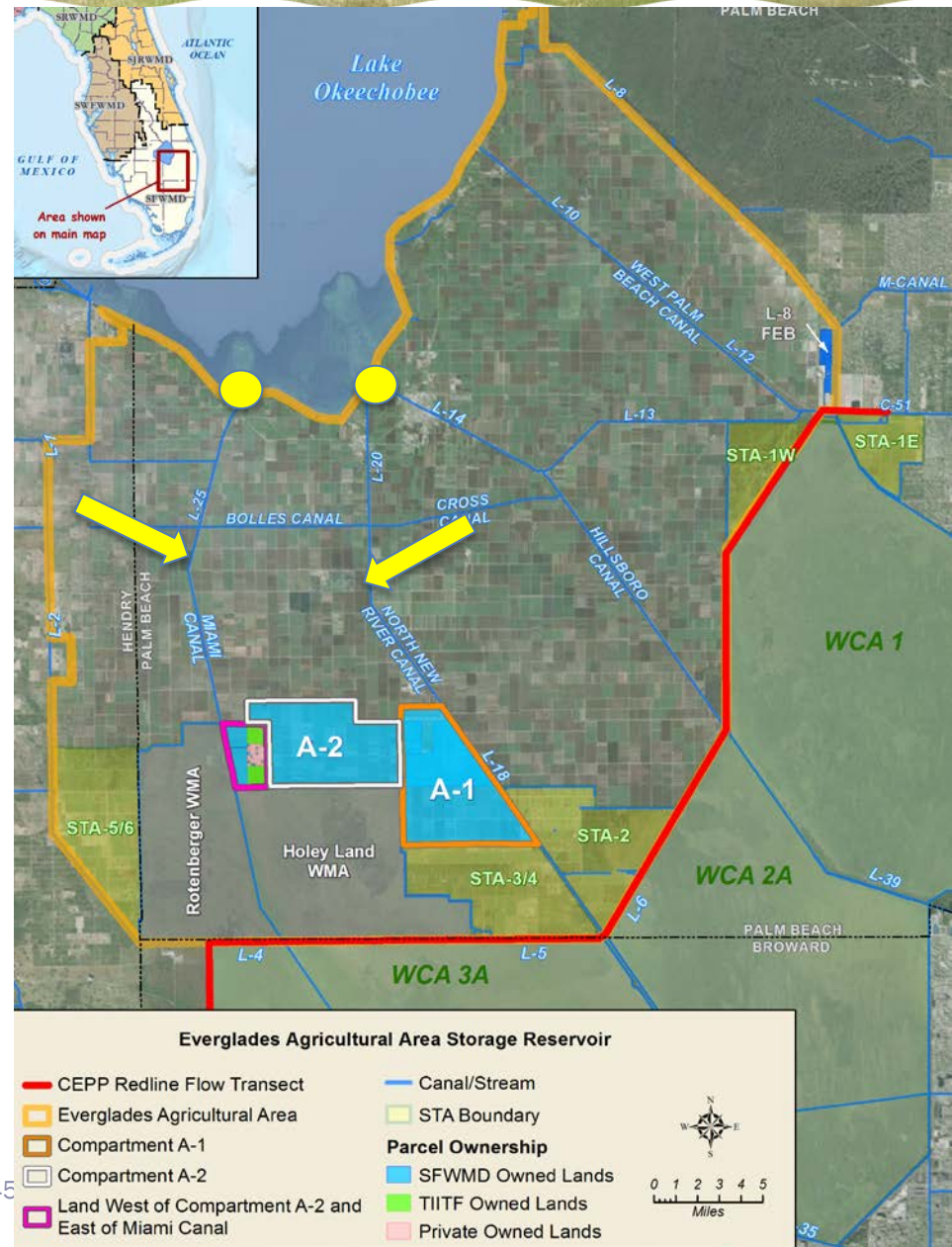
EAA Storage Reservoir Feasibility Study

# EAA CANAL CONVEYANCE

# Moving Water South- Existing Conditions

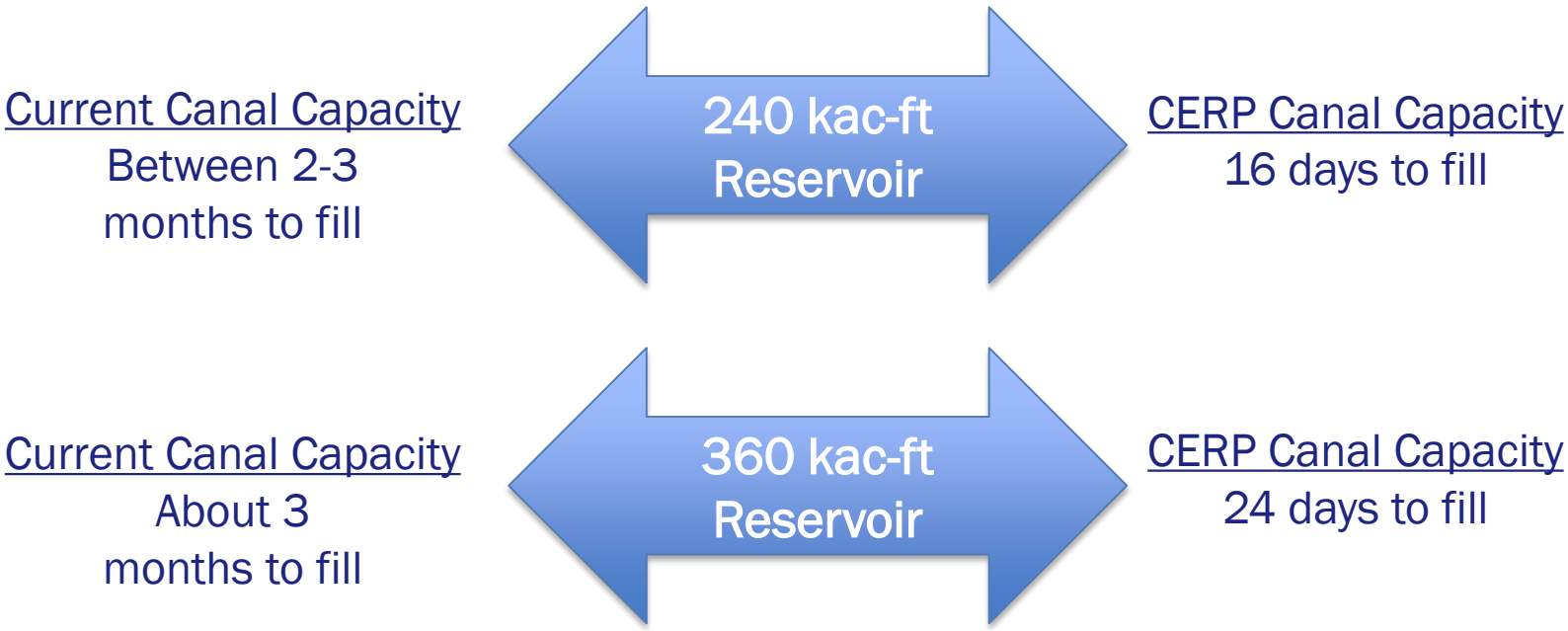
Water flows out of Lake Okeechobee to the south through lake outlet structures to the EAA major canals

- North New River (NNR) Canal
- Miami Canal

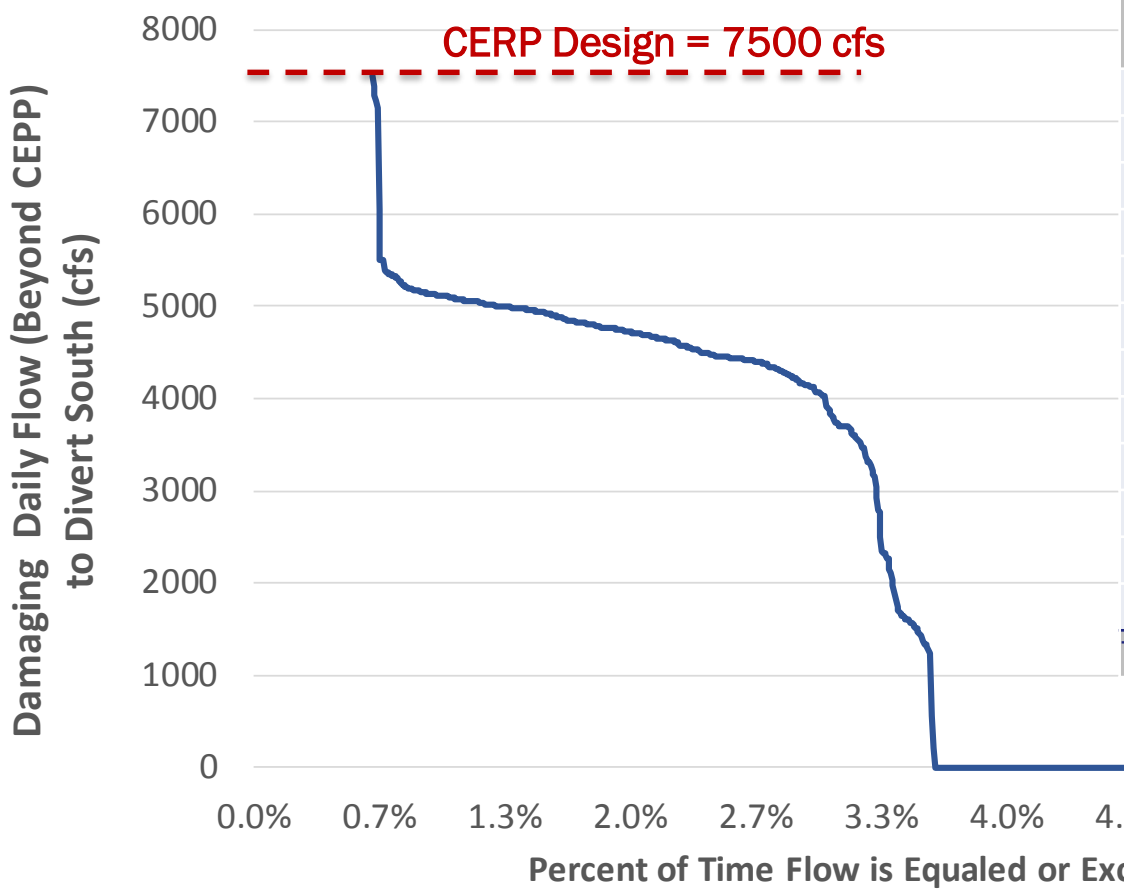


# Informing the Canal Capacity Discussion

Generally, improved canal capacity = faster reservoir fill times (assuming initially empty reservoir filling with Lake water and limited outflow):



# Potential Improvement to Combined Flow South Requires Increased Canal Conveyance




| Event # | Duration (months) | Average Monthly Excess Flow (cfs) |
|---|---|---|
| 1 | 2 | 2348 |
| 2 | 1 | 1024 |
| 3 | 7 | 3163 |
| 4 | 1 | 2526 |
| 5 | 3 | 2566 |
| 6 | 4 | 1252 |
| 7 | 3 | 3760 |
| 8 | 4 | 4330 |
| 9 | 4 | 2698 |
| 10 | 1 | 2875 |
| 11 | 2 | 2364 |
| 12 | 3 | 1740 |
| Total | 35 | 2554 |

# Canal Capacity and Right-Of-Way (ROW)

## Miami Canal

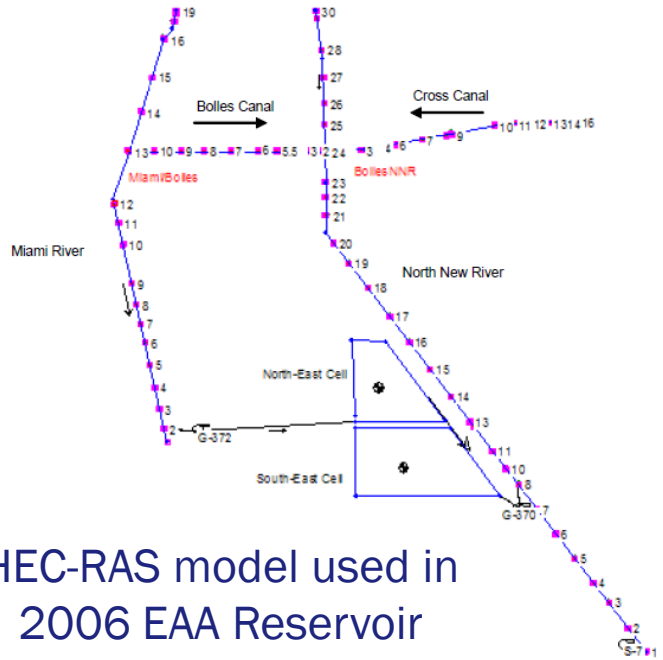
- Approx Channel Capacity ~4,000 cfs
- Min ROW = ~290 feet
- Max ROW = ~420 feet

## North New River (NNR) Canal

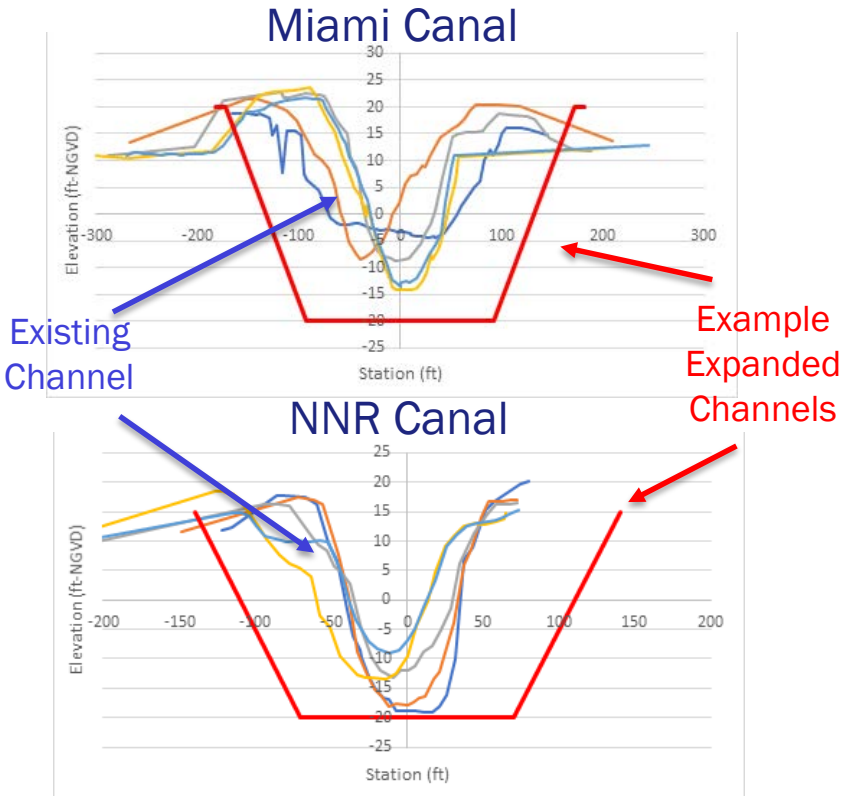
- Approx Channel Capacity ~3,600 cfs
- Min ROW = ~220 feet
  - To NE corner A-1
- Max ROW = ~330 feet

# HEC-RAS Modeling of Conveyance

Initial conveyance assessments for the CERP design (increase of 7500 cfs over current capacity)

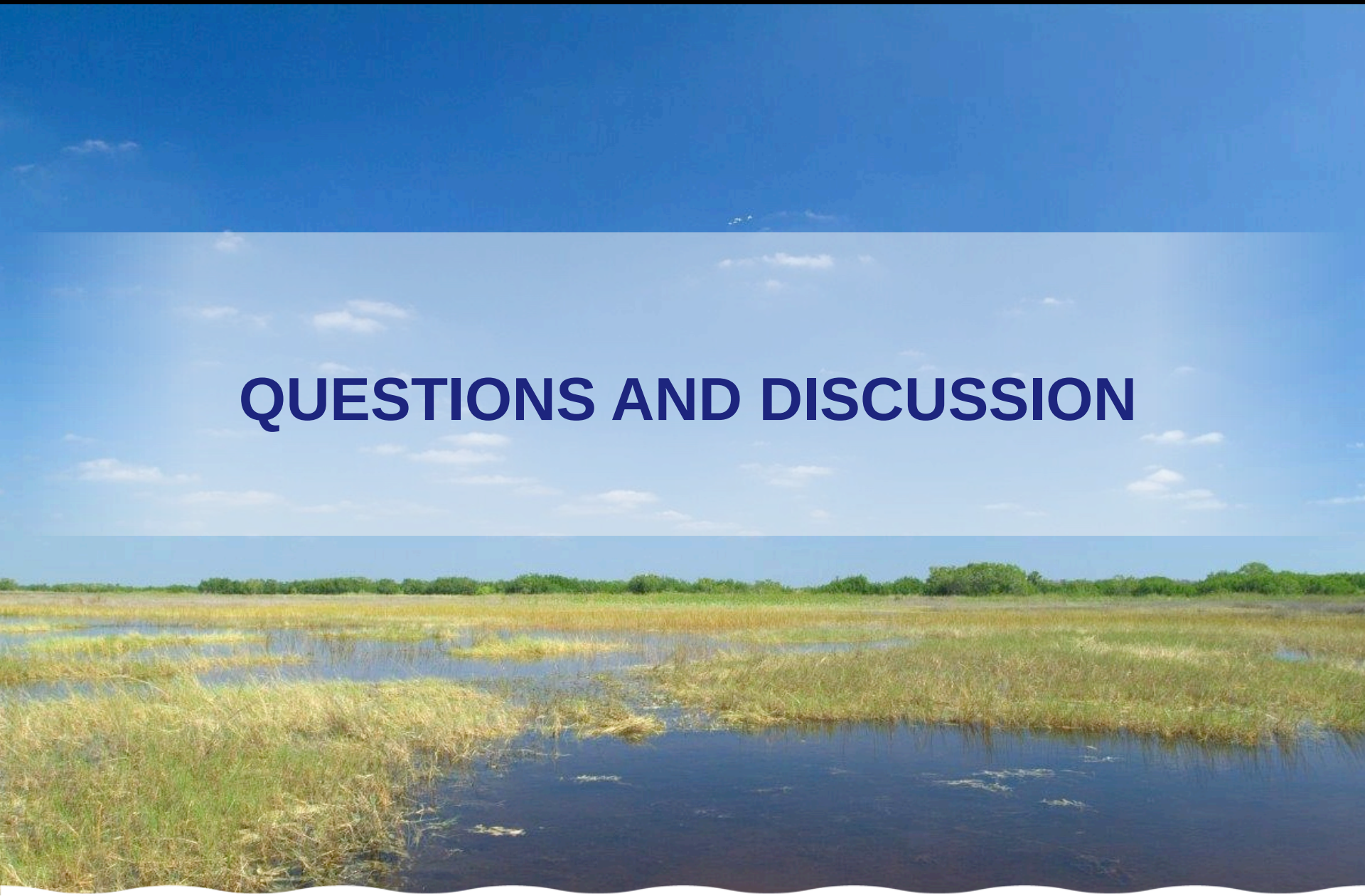



HEC-RAS model used in 2006 EAA Reservoir Basis of Design Report



# Some Potential Challenges to Consider

- US 27 & FPL along North New River
- Existing Bridges & Culverts
- Existing ROW Insufficient for Widening
- Canal Depth & Groundwater Interaction
- Spoil Disposal
- Pumping – Lake, Canal & Reservoir



# QUESTIONS AND DISCUSSION

EAA Storage Reservoir Feasibility Study

# NEXT STEPS

# Public Meetings

- **Project Meetings:**
  - November 15th – Agency Project Delivery Team meeting (teleconference only)
  - November 15th – 5:30 p.m. Clewiston, John Boy Auditorium
  - November 16th – 6:00 p.m. SFWMD Auditorium, West Palm Beach
- **Other Public Meetings:**
  - November 9th - Governing Board Meeting - Doral

# Public Comment Opportunities

- Public Comments Cards
- Email Address EAAreservoir@sfwmd.gov
- Mailing address:

  Mike Albert, Project Manager
  South Florida Water Management District
  3301 Gun Club Road, MSC 8312
  West Palm Beach, FL 33406
- Scoping comment period ends **November 22, 2017**
- Additional information available at www.sfwmd.gov/EAAreservoir

# DISCUSSION

www.sfwmd.gov/EAAreservoir