



Everglades Agricultural Area Storage Reservoir Feasibility Study

December 13, 2017

Meeting Agenda

- Welcome and Introductions
- Project Schedule
- Array of Alternatives
- Modeling Results
- Habitat Unit Analysis
- Next Steps
- Public Comment



EAA Storage Reservoir Feasibility Study

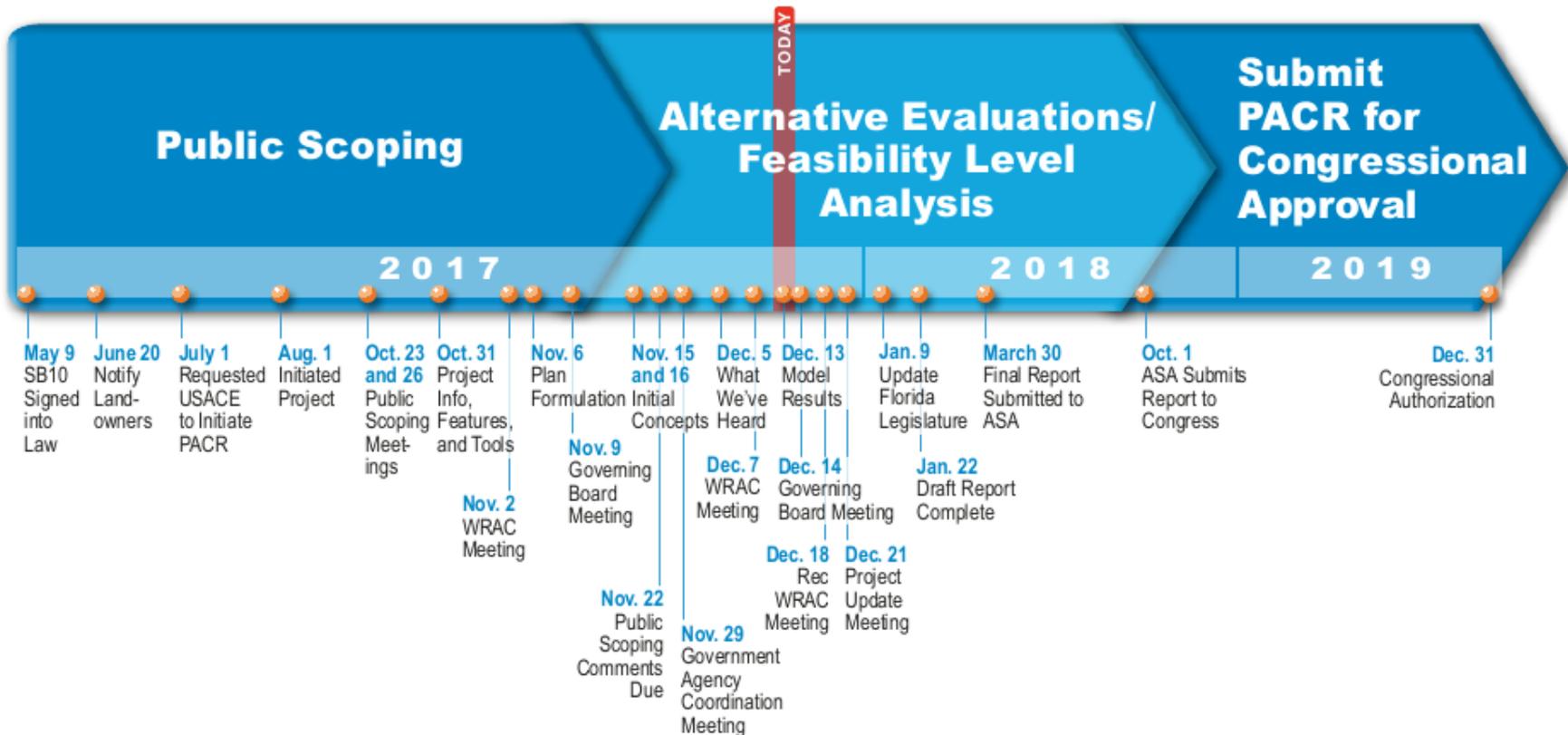
WELCOME AND INTRODUCTIONS



EAA Storage Reservoir Feasibility Study
PROJECT SCHEDULE

Project Schedule

EAA Reservoir Timeline





EAA Storage Reservoir Feasibility Study

ARRAY OF ALTERNATIVES

Laws of Florida Ch. 2017 – 10

CEPP Post Authorization Change Report

- The District is committed to planning, designing and constructing a project that meets the storage goals and water quality criteria set forth in state law and the Comprehensive Everglades Restoration Plan (CERP)
- The Central Everglades Planning Project (CEPP) included the first increment of CERP storage, treatment and conveyance south of Lake Okeechobee
- The CEPP Post Authorization Change Report (PACR) builds upon the first increment of CEPP and is consistent with the CERP by providing additional water storage, treatment and conveyance south of the lake to reduce the volume of regulatory discharges from the lake to the northern estuaries
- This increment of CEPP emphasizes the components that maximize reductions of harmful discharges to the estuaries



Laws of Florida Ch. 2017 – 10

CEPP Post Authorization Change Report

- The Legislature directs the District, in the implementation of the reservoir project, to abide by applicable state and federal law in order to do that which is required to obtain federal credit under CERP

Comprehensive Review Study (Yellow Book April 1999)

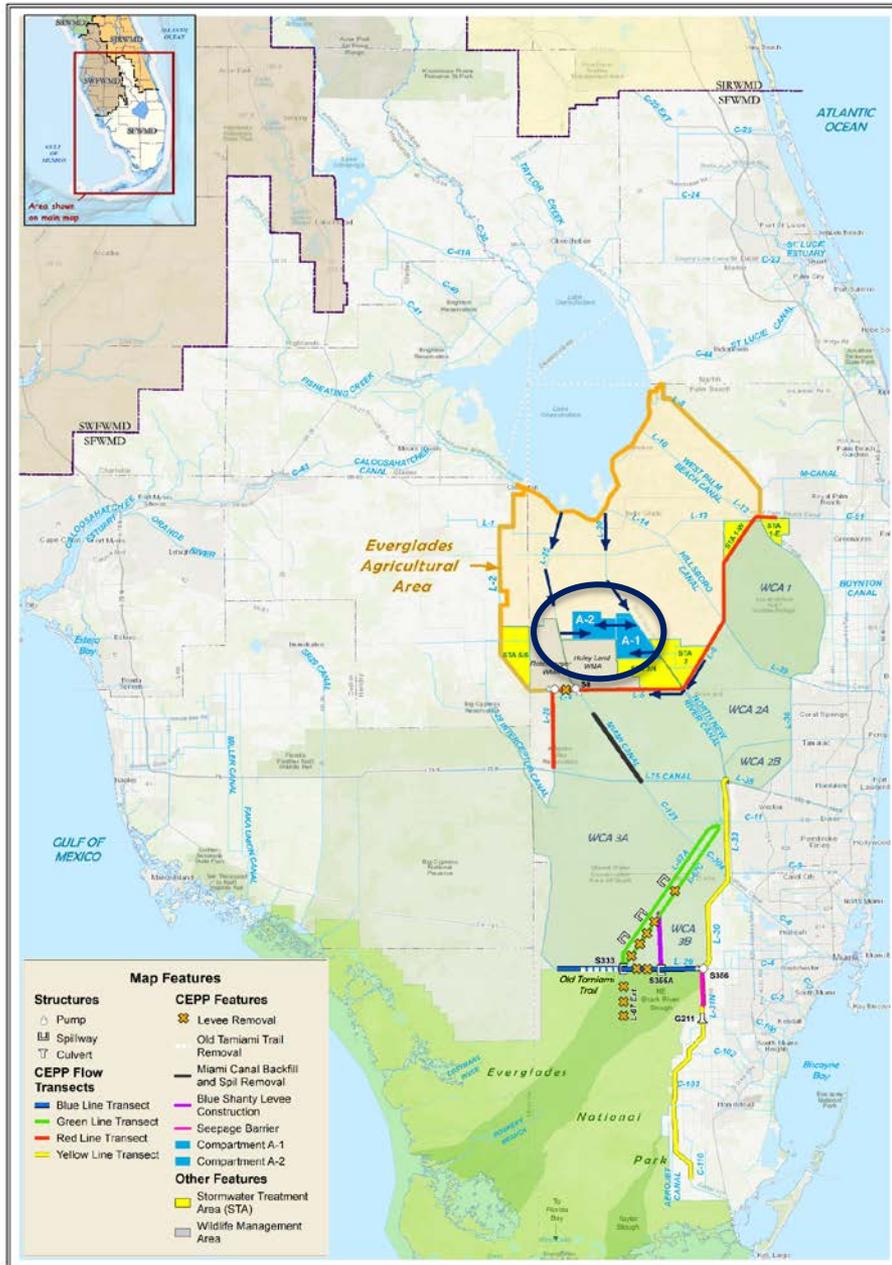
Everglades Agricultural Storage Reservoir (Component G) – The purpose of this feature is to improve the timing of environmental deliveries to the Water Conservation Areas, including reducing damaging flood releases from the Everglades Agricultural Area to the Water Conservation Areas, reducing Lake Okeechobee regulatory releases to the estuaries, meeting Everglades Agricultural Area irrigation and Everglades water demands, and increasing flood protection in the Everglades Agricultural Area.



Laws of Florida Ch. 2017 – 10

CEPP Post Authorization Change Report

- The District is directed to jointly develop a Post Authorization Change Report with the USACE for the CEPP
- Post Authorization Change Report modifies CEPP New Water Component



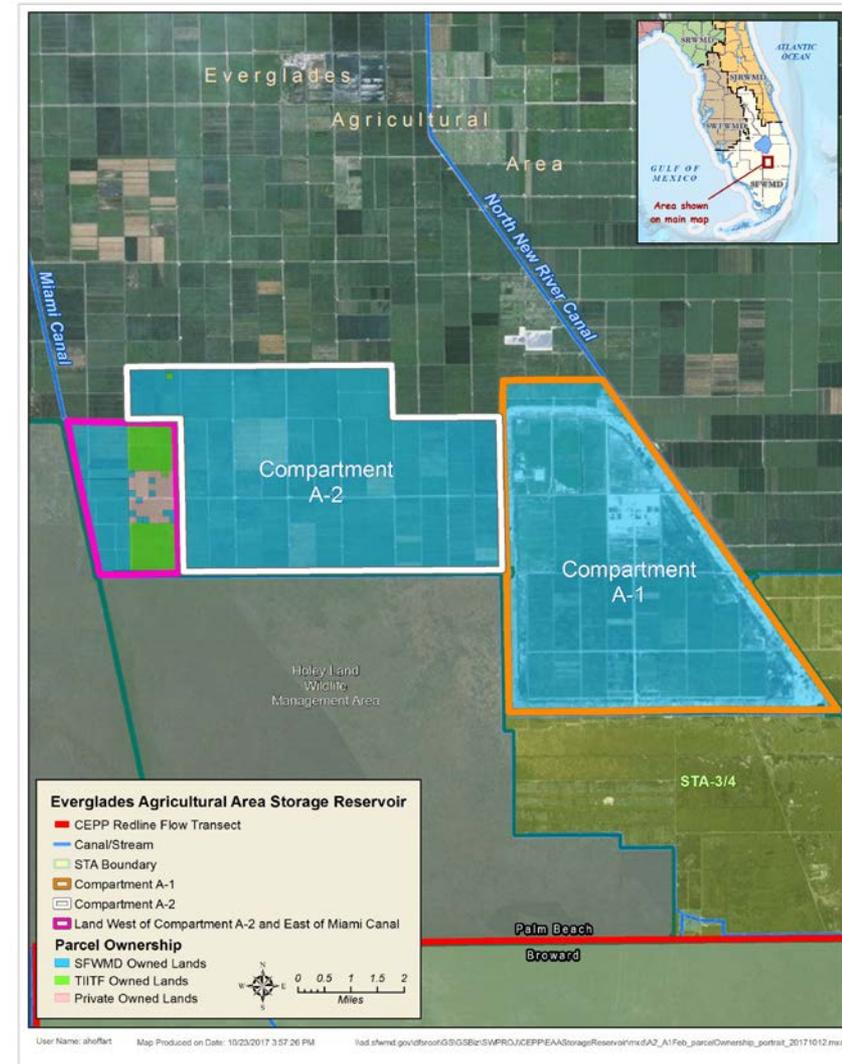
CEPP Recommended Plan ALT 4R2

- 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
 - 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

Laws of Florida Ch. 2017 – 10

CEPP 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



Other Applicable Laws

- **WRDA 2000 Sec. 601**
 - Elimination or transfer of existing legal sources
 - Maintain existing level of flood protection
 - Requires protection of water for the natural system

- **Section 373, Florida Statutes**
 - Elimination or transfer of existing legal sources
 - Maintain existing level of flood protection
 - Requires protection of water for the natural system
 - Compliance Report - requires FDEP to ensure that the project:
 - considered all water resource issues
 - is technologically feasible and cost effective
 - is consistent with all state and federal laws

- **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

What We've Heard

Public Involvement Overview

- Seven Public Meetings held to-date
 - 2 evening meetings in Clewiston, 5 evening/daytime meetings in West Palm Beach
 - Discussion/Q&A opportunities have been provided at each meeting
 - Several comment cards have been received
- Additional coordination meetings have been conducted
 - Governmental Agency, Tribal and Non-Governmental Organizations (NGOs)
- Over 830 emails and several written correspondence received
- The project website has received more than 3,400 views
- Comments received from governmental agencies, non-governmental organizations and the general public
- All comments received will be summarized in the Feasibility Report

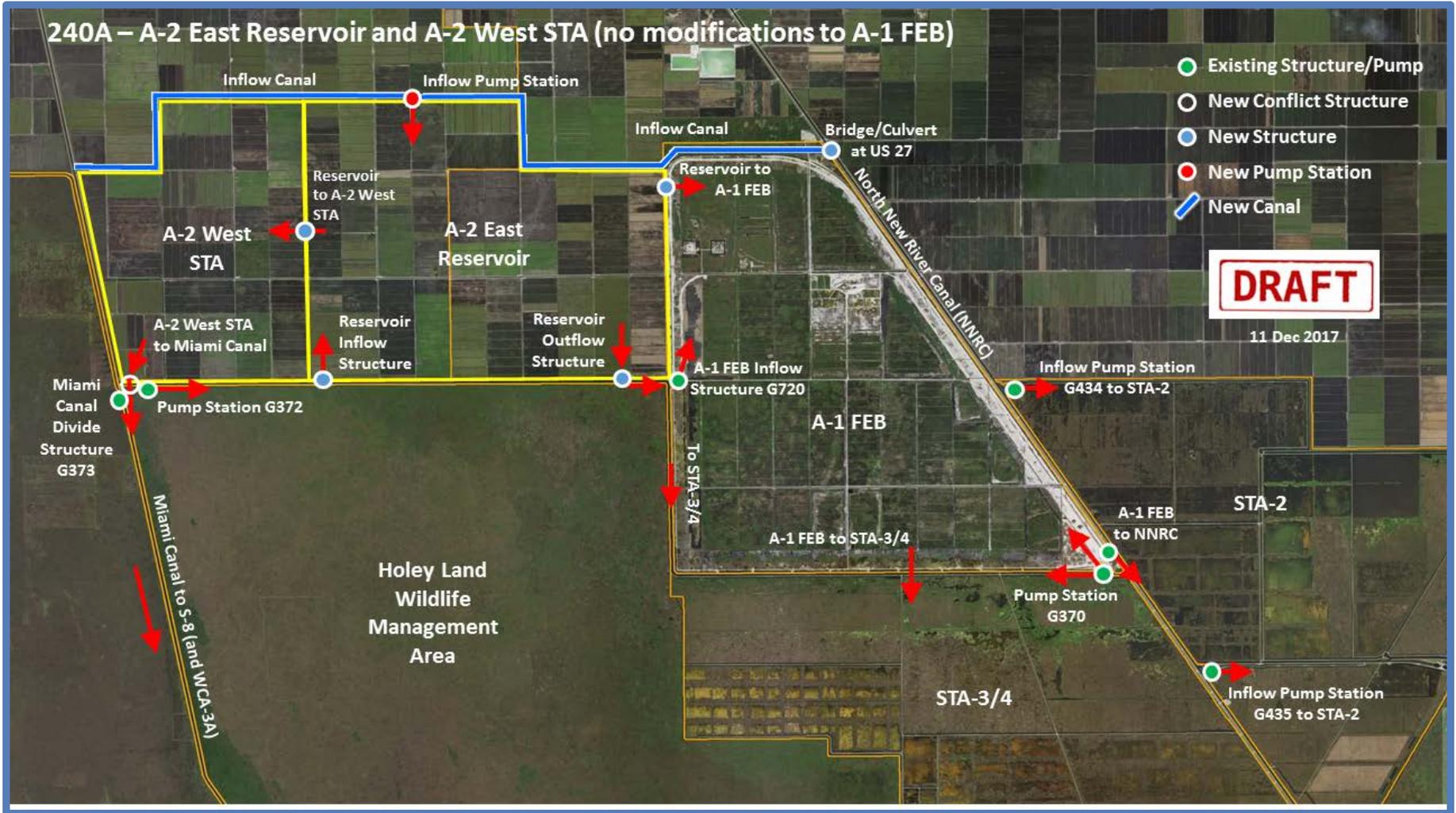
Project Opportunities and Objectives

- 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

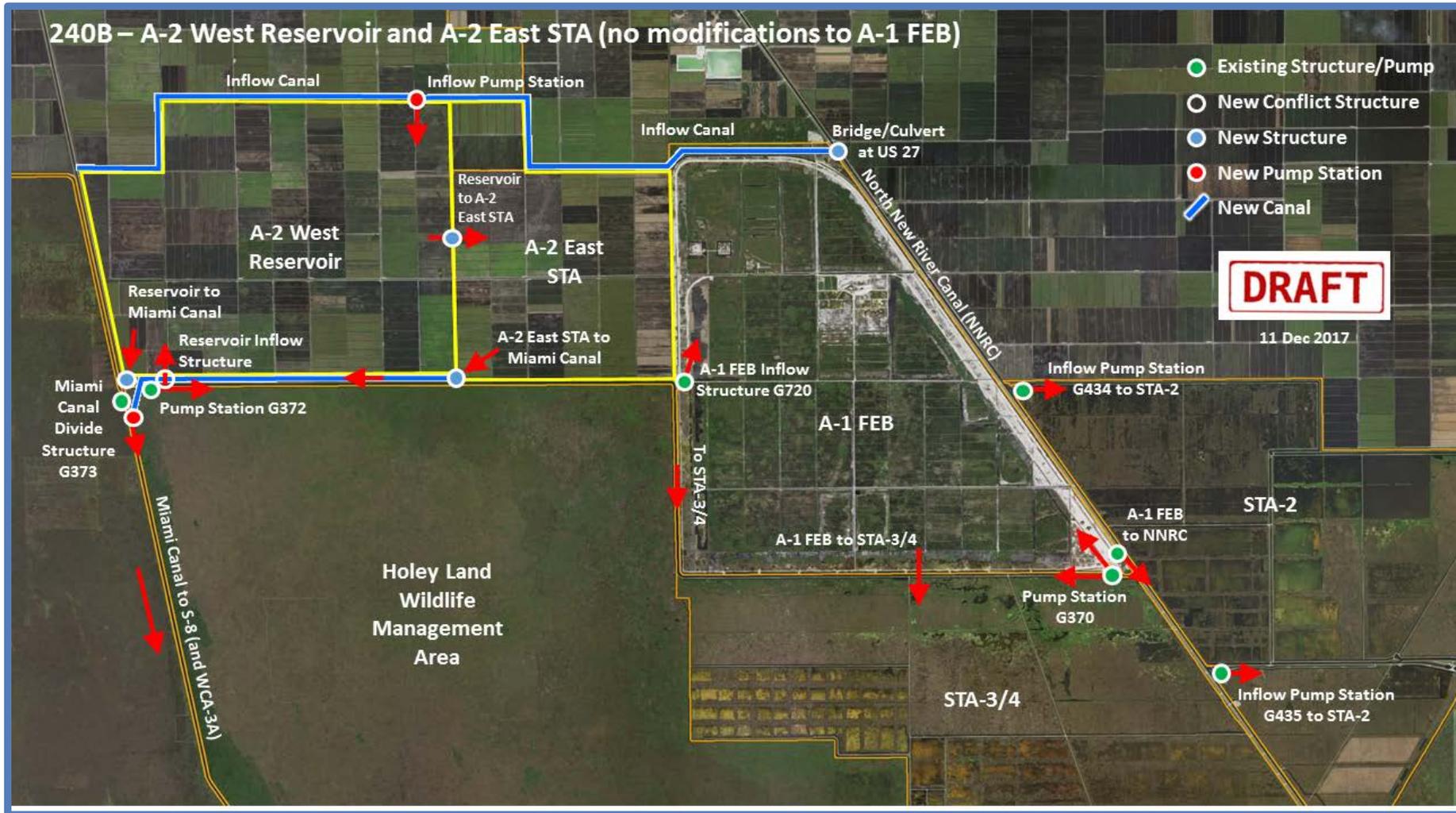


St. Lucie Inlet

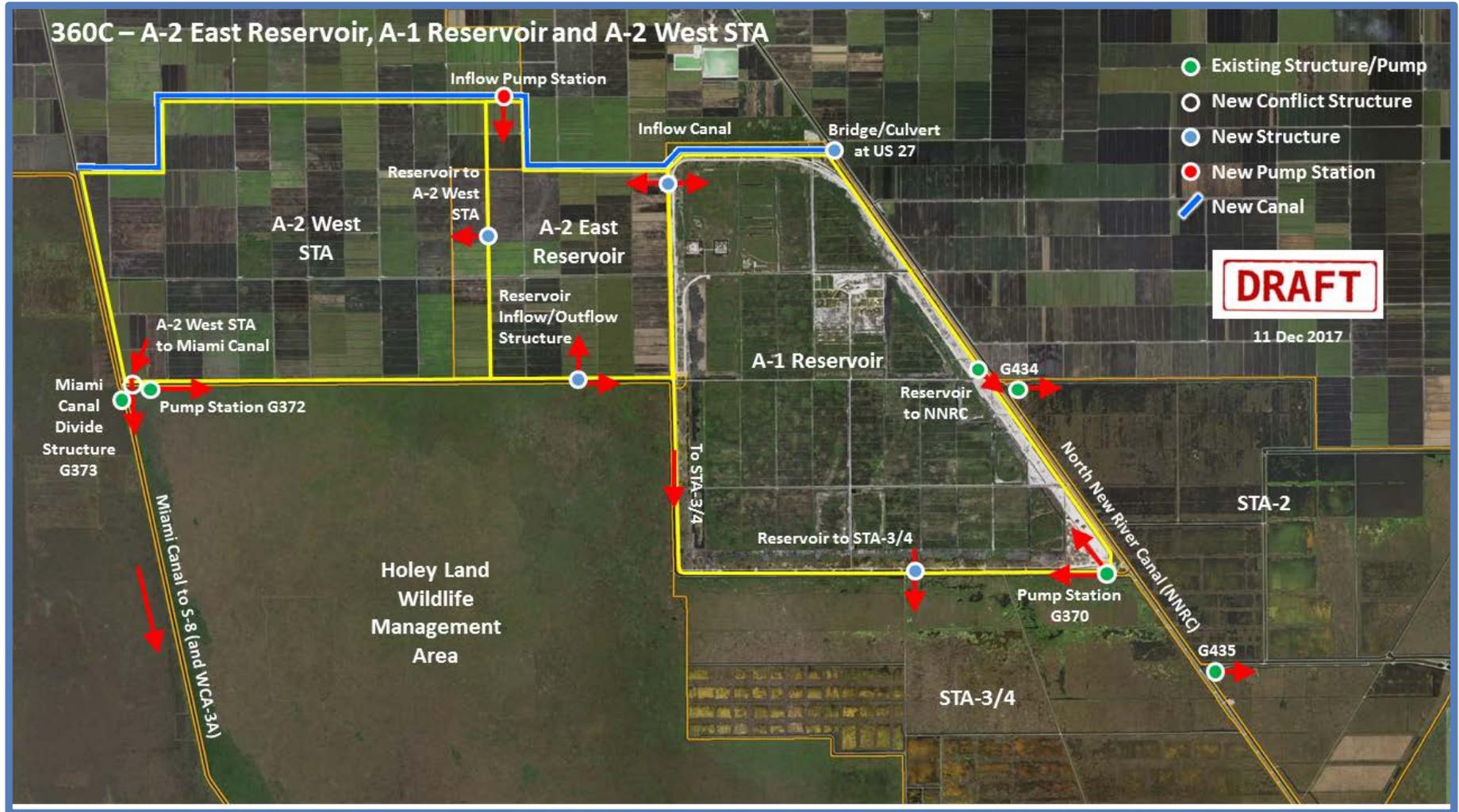
240A: A-2 East Reservoir and A-2 West STA (no modifications to A-1 FEB)



240B: A-2 West Reservoir and A-2 East STA (no modifications to A-1 FEB)



360C: A-2 East Reservoir, A-1 Reservoir and A-2 West STA



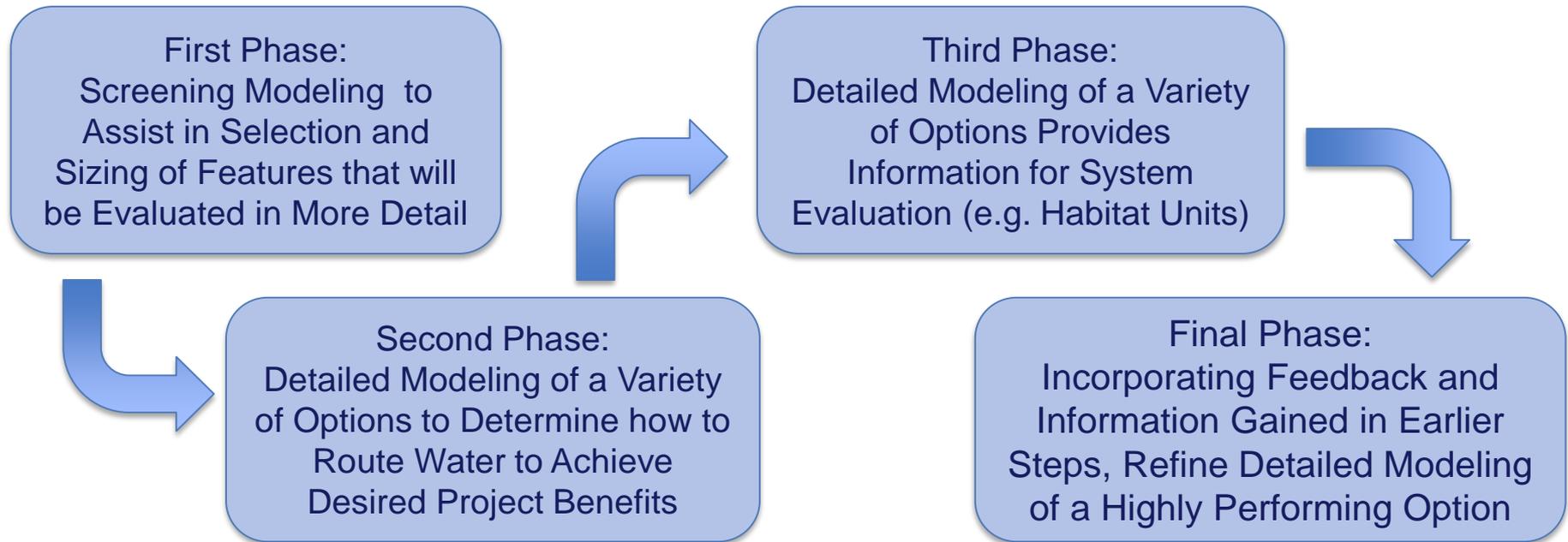
360D: A-2 Reservoir, A-1 North Reservoir and A-1 South STA





EAA Storage Reservoir Feasibility Study
MODELING RESULTS

How Modeling Fits into Project Planning



Along this path, there are many opportunities for refinement. Intermediate products serve the immediate need and then are enhanced, incorporating feedback and information as the process progresses.

Modeling Scenarios

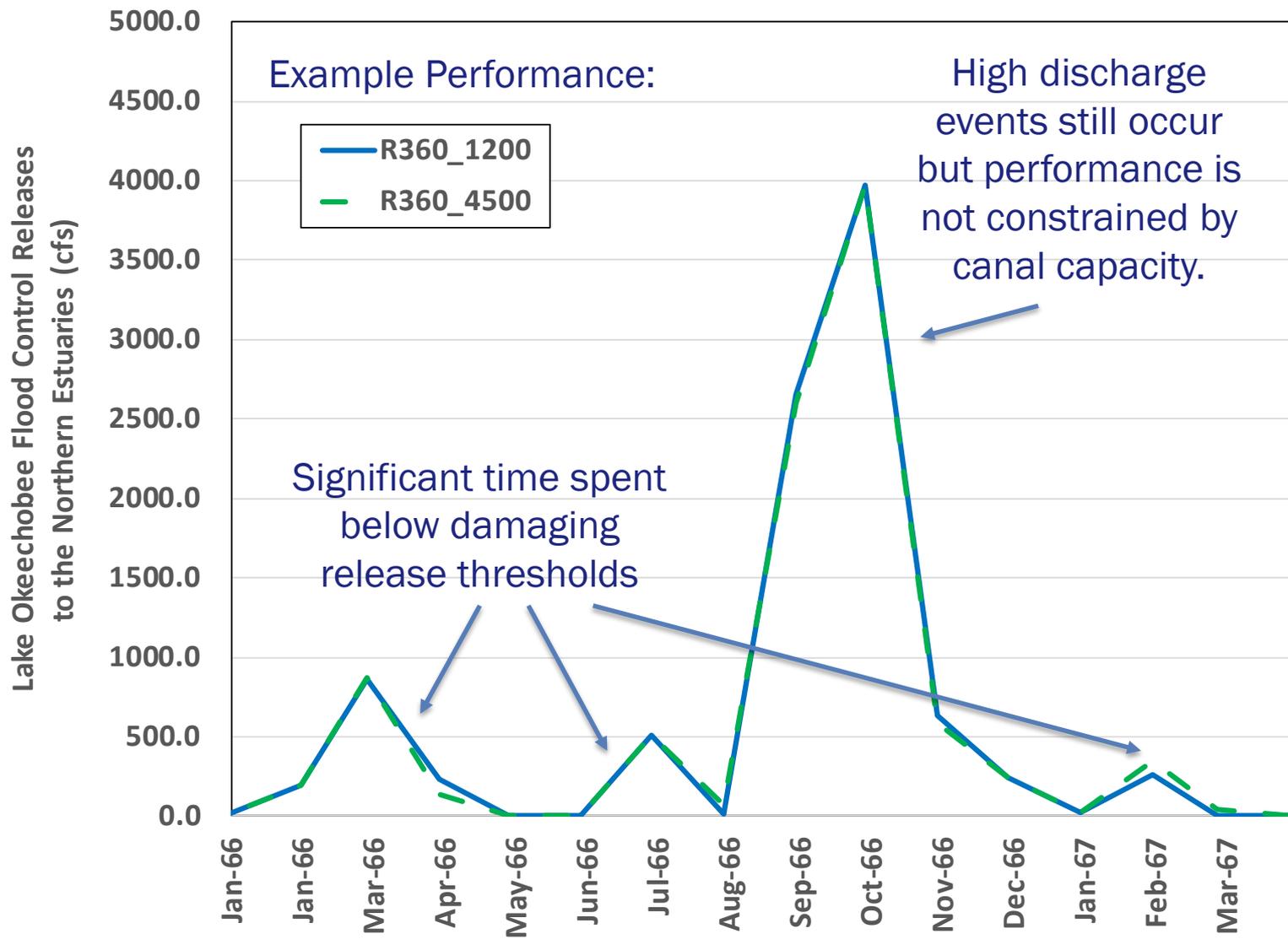
- R240 = 240 kac-ft reservoir + A1 FEB (configuration A or B)
 - Reservoir is ~ 10,100 acres effective area and ~ 23 ft depth (levee side-slopes accounted for in storage calculation)
 - 6,500 acre STA

- R360 = 360 kac-ft reservoir (no A1 FEB) (configuration C or D)
 - Reservoir is ~ 19,700 acres effective area and ~ 18 ft depth (levee side-slopes accounted for in storage calculation)
 - 11,500 acre STA

- C360 = 360 kac-ft reservoir (no A1 FEB)
 - Same as R360, but reservoir can also serve multiple purposes as identified in CERP Component G

Modeled Canal Conveyance

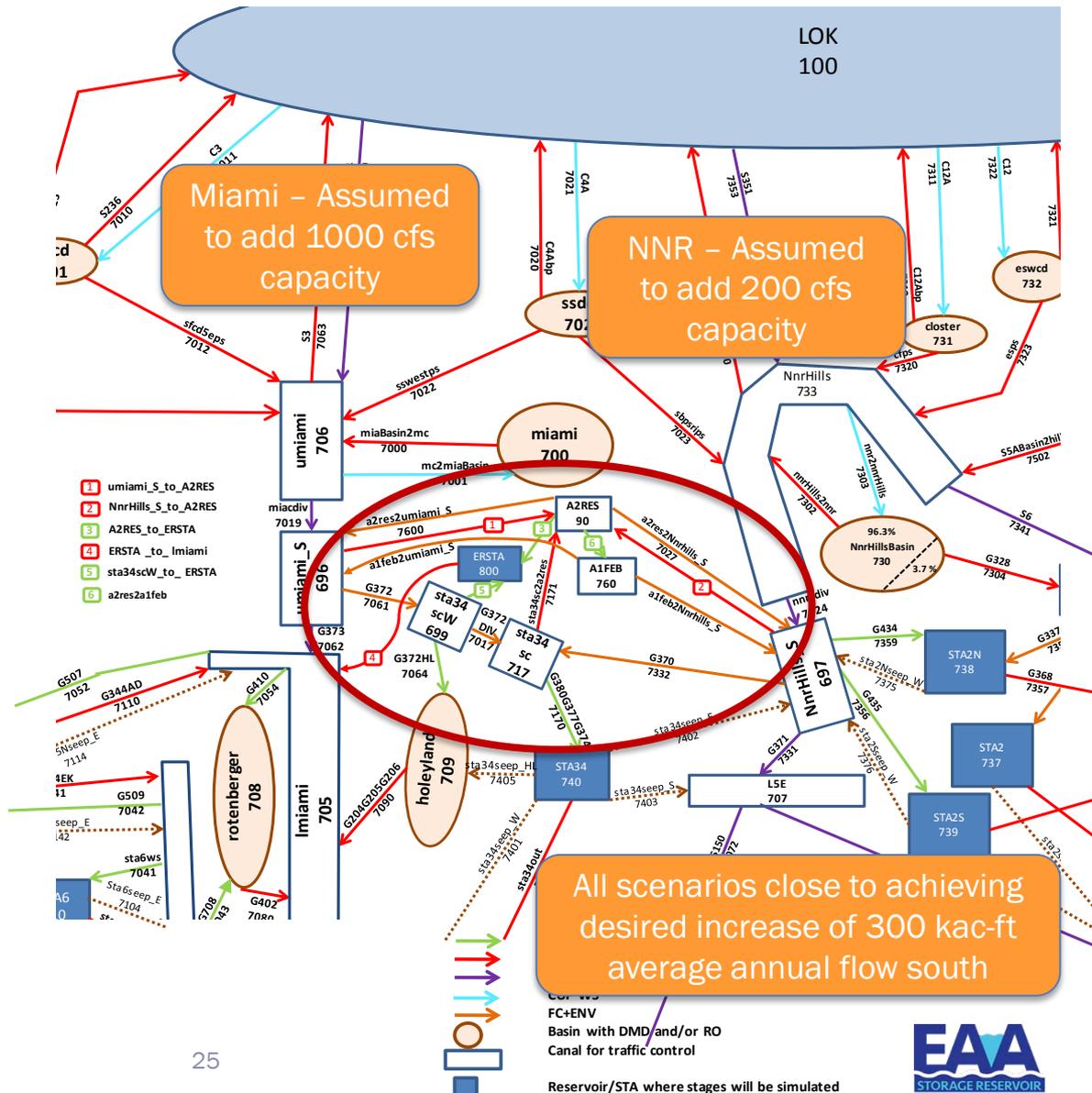
- CERP envisioned 7500 cfs increase in canal capacity split between the Miami and North New River Canals
- Evaluation of CEPP's performance showed that remaining damaging discharges (with CEPP in place) did not exceed 4500 cfs average monthly
- Model sensitivity was run to evaluate if other canal capacity assumptions (lower than 4500 cfs) achieve similar estuary performance
- Evaluation identified that 1200 cfs canal capacity improvements performs similar to 4500 cfs





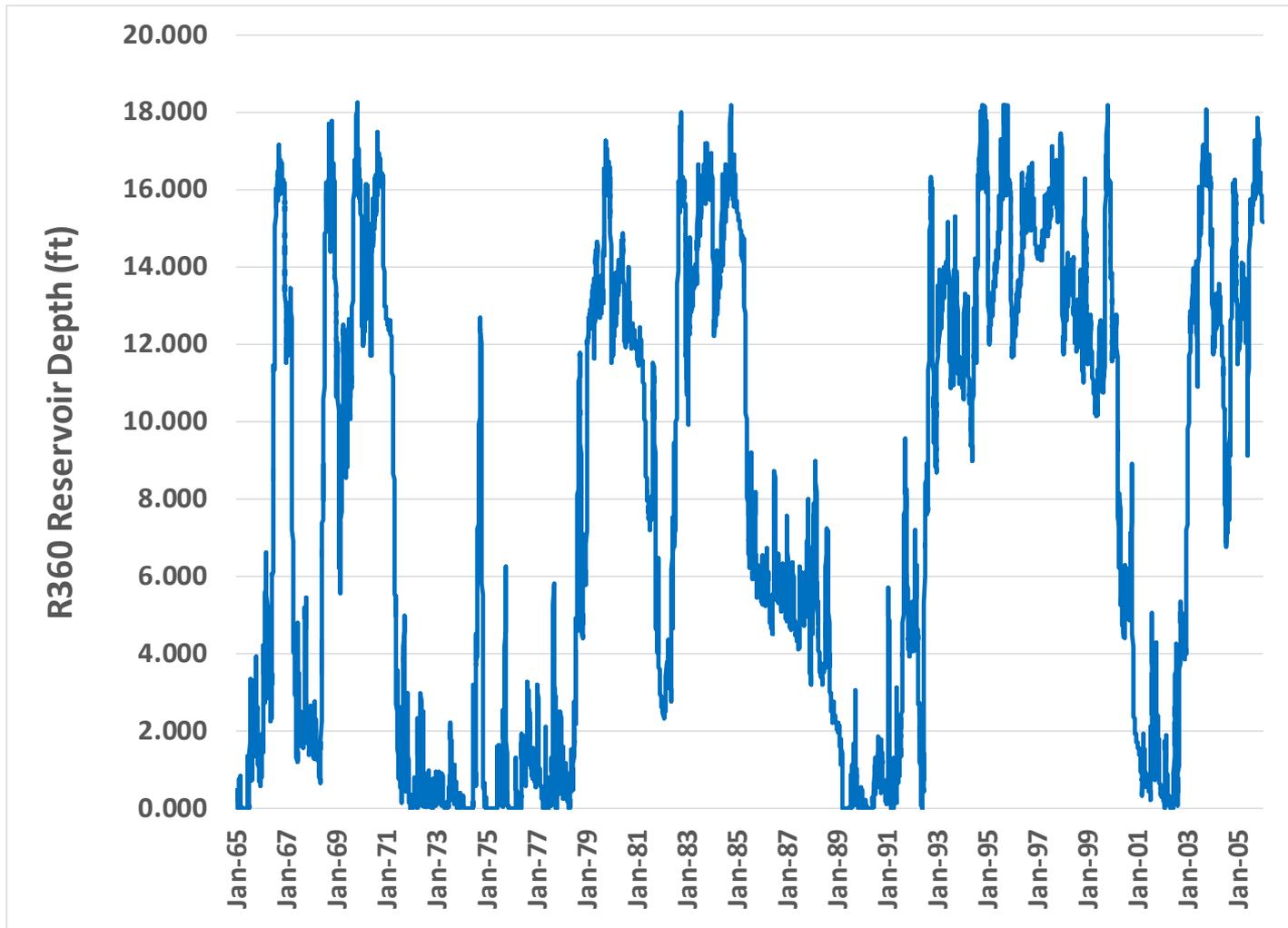
Example RSM model setup and flow routing diagram for a potential EAA Storage Reservoir concept

Detailed view in the vicinity of the A1 & A2 parcels displayed; does not show entire model domain or study area





Example Reservoir Utilization in Scenarios



Operational Considerations for EAASR

- As previously discussed, as storage is added and system infrastructure capability is increased, it makes sense to develop optimized Lake Okeechobee schedule rules that work with storage, treatment and conveyance improvements
- Modeling for these scenarios was informed by operational optimization efforts that evaluated approximately 30 parameters affecting the Lake Okeechobee decision outcomes (e.g. “up-to” limits, classification of tributary conditions, etc...) and when flow is sent south to storage and treatment.
- Constrained Latin Hypercube sampling techniques were used to explore 2500 unique operational strategies per scenario.
- Selected operations were identified using Pareto analysis and desired performance criteria (e.g. Flow south, Lake O, water supply) with an emphasis placed on estuary performance.

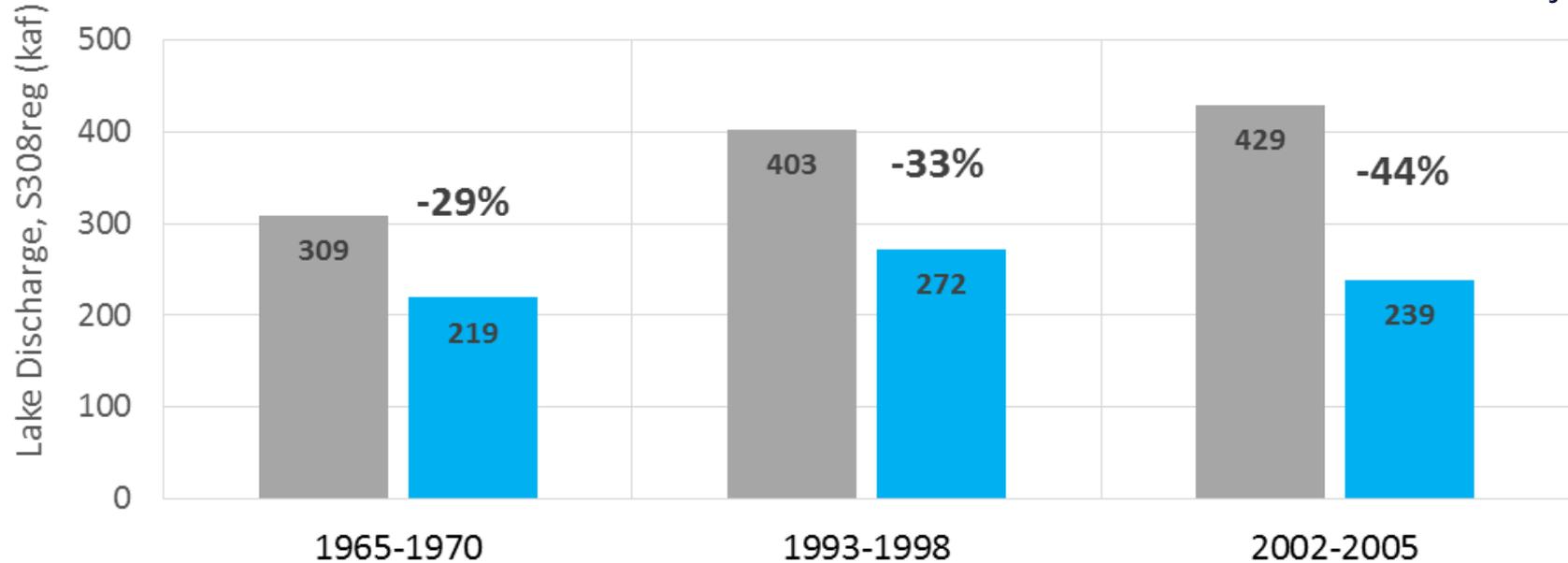


Current System

St. Lucie Estuary

Example Future System with IRL, CEPP, EAASR and other Projects

Annual Volume of Simulated Lake Discharge



Duration of the Lake-Caused High Discharge Events

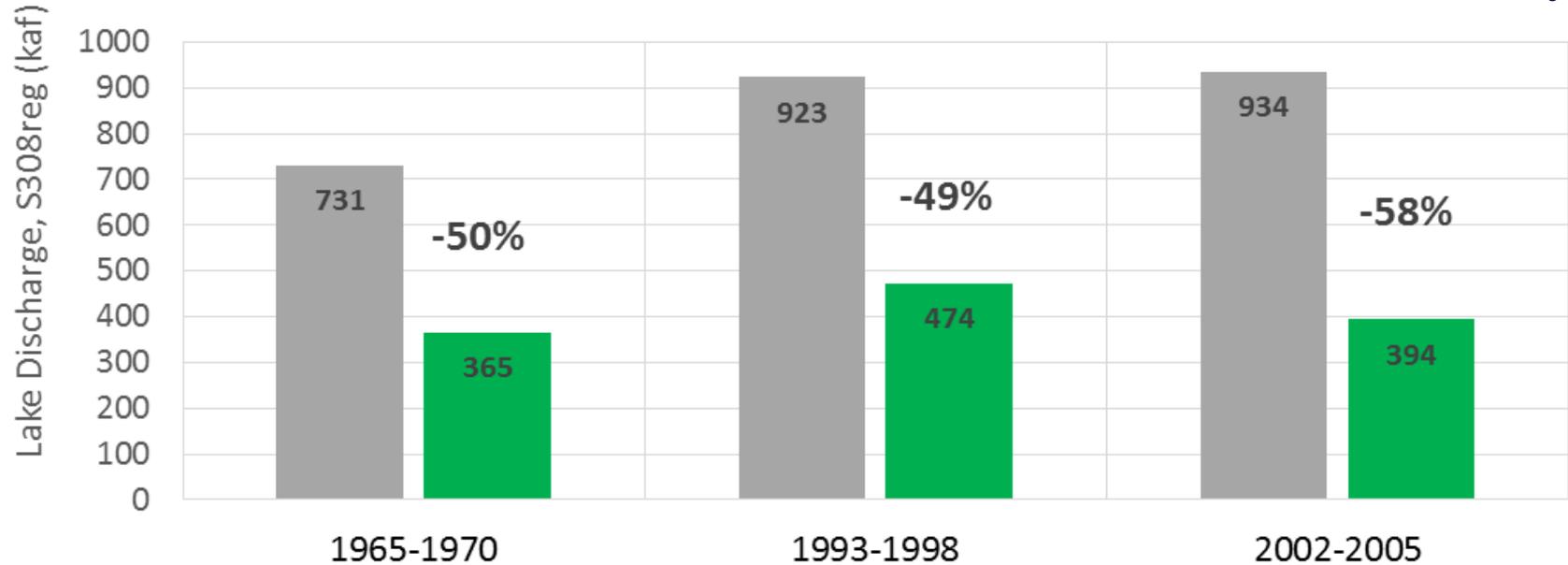
Reduced from 10 to 5 months	Reduced from 8 to 4 months	Reduced from 6 to 2 months
Reduced from 4 to 3 years	Reduced from 5 to 2 years	Reduced from 2 to 2 years



Current System

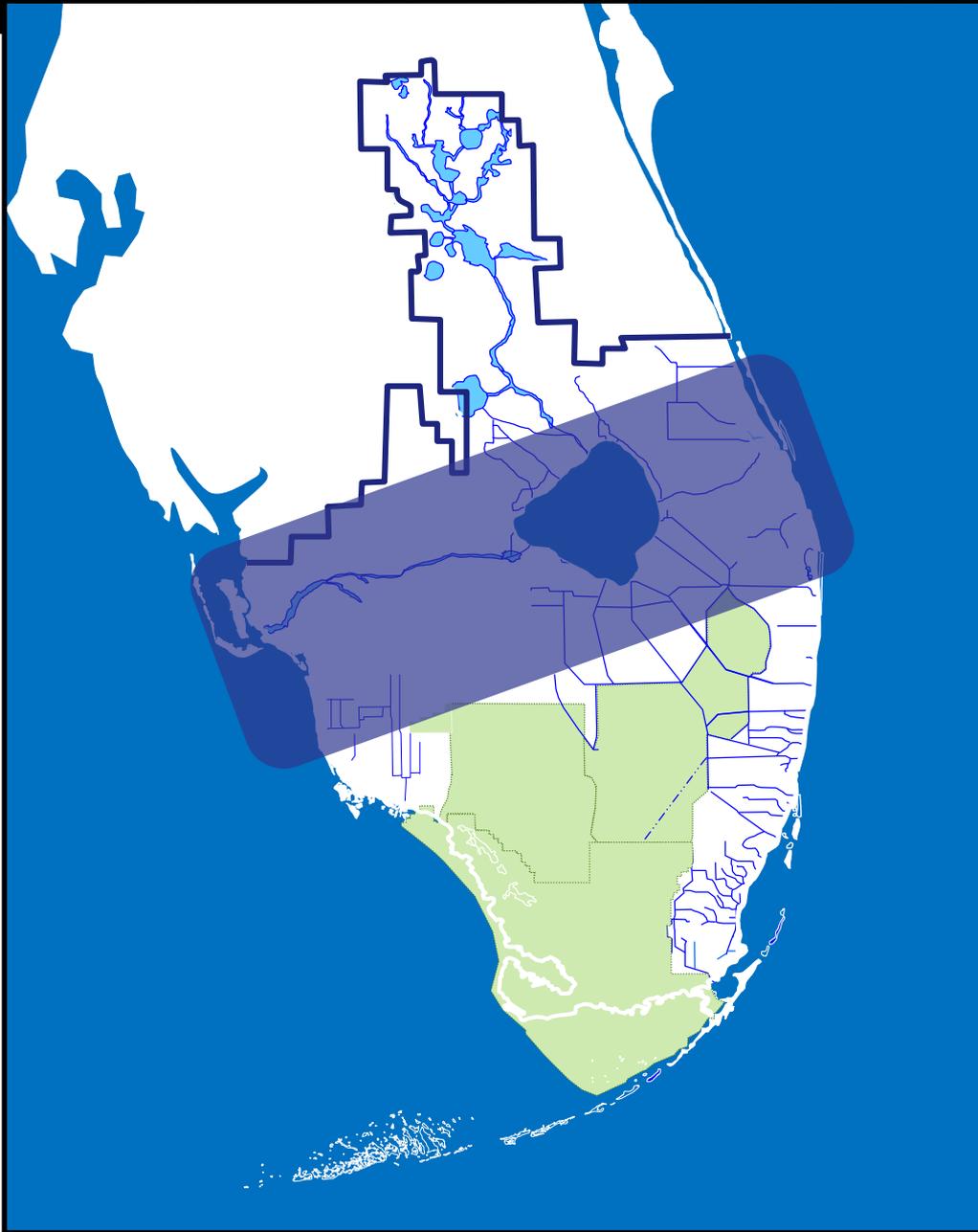
Caloosahatchee Estuary Annual Volume of Simulated Lake Discharge

Example Future System
with IRL, CEPP, EAASR
and other Projects



Duration of the Lake-Caused High Discharge Events

Reduced from 11 to 7 months	Reduced from 14 to 4 months	Reduced from 8 to 4 months
Reduced from 5 to 3 years	Reduced from 4 to 3 years	Reduced from 3 to 3 years



Geographic Area:

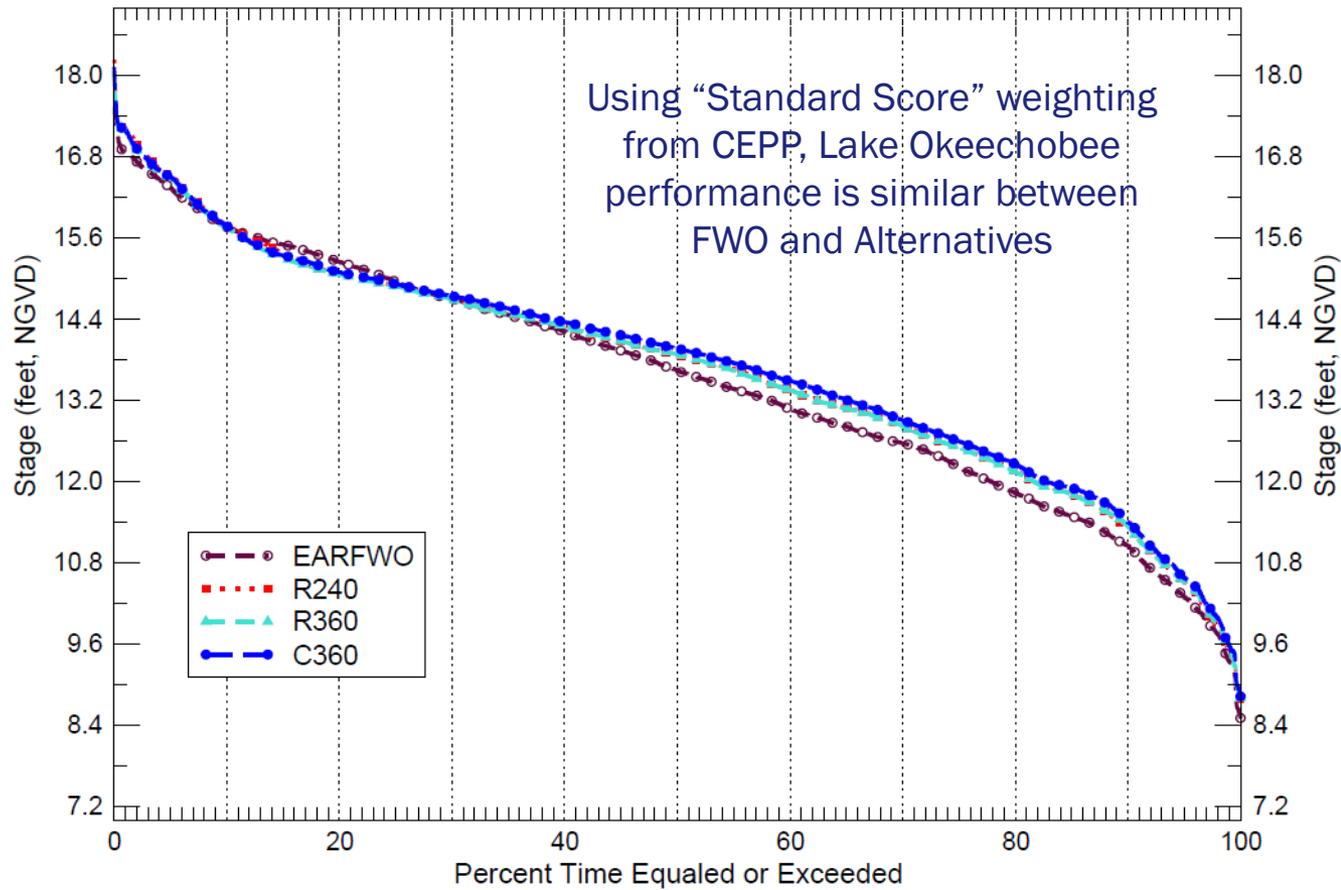
- Lake Okeechobee, Northern Estuaries (NE) and Lake Okeechobee Service Area (LOSA)

Key System Outcomes:

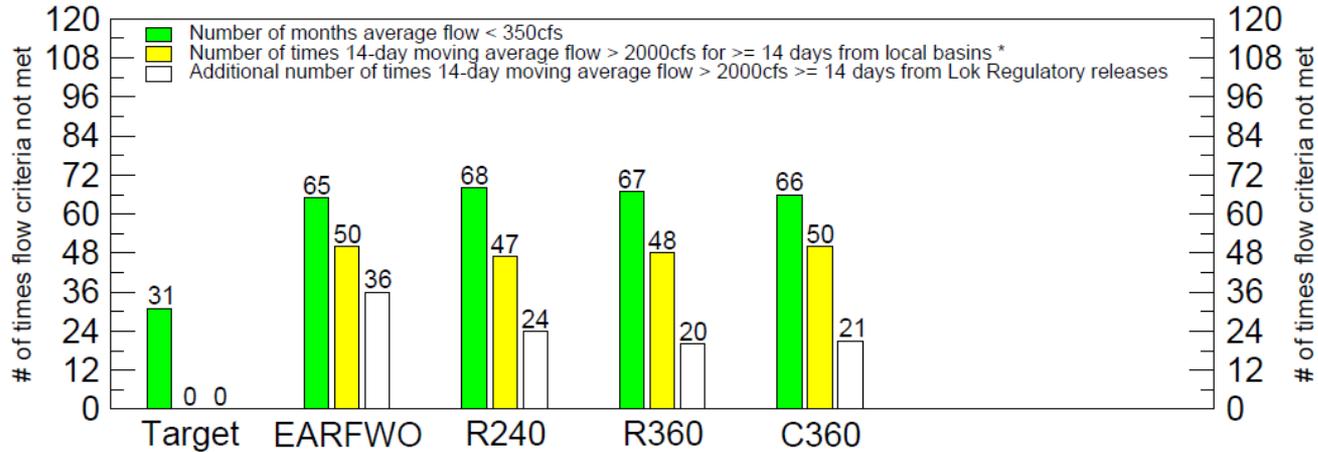
- Addition of EAA Storage Reservoir, STAs and Lake O. operational changes
- All alternatives generally maintain Lake O. performance relative to EARFWO
- All alternatives reduces the number of high discharge events to NEs relative to EARFWO
- All alternatives provide approximately 300 kac-ft additional flow to Everglades compared to EARFWO
- No alternatives adversely impact LOSA water supply; C360 alternative improves performance



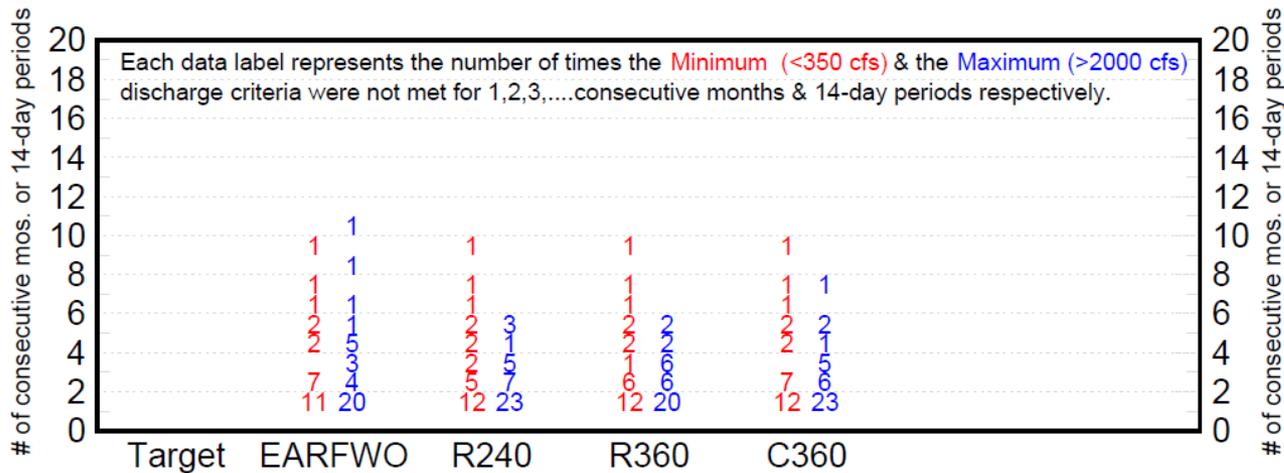
Stage Duration Curves for Lake Okeechobee



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



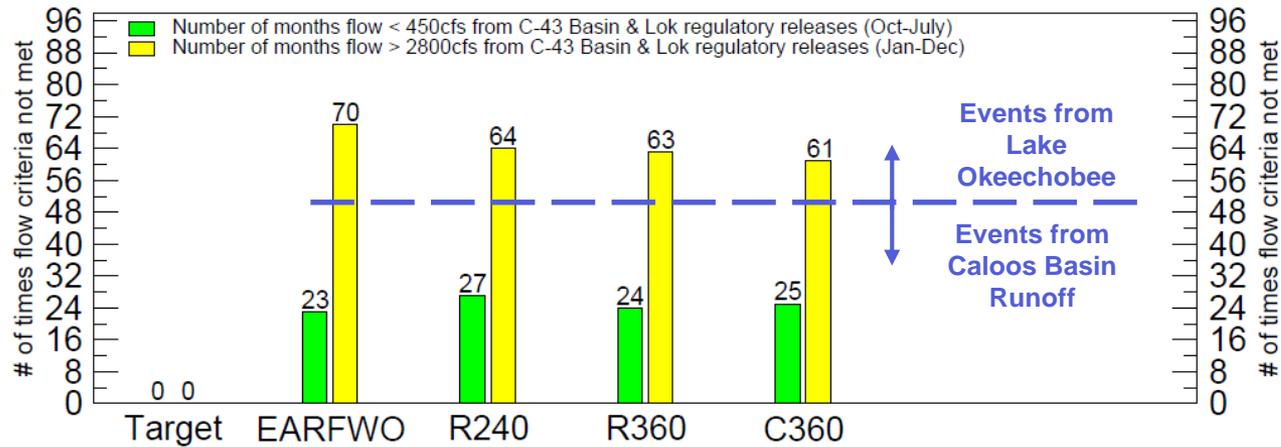
All alternatives show reduced number of high discharge events caused by Lake Okeechobee



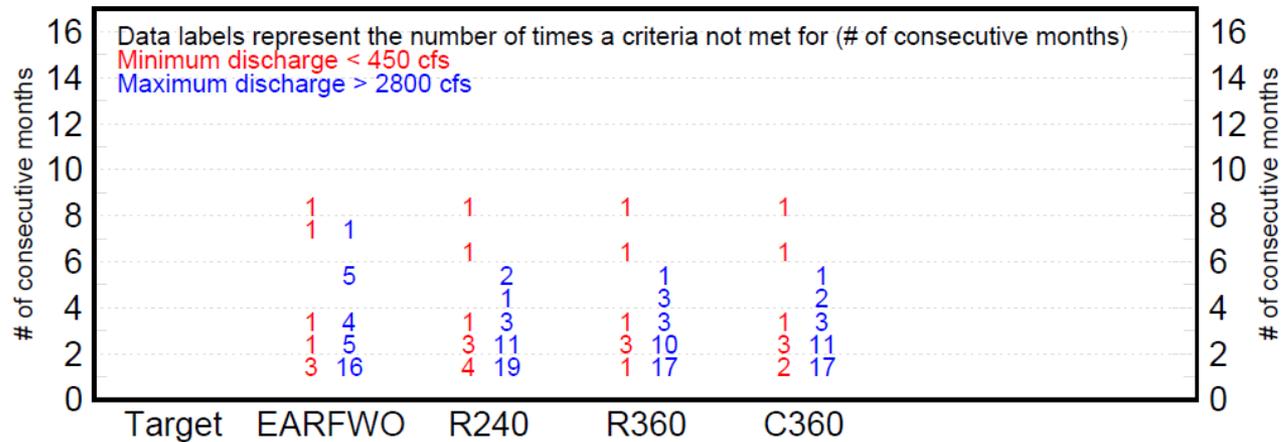
RECOVER Performance Measure

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 Script used: estuary_scr_ID496
 Filename: stluc_salinity_flow_bar.out.agr

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



All alternatives show reduced number of high discharge events caused by Lake Okeechobee

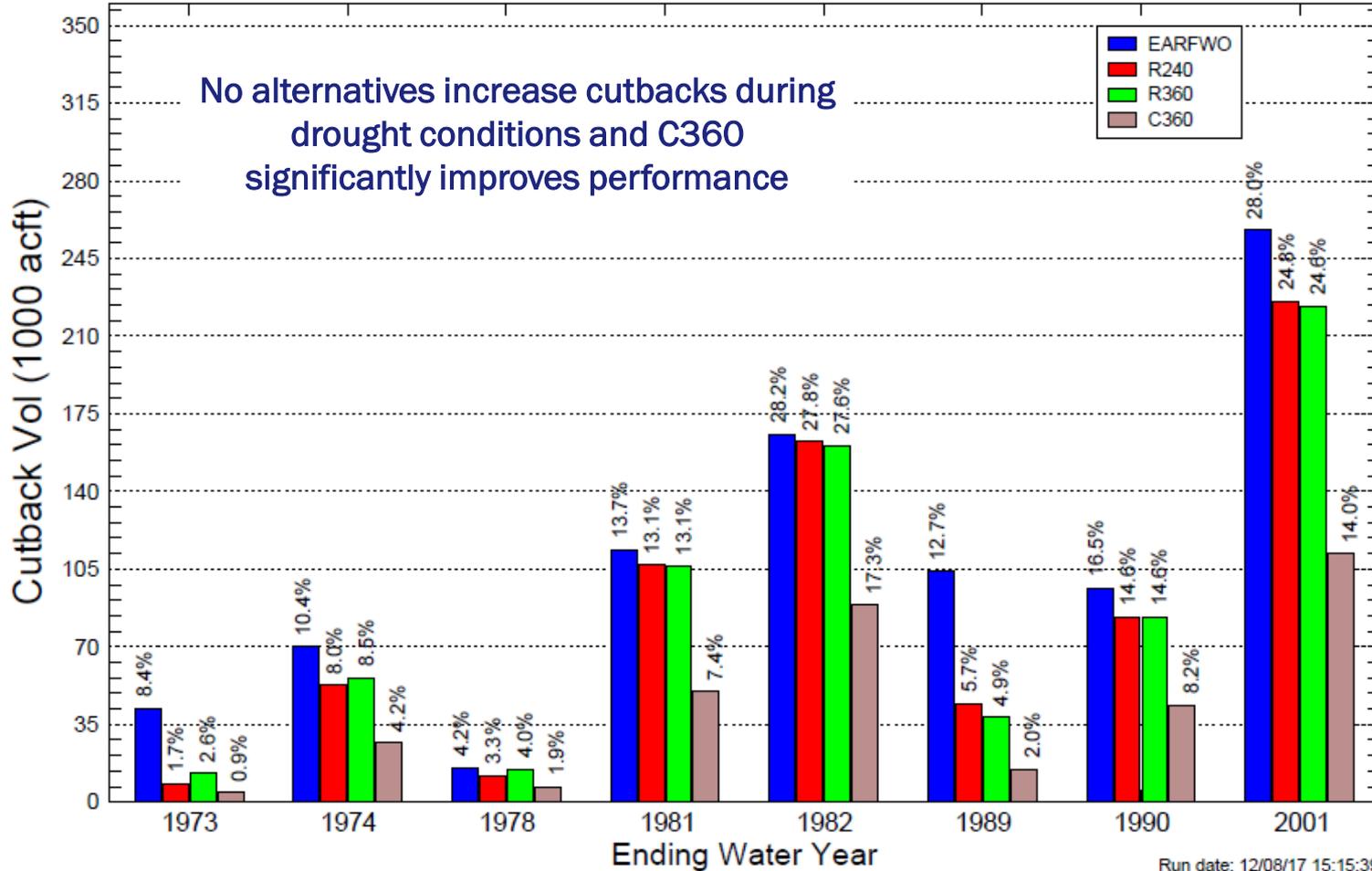


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Water Year (Oct-Sep) LOSA Demand Cutback Volumes for the 8 Years in Simulation Period with Largest Cutbacks



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Filename: losa_cutback_yrs_bar.agr

EAA Storage Reservoir Modeling Data

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

The screenshot shows the website for the EAA Storage Reservoir Project. The page features a navigation menu with links for 'Careers', 'Contact Us', and 'Locations'. The main content area includes a section titled 'Modeling Results' with the following text:

As part of the extensive public process for the EAA Storage Reservoir Project, the District is conducting a series of computer modeling runs to inform the development of the project's features.

Among the initial results presented during a Nov. 6 public meeting, baseline modeling will be used to help provide reference points for comparisons of project alternatives developed during the planning process. The District also released preliminary results from the Dynamic Model for Stormwater Treatment Areas (DMSTA) model to evaluate potential sizing of the reservoir and a corresponding stormwater treatment area for water quality treatment.

- [Modeling Results - Nov. 6, 2017 \[FTP\]](#)
- [Instructions for Accessing and Downloading Modeling Files from FTP Site \[PDF\]](#)

Link can also be found on
www.sfwmd.gov/EAareservoir



EAA Storage Reservoir Feasibility Study

PROJECT BENEFIT (HABITAT UNIT) ANALYSIS



Habitat Units are a Measure of Ecological Benefits

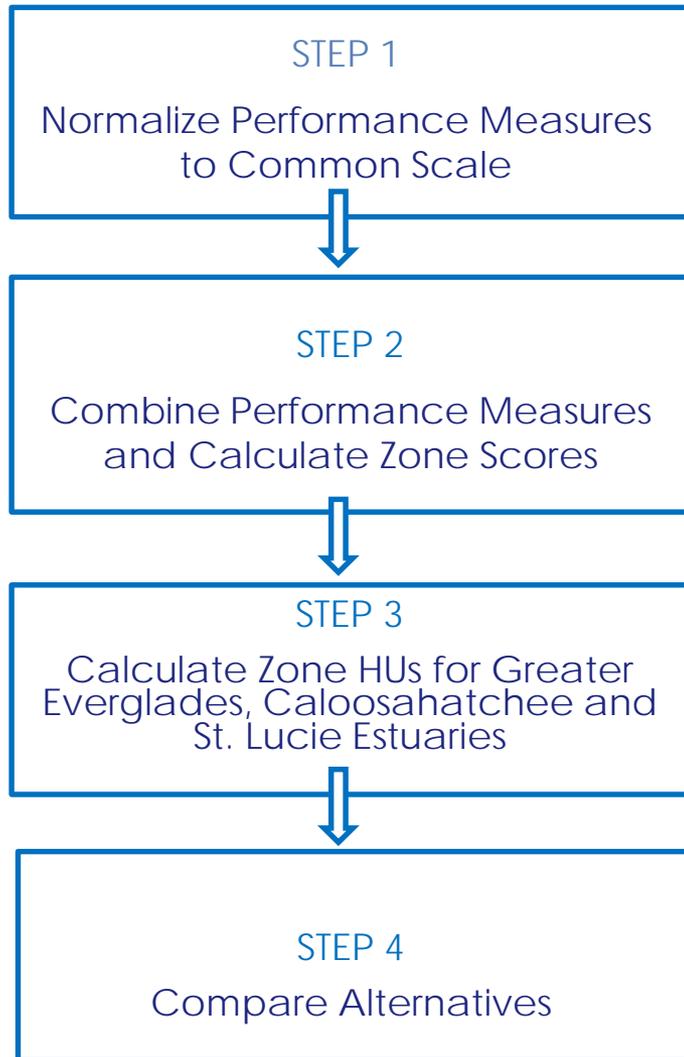
Ecological Benefits

- Reduce Lake Okeechobee damaging discharges to the northern estuaries
 - Caloosahatchee and St. Lucie Estuary Flow Targets
- Increase flow to water conservation areas and Everglades National Park
 - Sheetflow in the Ridge and Slough landscape
- Improve wetland hydroperiod
 - Inundation duration in the Ridge and Slough landscape



Ecological Benefits = Habitat Units (HU)

- USACE process
- Applied nation-wide for National Ecosystem Restoration
- Calculates environmental quality over an area, in acres, to describe environmental lift and to provide a standardized measure to compare alternatives
- Utilizes USACE Ecosystem Planning Center of Expertise approved and certified CEPP Planning Model



HABITAT UNITS – USACE methodology Methodology for quantifying ecological benefits on the array of alternatives

Step 1:

- Raw performance measure sub-metrics are linearly re-scaled between 0 and 100.

Step 2:

- Within each zone, performance measure metrics are combined for each project alternative to produce a net zone benefits score between 0 and 1.

Step 3:

- The 0 to 1 benefits score for each zone is then multiplied by the acreage of the zone to generate a HU value for the zone.
 - Northern Estuaries (Two Zones)
 - Greater Everglades (Nine Zones)

Step 4:

- HU Lift = Alternative – FWO Project Condition

Performance Measures (RECOVER approved)

Planning Region	Performance Measure	Description
Northern Estuaries	Salinity envelope St. Lucie	Suitability for oyster and sea grass habitat based on frequency of flows from S-80
	Salinity envelope Caloosahatchee	Suitability for oyster and sea grass habitat based on frequency of flows from S-79
Greater Everglades	Hydrologic surrogate for soil oxidation	Cumulative drought intensity to reduce exposure of peat to oxidation
	Inundation pattern in Greater Everglades Wetlands	Number and duration of inundation events used to calculate the percent period of record of inundation
	Number and duration of dry events in Shark River Slough	Number of times and mean duration in weeks that water drops below ground
	Sheet flow in the Everglades Ridge and Slough Landscape	Timing, distribution and continuity of sheet flow across the landscape
	Slough vegetation suitability	Hydrologic suitability for slough vegetation (hydroperiod, dry-down, dry and wet season depths)

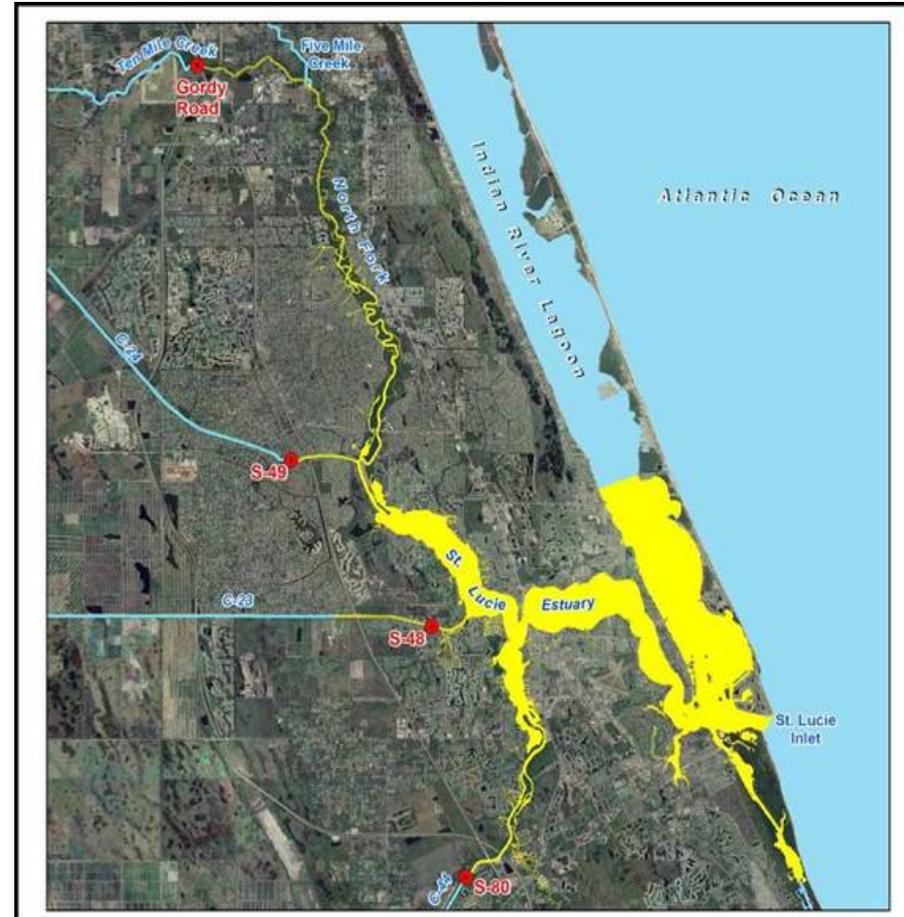
Habitat Units are a Measure of Ecological Benefits

HABITAT UNITS - USACE Methodology
Methodology for quantifying ecological benefits on the array of alternatives

St. Lucie Estuary

14,994 acres

Salinity envelope target based on habitat suitability for oysters and submerged aquatic vegetation



Habitat Units are a Measure of Ecological Benefits

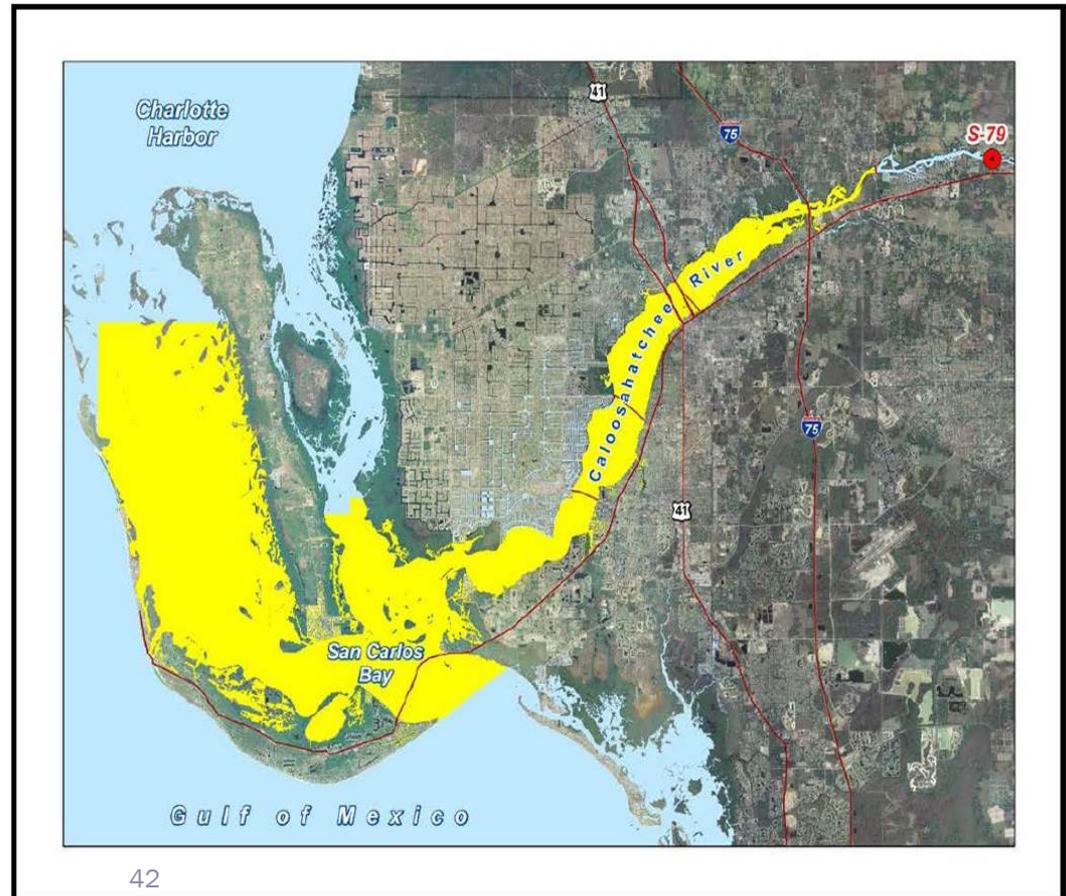
HABITAT UNITS - USACE methodology

Methodology for quantifying ecological benefits on the array of alternatives

Caloosahatchee Estuary

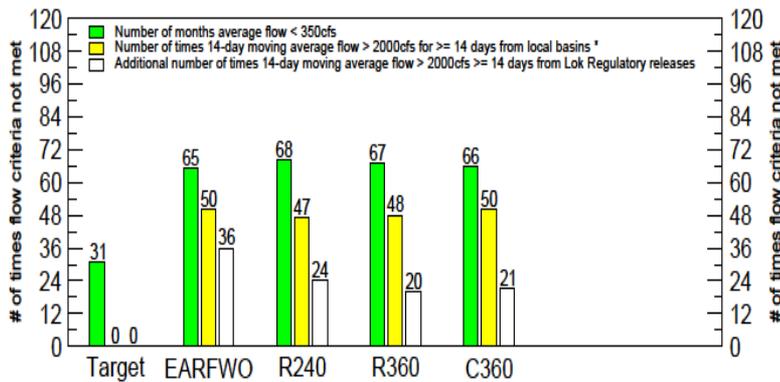
70,979 acres

Salinity envelope target based on habitat suitability for oysters and submerged aquatic vegetation

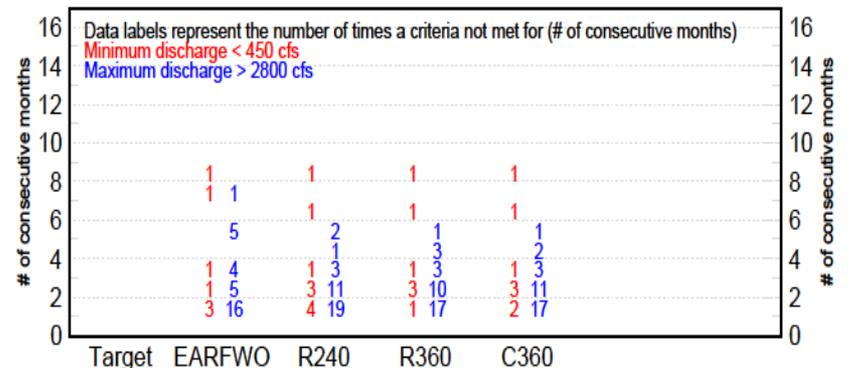
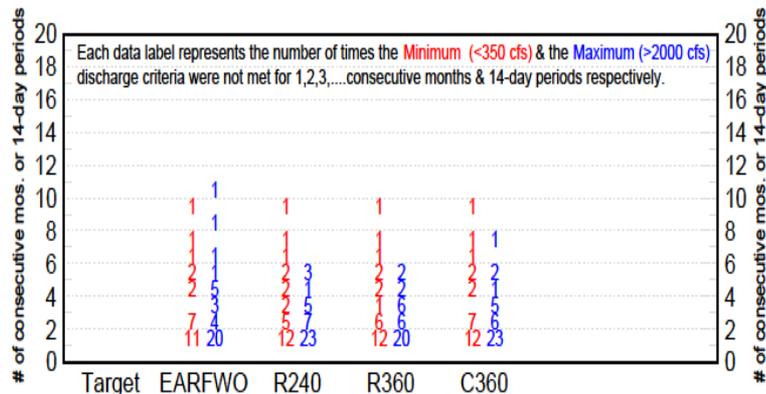
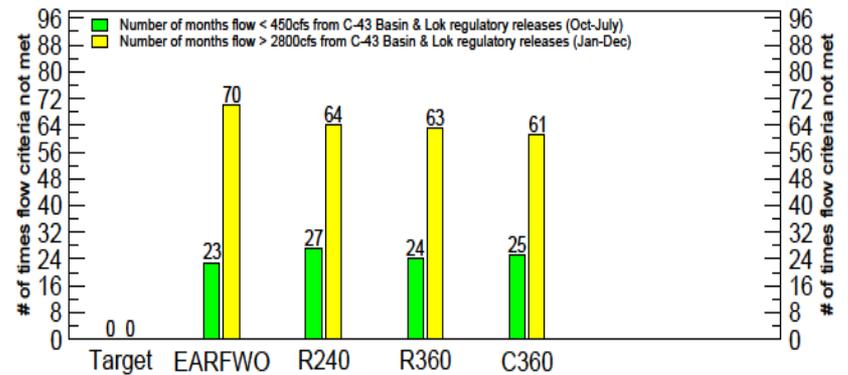


Estuary Performance Measures

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



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



RECOVER Performance Measure

RECOVER Performance Measure

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Northern Estuaries Habitat Units

NE Habitat Units	Modeling Scenarios				
Project Region (Zone)	Existing Condition	FWO	R240	R360	C360
Caloosahatchee Estuary (CE-1)	2,839	39,038	40,458	41,168	41,878
St Lucie Estuary (SE-1)	1,349	8,247	8,996	9,446	9,446
Total Northern Estuaries	4,188	47,285	49,454	50,614	51,324

Northern Estuaries Habitat Unit Lift

NE Habitat Units	Modeling Scenarios		
HU Lift Project Region (Zone)	R240	R360	C360
Caloosahatchee Estuary (CE-1)	+1,420	+2,130	+2,840
St Lucie Estuary (SE-1)	+749	+1,199	+1,199
Total Northern Estuaries	+2,169	+3,329	+4,039



EAA Storage Reservoir Feasibility Study
NEXT STEPS



Next Steps - Compare Alternative Plans

- Conduct cost benefits analysis on each alternative
- Submit report to Legislature on or before January 9, 2018
- Prepare Post Authorization Change Report/Feasibility Report
- Submit Post Authorization Change Report to ASA – March 30, 2018



Public Meetings

- December 14th – Governing Board Meeting - West Palm Beach
- December 18th- WRAC Recreation Meeting – West Palm Beach

Project Meetings

- December 21st– Public Workshop – West Palm Beach

Public Comment Opportunities

- Public Comment 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
- Additional information available at www.sfwmd.gov/EAareservoir

DISCUSSION

www.sfwmd.gov/EAAreservoir

