

Public Meeting
North of Lake Okeechobee Storage Reservoir Section 203 Study
Project Update and Proposed Tentatively Selected Plan

South Florida Water Management District

August 3, 2023

Opening Remarks

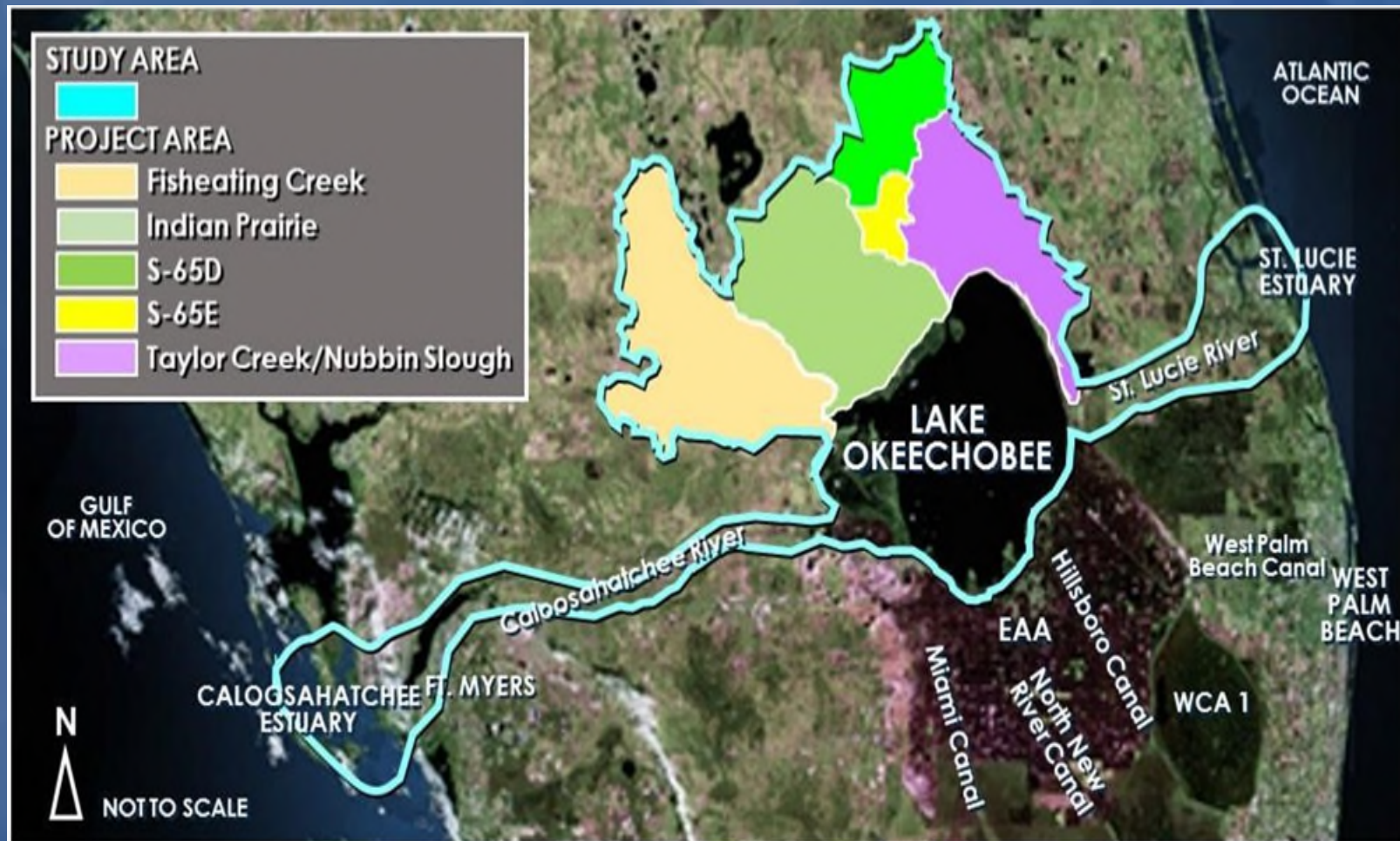
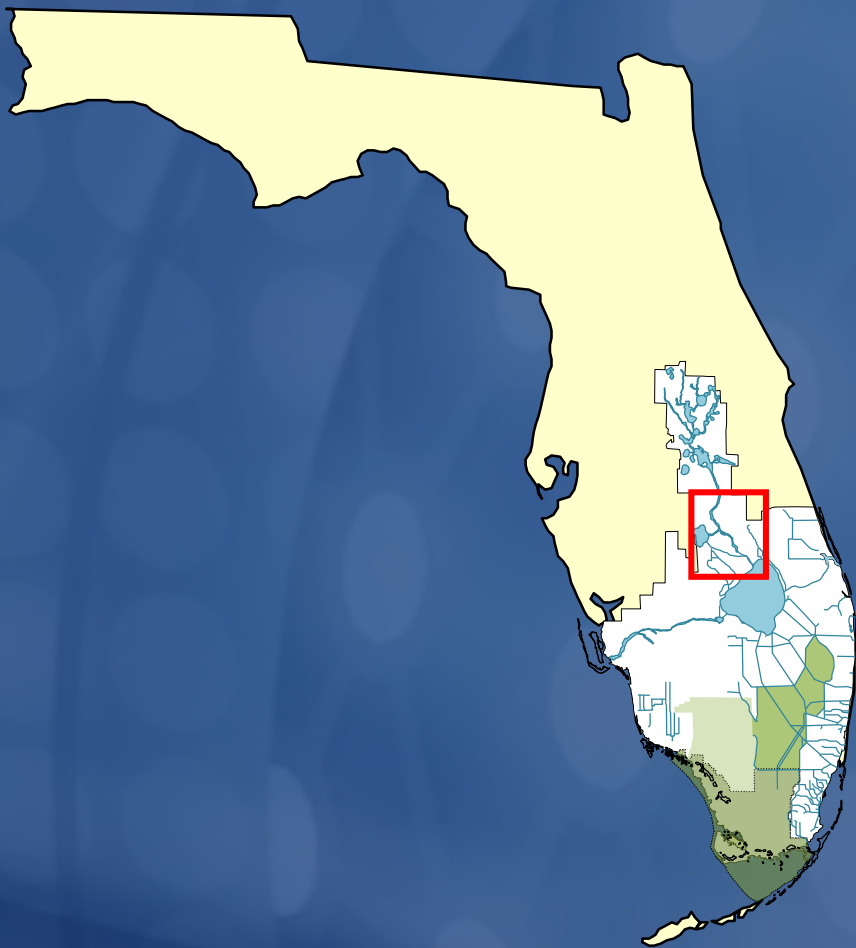
Ben Butler
SFWMD Governing
Board



Section 203 Feasibility Study Purpose

- Executive Order 23-06: January 10th, 2023
- SFWMD has initiated the planning of the North of Lake Okeechobee Storage Reservoir Section 203 Study in 2023 as the local sponsor
 - Also known as the Lake Okeechobee Component A Storage Reservoir (LOCAR) Section 203 Study
- SFWMD is preparing a Feasibility Study to evaluate the effects of implementing the LOCAR project under Section 203 of Water Resources Development Act (WRDA) of 1986
- Must be technically and policy compliant with federal planning process
- SFWMD will transmit it to the Assistant Secretary of the Army (ASA)
- SFWMD will recommend submission to Congress

Study Area



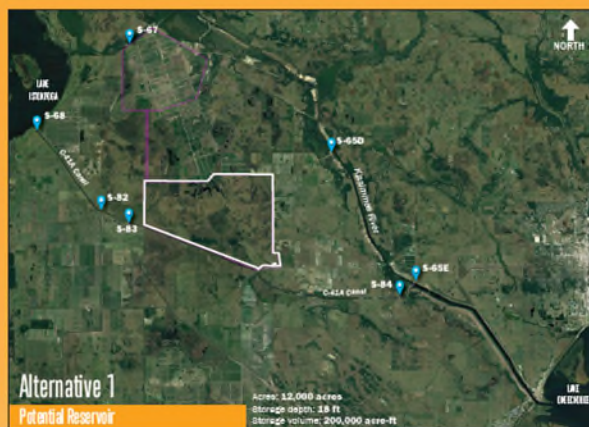
LOCAR Project Overview

- The goal of LOCAR is to construct Component A of CERP, a storage reservoir north of Lake Okeechobee providing approximately 200,000 ac-ft of storage.
- The purpose of LOCAR is to detain water during wet periods for later use during dry periods to benefit Lake Okeechobee.
- Increased storage capacity would reduce the duration and frequency of both high and low water levels in Lake Okeechobee that are stressful to the lake's ecosystems.
- Reduce large discharges from the lake that are damaging to the downstream estuary ecosystems.
- Generally, keep water in the system for environmental and water supply uses.

Storage Reservoir Locations Considered

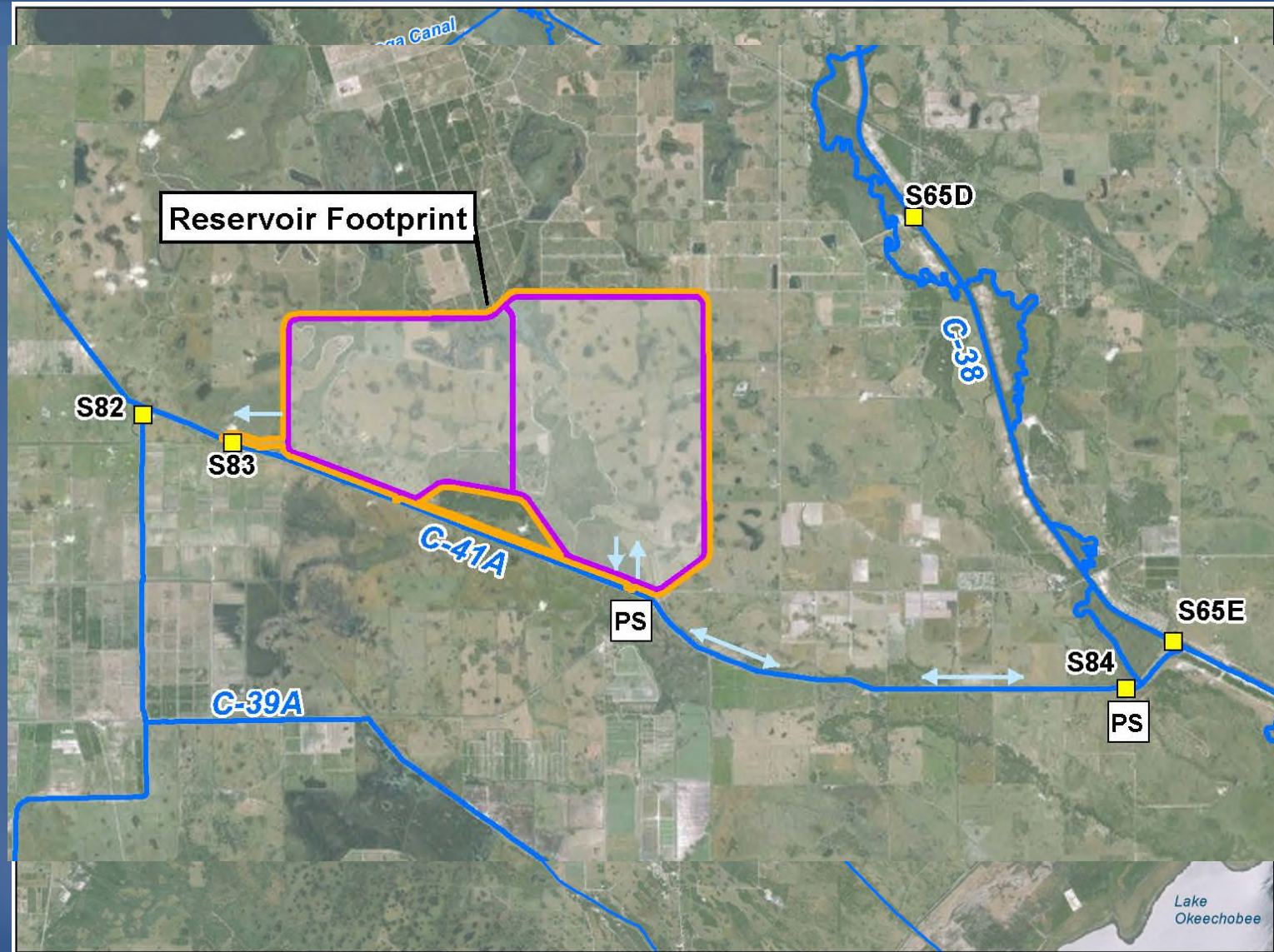
LOCAR Initial Array of Alternatives

North of Lake Okeechobee Storage Reservoir Section 203 Study being conducted by SFWMD



Proposed Tentatively Selected Plan (TSP) – Alternative 1

- Incorporates lessons learned on previous Everglades Restoration Reservoir Design and Construction experience
- 12,000 acres, 200,000 ac-ft of storage, average depth of 19 ft, 18 miles of embankment
- Incorporates 2 cells, 4,800 ac & 6,500 ac, for added safety, improved flexibility for operations and maintenance connected by gated culverts
- Two inflow pump stations (PS), one at S-84 (1,500 cfs), second into the reservoir (1,500 cfs)
- Gravity discharges back to system when called for to the C41A Canal via 2 gated gravity structures totaling 3,000 cfs

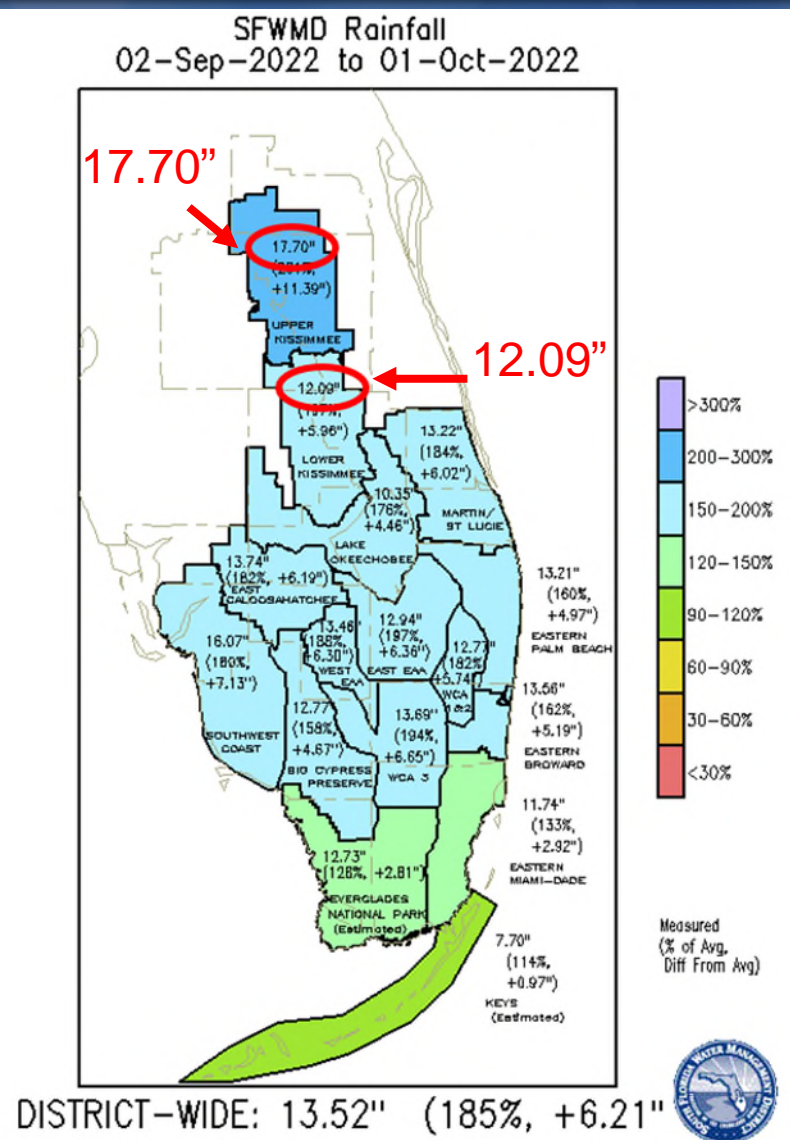
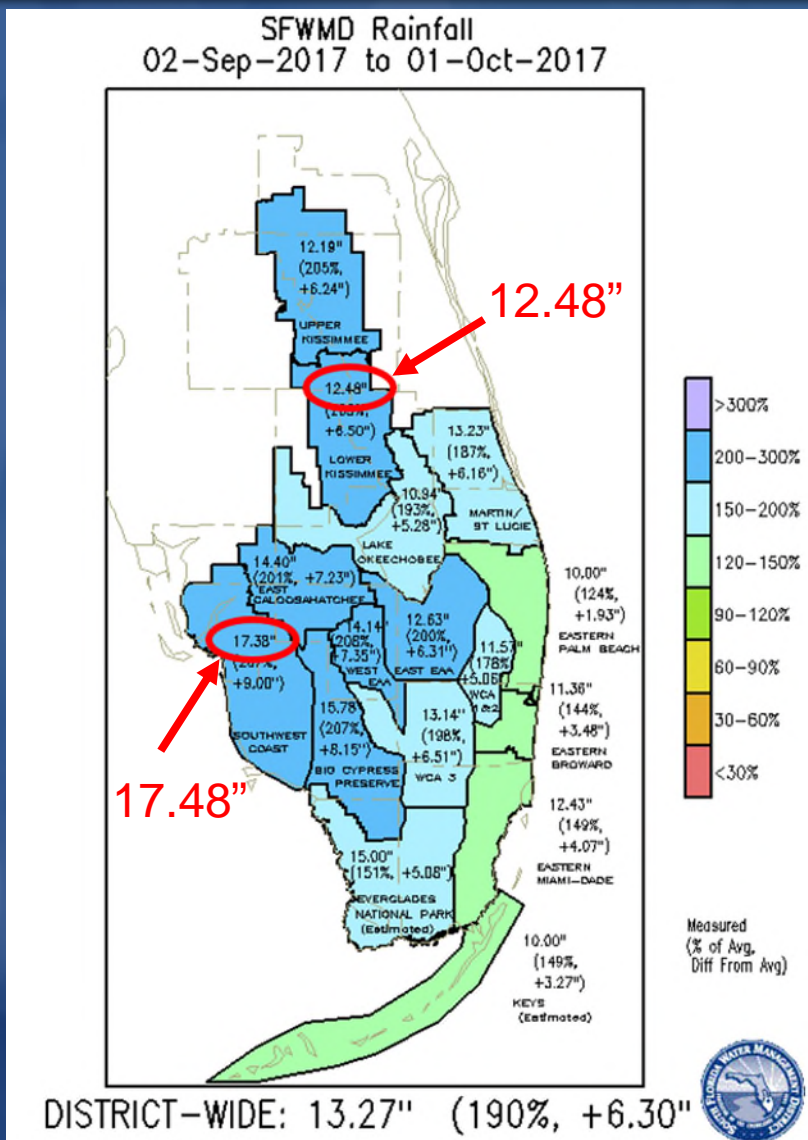


Reservoir Design Features

- **Designed to current USACE Dam Safety requirements and ultimately monitored by a Dam Safety Program**
 - Incorporates the Corps 3Rs – Robust, Redundant and Resilient Design to meet modern Dam Safety Design Criteria
 - Subject to Risk Review process by the Corps of Engineers Center of Excellence for Dam Safety, including Independent Peer Review
 - Maintains Flood Protection and Water Supply
- **Provides capacity to capture extreme storm events, including Probable Maximum Precipitation (PMP) and protected against Hurricane generated waves**
 - Designed to capture and control PMP which is 54 inches of rainfall
 - Designed to control waves in Category 5 storm
- **May include recreational features such as boat ramps, nature areas and potential equestrian facilities**

Recent Storm Rainfall Amounts

Category 2 Hurricane Irma impacted this area in September 2017



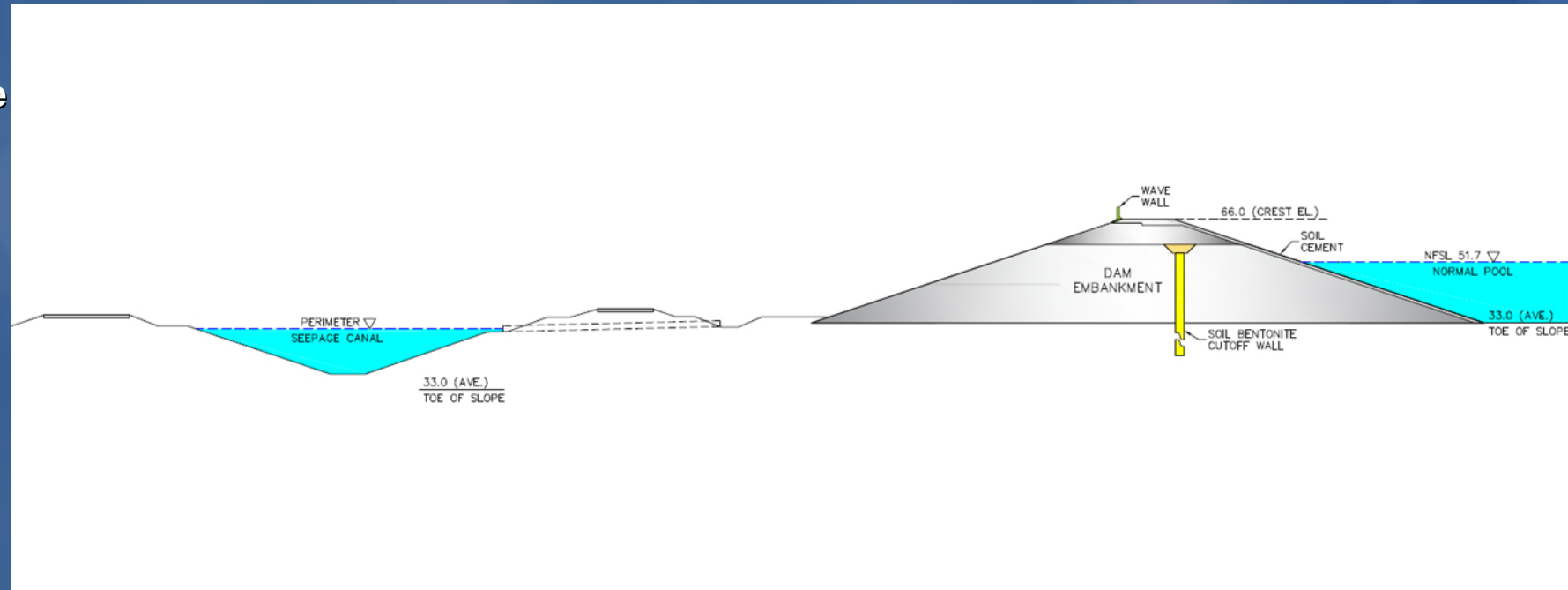
Category 3 Hurricane Ian impacted this area in September 2022

Freeboard – built in for extreme storm events

- Dam crest set at elevation 66.00' NAVD; 33' in height
- Normal full storage level (NFSL) set at elevation 51.70' NAVD; 19' average water depth
- Interior surface protected with Soil Cement Surface
- 14' freeboard available for a 54 in rain event, setup and wave containment
 - 54 in rain = 4.5' in reservoir
 - Storm event category 5 = 1.5'
 - Wave Height = 8' +/-
 - Includes wave wall for overwash containment

Typical Embankment and Seepage Management

- Control offsite seepage to meet Savings Clause Requirements meaning no impacts to neighboring water levels
- Incorporates bentonite seepage cutoff wall to minimize storage loss and control seepage
 - Seepage cutoff wall uses a 2-phase construction process to extend to 60' depth below ground
- Incorporates perimeter canal and pumping to return excess seepage and collects stormwater to send back to reservoir
- Internal seepage management system within the embankment in addition to the cutoff wall



C-41A Conveyance Improvements

- Still evaluating options to increase C-41A canal conveyance, within the existing ROW, to direct storm discharges to Lake Okeechobee
- Includes replacement of S-84 with increased flow capacity and integrated with a new pump station
- Can be used to move water quickly during extreme storms events

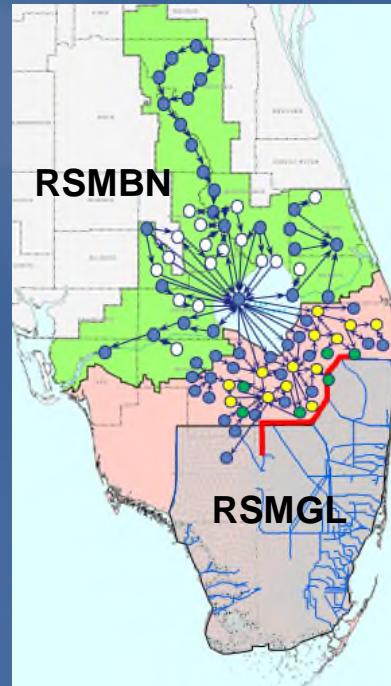
Regional Modeling of Storage

The LOCAR project utilizes the Regional Simulation Model (RSM), the same peer-reviewed modeling tool used for LOSOM, EAA, and other CERP planning efforts

- **Climatic Input**
 - Rainfall
 - ET

Climate Period of Simulation:
1965-2016

Scenario



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

Model Output

- Daily time series of water levels, flows
- Demands not met

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

Modeling Storage & Operations Changes

To help illustrate the effects of storage, several scenarios were produced that demonstrate hydrology changes as storage was added to the system. The starting point “baseline scenarios” show conditions without LOCAR storage:

- **Existing Condition Baseline (ECB23L)**
 - “Current” condition circa 2023 includes all existing and imminent infrastructure and operational features of the system
 - Assumptions consistent with those assumed in the CERP Biscayne Bay & South-Eastern Everglades Restoration (BBSEER) project
 - Key assumptions: Lake Okeechobee System Operating Manual (LOSOM), C44 Reservoir & STA, Interim Kissimmee Operations, Combined Operating Plan (COP)
- **Projected Future Without Project (PA_FWOLL)**
 - Future condition circa + 50 years into the future
 - Assumptions consistent with those assumed in the CERP Biscayne Bay & South-Eastern Everglades Restoration (BBSEER) project (except for Lake O schedule)
 - Key assumptions: EAA Reservoir & A2STA, C43 Reservoir, Full IRL, Kissimmee Headwaters Operations, Central Everglades Project, LOSOM

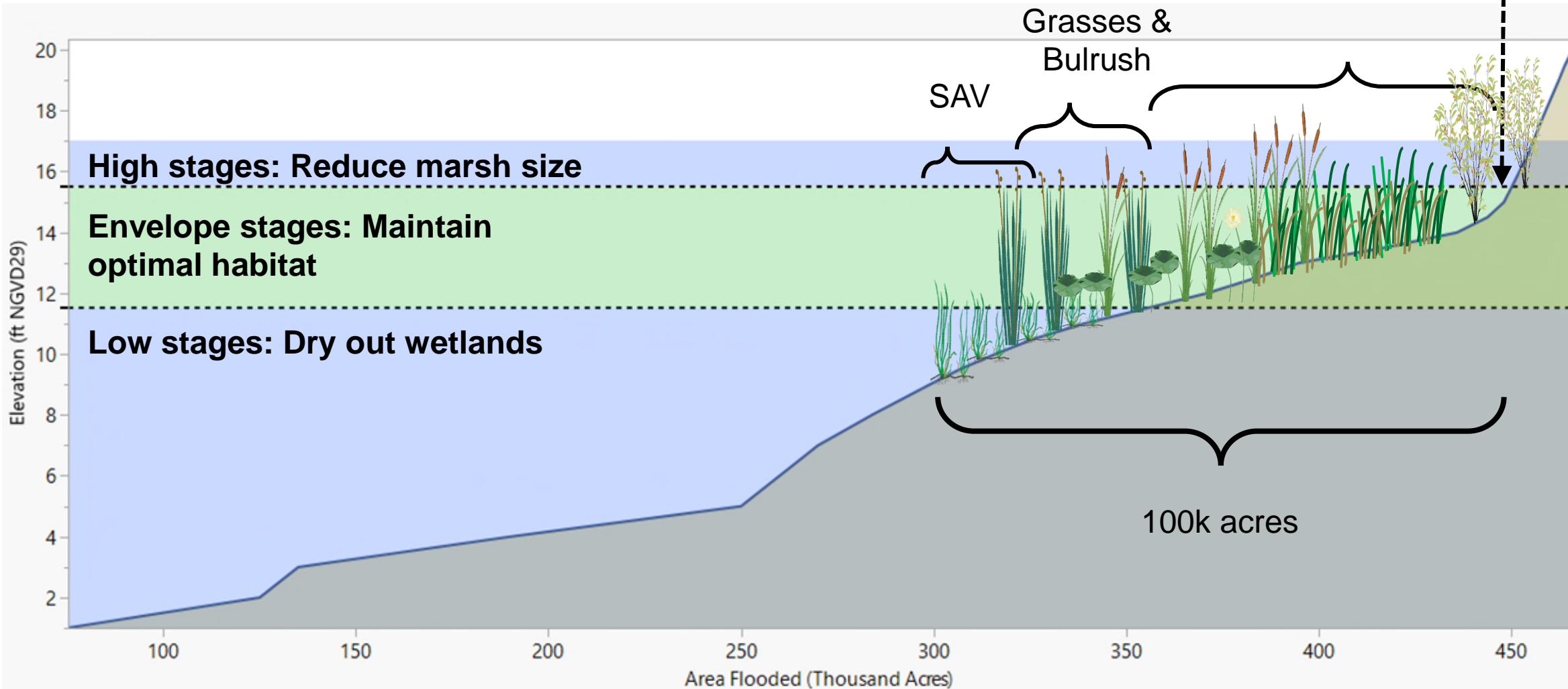
Modeling Storage Continued

LOCAR storage alternatives were developed by adding the proposed storage, conveyance and operational changes as follows:

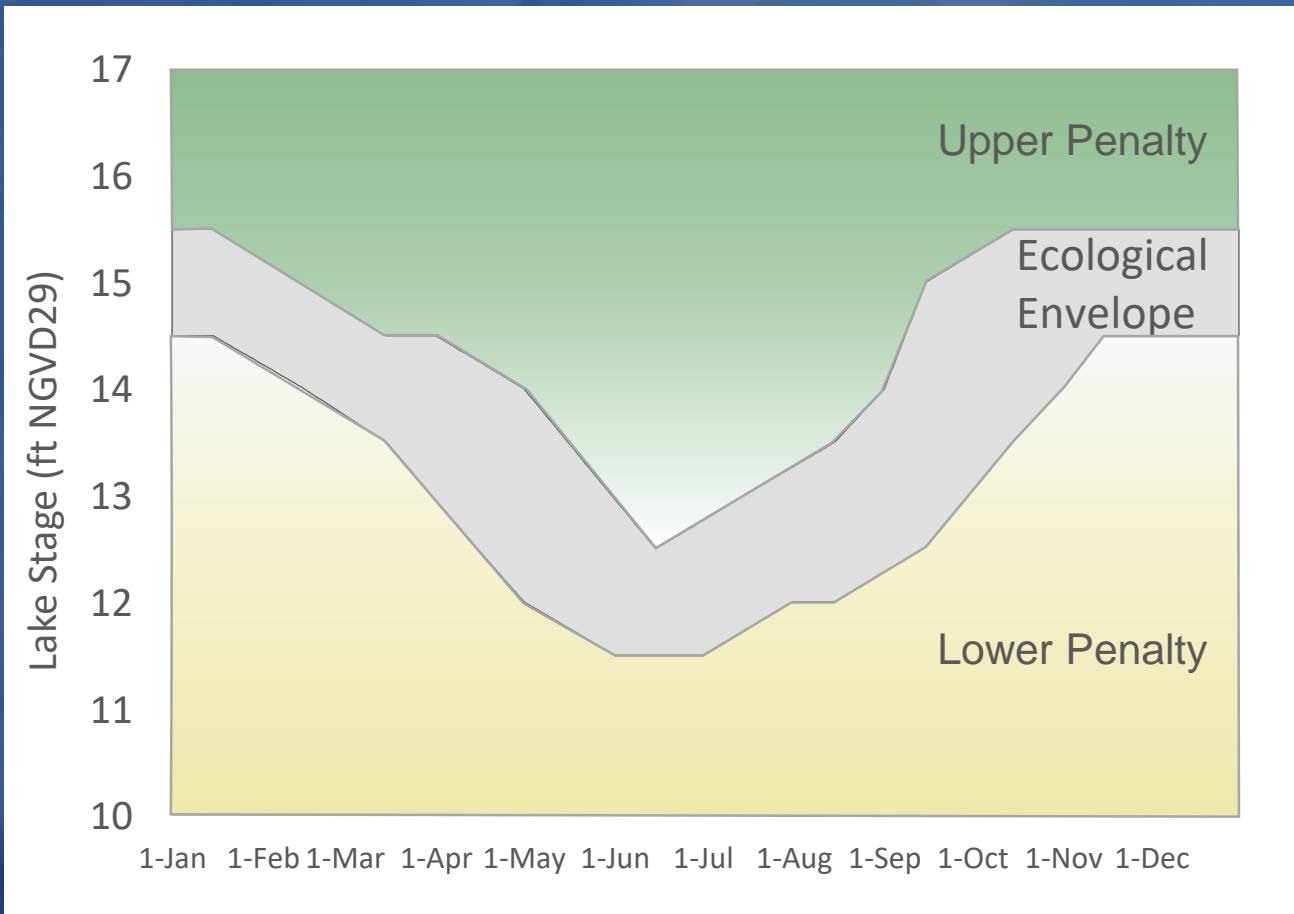
- **Projected Future with Project Alternatives: LCR1 (TSP), LCR2, LCR3**
 - Include storage & conveyance features per each alternative as previously described
 - Diversion to and recovery from storage included in modeling
 - Addition of diversion & recovery protocols
 - LCR1, LCR2 & LCR3 schedule parameters identified through model optimization (i.e. similar to LOSOM process)
 - EAA Reservoir discharge line revised to maintain flows south
 - Water can be released to the C41 / C41A canals and used for water supply if reservoir is >~ 33% full
- LCR1, LCR2 and LCR3 all perform similarly, so presentation material will focus on LCR1 (TSP)

Lake Okeechobee Water Levels

Ideal Marsh Conditions



Lake Okeechobee LOCAR Effects

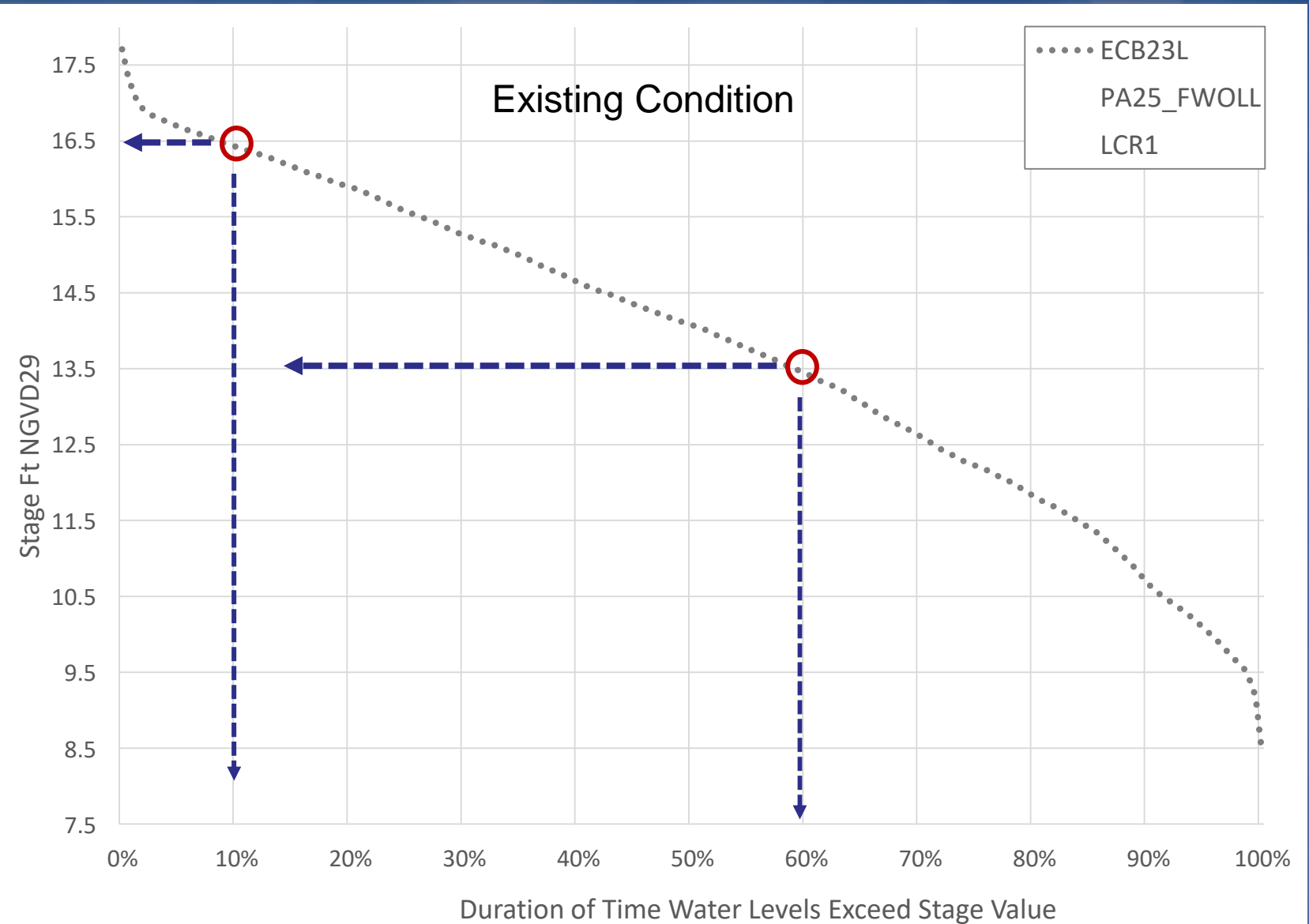


Lake Okeechobee SAV May, 2020

Lake Okeechobee LOCAR Effects

Stage Duration Curve

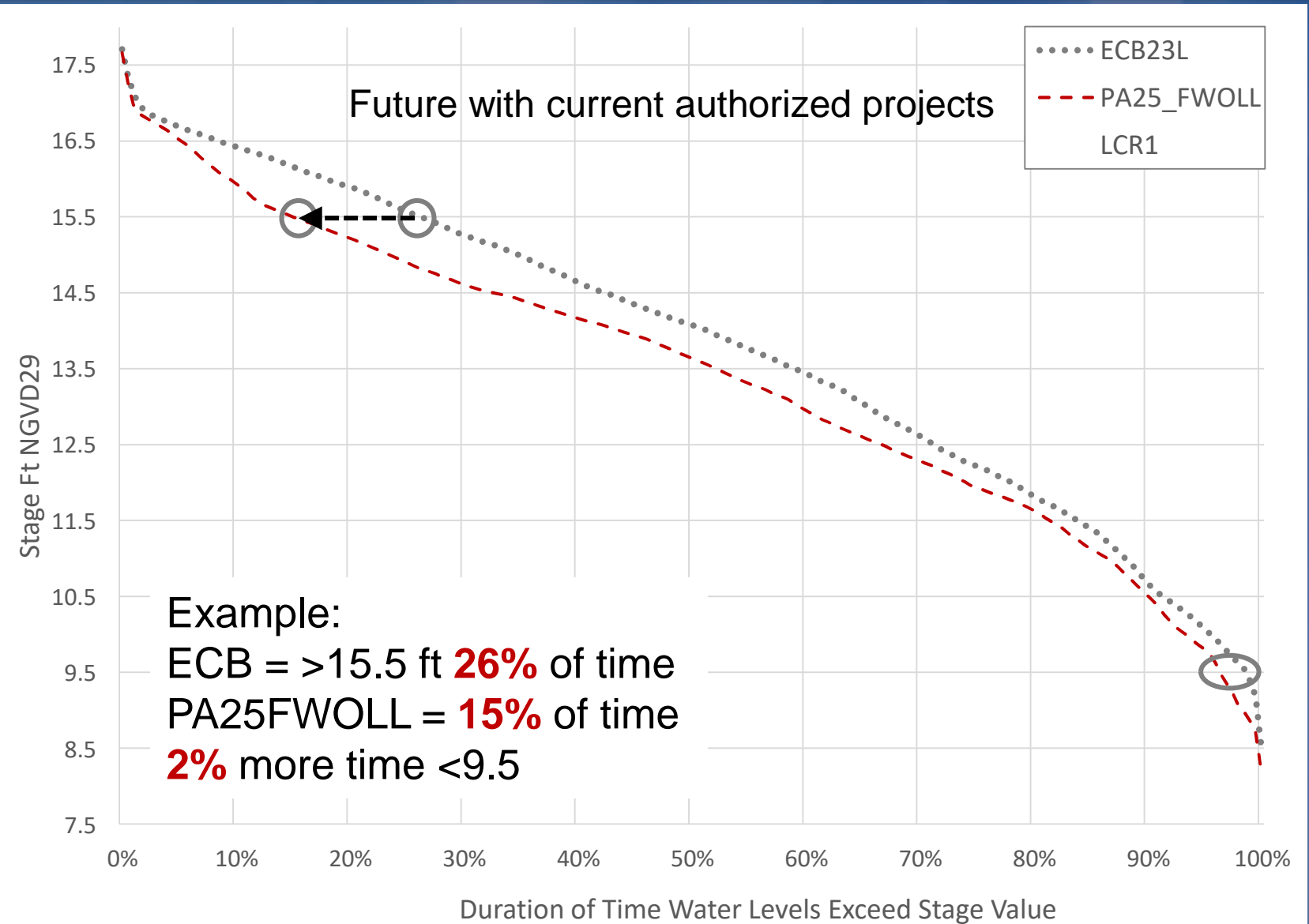
- Percent of time the lake is higher than a given stage
- Example: ECB = Stages higher than 16.5 ft about 10% of the POR
- Higher than 13.5 ft for about 60% of the POR



Lake Okeechobee LOCAR Effects

Stage Duration Curve

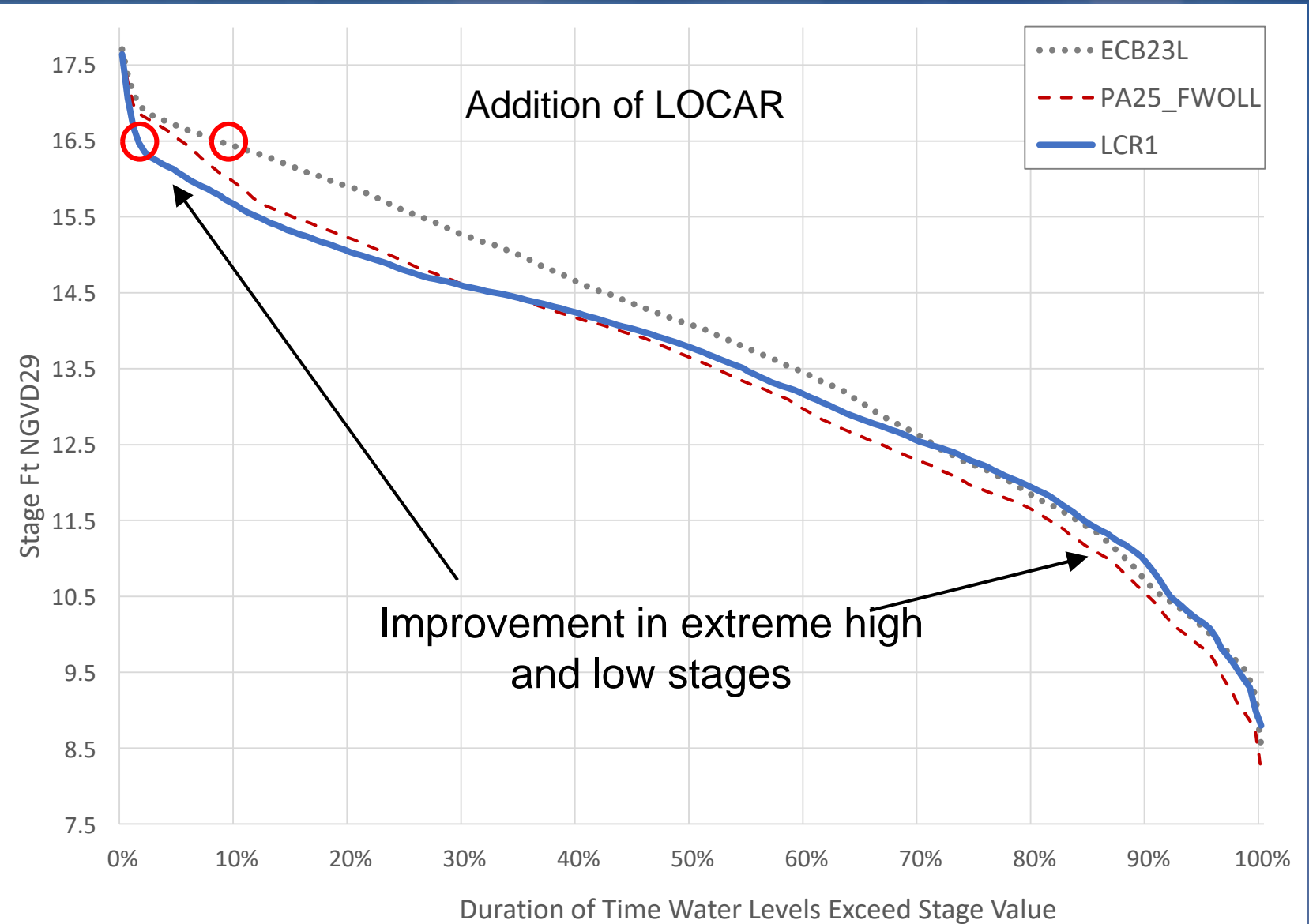
- PA25FWOLL – Same extreme highs (17ft or greater)
- Much lower duration at high stages
- Lower stages overall, mostly at moderate high stages



Lake Okeechobee LOCAR Effects

Stage Duration Curve

- LCR1 – More improvement at time >15 ft and extreme high stages
- Decrease from 10% to 2% at extreme high stage
- Less time at low stages
- Further flattening of curve: more time at average levels



St. Lucie Estuary Optimal Flow/Salinity

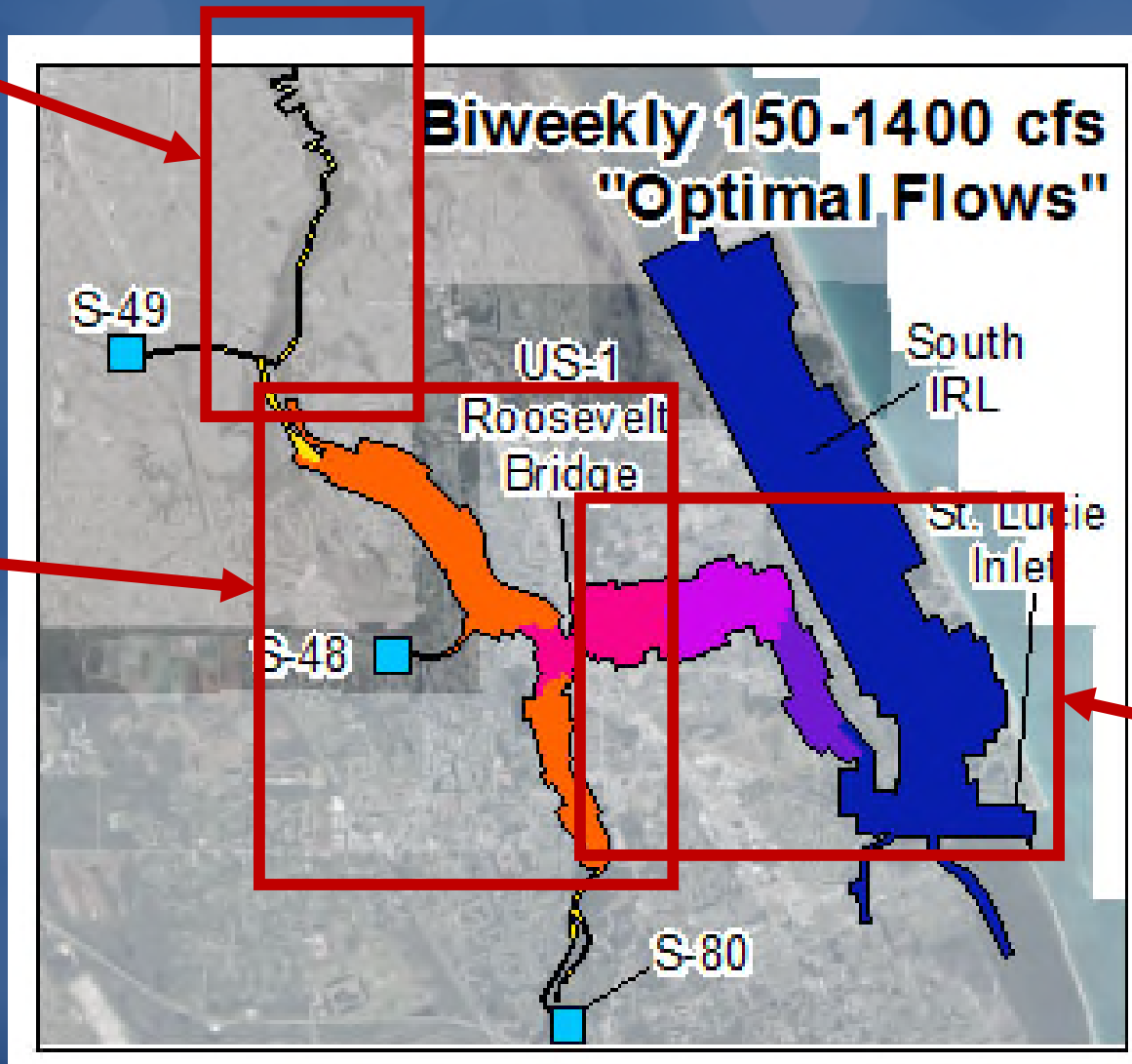
Oligohaline Zone:

- Sufficient salinities to support early lifestages of important fish species (e.g. red drum)

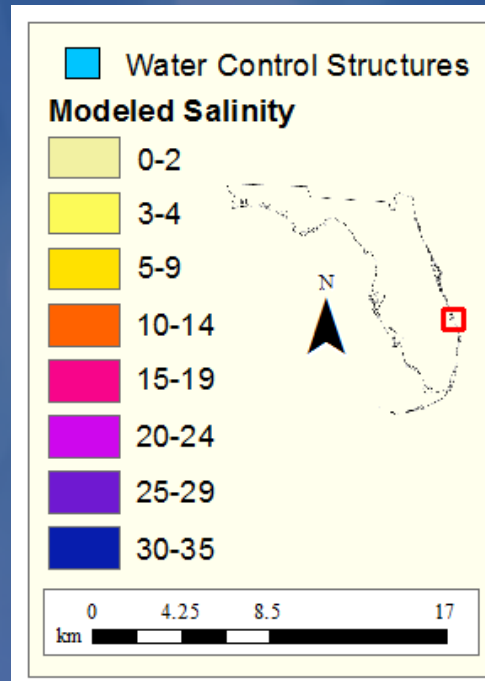


Mesohaline Zone:

- Salinities are good for larval and adult oysters, minimize disease, flows sufficient to allow to larval setting



Modeled Salinity of RECOVER Salinity Envelope Performance Measure Flow Categories

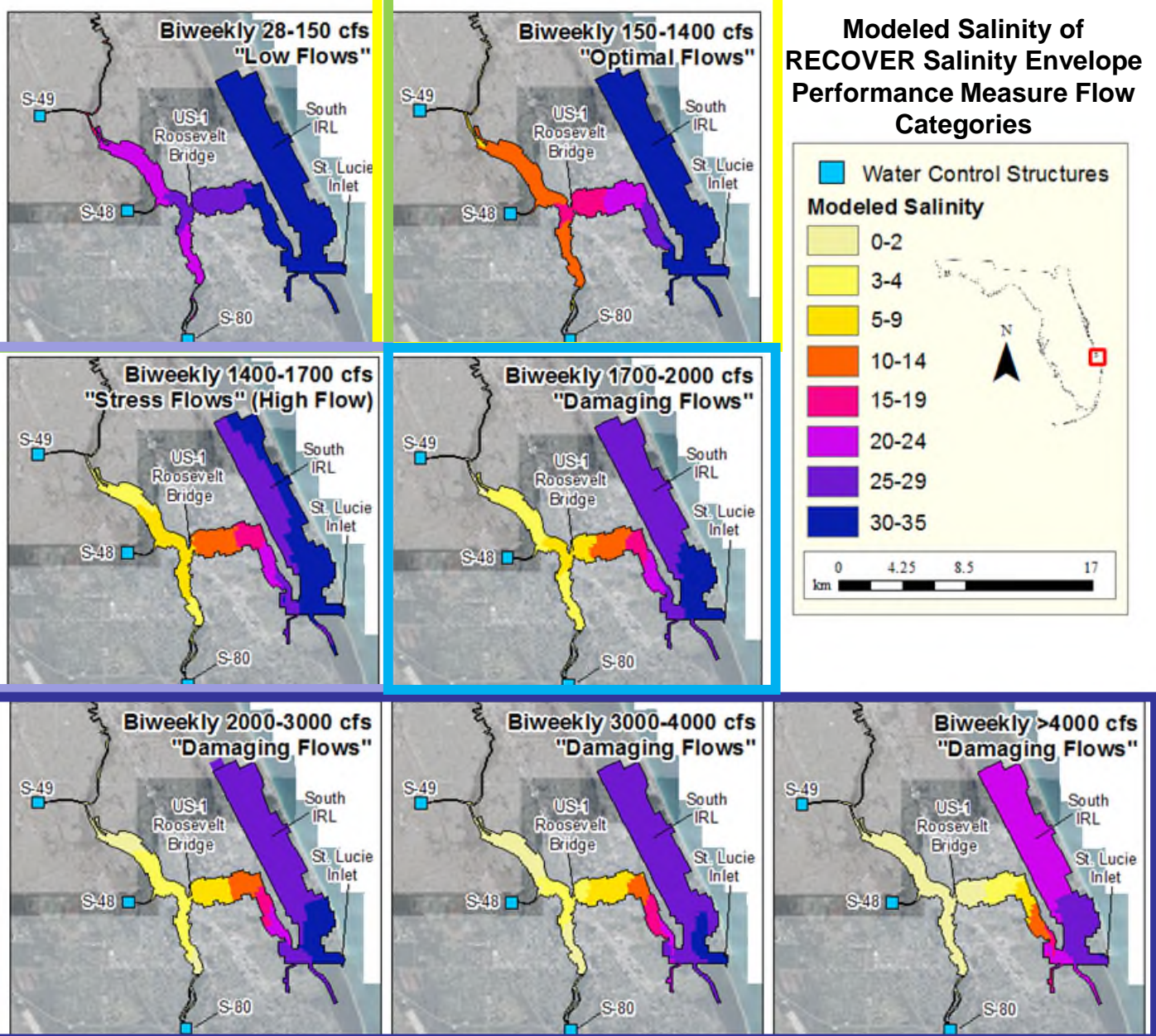


Polyhaline Zone:

- Salinities are good for SAV & larval and adult oysters, minimize disease upstream, flows sufficient to allow for larval setting



St. Lucie Estuary Salinity Envelope Metrics



No. of Low Flow Events (fewer is better)

- ECB: **183** / LOCAR (LCR1): **209 (26 more)**
- LOCAR may result in higher salinity in middle estuary
- May result in high salinity in river

Optimal Flow Events (more is better)

- ECB: **910** / LCR1: **1,013 (103 more)**
- LOCAR will benefit overall estuarine gradient for all indicator species more often

Stress Events (LOK-driven) (fewer is better)

- ECB: **30** / LCR1: **20 (10 fewer)**
- LOCAR reduces Lake O-driven low salinity impacts to oysters in the north and south forks

Damaging Events >1700 cfs(LOK) (fewer is better)

- ECB: **41** / LCR1: **29 (12 fewer)**
- LOCAR reduces Lake O-driven low salinity impacts to oysters and SAV in the middle estuary

Damaging Events+ (Total Flow) (fewer is better)

- 1700-4000 cfs - ECB: **427** / LCR1: **337 (90 fewer)**
- >4000 cfs - ECB: **166** / LCR1: **118 (48 fewer)**
- LOCAR reduces low salinity impacts downstream

Caloosahatchee Estuary Optimal Flow/Salinity

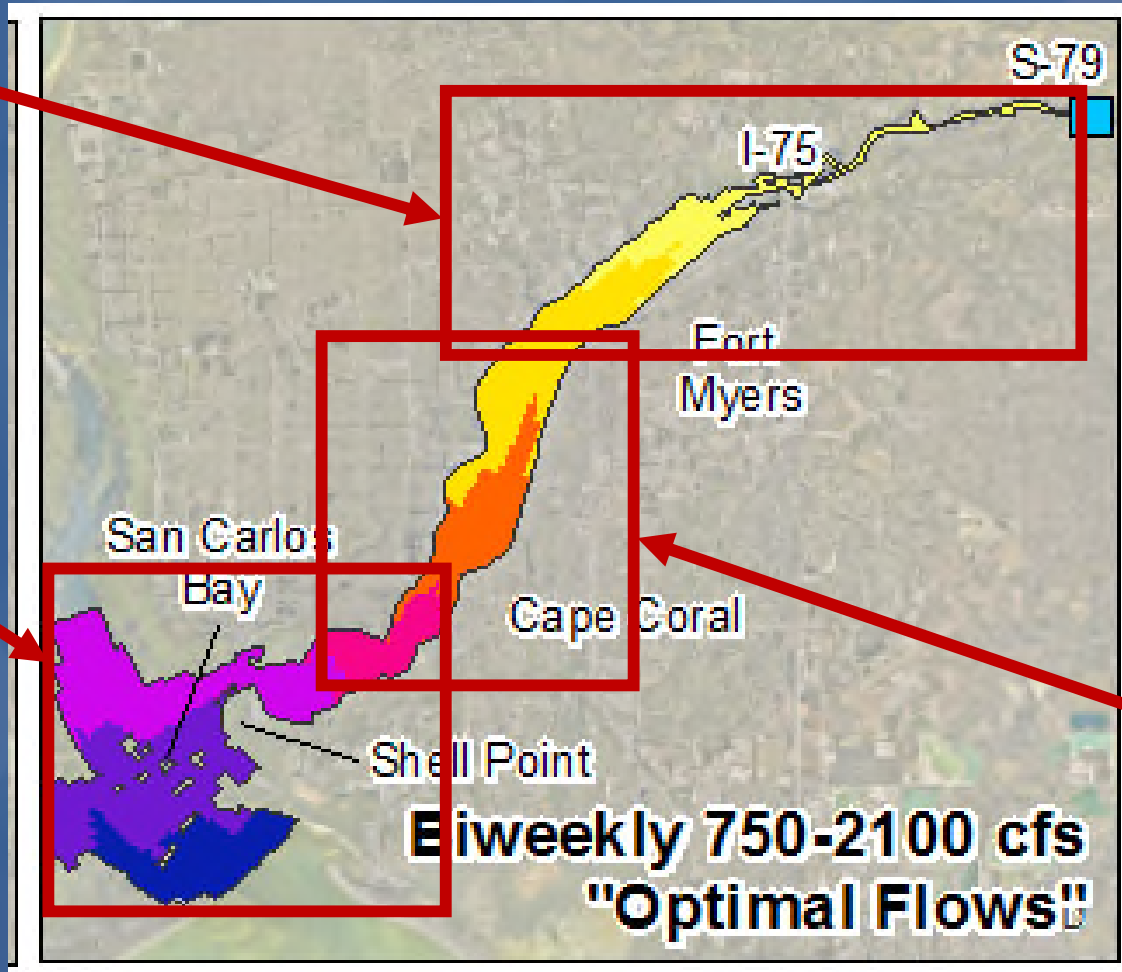
Oligohaline Zone:

- Fresh-to-low salinity required to support tape grass habitat and clams

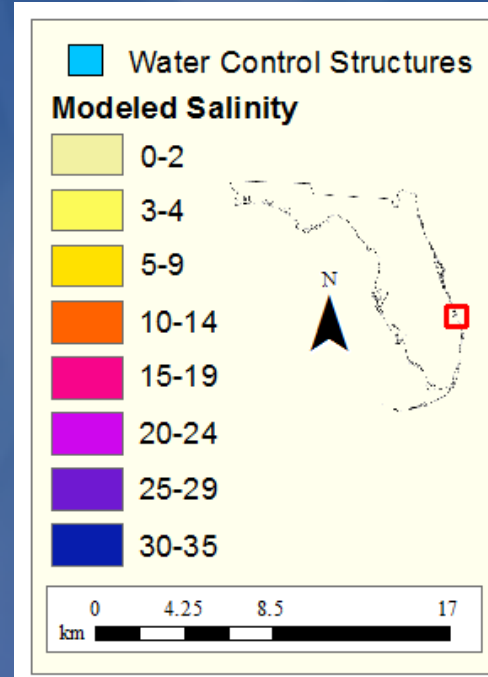


Polyhaline Zone:

- Marine seagrasses do well in higher salinities
- Still suitable for oysters but may experience increased predation and disease with higher salinity



Modeled Salinity of RECOVER Salinity Envelope Performance Measure Flow Categories

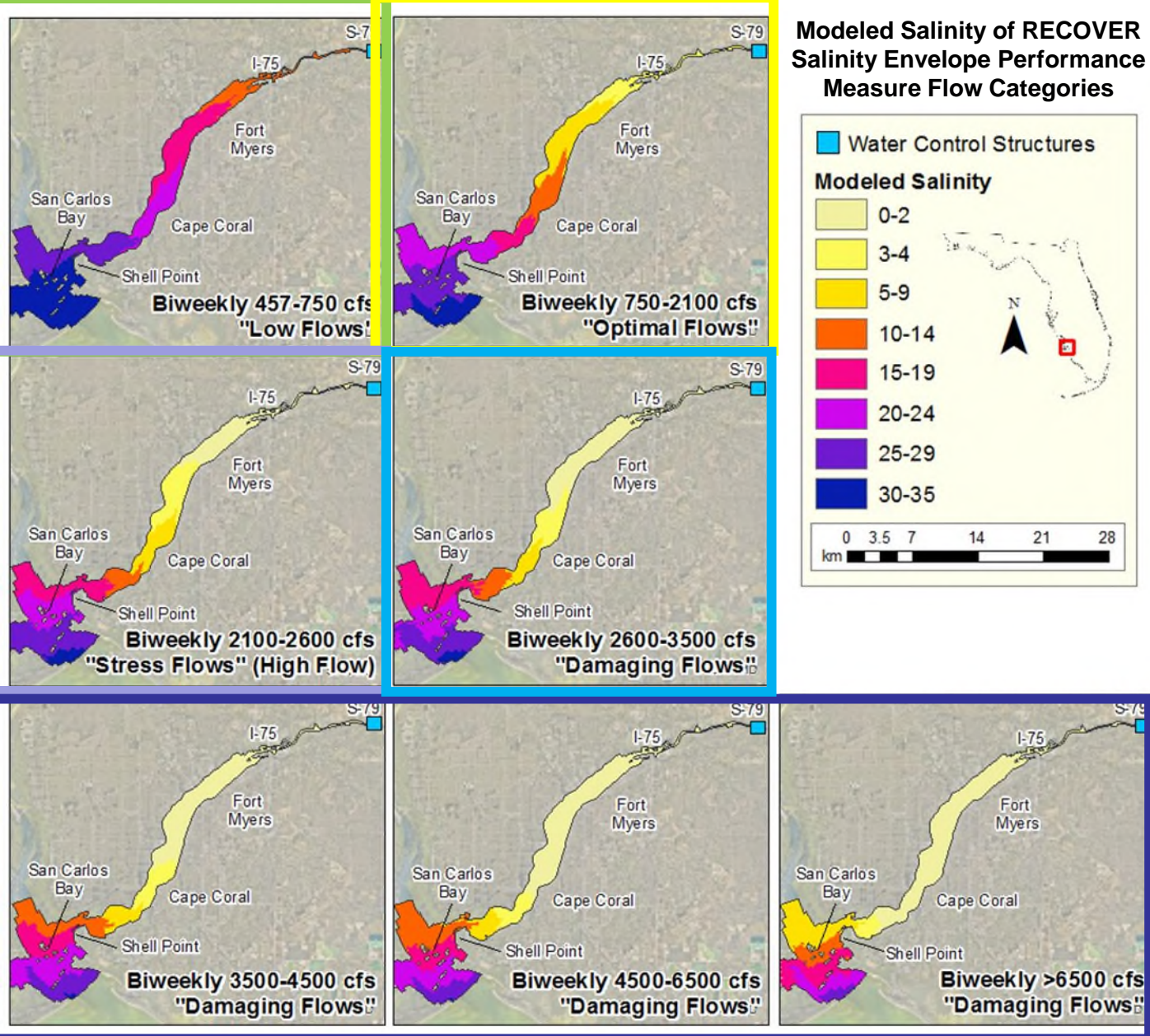


Mesohaline Zone:

- Salinities are good for larval and adult oysters, minimize disease, flows sufficient to allow for larval setting



Caloosahatchee Estuary Salinity Envelope Metrics



No. of Low Flow Events (fewer is better)

- <457 cfs - ECB: **426** / LOCAR (LCR1): **97 (329 fewer)**
- 450-750 cfs - ECB: **240** / LCR1: **514 (274 more)**
- LOCAR improves extreme lows

Optimal Flow Events (more is better)

- ECB: **638** / LCR1: **688 (50 more)**
- LOCAR will benefit overall estuarine gradient for all indicator species more often

Stress Events (LOK-driven) (fewer is better)

- ECB: **77** / LCR1: **42 (35 fewer)**
- LOCAR reduces low salinity impacts to the most upstream oysters around Cape Coral Bridge

Damaging Events >2600 cfs(LOK) (fewer is better)

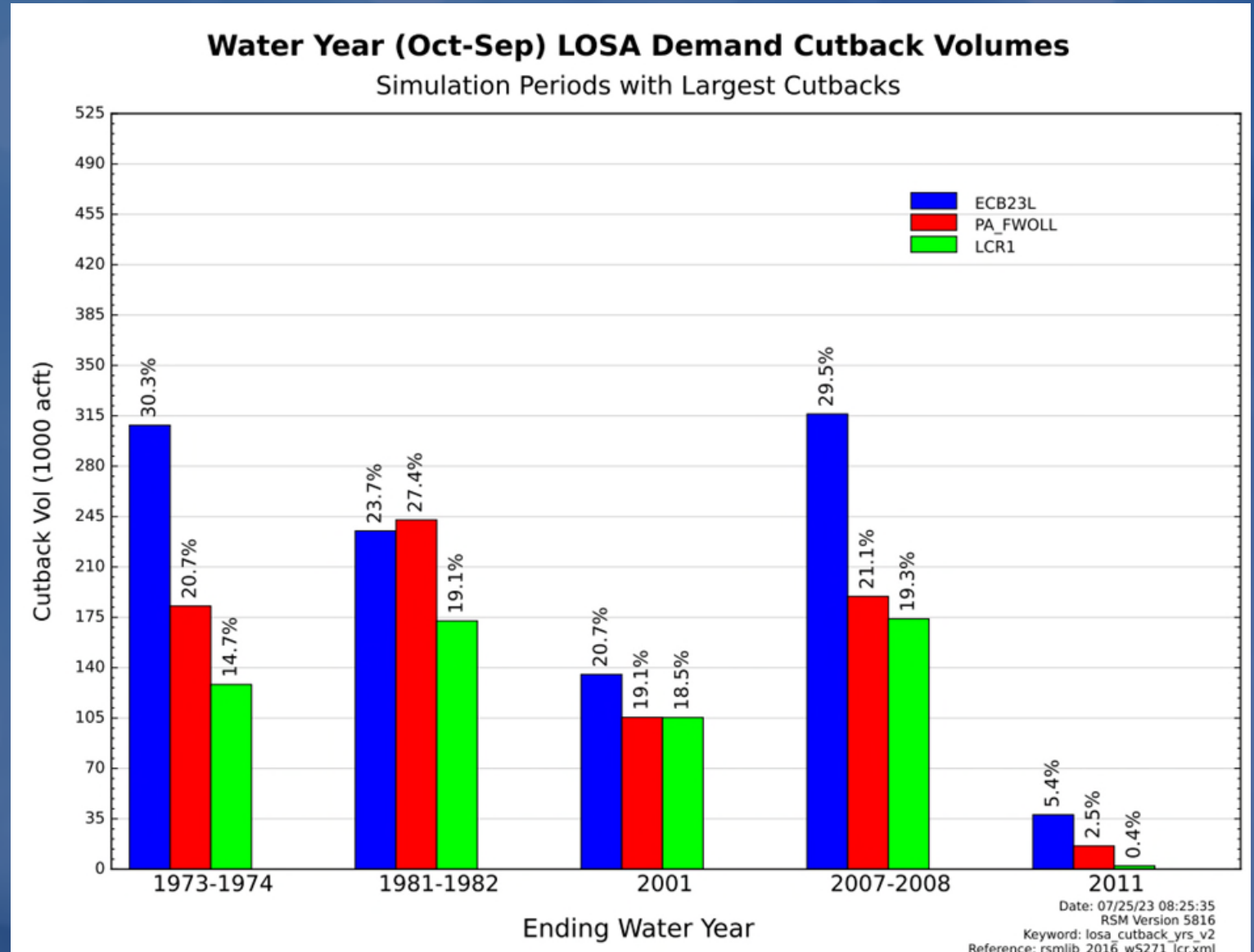
- ECB: **86** / LCR1: **55 (31 fewer)**
- LOCAR reduces Lake O-driven low salinity impacts to oysters in the lower estuary and San Carlos Bay

Damaging Events+ (Total Flow) (fewer is better)

- 2600-4500 cfs - ECB: 241 / LCR1: 179 (62 fewer)
- 4500-6500 cfs - ECB: 105 / LCR1: 75 (30 fewer)
- >6500 cfs - ECB: 84 / LCR1: 64 (20 fewer)

LOCAR Water Supply/Cutbacks

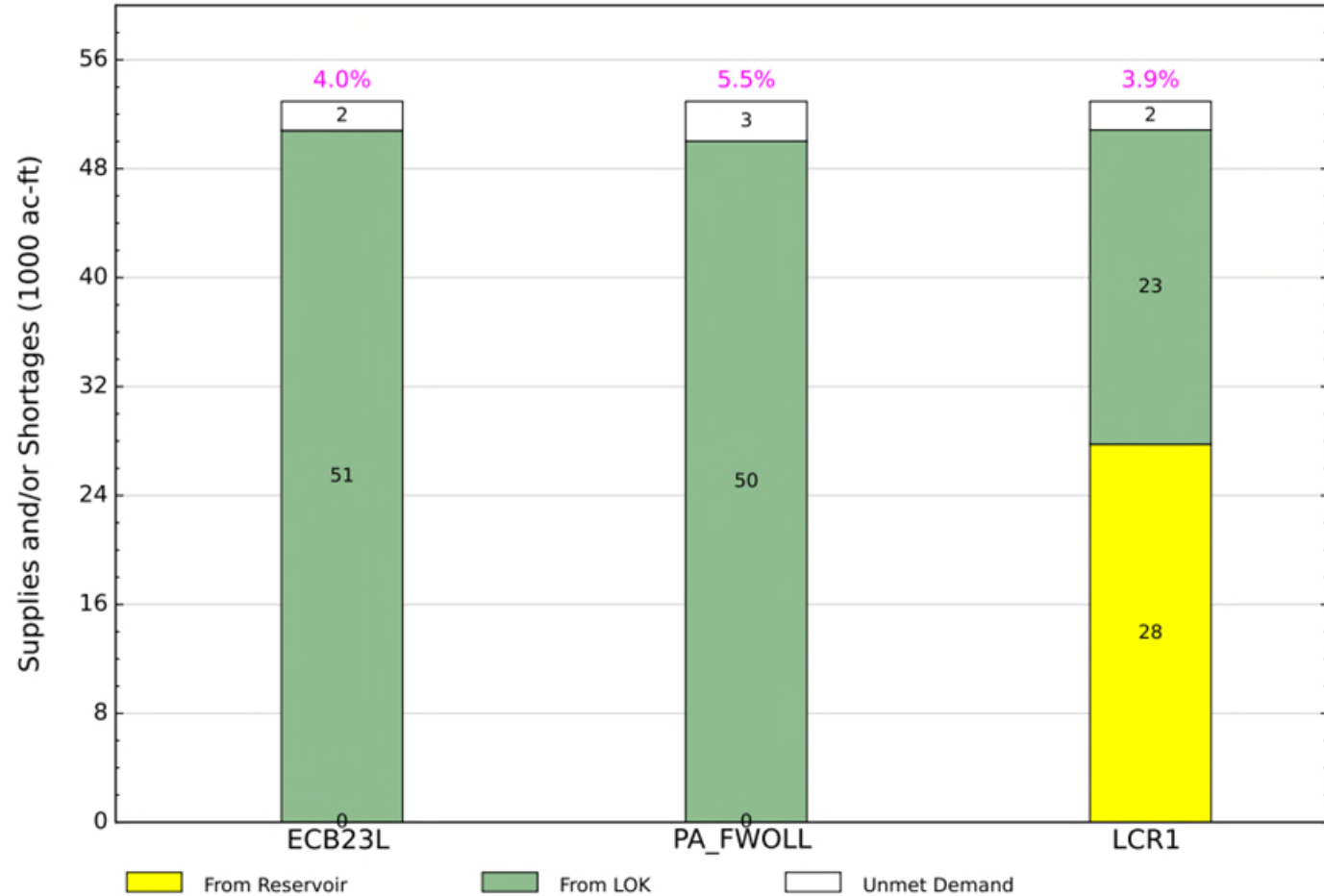
LOCAR alternatives show reduced cutbacks relative to existing conditions and future without



LOCAR Water Supply/Cutbacks Continued

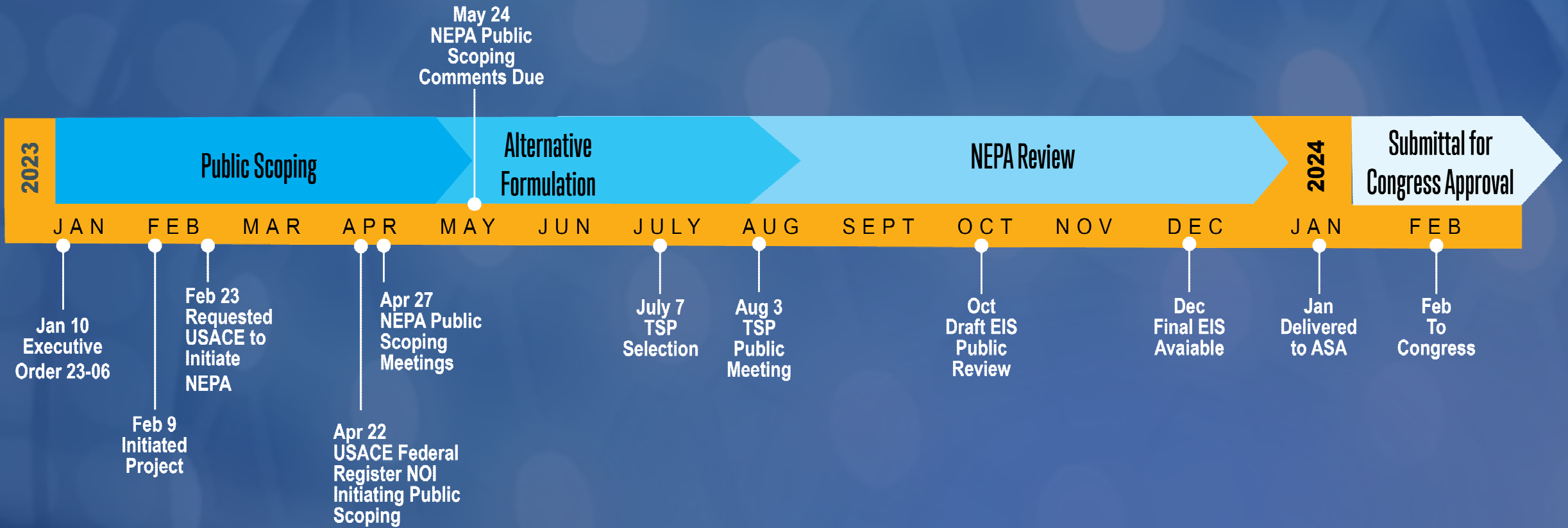
LOCAR alternatives show reduced cutbacks for STOF Brighton relative to LOSOM as well as the “local” availability of water from the reservoir

Annual Average (1965 - 2016) Irrigation Supplies and Shortages For the Seminole Tribe of Florida - Brighton Reservation



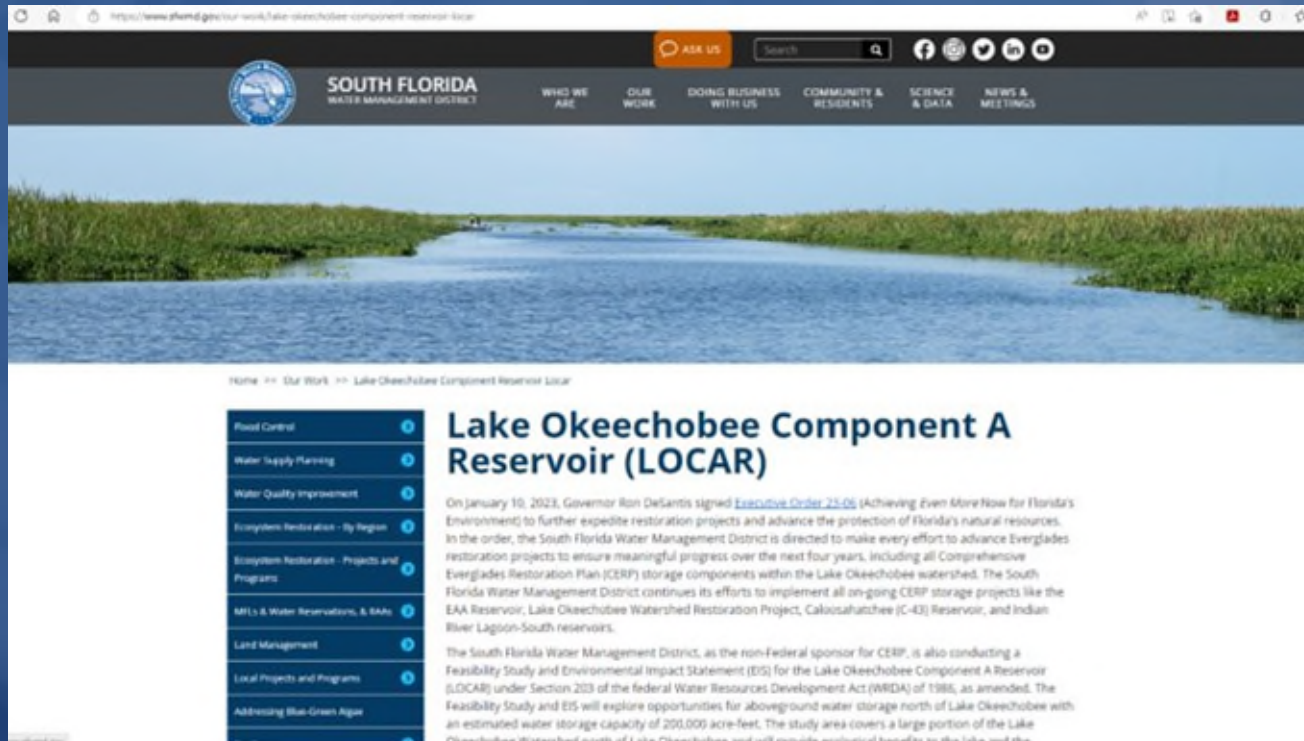
Note: The data on top of each bar represents the percentage of Demand Not Met.

LOCAR Project Timeline



Discussion/Questions

➤ www.sfwmd.gov/LOCAR



➤ Q&A/Public Comment

- Type your question using the Q&A Feature
- If you are participating via Zoom – Use the Raise Hand Feature
- If you are participating via Phone – *9 Raise Hand and *6 Mute/Unmute