South Florida Water Management District
Hydrology & Hydraulics Bureau

Model Documentation Report: Lake Okeechobee Minimum Flows and Minimum Levels (MFL) Recovery Strategy Storage Assessment

RSMBN Simulation **March 6, 2024**

1.0 Overview

Identification

The Lake Okeechobee Minimum Flows and Minimum Water Levels (LOK MFL) were adopted in 2001 and a prevention strategy was simultaneously adopted as a result of modeling analysis conducted at the time. In 2008, the U.S. Army Corps of Engineers (USACE) adopted a new Interim Lake Okeechobee Regulation Schedule (LORS08) to address public health and safety concerns related to the structural integrity of the Herbert Hoover Dike (HHD). Under LORS08 Lake Okeechobee was being managed at a lower level to reflect the risks associated with the status of the HHD, therefore SFWMD deemed LOK to be in "recovery" status and an associated recovery strategy was adopted in 2008. As presented in updates to the Lower East Coast Water Supply Plan, the main capital project of the recovery strategy was USACE's repair of the HHD, where after rehabilitation it was presumed LOK could be managed at a higher level given the reduced risks of HHD failure. In 2019, USACE initiated an update to LORS08 with a revised regulation schedule referred to as the Lake Okeechobee System Operating Manual (LOSOM). This update was initiated in large part based on the projected completion of HHD repairs by 2023. USACE's mandate for LOSOM to balance multiple federal objectives for LOK resulted in only modest improvement in LOK MFL performance. SFWMD's analysis indicates that this improvement was insufficient to consider returning LOK to prevention status and should therefore remain in recovery status. To this end, an updated LOK MFL recovery strategy was developed.

Modeling support to this effort was provided by the Modeling Section of the Hydrology & Hydraulics (H&H) Bureau of the SFWMD. The planning team consisted of staff from the Water Supply Bureau and the H&H Modeling Section of the SFWMD. The focus of this effort seeks to minimize LOK MFL exceedances. The goal of the LOK MFL recovery strategy is to identify MFL recovery plan elements by simulating future SFWMD planned projects. This effort will leverage previous modeling efforts. These models were used to identify plan elements by simulating future (authorized) South Florida Water Management District (SFWMD) projects incrementally shown in **Figure 1.1**. From a formulation perspective, this effort will maintain flow south toward the Everglades consistent with the previously authorized Eveglades Agricultural Area (EAA) Storage Reservoir performance and balance congressionally authorized projects that will: enhance ecology in Lake Okeechobee and northern (St. Lucie & Caloosahatchee) estuaries and improve water supply performance. Lastly, the modeling analysis was used to inform LOK MFL probabilistic modeling.

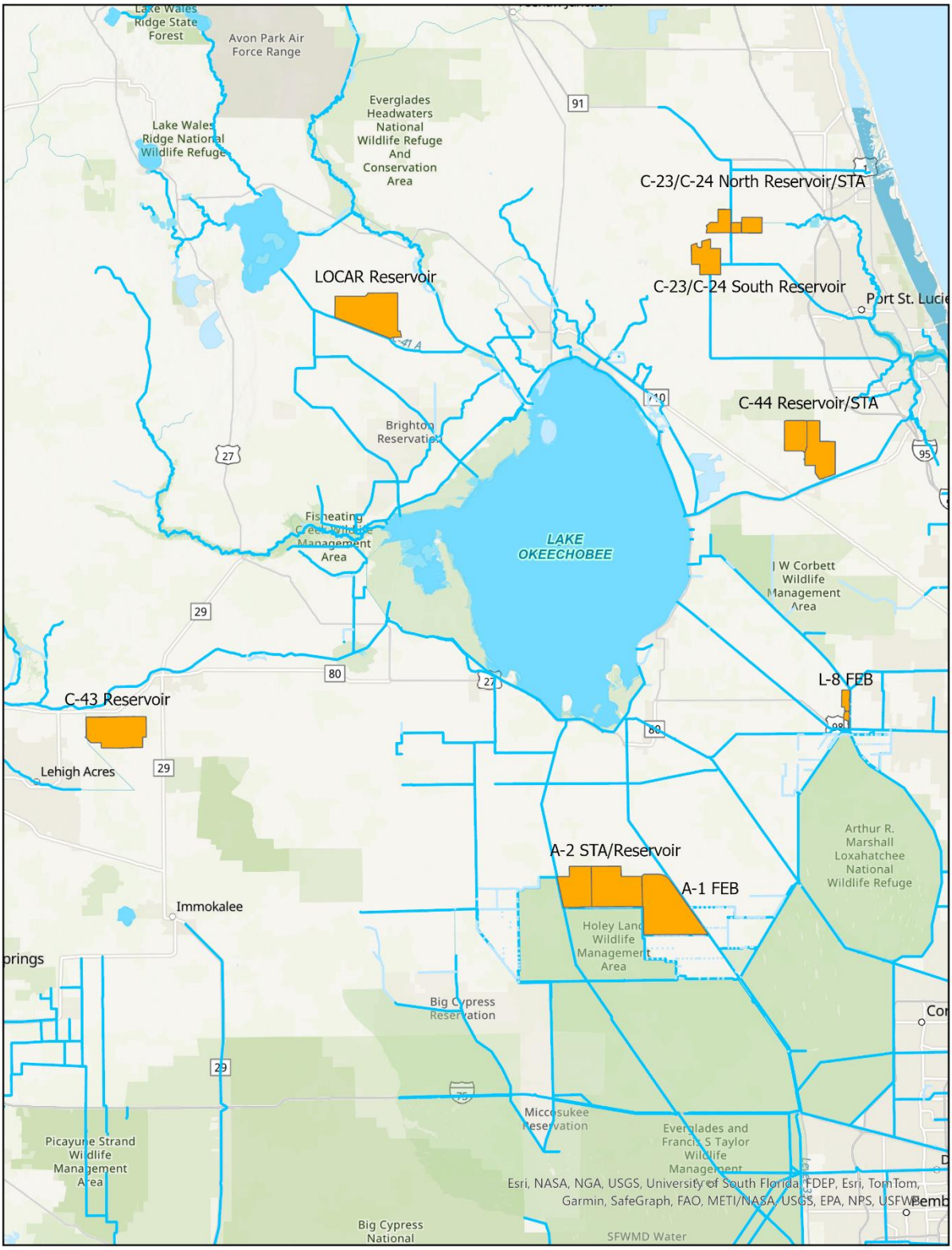


Figure 1.1. LOK MFL study area and project features.

Scope and Objectives

Modeling support for this effort focused on working with SFWMD's Water Suply Bureau to formulate and develop a recovery strategy. The project modeling and plan formulation framework is built upon work already completed as part of other Comprehensive Everglades Restoration Plan (CERP) and South Florida planning efforts and utilizes the same tools and techniques as used by the CERP Interagency Modeling Center (IMC). In particular, the modeling strategy is generally consistent with the parallel planning efforts for the CERP Lake Okeechobee Watershed Restoration Project (LOWRP) (**IMC, 2019**) and the modeling tools and assumptions closely match and leverage work from the recently completed Lake Okeechobee System Operating Manual (LOSOM) (**IMC, 2021a and IMC, 2021b**) and the ongoing Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) Project (**IMC, 2022a**).

The primary model support tool utilized in LOK MFL is the Regional Simulation Model Basins (RSMBN), the same model used to represent this part of the system in planning efforts for LOSOM, the EAA reservoir, LOWRP, etc. Unlike other CERP efforts that also employ the Regional Simulation Model Glades-LECSA (RSMGL) and the Dynamic Model for Stormwater Treatment Areas (DMSTA) models, this project focused on RMSBN application since maintaining flows south is a primary goal of the effort and significant changes to the system south of Lake Okeechobee were not anticipated. This Model Documentation Report (MDR) describes the assumptions, model implementation steps and observed outcomes associated with modeling representations of both the current and future without project condition model scenarios as well as the proposed project alternatives as simulated with the RSMBN. These model runs were predominantly used as a basis of comparison for many of the evaluations performed in support of plan formulation and project assurances assessment. This document will focus on the modeling details of these scenarios.

2.0 Basis

Project Assumptions

This MDR describes the assumptions, model implementation steps, and observed outcomes associated with modeling the following four (4) scenarios:

LOK MFL Recovery Plan Scenarios:

- 2023 Existing Condition (LOSOM)
- Future Condition Increment #1 (EAARES)
- Future Condition Increment #2 (LOCAR)
- Future Condition Increment #3 (ASR55)

The starting point for the LOK MFL modeling was the RSMBN work prepared as part of the IMC BBSEER project support (which heavily leverages the LOSOM project modeling) and utilizes the extended period of record modeling encompassing 1965-2016 climate stressors (**SFWMD, 2021**). The existing conditions scenario attempts to model assumed hydrologic conditions circa 2023 and includes current or imminent system infrastructure assumptions and current or imminent operational practices. The LOK regulation schedule is based on LOSOM Project's Preferred Alternative 2022 (PA22) and Preferred Alternative 2025 (PA25) with schedule modifications to accommodate additional storage features. The future condition increments include, relative to existing conditions, additional representations of planned future project activities, including state, federal and Central Everglades Restoration Project (CERP) projects as shown in **Figure 1.1** and **Table 2.1**. Detailed project assumption tables for the existing condition scenario are consistent with those assumptions made for the parallel CERP BBSEER project and are provided in **Appendix A**.

Table 2.1. Existing conditions and future condition increment descriptions.

Scenario	Description
LOSOM	Existing Condition simulation (ca. 2023)
EAARES	LOSOM + EAA Reservoir + A1 FEB + C-43 Reservoir + IRL South where: EAA Reservoir = A1 FEB + A-2 Reservoir + A-2 STA IRL South = C23/C24 North Reservoir / STA + C-23/C-24 South Reservoir + C-23/C-44 Interconnect
LOCAR	EAARES + LOCAR Reservoir
ASR55	LOCAR + 55 ASR

Each future condition increment scenario attempts to simulate the effect of additional planned storage. This construct enables the Planning Team to determine the effects of storage relative to system performance. Each scenario simulates different storage features with varying spatial locations.

EAARES represents the project implementation for future condition increment #1. It includes features from LOSOM (ECB) and the following: EAA reservoir, A1FEB, C-43 reservoir, and Indian River Lagoon-South (IRL-S). The EAA reservoir project consists of the 60,000 ac-ft A1 flow equalization basin (FEB) and the A2 stormwater treatment area (STA) which has a storage capacity of 240,000 ac-ft (**SFWMD, 2018a** and **SFWMD, 2018b**). The C-43 reservoir has a capacity of 178,600 ac-ft. IRL-S consists of the following features: Ten Mile Creek Reservoir/STA, C-23/C-24 Reservoir (North & South), C-23/C-24 STA and C-23/C-44

Interconnect. The LOK regulation schedule was adapted from LOSOM's Preferred Alternative 2025 (PA25).

LOCAR represents the project implementation for future condition increment #2. This includes all features from EAARES and adds the Lake Okeechobee Component "A" Reservoir (LOCAR) (**SFWMD, 2023**). LOCAR is a 200,000 ac-ft above ground storage reservoir north of LOK in the Indian Prairie watershed. The LOK regulation schedule was adapted from LOSOM's Preferred Alternative 2025 (PA25).

ASR55 represents the project implementation for future condition increment #3. This includes all features from LOCAR and adds 55 aquifer storage and recovery wells (ASR) as contemplated by the Lake Okeechobee Watershed Restoration Project (LOWRP) (**IMC, 2019**). The LOK regulation schedule was adapted from LOSOM's Preferred Alternative 2025 (PA25).

Model Limitations and Intended Use of Results

The primary modeling products were evaluated based on outputs from the Regional Simulation Model (RSM) (**SFWMD, 2005a** and **2005b**). The RSM is a robust and complex regional scale model. Due to the scale of the model, it is frequently necessary to implement abstractions of system infrastructure and operations that will generally mimic the intent and result of the desired project features while not matching the exact mechanism by which these results would be obtained in the real world. Additionally, it is sometimes necessary to work within established paradigms and foundations within the model code (e.g., use available input-driven options to represent more complex project operations). The RSM (**VanZee, 2011** and **SFWMD, 2022**) was reviewed through the USACE validation process for engineering software, as part of CEPP (**USACE, 2014**) and was classified as "allowed for use" for South Florida applications in August 2012.

3.0 Simulation

Modeling Tools Used

RSM version 19376 was used to run the RSMBN model.
Release date 3/5/2024, Source code repository: https://github.com/sfwmd-git/rsm-base.

All scenarios were developed using the RSMBN model. Collectively, the model link-node network covers the spatial extent of the project planning area as shown in **Figure 3.1**. The period of simulation for the model utilizes a climate record from 1965 to 2016.

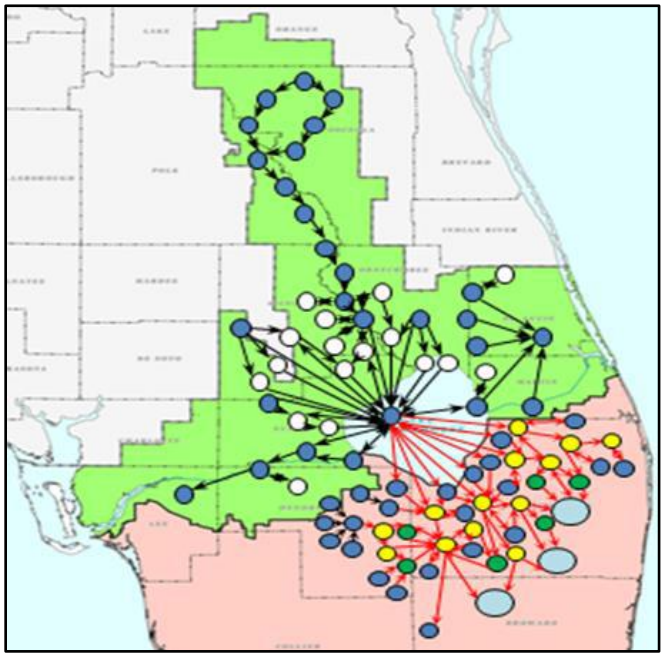


Figure 3.1. RSMBN Model.

The remainder of this section will focus on the project plan formulation of the existing conditions and future condition increment scenarios to describe model implementation. In general, the assumed modeled data sets (e.g., topography, water control districts, etc.) and/or system features (structure operations, etc.) are consistent with the previous planning exercises, unless identified as changed in this section or the assumptions tables in **Appendix A**.

Model Set Up

Within the project area, significant differences exist in the areas north, east, west and south of Lake Okeechobee as well as in the assumed operations for LOK itself. The subsequent sub-sections will explain the modeling setup for each of these areas as assumed in the existing conditions and future condition increment scenarios. Details about project intent can be found in the associated project reports for each effort.

Four (4) scenarios of the Regional Simulation Model Basin (RSMBN) were used to illustrate performance improvements from added storage. Below are basic assumptions for all scenarios:

- Climatic period of record: 1965-2016 (52 years),
- Lake Okeechobee Service Area (LOSA) Basins were updated using consumptive use permit information as of July 2017,
- LOK operation schedule is based on LOSOM-like schedules modified for additional storage,
- C-44 RES/STA operations per TMC Preliminary Operating Plan (SFWMD, June 2015), and
- L-8 FEB is simulated as a 950-acre, ~48,000 ac-ft reservoir with an inflow structure capacity of 3,000 cfs and an outflow pump capacity of 450 cfs; operations as described in the July 2015 L-8 Reservoir and FEB Draft Project Operations manual.
- A-1 FEB is simulated as a 15,853 acre, 60,000 ac-ft reservoir with operations as described in **Appendix A**.

3.1 LOSOM Scenario

Lake Okeechobee Operations

Overall, all scenarios utilize assumptions that are very similar to the recent LOSOM Project study and models the preferred alternative's LOSOM schedule as its assumption of current Lake Okeechobee Operations. This is consistent with assumptions in made in the parallel BBSEER CERP planning effort. The as-modeled LOSOM Project assumptions are shown in **Figure 3.1.1**. In the downstream Everglades Agricultural Area, the future condition increment scenarios assume the presence of existing central flowpath Stormwater Treatment Areas and the A1 Flow Equalization Basin (A1FEB, additional detail on the infrastructure assumed is shown below). The CERP A2STA, is assumed to be operational in all future condition increment scenarios.

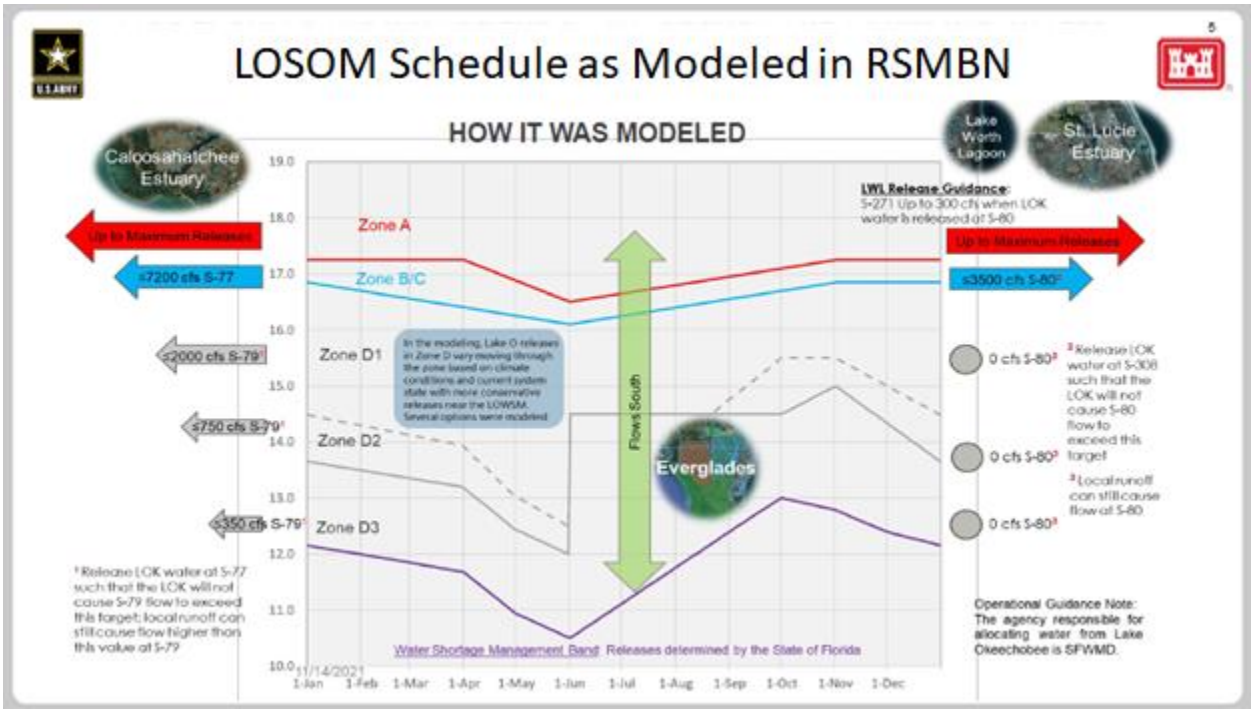


Figure 3.1.1. LOSOM Schedule simulated in all scenarios.

Kissimmee River Restoration

Several projects seek to improve the water resource management and ecosystem performance for the Kissimmee River and the Upper Chain of Lakes (**SFWMD, 2007**). In response to the Kissimmee River Restoration (KRR) Environmental Assessment (EA), hydrologic changes from implementing the Headwaters Revitalization Schedule (HRS) were simulated by RSMBN using the following assumptions for operations at S-65 moving from existing to future condition increment scenarios (**Neidrauer, 2020**).

Modification to the Lake Kissimmee regulation schedule moving from the current interim operations in existing conditions scenario as seen in **Figure 3.1.2** to the full headwaters revitalization schedule for all future condition increment scenarios as shown in **Figure 3.1.3**. All scenarios include full Kissimmee River Restoration as shown in **Figure 3.1.4**.

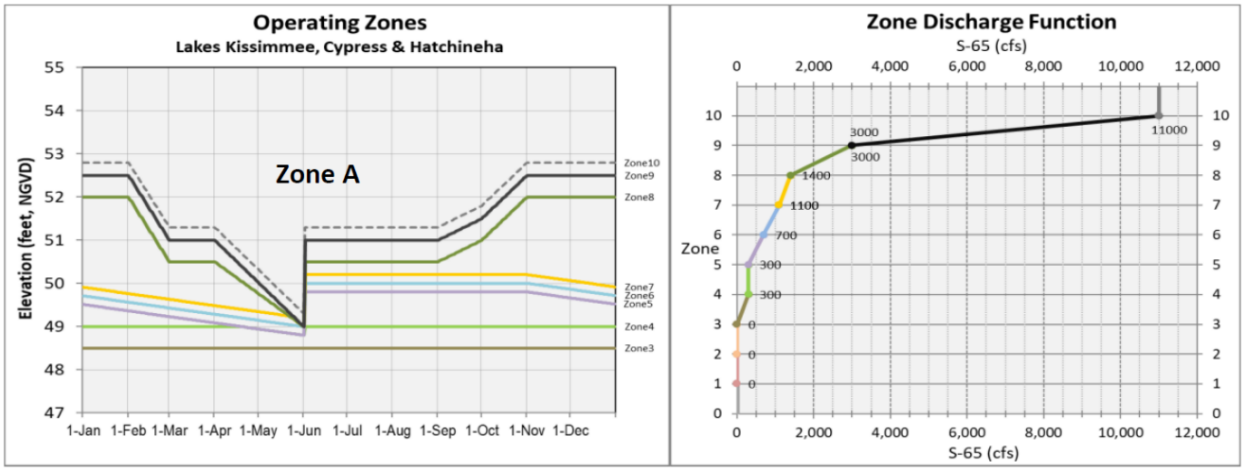


Figure 3.1.2. Lake Kissimmee Regulation Schedule for releases at S65 for existing condition scenario.

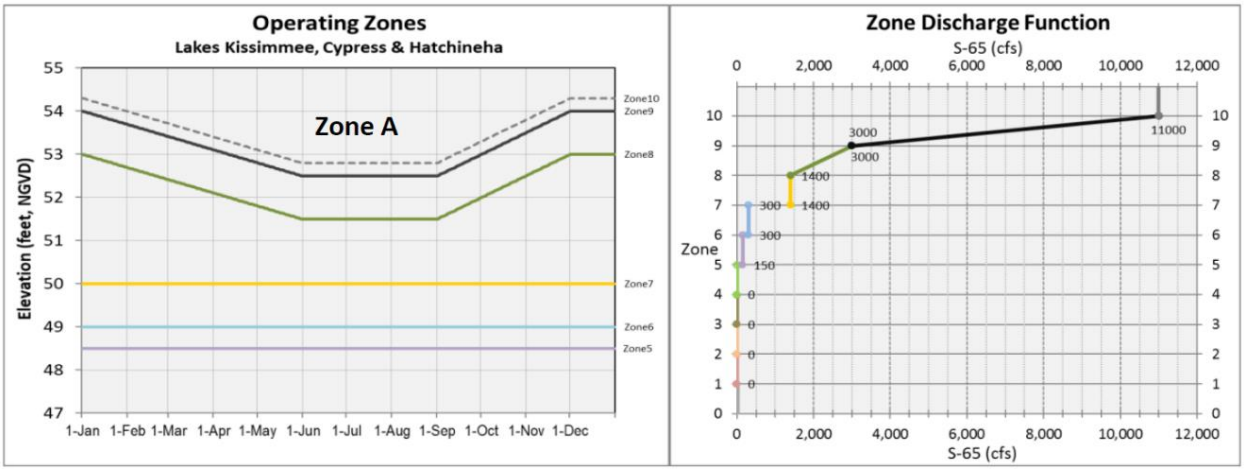
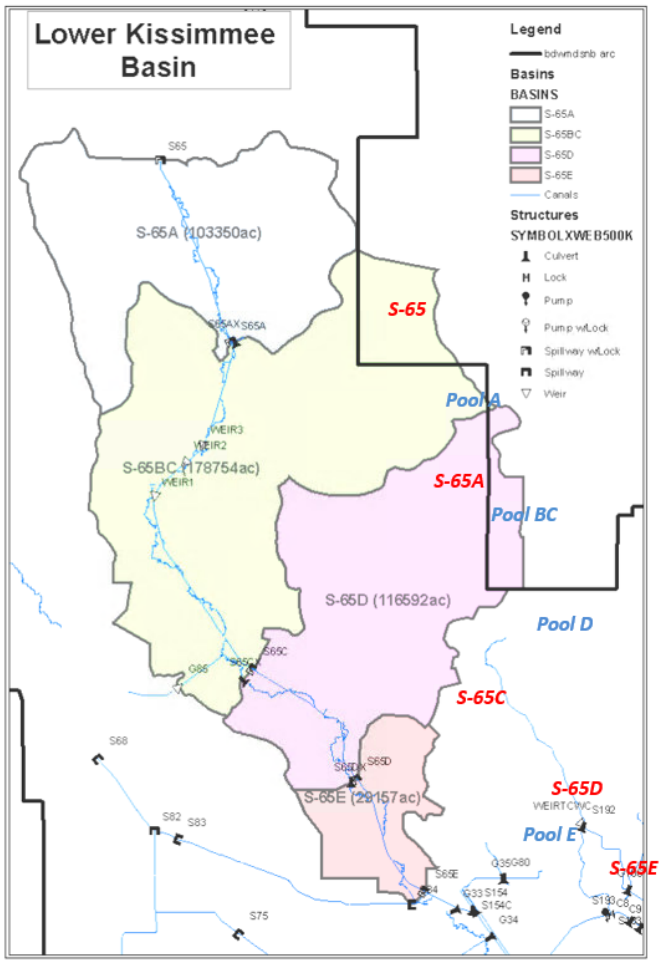


Figure 3.1.3. Lake Kissimmee Regulation Schedule for releases at S65 for future condition scenario.



All Scenarios

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

Figure 3.1.4. Kissimmee River Restoration as assumed in all scenarios.

3.2 EAARES Scenario

EAA Reservoir
All future condition increment scenarios include the EAA Reservoir. It assumes the following (see **Figure 3.2.1** for approximate component locations):

A 240,000 ac-ft storage reservoir located on 10,100 acre effective footprint (A2 RES) located north of Holey Land Wildlife Management Area and assumed operations as follows:

- A2 RES inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south (up to ~ 4ft buffer depth from full level to allow attenuation of peak EAA runoff events).
- Work in conjunction with the A2STA – a treatment facility having an effective area of 6,550 acre, receiving outflow from the A2 RES and discharging to lower Miami Canal.
- A2 RES outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at A1FEB, STA-3/4, STA-2N, STA-2S and A2STA if EAA basin runoff and LOK regulatory discharge are not sufficient.

- 0.5 ft minimum depth below which no releases are allowed.
- 23.5 ft maximum depth above which inflows are discontinued.
- Inflows at the reservoir inflow pump station are assumed to convey up to 3,000 cfs from the Miami Canal and 1,500 cfs from the North New River (NNR) Canal (combined basin runoff and LOK water); inflow to the EAA reservoir can also be made from the existing G370 and G372 pump stations up to a 6.0 ft depth.
- Supplemental irrigation demands in the Miami and NNR/Hillsboro agricultural basins can be met from the reservoir when reservoir depths exceed 8.2 feet.

A 15,853-acre Flow Equalization Basin (A1 FEB) located north of STA-3/4 with assumed operations as follows:

- A1 FEB inflows are from the A2 RES and are consistent with established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas). A1 FEB inflows are limited to 500 cfs when depths are above 2.5 ft.
- A1 FEB outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at STA-3/4, STA-2N, and STA-2S if EAA basin runoff and LOK regulatory discharge are not sufficient.
- 0.5 ft minimum depth below which no releases are allowed.
- 3.8 ft maximum depth above which inflows are discontinued.
- Assumed inlet structure of 1,500 cfs capacity from A2 RES for modeling purposes.

Figure 3.2.1. A2STA and A1FEB in EAARES scenario.

The operations of the assumed EAA reservoir and FEB features are LOSOM Project based.

C-43 Phase 1 Reservoir

All future scenarios include the C-43 Basin Storage Reservoir – Part 1. Its purpose is to improve the timing, quantity, and quality of freshwater flows to the Caloosahatchee River estuary. **Figures 3.2.2** and **3.2.3** show the model configuration for the existing condition scenario (no reservoir) and all future condition increment scenarios (with reservoir), respectively:

- Storage capacity: 175,800 acre-feet
- Maximum footprint: 9,379 acres
- Inflow, capacity 1,500 cfs, modeled as pump; destination: C-43 Reservoir
- Outflow, capacity 1,200 cfs modeled as pump; destination: C-43 Canal
- Operates based on "dynamic" inflow and release protocols as developed in parallel with LOSOM (**IMC, 2021b**)
- Can divert Lake Okeechobee regulatory releases into storage.

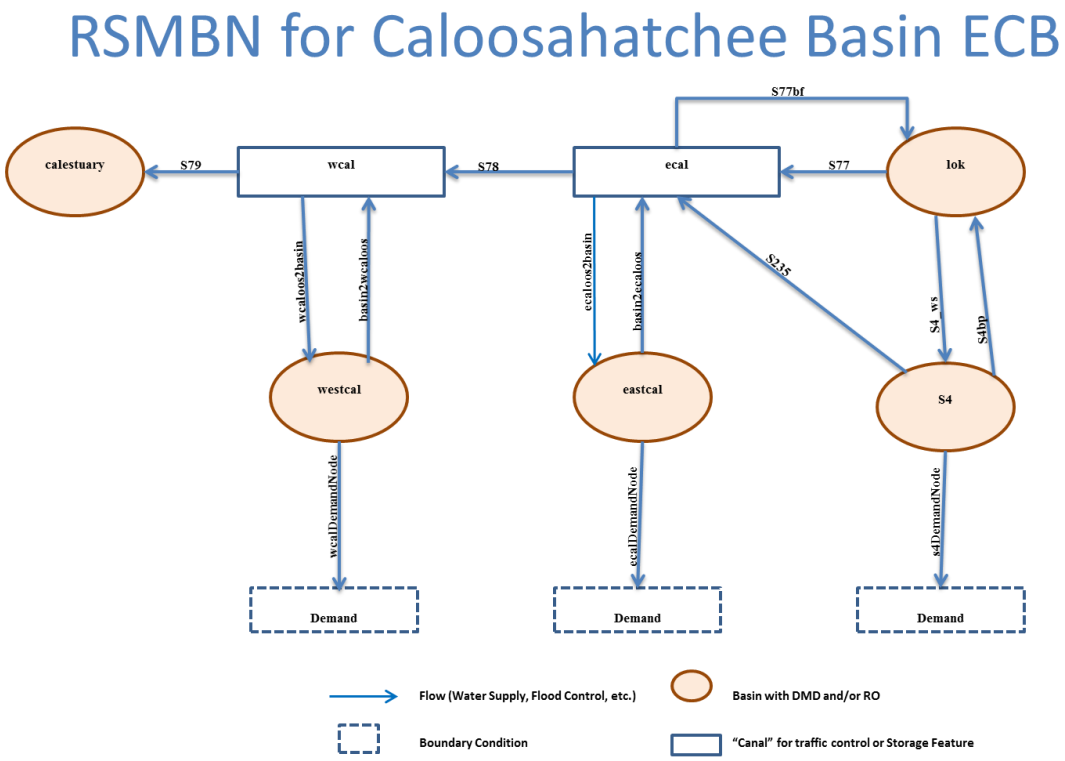


Figure 3.2.2. C-43 Basin and Reservoir routing for the existing condition scenario.

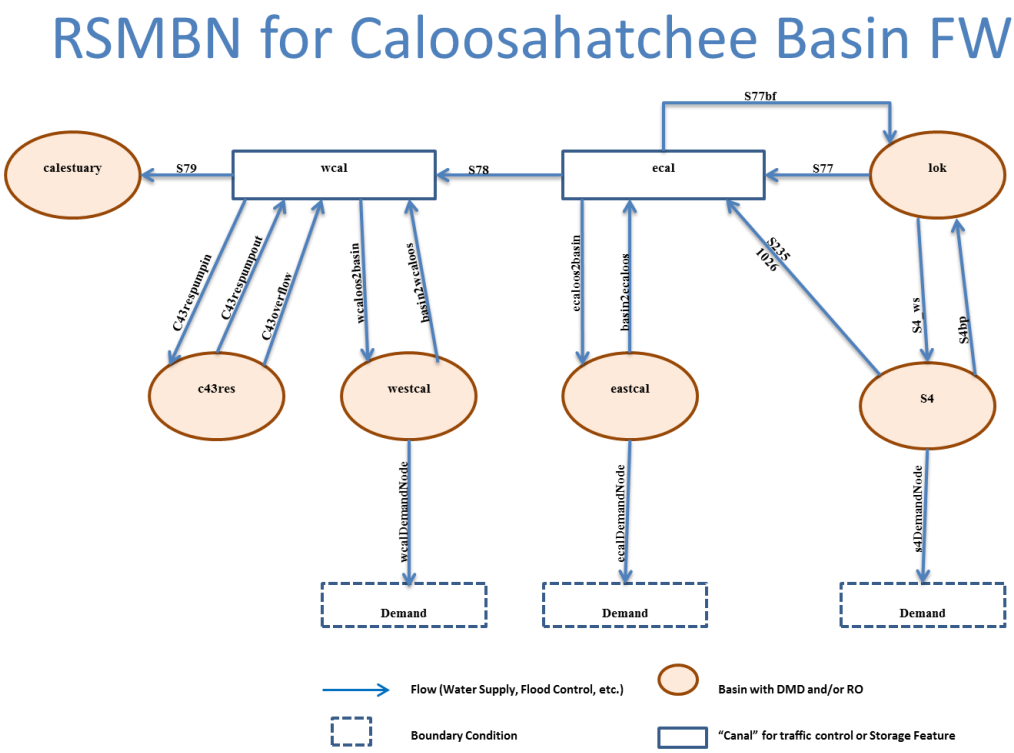


Figure 3.2.3. C-43 Basin and Reservoir routing for all future condition scenarios.

Indian River Lagoon-South

All future scenarios include the IRL South projects. The purpose of the IRL South and Ten Mile Creek projects is to improve surface-water management in the C-23/C-24, C-25, and C-44 basins for habitat improvement in the Saint Lucie River Estuary and southern portions of the Indian River Lagoon**.** The existing conditions configuration is shown in **Figure 3.2.4**. All future scenarios are consistent with the latest IRL-S design & operations modeling (**IMC, 2022b**) is shown in **Figure 3.2.5**. Additional details for the modeled features are consistent with latest CERP Indian River Lagoon – South DDRs that update the authorized 2004 PIR and include:

2023 Existing Conditions Scenario Features:

C-44 Reservoir and STA

- Storage capacity: 50,246 acre-feet
- Footprint: 12,125 acres (assumed 9700 effective acres / 80%)
- Inlet: 1,060 cfs capacity, modeled as pump; source: C-44 Basin
- Inlet: 250 cfs capacity, modeled as pump; source: C-23 Basin
- Outlet: 550 cfs capacity, modeled as pump; destination: C44 Basin
- Cannot divert Lake Okeechobee regulatory releases into storage, but runoff diverted is credited as contributing to Lake Okeechobee regulatory targets identified at S-80.
- Basin demands can be met by project features.

Ten Mile Creek Reservoir and STA

- Storage capacity: 7,078 acre-feet
- Footprint: 820 acres (assumed 656 effective acres / 80%)

- Inlet: 360 cfs capacity, modeled as pump; source: TMC Basin
- Outlet: 200 cfs capacity, modeled as pump; destination: TMC Basin

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Future Condition Increment Scenario Features (Includes existing conditions scenario Plus):

C-44 Reservoir and STA

- Water in the C-44 reservoir is discharged and allowed to backflow to Lake Okeechobee when Lake stages are below 14.5 ft, consistent with the CEPP TSP operation. Environmental targets for the St Lucie Estuary are met from the reservoir prior to implementing this operation. C-44 basin backflow.

C-23/C-24 Reservoir & STA

- Storage capacity: 90,492 acre-feet
- Footprint: North Reservoir = 2,005 acres, South Reservoir = 3,537 acres
- Inlet & Outlet Routing per **Figure 3.2.5**.

C23/C24 STA

- Storage capacity: 3852 acre-feet
- Footprint: 3,323 acres (assumed 2568 effective acres / 80%)
- Inlet: 200 cfs capacity, modeled as pump; source: C-23/C-24 Reservoir
- Outlet: 200 cfs capacity, modeled as pump; destination: TMC Basin

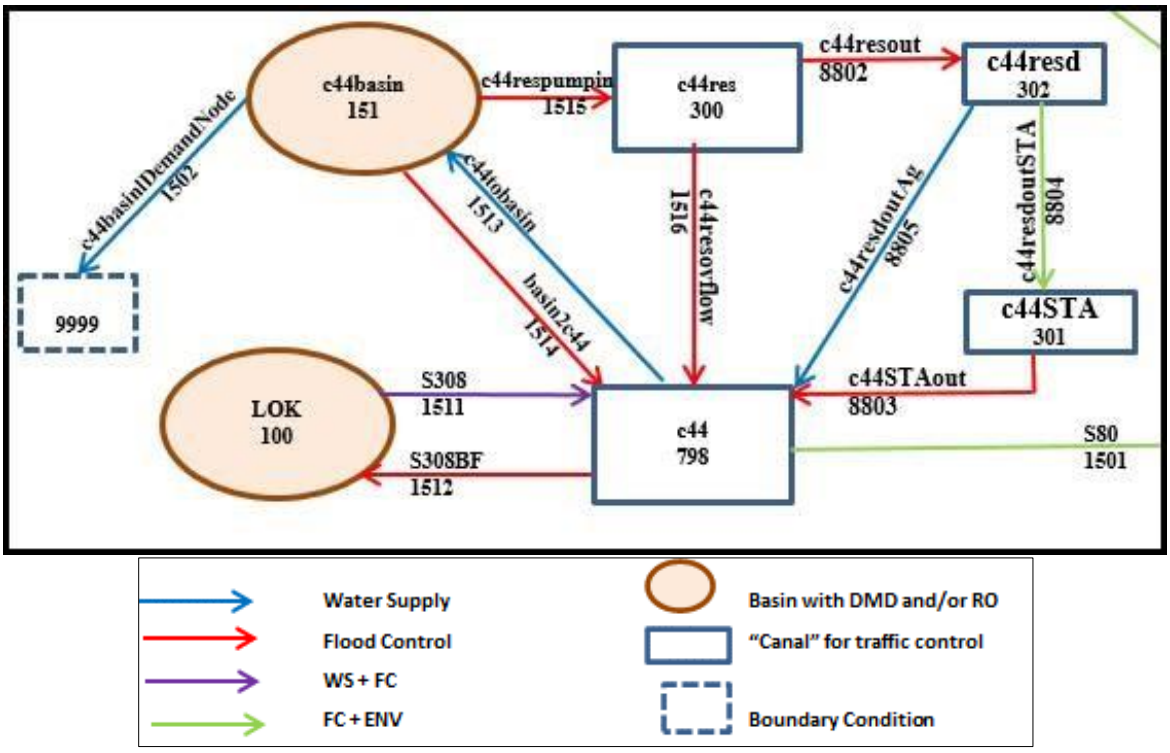

Figure 3.2.4. Schematic Representation of C-44 Reservoir & STA Implementation in the exiting conditions scenario.

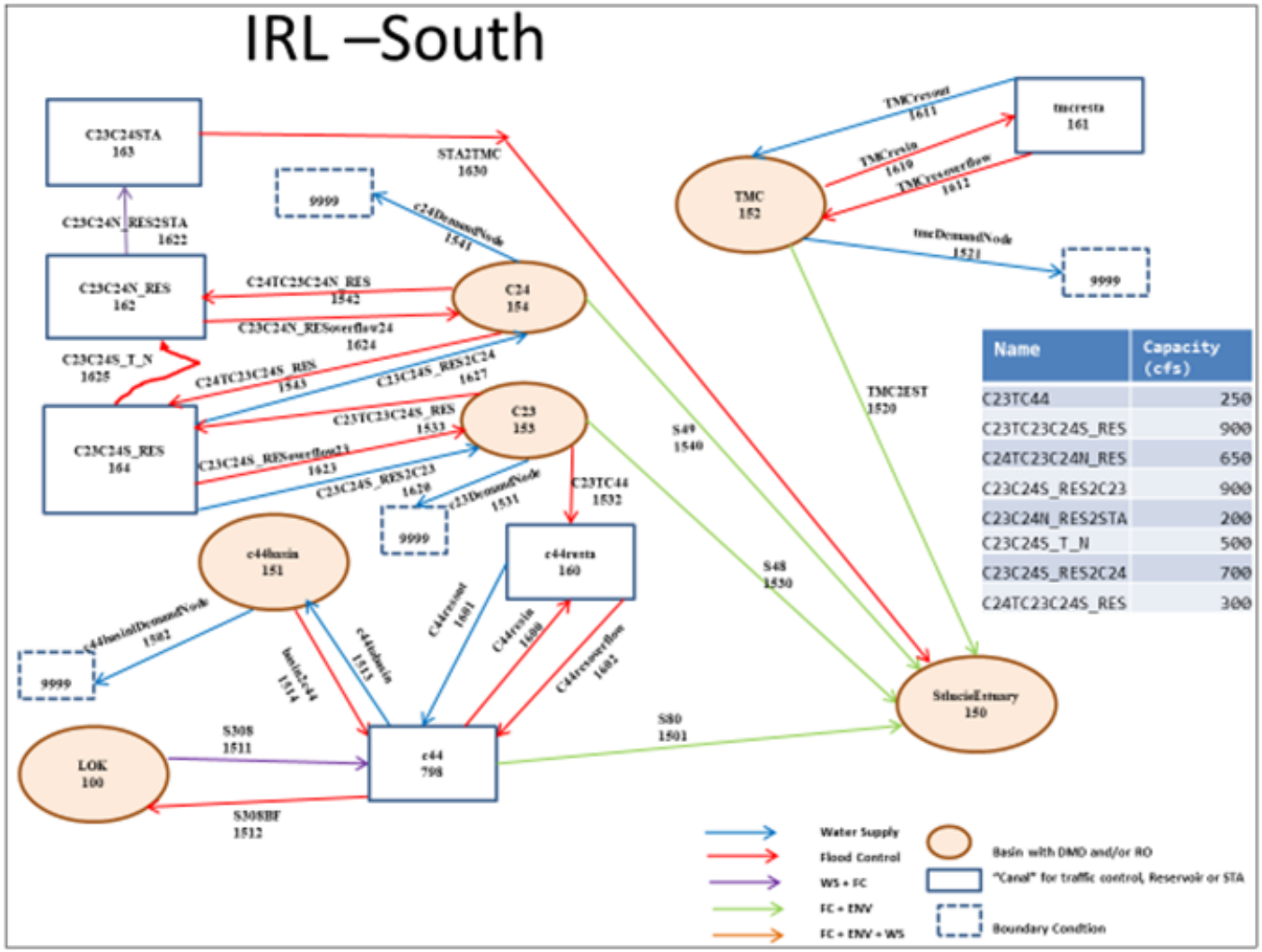

Figure 3.2.5. Schematic Representation of Full IRL-S Implementation in future scenarios (note C-44ressta implemented like existing conditions scenario with additional internal complexity not shown).

3.3 LOCAR Scenario

The future condition increment scenario LOCAR consists of a 200,000 acre-ft above ground storage reservoir located in the Indian Prairie basin between canal C-41A and the Kissimmee River/C-38 (**Figure 3.3.1**).

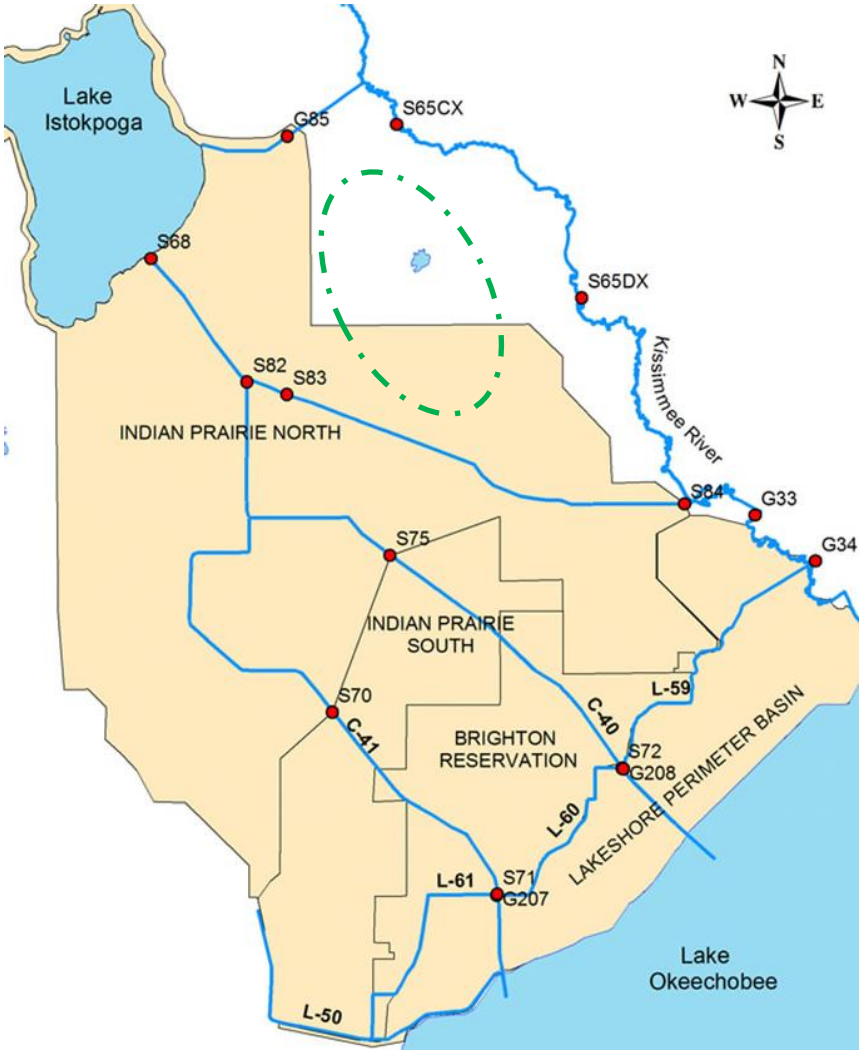

Figure 3.3.1. Project location of LOCAR 200,000 acre-ft above ground storage reservoir.

To improve the means to evaluate proposed effects of the above ground storage reservoir to flood control, water supply and environmental needs in the Indian Prairie Basin, the RSMBN conceptualization was refined. A detailed description of its implementation and simulation can be found in the LOCAR MDR (**SFWMD, 2023**).

3.4 ASR55 Scenario

The future condition increment scenario ASR55 has 55 ASR wells connected to Lake Okeechobee with no above ground reservoirs. This configuration represents ASR features and operations as contemplated during the LOWRP (**IMC, 2019**). It is important to note that

regional ASR siting is not yet determined. As planned, 34 ASR wells are located in the Upper Floridan Aquifer (UFA) with a 70% recovery efficiency and 21 ASR wells in the Avon Park Permeable Zone (APPZ) aquifer with a 30% recovery efficiency (**Figure 3.4.1**). Detailed descriptions of operations are in the LOWPR MDR (**IMC, 2019**).

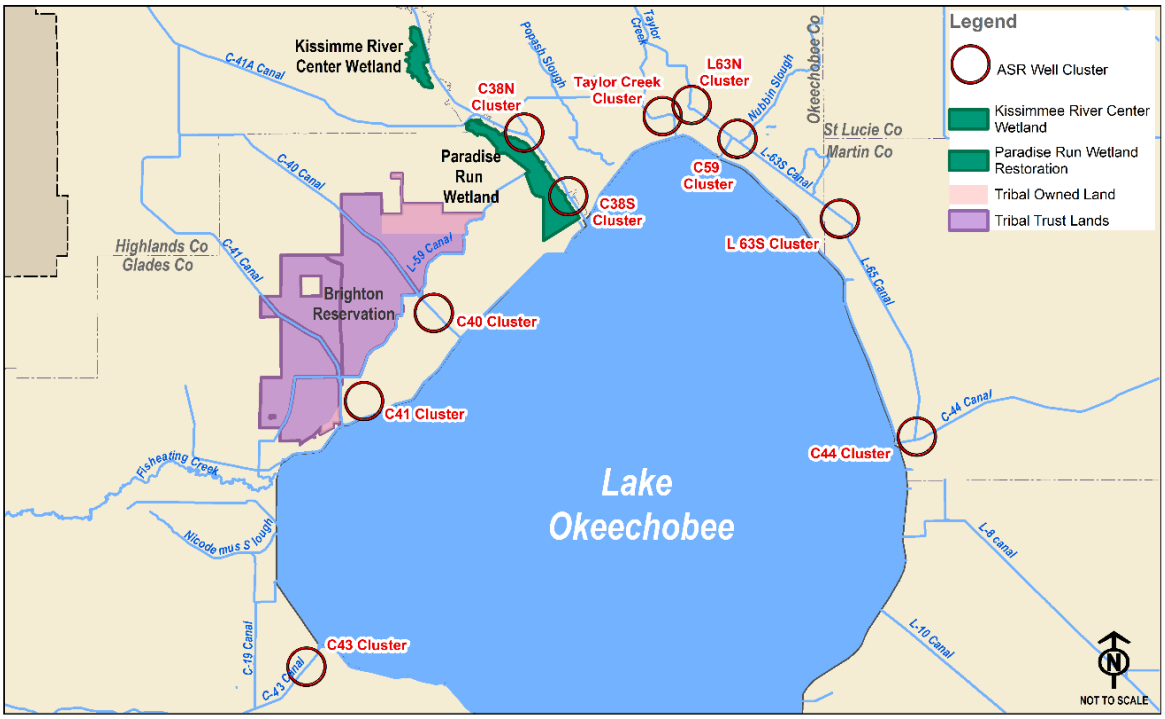

Figure 3.4.1. Proposed ASR well cluster locations for ASR55 scenarios.

Other 1st and 2nd Generation CERP and Foundation Projects

A number of other projects in the South Florida area are assumed to be implemented in the period of time between the existing conditions scenario (LOSOM) and future condition increment scenarios (EAARES, LOCAR and ASR55) and are fully cataloged in the model assumption tables.

4.0 Results

To illustrate the changes associated with the addition of storage, four (4) scenarios were developed and shown in **Table 4.1**. It is important to note each scenario is built upon the previous.

Table 4.1. Existing conditions and future condition increment descriptions.

Scenario	Description
LOSOM	Existing Condition simulation (ca. 2023)
EAARES	LOSOM + EAA Reservoir + A1 FEB + C-43 Reservoir + IRL South
LOCAR	EAARES + LOCAR (200 k-ac-ft above ground storage reservoir north of LOK)
ASR55	LOCAR + 55 ASR wells

The RSMBN modeling scenarios were reviewed from the perspective of ensuring that localized effects of project implementations were observed as expected and that regional performance was considered reasonable. Specific checks on RSM outputs included the following:

- Lake Okeechobee performance relative to existing conditions and future condition increments are shown in **Figures 4.1** through **4.3**. The figures show Lake Okeechobee stage duration, stage envelope upper/lower penalties and percent time within envelope. In general, these outcomes illustrate that added water management features improve performance within Lake Okeechobee.
- Mean annual food control releases from Lake Okeechobee are shown in **Figure 4.4**. These graphics illustrate flows south are maintained once the EAA Reservoir is added and the differences in regulatory releases east & west for all scenarios.
- Lake Okeechobee minimum flow and level (MFL) exceedances are shown in **Figure 4.5**. This shows that added water management features has the potential to reduce MFL counts within Lake Okeechobee.
- Lake triggered events relative to existing conditions and future condition increments are shown in **Figures 4.6** and **4.7**. The figures illustrate low, optimum, high, and damaging flow events. In addition, the high and damaging events are further discretized into Lake Okeechobee and basin events. The differences in performance reflect the addition of storage in each scenario and perform as expected.
- LOSA and Tribal water supply relative to existing conditions and future condition increments are shown in **Figures 4.8, 4.9, 4.10** and **4.11**. **Figure 4.8** illustrates largest events for the Lake Okeechobee Service Area (LOSA) demand cutback volumes. **Figure 4.9** illustrates EAA/LOSA supplemental irrigation demands and demands not met. **Figures 4.10** and **4.11** show annual average irrigation supplies and shortages for the Seminole Tribe at Brighton and Big Cypress reservations. The differences in demand cutback volumes and shortages reflect the addition of storage in each scenario and perform as expected.

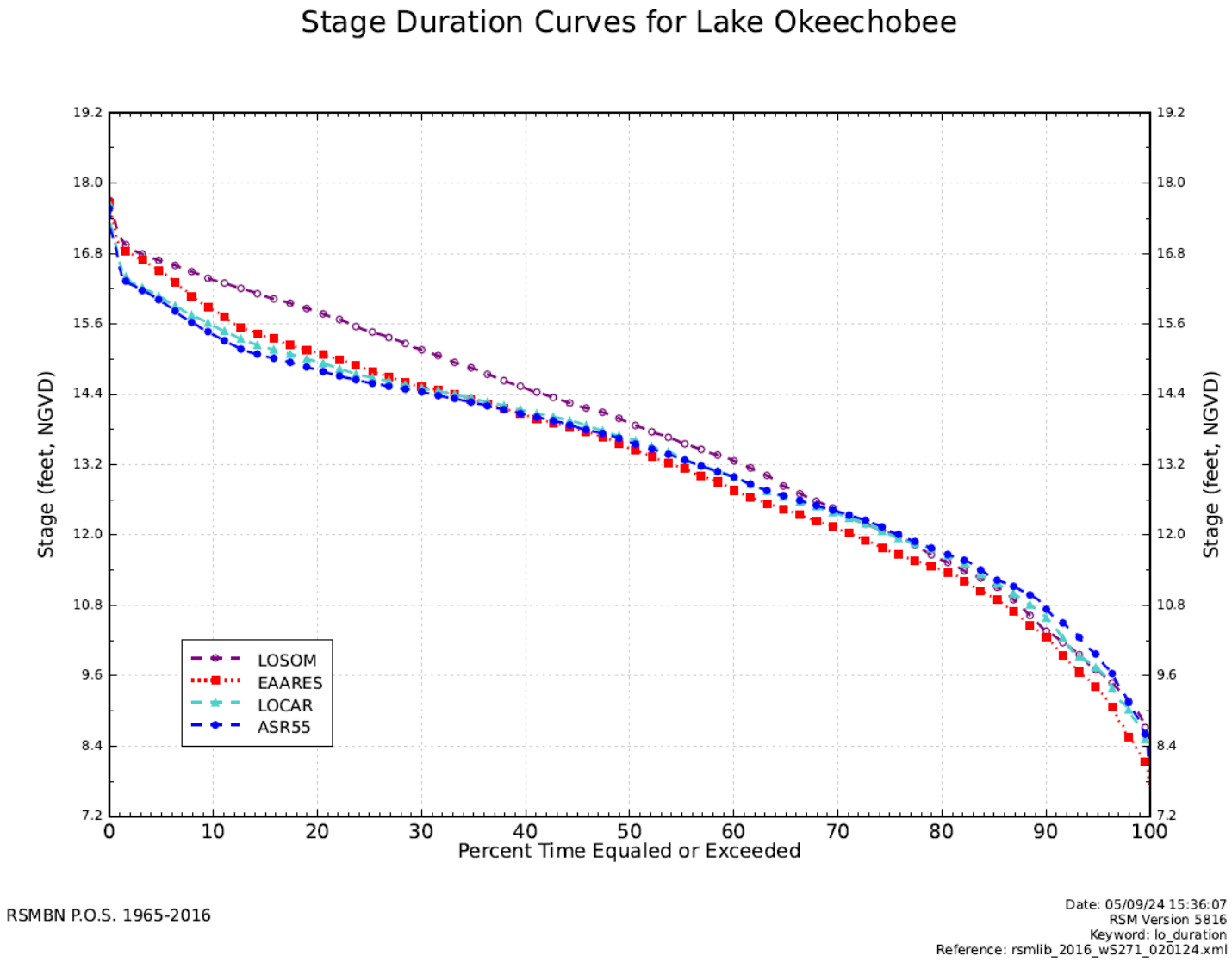

Figure 4.1. Lake Okeechobee stage duration curve comparing all scenarios.

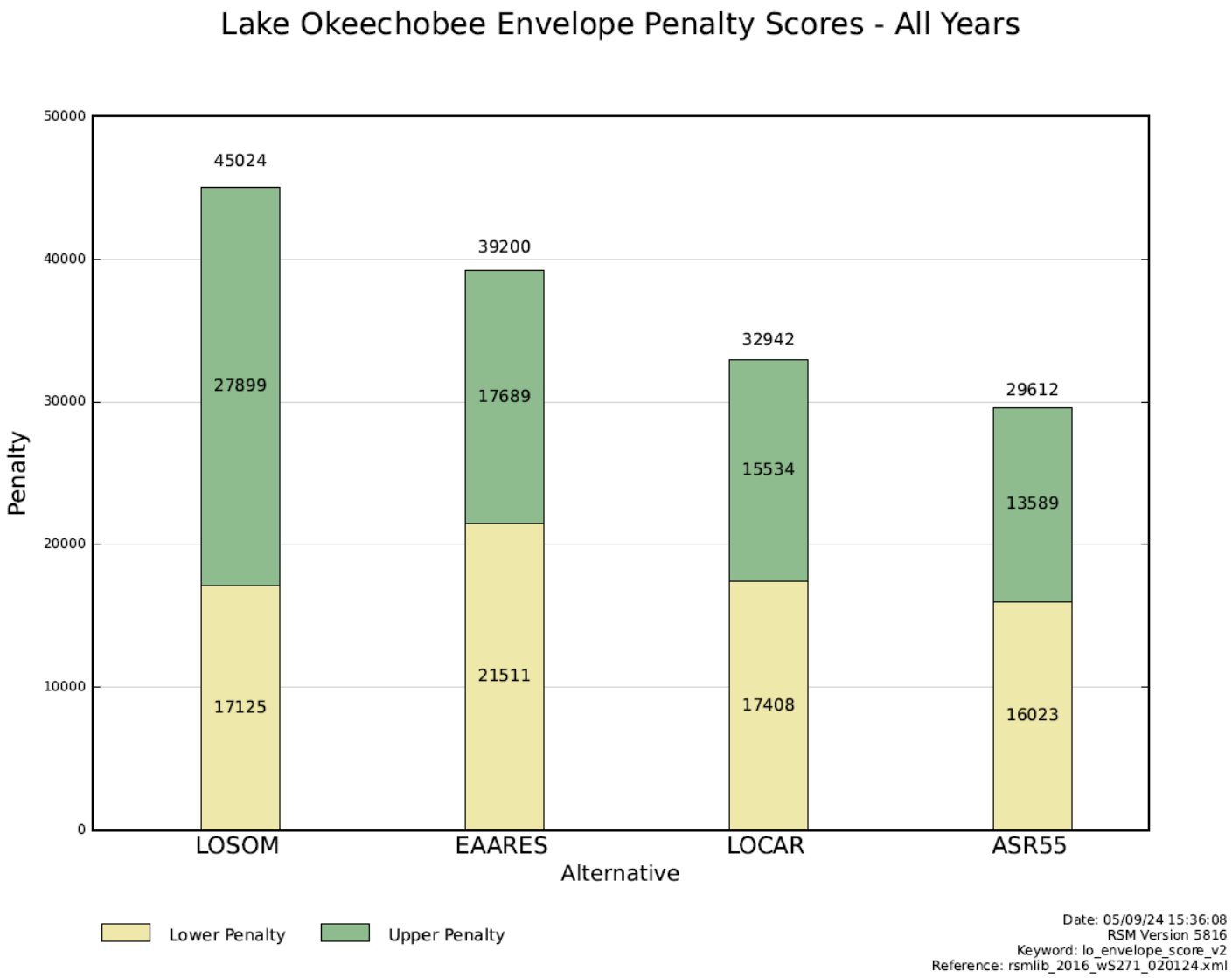

Figure 4.2. Lake Okeechobee stage envelope upper and lower penalties comparing all scenarios.

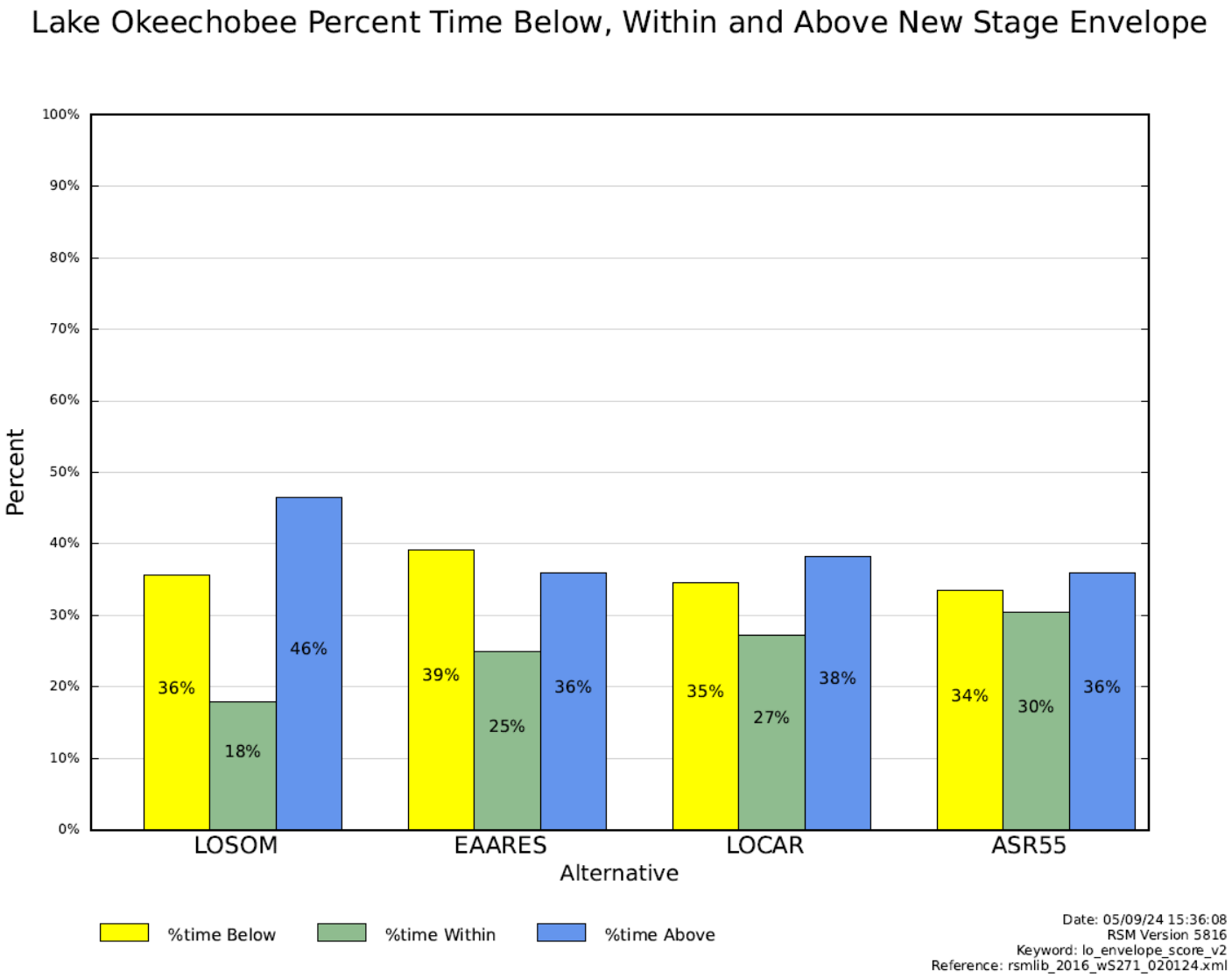

Figure 4.3. Lake Okeechobee stage envelope comparing all scenarios.

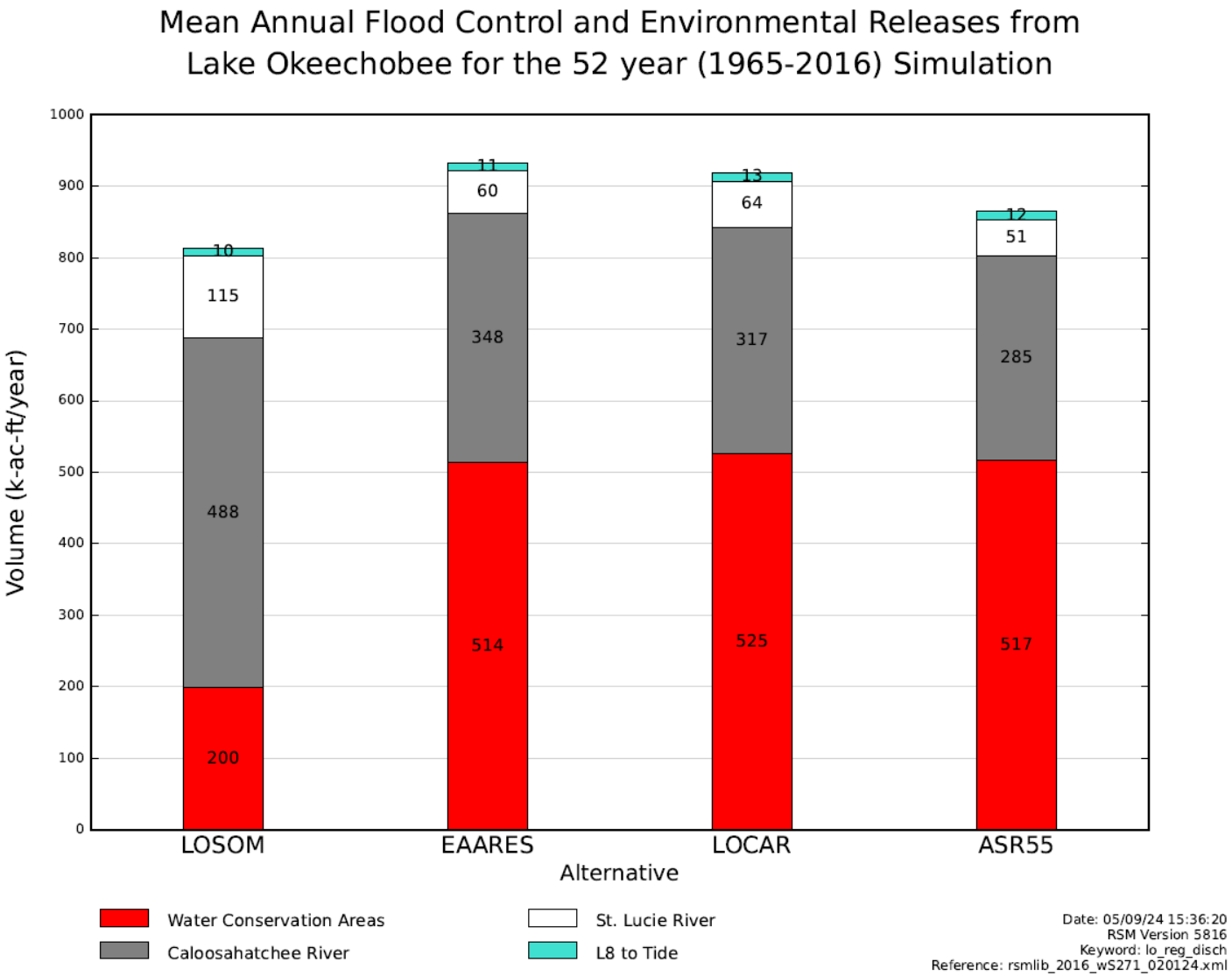

Figure 4.4. Lake Okeechobee mean annual flood control release comparison for all scenarios.

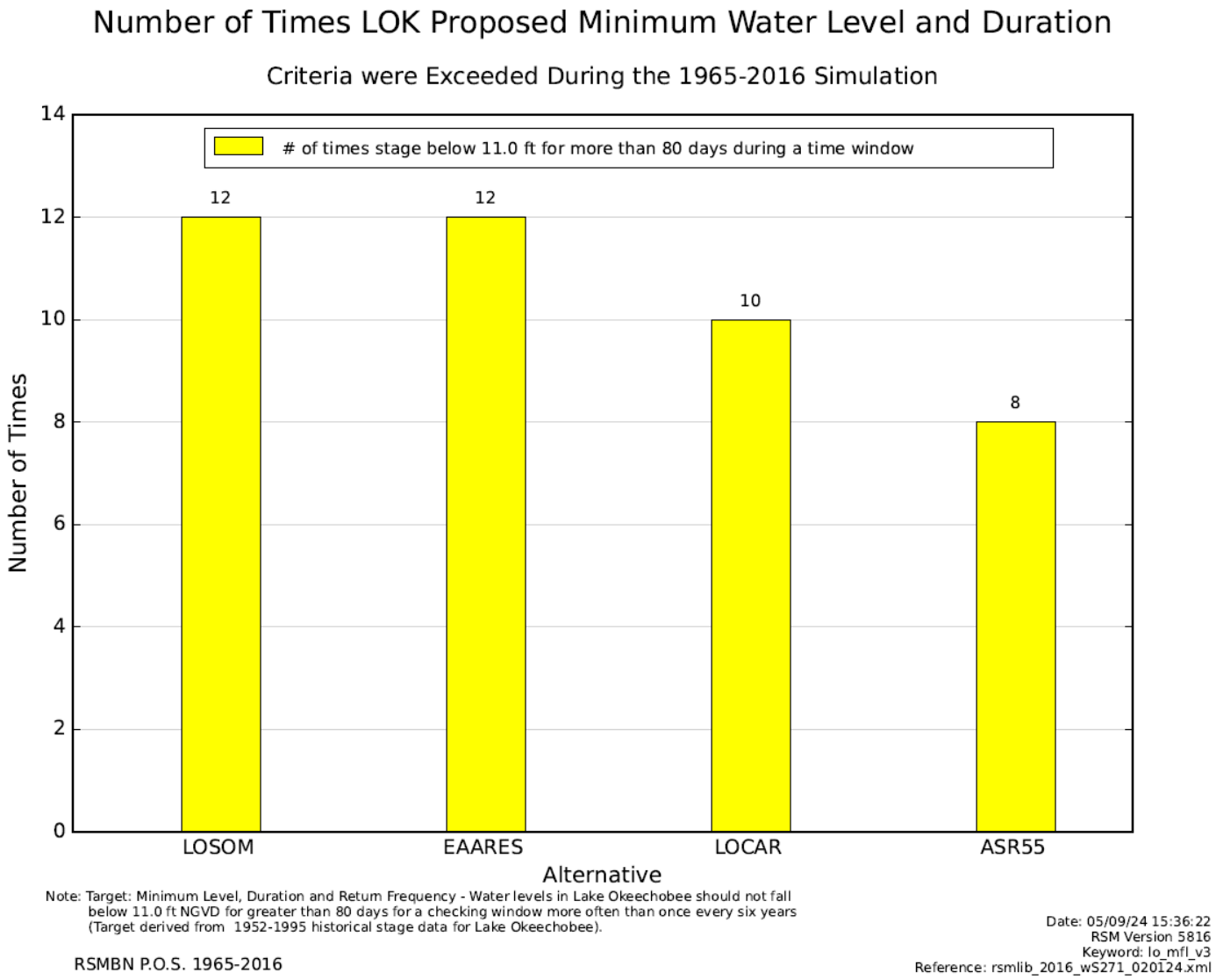

Figure 4.5. Lake Okeechobee minimum flow and level exceedance comparison for all scenarios.

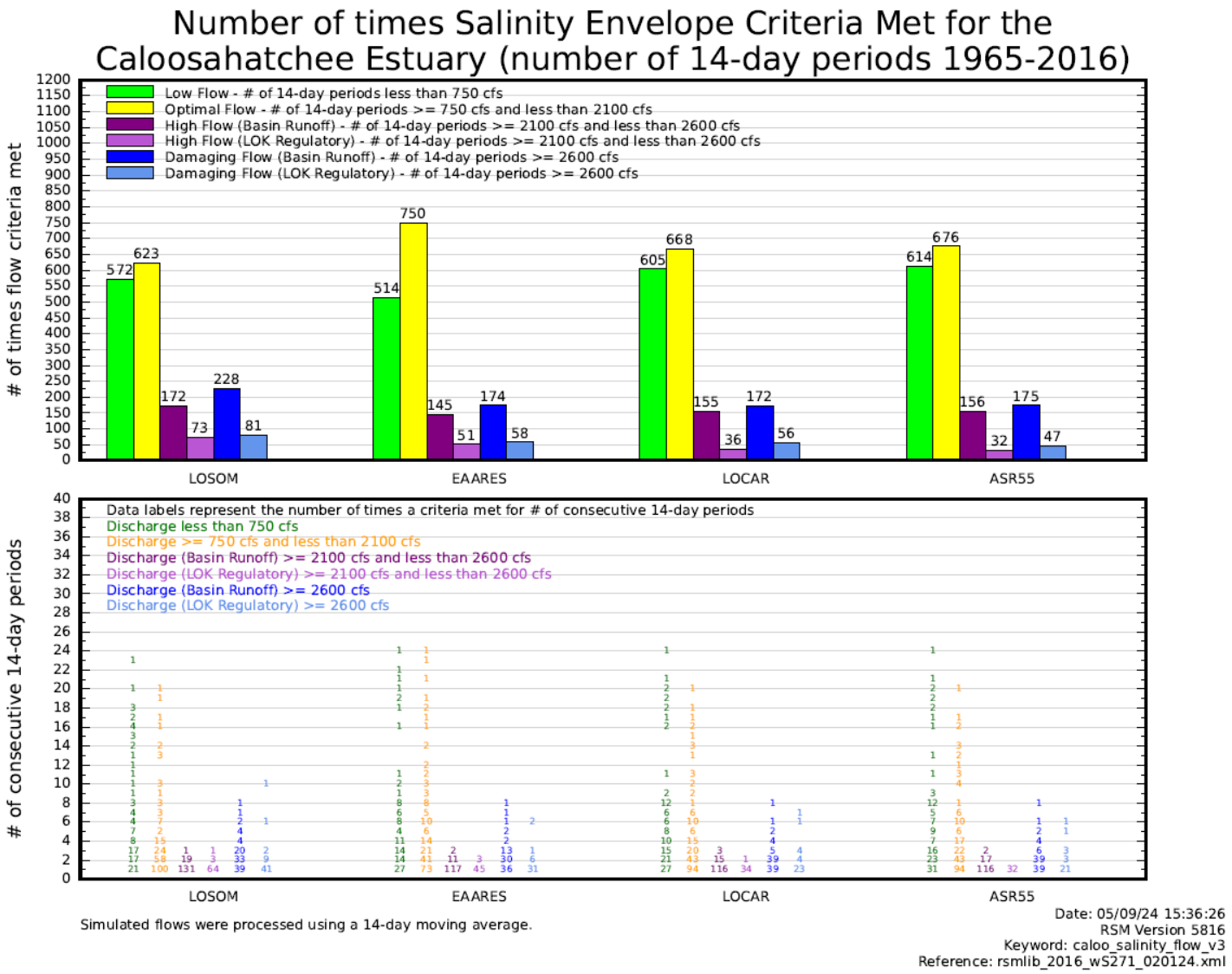

Figure 4.6. Salinity envelope criteria for Caloosahatchee River Estuary comparing all scenarios.

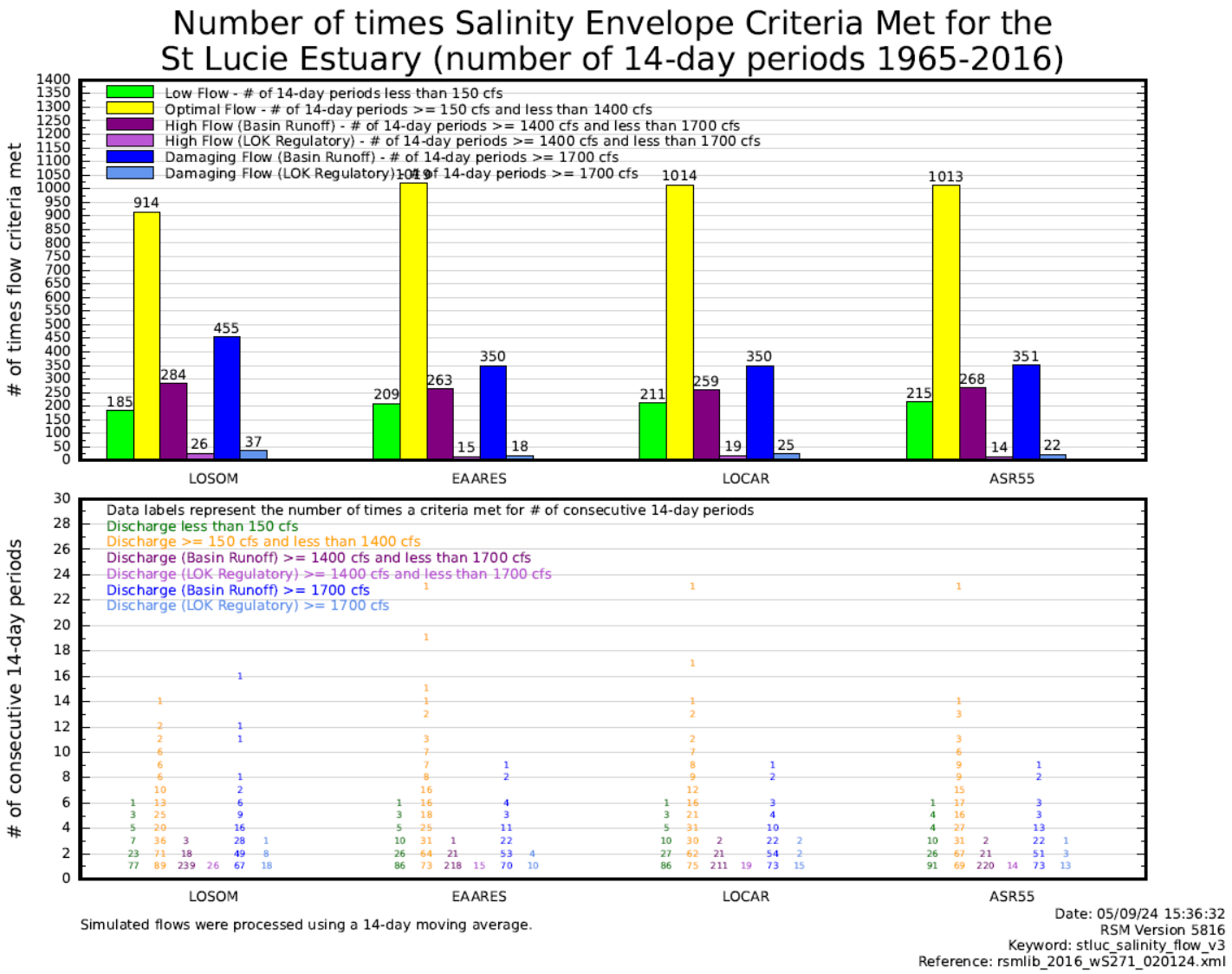

Figure 4.7. Salinity envelope criteria for St Lucie Estuary comparing all scenarios.

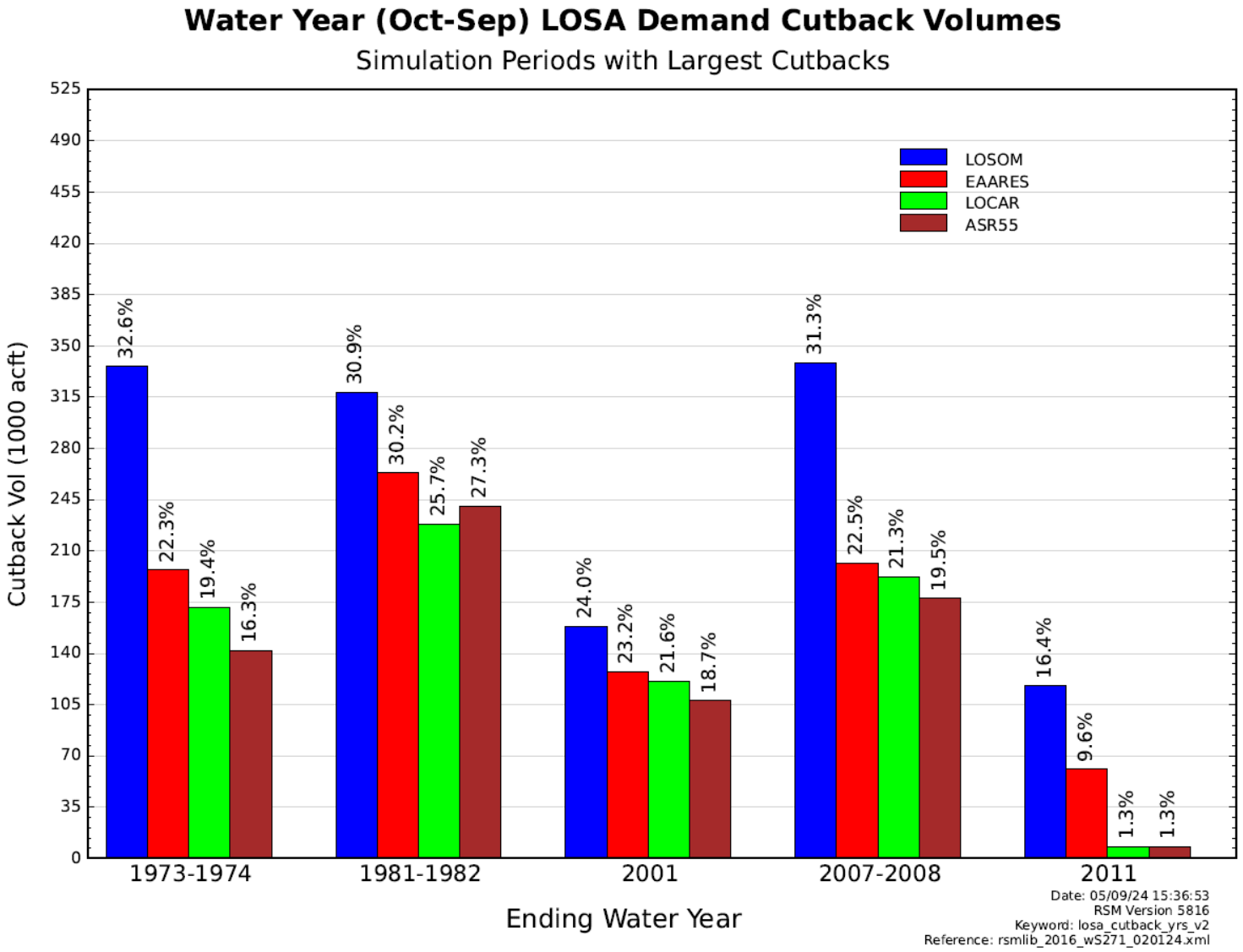

Figure 4.8. LOSA demand cutback volumes for drought events comparing all scenarios.

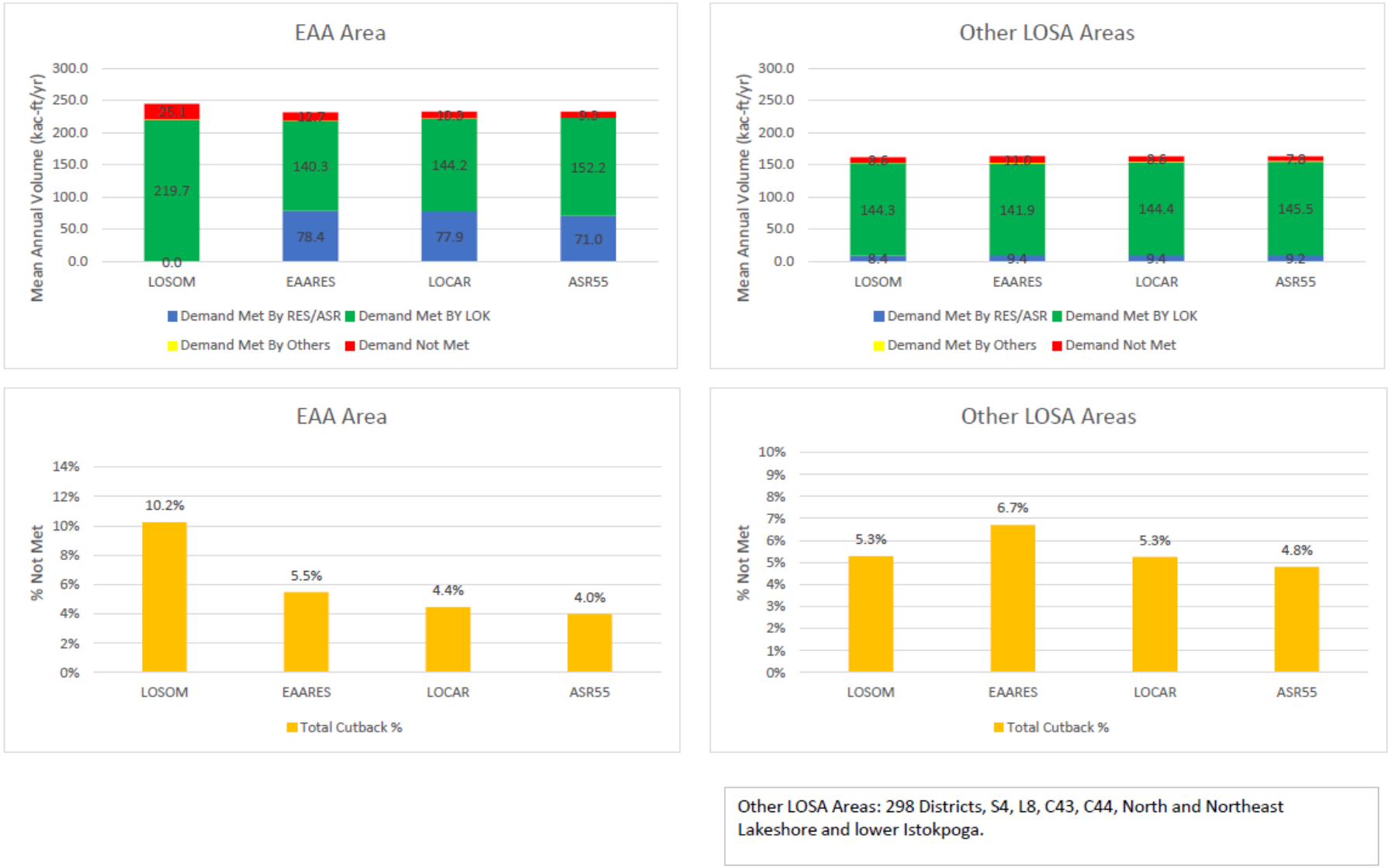

Figure 4.9. EAA/LOSA supplemental irrigation demands and demands not met comparing all scenarios.

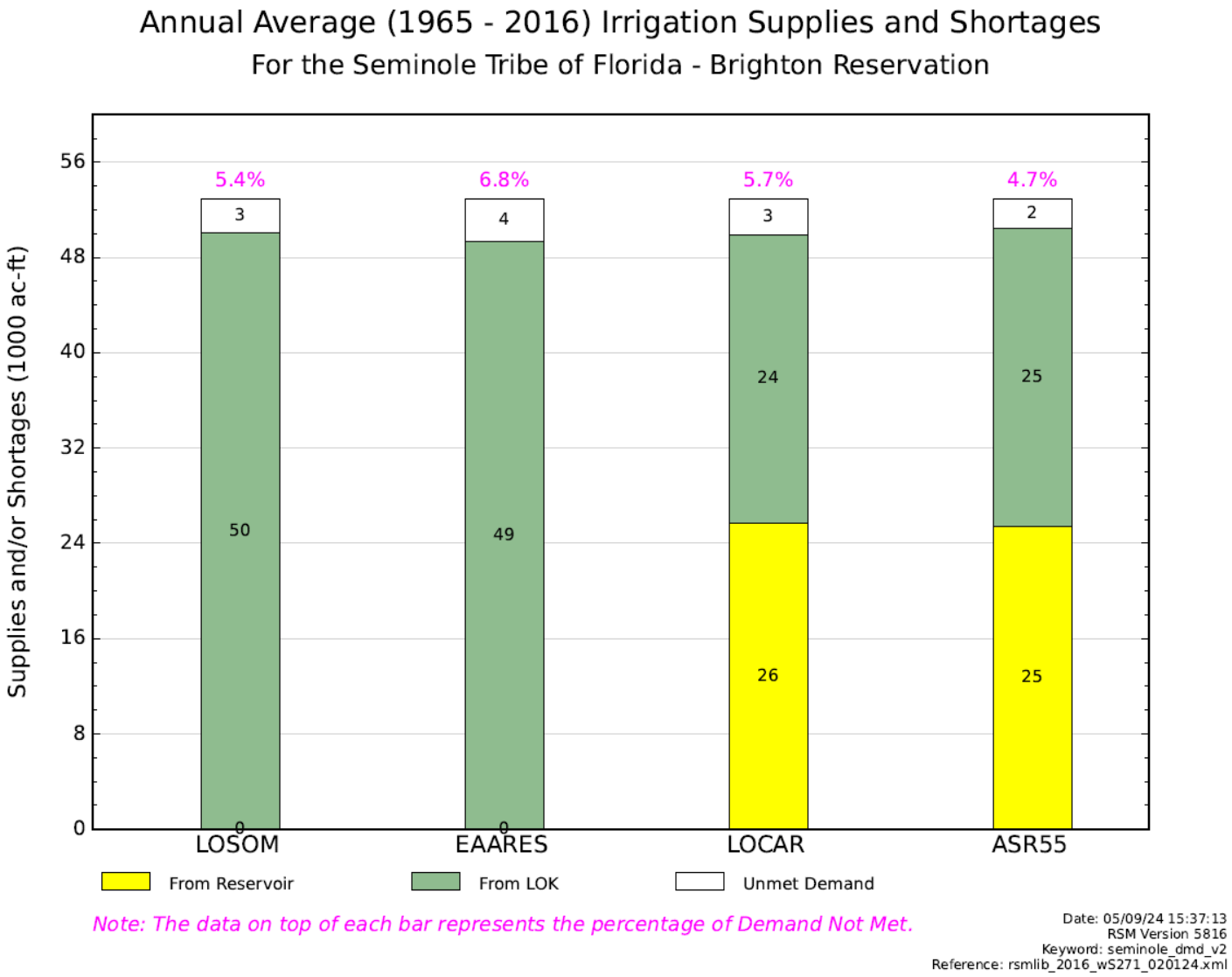

Figure 4.10. Average annual water shortage cutbacks for the Seminole Brighton Reservation.

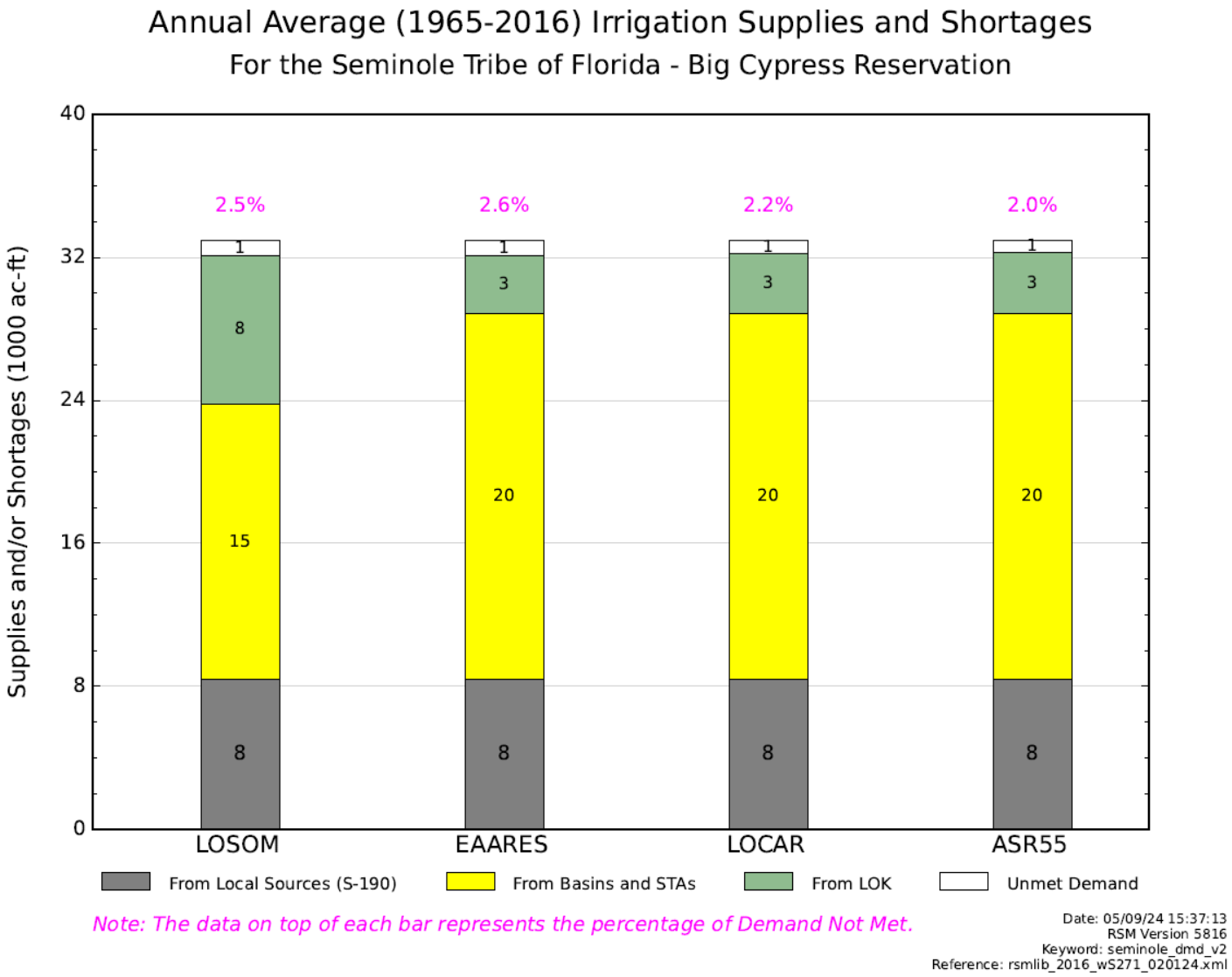

Figure 4.11. Average annual water shortage cutbacks for the Seminole Big Cypress Reservation.

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Appendix A – Modeling Tables of Assumptions

This Appendix contains RSMBN Tables of Assumptions for the following scenarios:
LOSOM
EAARES
LOCAR
ASR55

Regional Simulation Model Basins (RSMBN)
Lake Okeechobee System Operating Manual (LOSOM) Existing Conditions
Table of Assumptions

Feature	
Climate	• The climatic period of record is from 1965 to 2016 • Rainfall estimates have been revised and updated for 1965-2016, utilizing gauge interpolation through April 2002 and SFWMD NEXRAD from May 2002 to 2016 • Evapotranspiration datasets derived from NOAA's North American Land Data Assimilation System and extended through 2016
Topography	The Topography dataset for RSM was Updated in 2019 using the following datasets: • South Florida Digital Elevation Model, USACE, 2017 (Interim) • High Accuracy Elevation Data, US Geological Survey 2007 • Loxahatchee River LiDAR Study, Dewberry and Davis, 2004 • Grassy Water Preserve, CWPB DEM (LiDAR based), Sep 2021 • St. Lucie North Fork LiDAR, Dewberry and Davis, 2007 • Palm Beach County LiDAR Survey, Dewberry and Davis, 2004 • Stormwater Treatment Area stage-storage-area relationships based on G. Goforth spreadsheets with updated effective areas per 2019 South Florida Environmental Report (SFER). • C139 basin topographic update based on available Everglades Agricultural Area (EAA) LiDAR, 2007
Land Use	• Lake Okeechobee Service Area (LOSA) Basins were updated using consumptive use permit information as of July 2017, as reflected in the LOSA Ledger produced by the Water Use Bureau • C-43 Groundwater irrigated basins – Permitted as of 2010, the dataset was updated using land use, aerial imagery and 2010 consumptive use permit information • Dominant land use in the EAA is sugar cane; other land uses consist of shrub land, wet land, ridge and slough, and sawgrass
LOSA Basins	• Lower Istokpoga, North Lake Shore and Northeast Lake Shore demands and runoff estimated using the AFSIRS model and assumed permitted land use (see land use assumptions row).

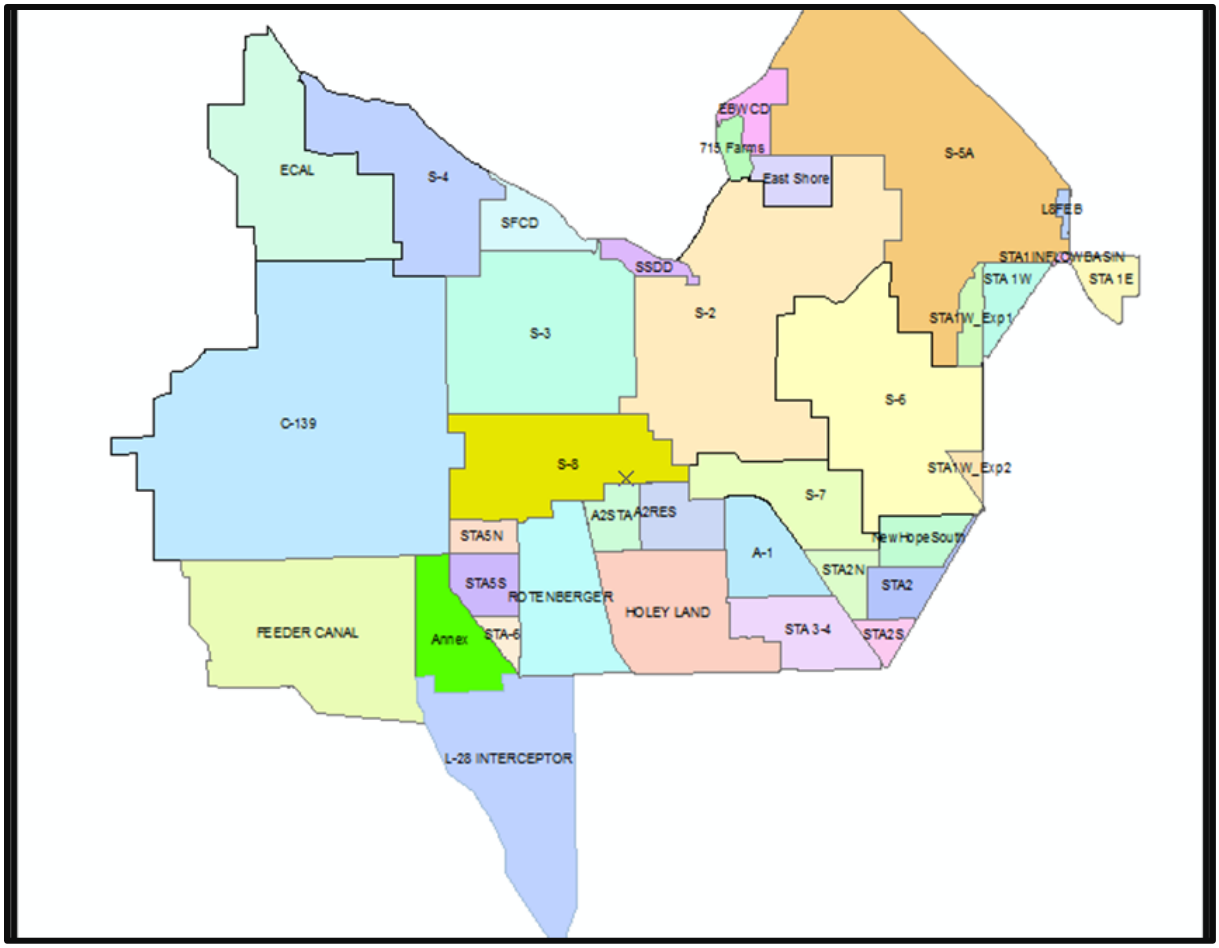
Lake Okeechobee	• Lake Okeechobee Systems Operating Manual (LOSOM)
	  ○ Schedule modeling details as in LOSOM Preferred Alternative 2022 (PA22) scenario
	  ○ Minimum of S308 flow or 300 cfs to West Palm Beach Canal when there is capacity for regulatory releases, checks for S-155A flows to see if water is needed in Lake Worth Lagoon.
	  ○ Lake Okeechobee regulatory releases limited to 1,550 cfs for Miami Canal and 1,350 cfs for North New River Canal based on studies performed by USACE.
	• Lake Okeechobee Water Shortage Management (LOWSM) Plan
	• Backpumping to Lake Okeechobee at S-2 and S-3 is minimized; since the model does not simulate EAA canal stages, triggering operations utilize 7-day moving average excess runoff surrogates
	• "Temporary" forward pumps as follows:

Feature	
	○ S354 – 400 cfs ○ S351 – 600 cfs ○ S352 – 400 cfs ○ All pumps reduce to the above capacities when Lake Okeechobee stage falls below 10.2 ft and turn off when stages recover to greater than 11.2 ft in the dry season (Nov-May) and 10.5 in the wet season (Jun-Oct). • No reduction in EAA runoff associated with the implementation of Best Management Practices (BMPs); No BMP makeup water deliveries to the WCAs • Backpumping of 298 Districts and 715 Farms into Lake minimized • 50,000 acre-foot additional demand for match to historical demands
Northern Lake Okeechobee Watershed Inflows	• Kissimmee River inflows based on UKOPS model; operations for Lakes Kissimmee-Cypress-Hatchineha based on current interim Regulation Schedule (IRS-14-50). Lake Tohopekaliga and East Lake Tohopekaliga use the current (1981) regulation schedule with an addition of a spring recession operation. • Watershed inflows from the H&H version of the Kissimmee Basin MIKE-SHE/MIKE-11 Model (KB_HHFB16). Restored reaches / pools of Kissimmee River as of 2019 • Fisheating Creek, Istokpoga & Taylor Creek / Nubbin Slough Basin Inflows calculated from historical runoff estimates.
Caloosahatchee River Basin	• Caloosahatchee River Basin irrigation demands and runoff estimated using the AFSIRS model and assumed permitted land use as of July 2017 (see land use assumptions row). • Public water supply daily intake from the river is included in the analysis.
St. Lucie Canal & Estuary Basins	• St. Lucie Canal Basin demands estimated using the AFSIRS model and assumed permitted land use as of July 2017 (see land use assumptions row). • Excess C-44 basin runoff is allowed to backflow into LOK if the lake stage is below 14.5 ft, NGVD. • St. Lucie Canal Basin demands include the Florida Power & Light reservoir at Indiantown. • Indian River Lagoon South Project features: • As-built Ten-mile Creek Reservoir and STA: 2,368 acre-feet maximum storage capacity at 4 ft maximum operating depth on 658 acres effective footprint (2 ft maximum depth on STA); receives excess water from North Fork Basin; operations per TMC Preliminary Operating Plan (SFWMD, June 2015). • C-44 Reservoir: 50,441 acre-feet storage capacity at 15 feet maximum depth on a 3,413 acres footprint. • Proposed C-44 reservoir releases to estuary and to meet C-44 basin supplemental demands for surface water irrigation. • C-44 STA: 6,384 acres effective area.
Seminole Brighton Reservation	○ Brighton reservation demands were estimated using AFSIRS method based on 2030 projected planted acreage provided by the Seminole Tribe of Florida and utilize the best available soil and

Feature	
	evapotranspiration parameters reflecting local conditions on the Reservation. ○ For the 52-year Period of Simulation (POS), this method results in a supplemental demand estimate of 52,938 ac-ft on an average annual basis. Estimated demands, and therefore deliveries, for every month of simulation do not equate to the monthly entitlement quantities as per Table 7, Agreement C-4121 (Nov. 1992). ○ Lake Okeechobee Water Shortage Management (LOWSM) applies to this agreement. On a monthly basis, water shortage management cutbacks are assumed to be deferred until after all entitlement volumes have been utilized.
Seminole Big Cypress Reservation	• Big Cypress Reservation irrigation demands and runoff were estimated using the AFSIRS method based on existing planted acreage • The 2-in-10 demand set forth in the Seminole Compact Work Plan equals 2,606 MGM • AFSIRS modeled 2-in-10 demands equaled 2,659 MGM • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per the District's Final Order and Tribe's Resolution establishing the Big Cypress Reservation entitlement, tribal rights to these quantities are preserved • LOWSM applies to this agreement
Everglades Agricultural Area	• Model water-body components as shown in **Figure A-1** below. • Simulated runoff from the North New River – Hillsboro basin apportioned based on simulated SFWMM flows for 2001–2016. • G-341 regulates water movement between S-5A Basin and Hillsboro Basin • EAA runoff and irrigation demand compared to SFWMM (ECB) simulated runoff and demand from 1965-2016 for reasonability • EAA ECP/RS STAs are simulated as single waterbodies consistent with 2019 SFER and recent construction efforts: ○ STA-1E: 4,994 acres effective area ○ STA-1E Distribution: 1,054 acres effective area ○ STA-1W: 10,818 acres effective area (includes expansion #1) ○ STA-1W Expansion #2: 1,800 acres effective area ○ STA-2: cells 1,2 & 3: 6,509 acres effective area ○ STA-2N: cells 4,5 & 6; a.k.a. Comp B-North; 5,990 acres effective area ○ STA-2S: cells 7 & 8; a.k.a. Comp B-South; 2,995 acres effective area ○ STA-3/4: 16,327 effective total area ○ STA-5N: includes cells 1 & 2: 4,846 acres effective area ○ STA-5S: includes cells 3, 4 & 5; a.k.a. Compartment C: 6,856 acres effective area ○ STA-6: expanded with phase 2: 3,054 acres effective area • Assumed operations of STAs: ○ 0.5 ft minimum depth below which supply from external sources is triggered;

Feature	
	○ 4 ft maximum depth above which inflows are discontinued; ○ Inflow targets established for STA-3/4, STA-2N and STA-2S based on DMSTA simulation; met from local basin runoff, LOK regulatory releases and available A1-FEB storage. • A 15,853-acre Flow Equalization Basin (A1-FEB) located north of STA-3/4 with assumed operations as follows: ○ FEB inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south. ○ FEB outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at STA-3/4, STA-2N, and STA-2S if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 4.0 ft maximum depth above which inflows are discontinued ○ Assumed inlet pump from STA-3/4 supply canal to FEB with capacity equal to combined capacity of G-720 and G-721 structures. ○ Outflow weir, with similar discharge characteristics as STA-3/4 outlet structure, discharging into lower North New River canal. ○ Structure capacities and water quality operating rules are consistent with modeling assumptions assumed during the A-1 FEB EIS application process. • A-2STA: 6,599 acres effective area; footprint is modeled, but the facility is not operational.
Holey Land Wildlife Management Area	• G200 inflow structure, total of 300 cfs, operated to send lower Miami canal water into Holey Land. • G-372HL inflow structure for fire protection used for keeping the water table from going lower than half a foot below land surface elevation. • Operations are per the Holey Land Wildlife Management Area Draft Project Operations Manual (SFWMD, October 2015)
Rotenberger Wildlife Management Area	• Operational Schedule as defined in the Operation Plan for Rotenberger WMA (SFWMD, March 2010)
Public Water Supply and Irrigation	• Regional water supply demands to maintain Lower East Coast canals as simulated from RSMGL ECB22.
Western Basins	• C139 basin runoff is modeled as follows: G136 flows is routed to Miami Canal; G342A-D flows routed to STA5N; G508 flows routed to STA5S; G406 flows routed to STA6. • C139 basin demand is met primarily by local groundwater. • C139 Annex flows routed to L28.
Eastern Flowway & North Palm Beach	• Runoff simulated by RSMBN for the Upper and Lower basins of the Indian Trail Improvement District (ITID) M-1 watershed to correspond to previous regional modeling (SFWMM) adjusted based on updated GIS-based drainage basin delineation and historical data provided by ITID staff. (Note: ITID M-2 watershed is assumed to be part of the overall C-51W basin.) ITID M1 runoff

Feature	
	discharges preferentially into C-51W canal, instead of the L-8 Canal, subject to available M-1 canal conveyance (750 cfs total capacity) after passage of runoff from the Town of Royal Palm Beach. M-1 canal discharges into C-51W canal and are assumed to be released to the east via S-155A instead of to the west via S-319 pump station. • L-8 FEB is simulated as a 950-acre, ~48,000 ac-ft reservoir with an inflow structure capacity of 3,000 cfs and an outflow pump capacity of 450 cfs; operations as described in the July 2015 L-8 Reservoir and FEB Draft Project Operations manual. It receives water primarily from the S5A and C-51W basins with coordinated closure of divide structure G-541 which prevents it from receiving water from the northern reaches of the L-8 Canal. • Grassy Waters Preserve is simulated and modeled with a maintenance level of 18.5 ft NGVD delivered via the M-Canal to supplement water supply demands to the City of West Palm Beach (41.2 MGD with 2016-2020 Seasonal Distribution) and releases via G161 toward the Loxahatchee Slough and River. Seepage losses are accounted for in both GWP and the conveyance route from Control 2 to GWP.
Water Shortage Rules	• Reflects the existing water shortage policies as in South Florida Water Management District Chapters 40E-21 and 40E-22, FAC, including Lake Okeechobee Water Shortage Management (LOWSM) Plan.



Water-Body Components:
MIA Water-Body = S3 + S8
NNR/HILLS Water-Body = S2 + S6 + S7 + New Hope South
WPB Water-Body = S-5A
A-1FEB = A-1

Figure A-1. RSMBN Basin Definition within the EAA for 2023 Existing Conditions Scenario (LOSOM).

Notes:

- The RSM is a robust and complex regional scale model. Due to the scale of the model, it is frequently necessary to implement abstractions of system infrastructure and operations that will, in general, mimic the intent and result of the desired project features while not matching the exact mechanism by which these results would be obtained in the real world. Additionally, it is sometimes necessary to work within established paradigms and foundations within the model code (e.g. use available input-driven options to represent more complex project operations).
- The boundary conditions along the eastern and southern boundaries of the RSMBN model were provided from either the South Florida Water Management Model (SFWMM) or the RSM Glades-LECSA Model (RSMGL). The SFWMM was the source of the eastern boundary groundwater/surface water flows, while the RSMGL was the source of the southern boundary structural flows.

Regional Simulation Model Basins (RSMBN)
Everglades Agricultural Area Reservoir (EAARES) Scenario
Table of Assumptions

Feature	
Climate	• The climatic period of record is from 1965 to 2016 • Rainfall estimates have been revised and updated for 1965-2016, utilizing gauge interpolation through April 2002 and SFWMD NEXRAD from May 2002 to 2016 • Evapotranspiration datasets derived from NOAA's North American Land Data Assimilation System and extended through 2016
Topography	The Topography dataset for RSM was Updated in 2019 using the following datasets: • South Florida Digital Elevation Model, USACE, 2017 (Interim) • High Accuracy Elevation Data, US Geological Survey 2007 • Loxahatchee River LiDAR Study, Dewberry and Davis, 2004 • Grassy Water Preserve, CWPB DEM (LiDAR based), Sep 2021 • St. Lucie North Fork LiDAR, Dewberry and Davis, 2007 • Palm Beach County LiDAR Survey, Dewberry and Davis, 2004 • Stormwater Treatment Area stage-storage-area relationships based on G. Goforth spreadsheets with updated effective areas per 2019 South Florida Environmental Report (SFER). • C139 basin topographic update based on available Everglades Agricultural Area (EAA) LiDAR, 2007
Land Use	• Lake Okeechobee Service Area (LOSA) Basins were updated using consumptive use permit information as of July 2017, as reflected in the LOSA Ledger produced by the Water Use Bureau • C-43 Groundwater irrigated basins – Permitted as of 2010, the dataset was updated using land use, aerial imagery and 2010 consumptive use permit information • Dominant land use in the EAA is sugar cane; other land uses consist of shrub land, wet land, ridge and slough, and sawgrass
LOSA Basins	• Lower Istokpoga, North Lake Shore and Northeast Lake Shore demands and runoff estimated using the AFSIRS model and assumed permitted land use (see land use assumptions row).

Lake Okeechobee	• Lake Okeechobee Systems Operating Manual (LOSOM)
	  ○ Modeled as LOSOM Preferred Alternative 2025 (PA25) scenario modified to accommodate additional storage.
	  ○ Minimum of S308 flow or 300 cfs to West Palm Beach Canal when there is capacity for regulatory releases, checks for S-155A flows to see if water is needed in Lake Worth Lagoon.
	  ○ Lake Okeechobee regulatory releases limited to 1,550 cfs for Miami Canal and 1,350 cfs for North New River Canal based on studies performed by USACE.
	• Lake Okeechobee Water Shortage Management (LOWSM) Plan
	• Backpumping to Lake Okeechobee at S-2 and S-3 is minimized; since the model does not simulate EAA canal stages, triggering operations utilize 7-day moving average excess runoff surrogates
	• "Temporary" forward pumps as follows:
	  ○ S354 – 400 cfs
	  ○ S351 – 600 cfs

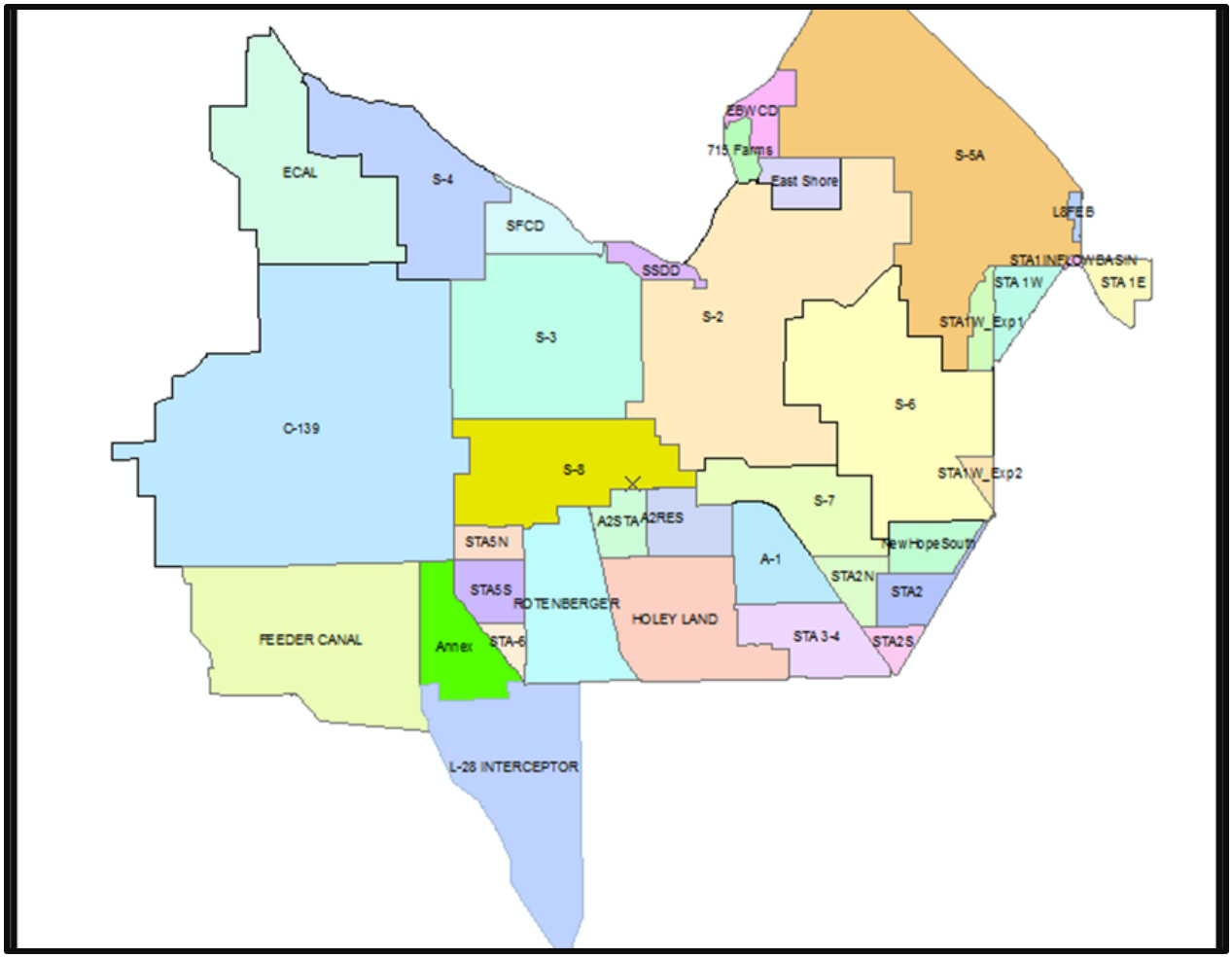
Feature	
	○ S352 – 400 cfs ○ All pumps reduce to the above capacities when Lake Okeechobee stage falls below 10.2 ft and turn off when stages recover to greater than 11.2 ft in the dry season (Nov-May) and 10.5 in the wet season (Jun-Oct). • No reduction in EAA runoff associated with the implementation of Best Management Practices (BMPs); No BMP makeup water deliveries to the WCAs • Backpumping of 298 Districts and 715 Farms into Lake minimized • 50,000 acre-foot additional demand for match to historical demands
Northern Lake Okeechobee Watershed Inflows	• Kissimmee River inflows based on UKOPS model; operations for Lakes Kissimmee-Cypress-Hatchineha based on proposed Headwaters Regulation Schedule (HRS-14-50). Zone A as defined in the 1996 SEIS, and Zone B modified per SFWMD scientists recommended restoration flow ramp (aka zone-discharge function). Lake Tohopekaliga and East Lake Tohopekaliga use the current (1981) regulation schedule with an addition of a spring recession operation. • Watershed inflows from the H&H version of the Kissimmee Basin MIKE-SHE/MIKE-11 Model (KB_HHFB16). Restored reaches / pools of Kissimmee River as of 2019. • Fisheating Creek, Istokpoga & Taylor Creek / Nubbin Slough Basin Inflows calculated from historical runoff estimates.
Caloosahatchee River Basin	• Caloosahatchee River Basin irrigation demands and runoff estimated using the AFSIRS model and assumed permitted land use as of July 2017 (see land use assumptions row). • Public water supply daily intake from the river is included in the analysis. • C-43 reservoir: maximum reservoir height of 41.7 ft NGVD with a 9,379-acre footprint in Western C-43 basin with a 175,800 acre-feet effective storage. • Proposed reservoir releases to estuary while C-43 basin supplemental demands for surface water irrigation are met by Lake Okeechobee.
St. Lucie Canal & Estuary Basins	• St. Lucie Canal Basin demands estimated using the AFSIRS model and assumed permitted land use as of November 2016 (see land use assumptions row). • Excess C-44 basin runoff is allowed to backflow into LOK if the lake stage is 0.25 ft below the low sub-band line. • St. Lucie Canal Basin demands include the Florida Power & Light reservoir at Indiantown. • Indian River Lagoon South Project features: • As-built Ten-mile Creek Reservoir and STA: 1,893 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 526 acres effective footprint; STA has 475 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 132 acres effective footprint; receives excess water from North Fork Basin;

Feature	
	operations per TMC Preliminary Operating Plan (SFWMD, June 2015). • C-44 Reservoir: 50,441 acre-feet storage capacity at 15 feet maximum depth on a 3,413 acres footprint. • C-44 Reservoir releases to estuary and to meet C-44 basin supplemental demands for surface water irrigation. • C-44 STA: 6,384 acres effective area. • C-23/C-24 North Reservoir: 32,677 acre-feet storage capacity at 16.5 ft maximum depth on a 2,005 acres footprint. • C-23/C-24 South Reservoir: 57,815 acre-feet storage capacity at 16.5 ft maximum depth on a 3,537 acres footprint. • C-23/C-24 STA: 1970 acres effective area.
Seminole Brighton Reservation	○ Brighton reservation demands were estimated using AFSIRS method based on 2030 projected planted acreage provided by the Seminole Tribe of Florida and utilize the best available soil and evapotranspiration parameters reflecting local conditions on the Reservation. ○ For the 52-year Period of Simulation (POS), this method results in a supplemental demand estimate of 52,938 ac-ft on an average annual basis. Estimated demands, and therefore deliveries, for every month of simulation do not equate to the monthly entitlement quantities as per Table 7, Agreement C-4121 (Nov. 1992). ○ Lake Okeechobee Water Shortage Management (LOWSM) applies to this agreement. On a monthly basis, water shortage management cutbacks are assumed to be deferred until after all entitlement volumes have been utilized.
Seminole Big Cypress Reservation	• Big Cypress Reservation irrigation demands and runoff were estimated using the AFSIRS method based on existing planted acreage • The 2-in-10 demand set forth in the Seminole Compact Work Plan equals 2,606 MGM • AFSIRS modeled 2-in-10 demands equaled 2,659 MGM • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per the District's Final Order and Tribe's Resolution establishing the Big Cypress Reservation entitlement, tribal rights to these quantities are preserved • LOWSM applies to this agreement
Everglades Agricultural Area	• Model water-body components as shown in **Figure A-2** below. • Simulated runoff from the North New River – Hillsboro basin apportioned based on simulated SFWMM flows for 2001–2016. • G-341 regulates water movement between S-5A Basin and Hillsboro Basin • EAA runoff and irrigation demand compared to SFWMM (ECB) simulated runoff and demand from 1965-2016 for reasonability • EAA ECP/RS STAs are simulated as single waterbodies consistent with 2019 SFER and recent construction efforts:

Feature	
	○ STA-1E: 4,994 acres effective area ○ STA-1E Distribution: 1,054 acres effective area ○ STA-1W: 10,818 acres effective area (includes expansion #1) ○ STA-1W Expansion #2: 1,800 acres effective area ○ STA-2: cells 1,2 & 3: 6,509 acres effective area ○ STA-2N: cells 4,5 & 6; a.k.a. Comp B-North; 5,990 acres effective area ○ STA-2S: cells 7 & 8; a.k.a. Comp B-South; 2,995 acres effective area ○ STA-3/4: 16,327 effective total area ○ STA-5N: includes cells 1 & 2: 4,846 acres effective area ○ STA-5S: includes cells 3, 4 & 5; a.k.a. Compartment C: 6,856 acres effective area ○ STA-6: expanded with phase 2: 3,054 acres effective area • Assumed operations of STAs: ○ 0.5 ft minimum depth below which supply from external sources is triggered; ○ 4 ft maximum depth above which inflows are discontinued; ○ Inflow targets established for STA-3/4, STA-2N and STA-2S based on DMSTA simulation; met from local basin runoff, LOK regulatory releases and available A1-FEB storage. • EAA Reservoir: A 240 kac-ft storage reservoir located on 10,100 acre effective footprint (A2-RES) located north of Holey Land and assumed operations as follows: ○ A2-RES inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south (up to ~ 4ft buffer depth from full level to allow attenuation of peak EAA runoff events). ○ A2-RES outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at A1FEB, STA-3/4, STA-2N, STA-2S and ERSTA if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 23.5 ft maximum depth above which inflows are discontinued ○ Inflows at the reservoir inflow pump station are assumed to convey up to 3000 cfs from the Miami canal and 1500 cfs from the NNR canal (combined basin runoff and Lake O water); inflow to the EAA reservoir can also be made from the existing G370 and G372 pump stations up to a 6 ft depth. ○ Supplemental irrigation demands in the Miami and NNR/Hillsboro basins can be met from the reservoir when reservoir depths exceed 8.2 feet. • A 15,853-acre Flow Equalization Basin (A1-FEB) located north of STA-3/4 with assumed operations as follows: ○ FEB inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south. ○ FEB outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater

Feature	
	Treatment Areas) at STA-3/4, STA-2N, and STA-2S if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 4.0 ft maximum depth above which inflows are discontinued ○ Assumed inlet pump from STA-3/4 supply canal to FEB with capacity equal to combined capacity of G-720 and G-721 structures. ○ Outflow weir, with similar discharge characteristics as STA-3/4 outlet structure, discharging into lower North New River canal. ○ Structure capacities and water quality operating rules are consistent with modeling assumptions assumed during the A-1 FEB EIS application process. • A-2STA: 6,599 acres effective area; facility is operational, receiving inflow directly from A-2 RES.
Holey Land Wildlife Management Area	• G200 inflow structure, total of 300 cfs, operated to send lower Miami canal water into Holey Land. • G-372HL inflow structure for fire protection used for keeping the water table from going lower than half a foot below land surface elevation. • Operations are per the Holey Land Wildlife Management Area Draft Project Operations Manual (SFWMD, October 2015)
Rotenberger Wildlife Management Area	• Operational Schedule as defined in the Operation Plan for Rotenberger WMA (SFWMD, March 2010)
Public Water Supply and Irrigation	• Regional water supply demands to maintain Lower East Coast canals as simulated from RSMGL BBFWO.
Western Basins	• C139 basin runoff is modeled as follows: G136 flows is routed to Miami Canal; G342A-D flows routed to STA5N; G508 flows routed to STA5S; G406 flows routed to STA6. • Full Restoration Strategies western flow path features including the C139FEB are not yet simulated by the RSM. • C139 basin demand is met primarily by local groundwater. • C139 Annex flows routed to L28.
Eastern Flowway & North Palm Beach	• Runoff simulated by RSMBN for the Upper and Lower basins of the Indian Trail Improvement District (ITID) M-1 watershed to correspond to previous regional modeling (SFWMM) adjusted based on updated GIS-based drainage basin delineation and historical data provided by ITID staff. (Note: ITID M-2 watershed is assumed to be part of the overall C-51W basin.) ITID M1 runoff discharges preferentially into C-51W canal, instead of the L-8 Canal, subject to available M-1 canal conveyance (750 cfs total capacity) after passage of runoff from the Town of Royal Palm Beach. M-1 canal discharges into C-51W canal and are assumed to be released to the east via S-155A instead of to the west via S-319 pump station.

Feature	
	• L-8 FEB is simulated as a 950-acre, ~48,000 ac-ft reservoir with an inflow structure capacity of 3,000 cfs and an outflow pump capacity of 450 cfs; operations as described in the July 2015 L-8 Reservoir and FEB Draft Project Operations manual. It receives water primarily from the S5A and C-51W basins with coordinated closure of divide structure G-541 which prevents it from receiving water from the northern reaches of the L-8 Canal. • Grassy Waters Preserve is simulated and modeled with a maintenance level of 18.5 ft NGVD delivered via the M-Canal to supplement water supply demands to the City of West Palm Beach (41.2 MGD with 2016-2020 Seasonal Distribution) and releases via G161 toward the Loxahatchee Slough and River. Seepage losses are accounted for in both GWP and the conveyance route from Control 2 to GWP. • Features of the Loxahatchee River Watershed Restoration Projects although authorized, are not yet simulated in RSM.
Water Shortage Rules	• Reflects the existing water shortage policies as in South Florida Water Management District Chapters 40E-21 and 40E-22, FAC, including Lake Okeechobee Water Shortage Management (LOWSM) Plan.



Water-Body Components:
MIA Water-Body = S3 + S8
NNR/HILLS Water-Body = S2 + S6 + S7 + New Hope South
WPB Water-Body = S-5A
A-1FEB = A-1
EAA Reservoir = A2RES

Figure A-2. RSMBN Basin Definition within the EAA for Future Condition Increment #1 (EAARES).

Notes:

- The RSM is a robust and complex regional scale model. Due to the scale of the model, it is frequently necessary to implement abstractions of system infrastructure and operations that will, in general, mimic the intent and result of the desired project features while not matching the exact mechanism by which these results would be obtained in the real world. Additionally, it is sometimes necessary to work within established paradigms and foundations within the model code (e.g. use available input-driven options to represent more complex project operations).

- The boundary conditions along the eastern and southern boundaries of the RSMBN model were provided from either the South Florida Water Management Model (SFWMM) or the RSM Glades-LECSA Model (RSMGL). The SFWMM was the source of the eastern boundary groundwater/surface water flows, while the RSMGL was the source of the southern boundary structural flows.
- Future Condition Increment #1 (EAARES) assumptions were taken from and are consistent with the BBSEER FWO assumptions.

Regional Simulation Model Basins (RSMBN)
Okeechobee Component "A" Reservoir (LOCAR) Scenario
Table of Assumptions

Feature	
Climate	• The climatic period of record is from 1965 to 2016 • Rainfall estimates have been revised and updated for 1965-2016, utilizing gauge interpolation through April 2002 and SFWMD NEXRAD from May 2002 to 2016 • Evapotranspiration datasets derived from NOAA's North American Land Data Assimilation System and extended through 2016
Topography	The Topography dataset for RSM was Updated in 2019 using the following datasets: • South Florida Digital Elevation Model, USACE, 2017 (Interim) • High Accuracy Elevation Data, US Geological Survey 2007 • Loxahatchee River LiDAR Study, Dewberry and Davis, 2004 • Grassy Water Preserve, CWPB DEM (LiDAR based), Sep 2021 • St. Lucie North Fork LiDAR, Dewberry and Davis, 2007 • Palm Beach County LiDAR Survey, Dewberry and Davis, 2004 • Stormwater Treatment Area stage-storage-area relationships based on G. Goforth spreadsheets with updated effective areas per 2019 South Florida Environmental Report (SFER). • C139 basin topographic update based on available Everglades Agricultural Area (EAA) LiDAR, 2007
Land Use	• Lake Okeechobee Service Area (LOSA) Basins were updated using consumptive use permit information as of July 2017, as reflected in the LOSA Ledger produced by the Water Use Bureau • C-43 Groundwater irrigated basins – Permitted as of 2010, the dataset was updated using land use, aerial imagery and 2010 consumptive use permit information • Dominant land use in the EAA is sugar cane; other land uses consist of shrubland, wetland, ridge and slough, and sawgrass

LOSA Basins	• Lower Istokpoga, North Lake Shore and Northeast Lake Shore demands and runoff estimated using the AFSIRS model and assumed permitted land use (see land use assumptions row).
	  • Lake Okeechobee Component "A" Reservoir (LOCAR) reservoir in Indian Prairie Basin
	  • Reservoir Storage = 200,127 acre-feet
	  • 23.92 feet of storage
	  • 1,500 cfs inflow/outflow capacity
	  • 4,500 cfs emergency outflow capacity

Lake Okeechobee	• Lake Okeechobee Systems Operating Manual (LOSOM)
	  ○ Modeled as LOSOM Preferred Alternative 2025 (PA25) scenario modified to accommodate additional storage.
	  ○ Minimum of S308 flow or 300 cfs to West Palm Beach Canal when there is capacity for regulatory releases, checks for S-155A flows to see if water is needed in Lake Worth Lagoon.
	  ○ Lake Okeechobee regulatory releases limited to 1,550 cfs for Miami Canal and 1,350 cfs for North New River Canal based on studies performed by USACE.
	• Lake Okeechobee Water Shortage Management (LOWSM) Plan

Feature	

	• Backpumping to Lake Okeechobee at S-2 and S-3 is minimized; since the model does not simulate EAA canal stages, triggering operations utilize 7-day moving average excess runoff surrogates
	• "Temporary" forward pumps as follows:
	  ○ S354 – 400 cfs
	  ○ S351 – 600 cfs
	  ○ S352 – 400 cfs
	  ○ All pumps reduce to the above capacities when Lake Okeechobee stage falls below 10.2 ft and turn off when stages recover to greater than 11.2 ft in the dry season (Nov-May) and 10.5 in the wet season (Jun-Oct).
	• No reduction in EAA runoff associated with the implementation of Best Management Practices (BMPs); No BMP makeup water deliveries to the WCAs
	• Backpumping of 298 Districts and 715 Farms into Lake minimized
	• 50,000 acre-foot additional demand for match to historical demands

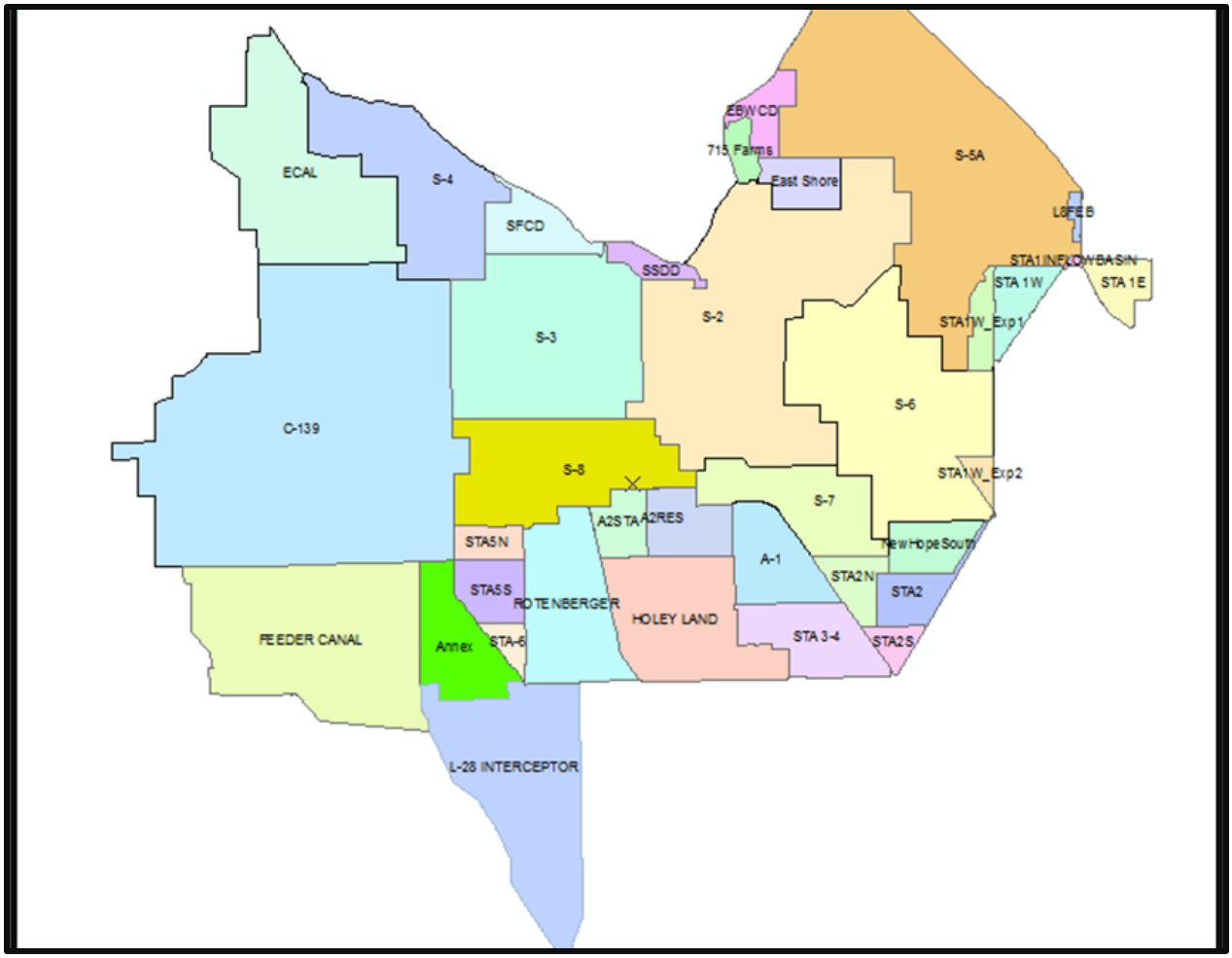
Northern Lake Okeechobee Watershed Inflows	• Kissimmee River inflows based on UKOPS model; operations for Lakes Kissimmee-Cypress-Hatchineha based on proposed Headwaters Regulation Schedule (HRS-14-50). Zone A as defined in the 1996 SEIS, and Zone B modified per SFWMD scientists recommended restoration flow ramp (aka zone-discharge function). Lake Tohopekaliga and East Lake Tohopekaliga use the current (1981) regulation schedule with an addition of a spring recession operation. • Watershed inflows from the H&H version of the Kissimmee Basin MIKE-SHE/MIKE-11 Model (KB_HHFB16). Restored reaches / pools of Kissimmee River as of 2019. • Fisheating Creek, Istokpoga & Taylor Creek / Nubbin Slough Basin Inflows calculated from historical runoff estimates.
Caloosahatchee River Basin	• Caloosahatchee River Basin irrigation demands and runoff estimated using the AFSIRS model and assumed permitted land use as of July 2017 (see land use assumptions row). • Public water supply daily intake from the river is included in the analysis. • C-43 reservoir: maximum reservoir height of 41.7 ft NGVD with a 9,379-acre footprint in Western C-43 basin with a 175,800 acre-feet effective storage. • Proposed reservoir releases to estuary while C-43 basin supplemental demands for surface water irrigation are met by Lake Okeechobee.
St. Lucie Canal & Estuary Basins	• St. Lucie Canal Basin demands estimated using the AFSIRS model and assumed permitted land use as of November 2016 (see land use assumptions row). • Excess C-44 basin runoff is allowed to backflow into LOK if the lake stage is 0.25 ft below the low sub-band line. • St. Lucie Canal Basin demands include the Florida Power & Light reservoir at Indiantown. • Indian River Lagoon South Project features:

Feature	
	• As-built Ten-mile Creek Reservoir and STA: 1,893 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 526 acres effective footprint; STA has 475 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 132 acres effective footprint; receives excess water from North Fork Basin; operations per TMC Preliminary Operating Plan (SFWMD, June 2015). • C-44 Reservoir: 50,441 acre-feet storage capacity at 15 feet maximum depth on a 3,413 acres footprint. • C-44 Reservoir releases to estuary and to meet C-44 basin supplemental demands for surface water irrigation. • C-44 STA: 6,384 acres effective area. • C-23/C-24 North Reservoir: 32,677 acre-feet storage capacity at 16.5 ft maximum depth on a 2,005 acres footprint. • C-23/C-24 South Reservoir: 57,815 acre-feet storage capacity at 16.5 ft maximum depth on a 3,537 acres footprint. • C-23/C-24 STA: 1970 acres effective area.
Seminole Brighton Reservation	○ Brighton reservation demands were estimated using AFSIRS method based on 2030 projected planted acreage provided by the Seminole Tribe of Florida and utilize the best available soil and evapotranspiration parameters reflecting local conditions on the Reservation. ○ For the 52-year Period of Simulation (POS), this method results in a supplemental demand estimate of 52,938 ac-ft on an average annual basis. Estimated demands, and therefore deliveries, for every month of simulation do not equate to the monthly entitlement quantities as per Table 7, Agreement C-4121 (Nov. 1992). ○ Lake Okeechobee Water Shortage Management (LOWSM) applies to this agreement. On a monthly basis, water shortage management cutbacks are assumed to be deferred until after all entitlement volumes have been utilized. ○ Water supply requirements met from LOCAR reservoir and Lake Okeechobee.
Seminole Big Cypress Reservation	• Big Cypress Reservation irrigation demands and runoff were estimated using the AFSIRS method based on existing planted acreage • The 2-in-10 demand set forth in the Seminole Compact Work Plan equals 2,606 MGM • AFSIRS modeled 2-in-10 demands equaled 2,659 MGM • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per the District's Final Order and Tribe's Resolution establishing the Big Cypress Reservation entitlement, tribal rights to these quantities are preserved • LOWSM applies to this agreement

Feature	
Everglades Agricultural Area	• Model water-body components as shown in **Figure A-3** below. • Simulated runoff from the North New River – Hillsboro basin apportioned based on simulated SFWMM flows for 2001–2016. • G-341 regulates water movement between S-5A Basin and Hillsboro Basin • EAA runoff and irrigation demand compared to SFWMM (ECB) simulated runoff and demand from 1965-2016 for reasonability • EAA ECP/RS STAs are simulated as single waterbodies consistent with 2019 SFER and recent construction efforts: o STA-1E: 4,994 acres effective area o STA-1E Distribution: 1,054 acres effective area o STA-1W: 10,818 acres effective area (includes expansion #1) o STA-1W Expansion #2: 1,800 acres effective area o STA-2: cells 1,2 & 3: 6,509 acres effective area o STA-2N: cells 4,5 & 6; a.k.a. Comp B-North; 5,990 acres effective area o STA-2S: cells 7 & 8; a.k.a. Comp B-South; 2,995 acres effective area o STA-3/4: 16,327 effective total area o STA-5N: includes cells 1 & 2: 4,846 acres effective area o STA-5S: includes cells 3, 4 & 5; a.k.a. Compartment C: 6,856 acres effective area o STA-6: expanded with phase 2: 3,054 acres effective area • Assumed operations of STAs: o 0.5 ft minimum depth below which supply from external sources is triggered; o 4 ft maximum depth above which inflows are discontinued; o Inflow targets established for STA-3/4, STA-2N and STA-2S based on DMSTA simulation; met from local basin runoff, LOK regulatory releases and available A1-FEB storage. • EAA Reservoir: A 240 kac-ft storage reservoir located on 10,100 acre effective footprint (A2-RES) located north of Holey Land and assumed operations as follows: o A2-RES inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south (up to ~ 4ft buffer depth from full level to allow attenuation of peak EAA runoff events). o A2-RES outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at A1FEB, STA-3/4, STA-2N, STA-2S and ERSTA if EAA basin runoff and LOK regulatory discharge are not sufficient. o 0.5 ft minimum depth below which no releases are allowed o 23.5 ft maximum depth above which inflows are discontinued o Inflows at the reservoir inflow pump station are assumed to convey up to 3000 cfs from the Miami canal and 1500 cfs from the NNR canal (combined basin runoff and Lake O water); inflow to the EAA reservoir can also be made from the existing G370 and G372 pump stations up to a 6 ft depth.

Feature	
	○ Supplemental irrigation demands in the Miami and NNR/Hillsboro basins can be met from the reservoir when reservoir depths exceed 8.2 feet. • A 15,853-acre Flow Equalization Basin (A1-FEB) located north of STA-3/4 with assumed operations as follows: ○ FEB inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south. ○ FEB outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at STA-3/4, STA-2N, and STA-2S if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 4.0 ft maximum depth above which inflows are discontinued ○ Assumed inlet pump from STA-3/4 supply canal to FEB with capacity equal to combined capacity of G-720 and G-721 structures. ○ Outflow weir, with similar discharge characteristics as STA-3/4 outlet structure, discharging into lower North New River canal. ○ Structure capacities and water quality operating rules are consistent with modeling assumptions assumed during the A-1 FEB EIS application process. • A-2STA: 6,599 acres effective area; facility is operational, receiving inflow directly from A-2 RES.
Holey Land Wildlife Management Area	• G200 inflow structure, total of 300 cfs, operated to send lower Miami canal water into Holey Land. • G-372HL inflow structure for fire protection used for keeping the water table from going lower than half a foot below land surface elevation. • Operations are per the Holey Land Wildlife Management Area Draft Project Operations Manual (SFWMD, October 2015)
Rotenberger Wildlife Management Area	• Operational Schedule as defined in the Operation Plan for Rotenberger WMA (SFWMD, March 2010)
Public Water Supply and Irrigation	• Regional water supply demands to maintain Lower East Coast canals as simulated from RSMGL BBFWO.
Western Basins	• C139 basin runoff is modeled as follows: G136 flows is routed to Miami Canal; G342A-D flows routed to STA5N; G508 flows routed to STA5S; G406 flows routed to STA6. • Full Restoration Strategies western flow path features including the C139FEB are not yet simulated by the RSM. • C139 basin demand is met primarily by local groundwater. • C139 Annex flows routed to L28.
Eastern Flowway & North Palm Beach	• Runoff simulated by RSMBN for the Upper and Lower basins of the Indian Trail Improvement District (ITID) M-1 watershed to correspond to previous regional modeling (SFWMM) adjusted

Feature	
	based on updated GIS-based drainage basin delineation and historical data provided by ITID staff. (Note: ITID M-2 watershed is assumed to be part of the overall C-51W basin.) ITID M1 runoff discharges preferentially into C-51W canal, instead of the L-8 Canal, subject to available M-1 canal conveyance (750 cfs total capacity) after passage of runoff from the Town of Royal Palm Beach. M-1 canal discharges into C-51W canal and are assumed to be released to the east via S-155A instead of to the west via S-319 pump station. • L-8 FEB is simulated as a 950-acre, ~48,000 ac-ft reservoir with an inflow structure capacity of 3,000 cfs and an outflow pump capacity of 450 cfs; operations as described in the July 2015 L-8 Reservoir and FEB Draft Project Operations manual. It receives water primarily from the S5A and C-51W basins with coordinated closure of divide structure G-541 which prevents it from receiving water from the northern reaches of the L-8 Canal. • Grassy Waters Preserve is simulated and modeled with a maintenance level of 18.5 ft NGVD delivered via the M-Canal to supplement water supply demands to the City of West Palm Beach (41.2 MGD with 2016-2020 Seasonal Distribution) and releases via G161 toward the Loxahatchee Slough and River. Seepage losses are accounted for in both GWP and the conveyance route from Control 2 to GWP. • Features of the Loxahatchee River Watershed Restoration Projects although authorized, are not yet simulated in RSM.
Water Shortage Rules	• Reflects the existing water shortage policies as in South Florida Water Management District Chapters 40E-21 and 40E-22, FAC, including Lake Okeechobee Water Shortage Management (LOWSM) Plan.



Water-Body Components:
MIA Water-Body = S3 + S8
NNR/HILLS Water-Body = S2 + S6 + S7 + New Hope South
WPB Water-Body = S-5A
A-1FEB = A-1
EAA Reservoir = A2RES

Figure A-3. RSMBN Basin Definition within the EAA for Future Condition Increment #2 (LOCAR).

Notes:

- The RSM is a robust and complex regional scale model. Due to the scale of the model, it is frequently necessary to implement abstractions of system infrastructure and operations that will, in general, mimic the intent and result of the desired project features while not matching the exact mechanism by which these results would be obtained in the real world. Additionally, it is sometimes necessary to work within established paradigms and foundations within the model code (e.g. use available input-driven options to represent more complex project operations).

- The boundary conditions along the eastern and southern boundaries of the RSMBN model were provided from either the South Florida Water Management Model (SFWMM) or the RSM Glades-LECSA Model (RSMGL). The SFWMM was the source of the eastern boundary groundwater/surface water flows, while the RSMGL was the source of the southern boundary structural flows.
- Future Condition Increment #2 (LOCAR) assumptions were taken from and are consistent with the BBSEER FWO assumptions.

Regional Simulation Model Basins (RSMBN) Storage and Recovery (ASR55) Scenario Table of Assumptions

Feature	
Climate	• The climatic period of record is from 1965 to 2016 • Rainfall estimates have been revised and updated for 1965-2016, utilizing gauge interpolation through April 2002 and SFWMD NEXRAD from May 2002 to 2016 • Evapotranspiration datasets derived from NOAA's North American Land Data Assimilation System and extended through 2016
Topography	The Topography dataset for RSM was Updated in 2019 using the following datasets: • South Florida Digital Elevation Model, USACE, 2017 (Interim) • High Accuracy Elevation Data, US Geological Survey 2007 • Loxahatchee River LiDAR Study, Dewberry and Davis, 2004 • Grassy Water Preserve, CWPB DEM (LiDAR based), Sep 2021 • St. Lucie North Fork LiDAR, Dewberry and Davis, 2007 • Palm Beach County LiDAR Survey, Dewberry and Davis, 2004 • Stormwater Treatment Area stage-storage-area relationships based on G. Goforth spreadsheets with updated effective areas per 2019 South Florida Environmental Report (SFER). • C139 basin topographic update based on available Everglades Agricultural Area (EAA) LiDAR, 2007
Land Use	• Lake Okeechobee Service Area (LOSA) Basins were updated using consumptive use permit information as of July 2017, as reflected in the LOSA Ledger produced by the Water Use Bureau • C-43 Groundwater irrigated basins – Permitted as of 2010, the dataset was updated using land use, aerial imagery and 2010 consumptive use permit information • Dominant land use in the EAA is sugar cane; other land uses consist of shrubland, wetland, ridge and slough, and sawgrass

LOSA Basins	• Lower Istokpoga, North Lake Shore and Northeast Lake Shore demands and runoff estimated using the AFSIRS model and assumed permitted land use (see land use assumptions row).
	  • Lake Okeechobee Component "A" Reservoir (LOCAR) reservoir in Indian Prairie Basin
	  • Reservoir Area = 11,875 acres
	  • Reservoir Storage = 278,113 acre-feet
	  • 23.92 feet of storage
	  • 1,500 cfs inflow/outflow capacity
	  • 4,500 cfs emergency outflow capacity

Lake Okeechobee	• Lake Okeechobee Systems Operating Manual (LOSOM)
	  ○ Modeled as LOSOM Preferred Alternative 2025 (PA25) scenario modified to accommodate additional storage.
	  ○ Minimum of S308 flow or 300 cfs to West Palm Beach Canal when there is capacity for regulatory releases, checks for S-155A flows to see if water is needed in Lake Worth Lagoon.
	  ○ Lake Okeechobee regulatory releases limited to 1,550 cfs for Miami Canal and 1,350 cfs for North New River Canal based on studies performed by USACE.

Feature	

	• Lake Okeechobee Water Shortage Management (LOWSM) Plan
	• Backpumping to Lake Okeechobee at S-2 and S-3 is minimized; since the model does not simulate EAA canal stages, triggering operations utilize 7-day moving average excess runoff surrogates
	• "Temporary" forward pumps as follows:
	  ○ S354 – 400 cfs
	  ○ S351 – 600 cfs
	  ○ S352 – 400 cfs
	  ○ All pumps reduce to the above capacities when Lake Okeechobee stage falls below 10.2 ft and turn off when stages recover to greater than 11.2 ft in the dry season (Nov-May) and 10.5 in the wet season (Jun-Oct).
	• No reduction in EAA runoff associated with the implementation of Best Management Practices (BMPs); No BMP makeup water deliveries to the WCAs
	• Backpumping of 298 Districts and 715 Farms into Lake minimized
	• 50,000 acre-foot additional demand for match to historical demands
	• Aquifer Storage and Recovery stores excess Lake Okeechobee water during high stage events and retrieves when Lake Okeechobee stages are low. Quantity and placement of ASR is consistent with Lake Okeechobee Watershed Restoration Project (LOWRP).
	  ○ 34 ASR wells @ 5 MGD each in the Upper Floridan Aquifer (UFA) with an efficiency of 70% (30% of water stored is unrecoverable).
	  ○ 21 ASR wells @ 5 MGD each in the Avon Park Permeable Zone (APPZ) with an efficiency of 30% (70% of water stored is unrecoverable).

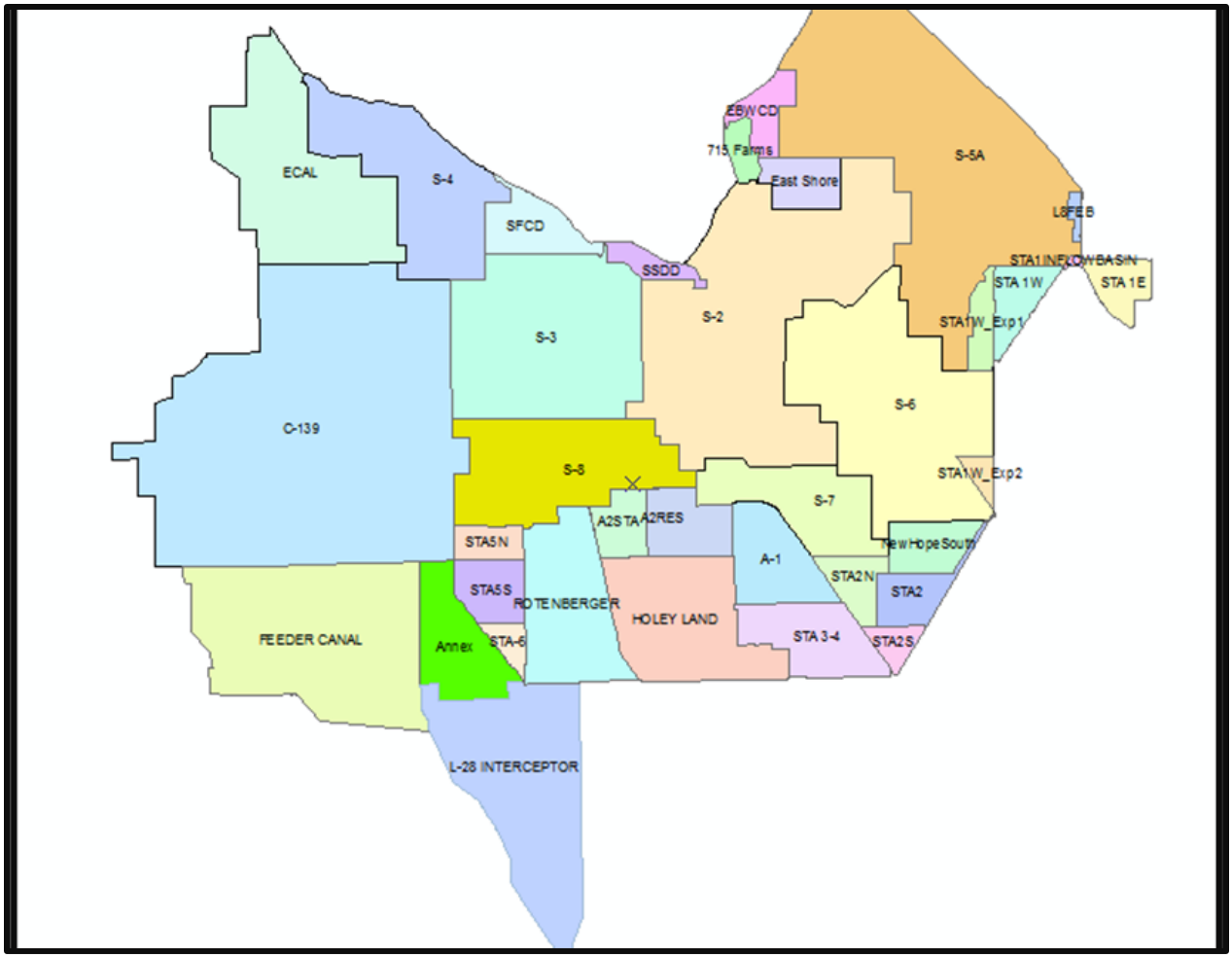
Northern Lake Okeechobee Watershed Inflows	• Kissimmee River inflows based on UKOPS model; operations for Lakes Kissimmee-Cypress-Hatchineha based on proposed Headwaters Regulation Schedule (HRS-14-50). Zone A as defined in the 1996 SEIS, and Zone B modified per SFWMD scientists recommended restoration flow ramp (aka zone-discharge function). Lake Tohopekaliga and East Lake Tohopekaliga use the current (1981) regulation schedule with an addition of a spring recession operation. • Watershed inflows from the H&H version of the Kissimmee Basin MIKE-SHE/MIKE-11 Model (KB_HHFB16). Restored reaches / pools of Kissimmee River as of 2019. • Fisheating Creek, Istokpoga & Taylor Creek / Nubbin Slough Basin Inflows calculated from historical runoff estimates.
Caloosahatchee River Basin	• Caloosahatchee River Basin irrigation demands and runoff estimated using the AFSIRS model and assumed permitted land use as of July 2017 (see land use assumptions row). • Public water supply daily intake from the river is included in the analysis. • C-43 reservoir: maximum reservoir height of 41.7 ft NGVD with a 9,379-acre footprint in Western C-43 basin with a 175,800 acre-feet effective storage.

Feature	
	• Proposed reservoir releases to estuary while C-43 basin supplemental demands for surface water irrigation are met by Lake Okeechobee.
St. Lucie Canal & Estuary Basins	• St. Lucie Canal Basin demands estimated using the AFSIRS model and assumed permitted land use as of November 2016 (see land use assumptions row). • Excess C-44 basin runoff is allowed to backflow into LOK if the lake stage is 0.25 ft below the low sub-band line. • St. Lucie Canal Basin demands include the Florida Power & Light reservoir at Indiantown. • Indian River Lagoon South Project features: • As-built Ten-mile Creek Reservoir and STA: 1,893 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 526 acres effective footprint; STA has 475 acre-feet maximum storage capacity at 3.6 ft maximum operating depth on 132 acres effective footprint; receives excess water from North Fork Basin; operations per TMC Preliminary Operating Plan (SFWMD, June 2015). • C-44 Reservoir: 50,441 acre-feet storage capacity at 15 feet maximum depth on a 3,413 acres footprint. • C-44 Reservoir releases to estuary and to meet C-44 basin supplemental demands for surface water irrigation. • C-44 STA: 6,384 acres effective area. • C-23/C-24 North Reservoir: 32,677 acre-feet storage capacity at 16.5 ft maximum depth on a 2,005 acres footprint. • C-23/C-24 South Reservoir: 57,815 acre-feet storage capacity at 16.5 ft maximum depth on a 3,537 acres footprint. • C-23/C-24 STA: 1970 acres effective area.
Seminole Brighton Reservation	○ Brighton reservation demands were estimated using AFSIRS method based on 2030 projected planted acreage provided by the Seminole Tribe of Florida and utilize the best available soil and evapotranspiration parameters reflecting local conditions on the Reservation. ○ For the 52-year Period of Simulation (POS), this method results in a supplemental demand estimate of 52,938 ac-ft on an average annual basis. Estimated demands, and therefore deliveries, for every month of simulation do not equate to the monthly entitlement quantities as per Table 7, Agreement C-4121 (Nov. 1992). ○ Lake Okeechobee Water Shortage Management (LOWSM) applies to this agreement. On a monthly basis, water shortage management cutbacks are assumed to be deferred until after all entitlement volumes have been utilized. ○ Water supply requirements met from LOCAR reservoir and Lake Okeechobee.

Feature	
Seminole Big Cypress Reservation	• Big Cypress Reservation irrigation demands and runoff were estimated using the AFSIRS method based on existing planted acreage • The 2-in-10 demand set forth in the Seminole Compact Work Plan equals 2,606 MGM • AFSIRS modeled 2-in-10 demands equaled 2,659 MGM • While estimated demands, and therefore deliveries, for every month of simulation do not equate to monthly entitlement quantities as per the District's Final Order and Tribe's Resolution establishing the Big Cypress Reservation entitlement, tribal rights to these quantities are preserved • LOWSM applies to this agreement
Everglades Agricultural Area	• Model water-body components as shown in **Figure A-4** below. • Simulated runoff from the North New River – Hillsboro basin apportioned based on simulated SFWMM flows for 2001–2016. • G-341 regulates water movement between S-5A Basin and Hillsboro Basin • EAA runoff and irrigation demand compared to SFWMM (ECB) simulated runoff and demand from 1965-2016 for reasonability • EAA ECP/RS STAs are simulated as single waterbodies consistent with 2019 SFER and recent construction efforts: ○ STA-1E: 4,994 acres effective area ○ STA-1E Distribution: 1,054 acres effective area ○ STA-1W: 10,818 acres effective area (includes expansion #1) ○ STA-1W Expansion #2: 1,800 acres effective area ○ STA-2: cells 1,2 & 3: 6,509 acres effective area ○ STA-2N: cells 4,5 & 6; a.k.a. Comp B-North; 5,990 acres effective area ○ STA-2S: cells 7 & 8; a.k.a. Comp B-South; 2,995 acres effective area ○ STA-3/4: 16,327 effective total area ○ STA-5N: includes cells 1 & 2: 4,846 acres effective area ○ STA-5S: includes cells 3, 4 & 5; a.k.a. Compartment C: 6,856 acres effective area ○ STA-6: expanded with phase 2: 3,054 acres effective area • Assumed operations of STAs: ○ 0.5 ft minimum depth below which supply from external sources is triggered; ○ 4 ft maximum depth above which inflows are discontinued; ○ Inflow targets established for STA-3/4, STA-2N and STA-2S based on DMSTA simulation; met from local basin runoff, LOK regulatory releases and available A1-FEB storage. • EAA Reservoir: A 240 kac-ft storage reservoir located on 10,100 acre effective footprint (A2-RES) located north of Holey Land and assumed operations as follows: ○ A2-RES inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south (up to ~ 4ft buffer depth from full level to allow attenuation of peak EAA runoff events).

Feature	
	○ A2-RES outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at A1FEB, STA-3/4, STA-2N, STA-2S and ERSTA if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 23.5 ft maximum depth above which inflows are discontinued ○ Inflows at the reservoir inflow pump station are assumed to convey up to 3000 cfs from the Miami canal and 1500 cfs from the NNR canal (combined basin runoff and Lake O water); inflow to the EAA reservoir can also be made from the existing G370 and G372 pump stations up to a 6 ft depth. ○ Supplemental irrigation demands in the Miami and NNR/Hillsboro basins can be met from the reservoir when reservoir depths exceed 8.2 feet. • A 15,853-acre Flow Equalization Basin (A1-FEB) located north of STA-3/4 with assumed operations as follows: ○ FEB inflows are from excess EAA basin runoff above the established inflow targets at STA-3/4, STA-2N, and STA-2S, and from LOK flood releases south. ○ FEB outflows are used to help meet established inflow targets (as estimated using the Dynamic Model for Stormwater Treatment Areas) at STA-3/4, STA-2N, and STA-2S if EAA basin runoff and LOK regulatory discharge are not sufficient. ○ 0.5 ft minimum depth below which no releases are allowed ○ 4.0 ft maximum depth above which inflows are discontinued ○ Assumed inlet pump from STA-3/4 supply canal to FEB with capacity equal to combined capacity of G-720 and G-721 structures. ○ Outflow weir, with similar discharge characteristics as STA-3/4 outlet structure, discharging into lower North New River canal. ○ Structure capacities and water quality operating rules are consistent with modeling assumptions assumed during the A-1 FEB EIS application process. • A-2STA: 6,599 acres effective area; facility is operational, receiving inflow directly from A-2 RES.
Holey Land Wildlife Management Area	• G200 inflow structure, total of 300 cfs, operated to send lower Miami canal water into Holey Land. • G-372HL inflow structure for fire protection used for keeping the water table from going lower than half a foot below land surface elevation. • Operations are per the Holey Land Wildlife Management Area Draft Project Operations Manual (SFWMD, October 2015)
Rotenberger Wildlife Management Area	• Operational Schedule as defined in the Operation Plan for Rotenberger WMA (SFWMD, March 2010)
Public Water Supply and Irrigation	• Regional water supply demands to maintain Lower East Coast canals as simulated from RSMGL BBFWO.

Feature	
Western Basins	• C139 basin runoff is modeled as follows: G136 flows is routed to Miami Canal; G342A-D flows routed to STA5N; G508 flows routed to STA5S; G406 flows routed to STA6. • Full Restoration Strategies western flow path features including the C139FEB are not yet simulated by the RSM. • C139 basin demand is met primarily by local groundwater. • C139 Annex flows routed to L28.
Eastern Flowway & North Palm Beach	• Runoff simulated by RSMBN for the Upper and Lower basins of the Indian Trail Improvement District (ITID) M-1 watershed to correspond to previous regional modeling (SFWMM) adjusted based on updated GIS-based drainage basin delineation and historical data provided by ITID staff. (Note: ITID M-2 watershed is assumed to be part of the overall C-51W basin.) ITID M1 runoff discharges preferentially into C-51W canal, instead of the L-8 Canal, subject to available M-1 canal conveyance (750 cfs total capacity) after passage of runoff from the Town of Royal Palm Beach. M-1 canal discharges into C-51W canal and are assumed to be released to the east via S-155A instead of to the west via S-319 pump station. • L-8 FEB is simulated as a 950-acre, ~48,000 ac-ft reservoir with an inflow structure capacity of 3,000 cfs and an outflow pump capacity of 450 cfs; operations as described in the July 2015 L-8 Reservoir and FEB Draft Project Operations manual. It receives water primarily from the S5A and C-51W basins with coordinated closure of divide structure G-541 which prevents it from receiving water from the northern reaches of the L-8 Canal. • Grassy Waters Preserve is simulated and modeled with a maintenance level of 18.5 ft NGVD delivered via the M-Canal to supplement water supply demands to the City of West Palm Beach (41.2 MGD with 2016-2020 Seasonal Distribution) and releases via G161 toward the Loxahatchee Slough and River. Seepage losses are accounted for in both GWP and the conveyance route from Control 2 to GWP. • Features of the Loxahatchee River Watershed Restoration Projects although authorized, are not yet simulated in RSM.
Water Shortage Rules	• Reflects the existing water shortage policies as in South Florida Water Management District Chapters 40E-21 and 40E-22, FAC, including Lake Okeechobee Water Shortage Management (LOWSM) Plan.



Water-Body Components:
MIA Water-Body = S3 + S8
NNR/HILLS Water-Body = S2 + S6 + S7 + New Hope South
WPB Water-Body = S-5A
A-1FEB = A-1
EAA Reservoir = A2RES

Figure A-4. RSMBN Basin Definition within the EAA for Future Condition Increment #3 (ASR55).

Notes:

- The RSM is a robust and complex regional scale model. Due to the scale of the model, it is frequently necessary to implement abstractions of system infrastructure and operations that will, in general, mimic the intent and result of the desired project features while not matching the exact mechanism by which these results would be obtained in the real world. Additionally, it is sometimes necessary to work within established paradigms and foundations within the model code (e.g. use available input-driven options to represent more complex project operations).

- The boundary conditions along the eastern and southern boundaries of the RSMBN model were provided from either the South Florida Water Management Model (SFWMM) or the RSM Glades-LECSA Model (RSMGL). The SFWMM was the source of the eastern boundary groundwater/surface water flows, while the RSMGL was the source of the southern boundary structural flows.
- Future Condition Increment #3 (ASR55) assumptions were taken from and are consistent with the BBSEER FWO assumptions.