SOUTH FLORIDA WATER MANAGEMENT DISTRICT

TECHNICAL DOCUMENT TO SUPPORT THE CENTRAL EVERGLADES PLANNING PROJECT EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION

~~Draft~~Final Report

~~July 28,~~September 2020



South Florida Water Management District

West Palm Beach, FL

EXECUTIVE SUMMARY

Authorized by Congress in 2016 and 2018, the Central Everglades Planning Project (CEPP) is one of many projects associated with the Comprehensive Everglades Restoration Plan (CERP) and provides a framework to address restoration of the South Florida Everglades ecosystem. As part of CEPP, the Everglades Agricultural Area (EAA) Reservoir was designed to increase water storage and treatment capacity to accommodate additional flows south to the Central Everglades (Water Conservation Area 3 and Everglades National Park). EAA Reservoir project features previously were evaluated to enhance performance of CEPP by providing an additional 240,000 acre-feet of storage. The additional storage will increase flows to the Everglades by reducing harmful discharges from Lake Okeechobee to the Caloosahatchee River and St. Lucie estuaries and capturing EAA basin runoff. The EAA Reservoir also enhances regional water supplies, which increases the water available to meet environmental needs.

The Water Resources Development Act of 2000 (Public Law 106-541) requires water be reserved or allocated as an assurance that each CERP project meets its goals and objectives. A water reservation is a legal mechanism to reserve a quantity of water from consumptive use for the protection of fish and wildlife or public health and safety. Under Section 373.223(4), Florida Statutes, a water reservation is composed of a quantification of the water to be protected, which may include a seasonal component and a location component. All surface water released from the EAA Reservoir through the S-624, S-625, and S-626 structures and directed to the Lower East Coast Everglades waterbodies will be reserved for the protection of fish and wildlife in the Central Everglades through adoption of a prospective water reservation rule.

This technical document summarizes the information and data collected and analyzed to support the EAA Reservoir Water Reservation rulemaking effort. It provides the best available information regarding the correlation between hydrology and biology, and it reserves a quantity of water needed for the protection of fish and wildlife. A description of the water reservation waterbody, an overview of CEPP, and a discussion of the project features and benefits associated with the EAA Reservoir are provided. Proposed hydrologic improvements within Water Conservation Area 3 and Everglades National Park are discussed. The conditions created by the EAA Reservoir will increase average depths and lengthen inundation durations in over-drained areas, while also reducing damaging peak water levels in ponded areas. The quantity, distribution, and timing of these hydrologic improvements are expected to restore multiple habitat types (e.g., tree islands, slough systems) that provide critical ecological functions for a multitude of fish and wildlife. Modeling information is included to show the expected hydrologic improvements associated with different habitat types and areas in the Central Everglades. Linkages are established between the hydrology and biology to show the expected benefits to fish and wildlife. Rehydration would facilitate transition from upland to wetland vegetation where submerged aquatic plants can provide structure for growth of periphyton, which are primary dietary components of invertebrates and small fishes. Thus, the expansion of rehydrated areas would increase prey availability, providing a long-term benefit to the spatial extent of suitable foraging and nesting habitat for higher trophic level species. These linkages are demonstrated by ecological models using key indicator species such as alligators, apple snails, wading birds, and small fish.

TABLE OF CONTENTS

Executive Summary **ES-1**
1 Introduction **1**
1.1 Overview and Purpose 1
1.2 Identification of the Water Reservation Waterbody 3
1.3 Comprehensive Everglades Restoration Plan 4
1.4 Central Everglades Planning Project 7
1.4.1 Everglades Agricultural Area 9
1.4.2 Northern Water Conservation Area 3A 9
1.4.3 Southern Water Conservation Area 3A, Water Conservation Area 3B, and Everglades National Park 10
1.4.4 Lower East Coast Protective Levee 10
1.5 Benefits of the Central Everglades Planning Project 11
1.5.1 Meeting Comprehensive Everglades Restoration Plan Goals for Flows to Central Everglades 11
1.5.2 Benefits to the Northern Estuaries 11
1.5.3 Benefits to the Central Everglades 11
2 Basis for Water Reservations **13**
2.1 Definition and Statutory Authority 13
2.1.1 Prospective Water Reservation 14
2.2 Water Reservation Rulemaking Process 14
3 Existing Conditions in the Central Everglades Watershed **17**
3.1 Water Conservation Areas 3A and 3B 17
3.2 Everglades National Park 21
4 Improvements to Hydrologic Conditions, Habitats, and Fish and Wildlife Resources **22**
4.1 Hydrologic Conditions 24
4.1.1 Hydroperiod, Ponding Depth, and Overland Flow 24
4.1.2 Water Conservation Areas 3A and 3B 28
4.1.3 Northeast Shark River Slough 35
4.1.4 Western Shark River Slough 38
4.1.5 Taylor Slough 41
4.2 Habitats 41
4.2.1 Central Everglades 41
4.2.2 Slough/Open Water Marsh 51
4.2.3 Wet Marl Prairies 51
4.2.4 Tree Islands 52

4.2.5 Shark River Slough 54
4.2.6 Hydrologic Summary 55
4.3 Fish and Wildlife Resources 56
4.3.1 Small Fish 59
4.3.2 Crayfish 61
4.3.3 Alligators 61
4.3.4 Wading Birds (White Ibis, Wood Stork, and Great Egret) 64
4.3.5 Apple Snail 68
4.3.6 Cape Sable Seaside Sparrow 71
4.3.7 Ecological Summary 73
5 Identification of Water to be Reserved 75
5.1 Water Made Available by the Project 75
5.1.1 Water Stored Within the Reservoir and Conveyed to the Natural System 75
5.2 Effects of the Proposed Everglades Agricultural Area Reservoir on Existing Legal Users 80
5.2.1 Water Not Reserved for the Protection of Fish and Wildlife 81
5.3 Risk to Project Waters 84
5.3.1 Upstream Watershed Evaluation 84
5.3.2 Water Stored Within the Everglades Agricultural Area Reservoir 87
5.3.3 Downstream Watershed Evaluation 87
Literature Cited 90
Appendices 96
Appendix A: Final Peer-Review Report on the Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation A-1
Appendix B: Summary of Peer-Review and Public Comments, Questions, and District Responses on the Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation B-1
Appendix C: Public Comment Letters Received After the May 29 Public Peer-Review Session C-1
Appendix D: Summary of Public Comments, Questions, and District Responses on Draft Water Reservation Rule D-1
Appendix E: Public Comment Letters Received After Rule Development Workshop #1 and Workshop #2 ..... E-1
Appendix F: Everglades Agricultural Area Reservoir Water Reservation Quantification Documentation Report F-1
Appendix G: Evaluation of Impacts to Water Sources for Existing Legal Consumptive Users Due to the Everglades Agricultural Area Reservoir and A-2 Stormwater Treatment Area G-1

LIST OF TABLES

Table 4-1. A summary comparison of hydrologic conditions under the existing conditions baseline and Alternative C240 across the project regions. 56
Table 4-2. Comparison of effects on key indicator species, including federally and state-listed threatened and endangered species, under the existing conditions baseline and Alternative C240. 57
Table 4-3. A comparison of ecological model output and simulation period. 59
Table 5-1. Existing legal users surrounding the Everglades Agricultural Area Reservoir site. 81

LIST OF FIGURES

Figure 1-1. Location of the Central Everglades, encompassing Water Conservation Area 3 (3A and 3B) and Everglades National Park. 2
Figure 1-2. General features of the Everglades Agricultural Area Reservoir. 3
Figure 1-3. Location of the Everglades Agricultural Area Reservoir and Stormwater Treatment Area. 4
Figure 1-4. Land changes in the Everglades system over time. 5
Figure 1-5. Pre-drainage, current, and restored flows to illustrate Comprehensive Everglades Restoration Plan (CERP) restoration. 6
Figure 1-6. The authorized Central Everglades Planning Project components. 8
Figure 1-7. Timing of treated flows south into the Central Everglades with the Central Everglades Planning Project (C240TSP) compared to existing conditions (EARECB). 12
Figure 2-1. Water reservation rule development process. 16
Figure 3-1. Water Conservation Areas 3A and 3B landscape vegetation conditions in August 2017 18
Figure 3-2. (a) Minimum and (b) maximum changes in soil thickness (feet) between 1946 to 1996 in the Central Everglades 19
Figure 3-3. Changes in landscape vegetation patterns in Water Conservation Areas 3A and 3B between 1995 (left) and 2004 (right). 20
Figure 3-4. Tree island loss in Water Conservation Areas 3A and 3B from 1940 to 1995 21
Figure 4-1. The Regional Simulation Model for the Greater Everglades and Lower East Coast Service Area (RSM-GL) domain with (a) gauges; and (b) flow transects (e.g., T5) and indicator regions (e.g., IR114). 24
Figure 4-2. Modeled hydroperiod during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative C240 (right). 25
Figure 4-3. Modeled ponding depth during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative C240 (right). 26
Figure 4-4. Modeled surface water flow vectors during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative C240 (right). 27
Figure 4-5. Water Conservation Area 3A water budget for (a) the existing conditions baseline, and (b) Alternative C240. 29
Figure 4-6. Northwestern Water Conservation Area 3A normalized duration curves. 30
Figure 4-7. Northeastern Water Conservation Area 3A normalized duration curves. 30
Figure 4-8. East-central Water Conservation Area 3A normalized duration curves. 31
Figure 4-9. Eastern Water Conservation Area 3A normalized duration curves. 31
Figure 4-10. Central Water Conservation Area 3A normalized duration curves. 32
Figure 4-11. Southern Water Conservation Area 3A normalized duration curves. 32
Figure 4-12. Water Conservation Area 3B water budget for the (a) existing conditions baseline and (b) Alternative C240. 33
Figure 4-13. Northern Water Conservation Area 3B normalized duration curves. 34
Figure 4-14. Central Water Conservation Area 3B normalized duration curves. 34
Figure 4-15. Water Conservation Area 3B Blue Shanty Flow-way normalized duration curves. 35
Figure 4-16. Average annual overland flow across Transect 18 in Northeast Shark River Slough. 36
Figure 4-17. Water Conservation Area 3B Blue Shanty Flow-way stage duration curve 36

Figure 4-18. Northeast Shark River Slough normalized duration curves. 37
Figure 4-19. Eastern Everglades National Park normalized duration curves. 37
Figure 4-20. Average annual overland flow from WCA-3A to Shark River Slough across Transect 17. 38
Figure 4-21. Northern Everglades National Park normalized duration curves. 39
Figure 4-22. Northwestern Everglades National Park normalized duration curves. 39
Figure 4-23. Central Everglades National Park normalized duration curves. 40
Figure 4-24. Average annual overland flow across Transect 27 in central Shark River Slough 40
Figure 4-25. Taylor Slough normalized duration curves. 41
Figure 4-26. Normalized duration curves for northwestern Water Conservation Area 3A. 42
Figure 4-27. Normalized duration curves for northeastern Water Conservation Area 3A 42
Figure 4-28. Average annual overland flow in northern Water Conservation Area 3A (west of the Miami Canal). 43
Figure 4-29. Normalized duration curves for northeastern Water Conservation Area 3A 44
Figure 4-30. Normalized duration curves for central Water Conservation Area 3A. 45
Figure 4-31. Normalized duration curves for southern Water Conservation Area 3A 46
Figure 4-32. Normalized duration curves for central Water Conservation Area 3B. 46
Figure 4-33. Normalized duration curves for southern Water Conservation Area 3B. 47
Figure 4-34. Normalized duration curves for Northeast Shark River Slough. 48
Figure 4-35. A weekly count of dry events in four indicator regions within Shark River Slough between 1965 and 2005 under a pre-drained hydrologic condition (NSM462), the existing conditions baseline (EARECB), and Alternative C240 (C240). 49
Figure 4-36. Average annual overland flow in southern Everglades National Park. 50
Figure 4-37. Normalized duration curves in southern Big Cypress National Preserve 52
Figure 4-38. Normalized duration curves in southeastern Water Conservation Area 3B. 54
Figure 4-39. Normalized duration curves in Shark River Slough. 55
Figure 4-40. Mean total fish density for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences between Alternative C240 and the existing conditions baseline for an average rainfall year. 60
Figure 4-41. Habitat suitability index score for (a) the existing condition baseline and (b) Alternative C240, and (c) habitat suitability index differences between Alternative C240 and the existing conditions baseline for an average rainfall year. 63
Figure 4-42. White ibis spatial foraging conditions is presented for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences in spatial foraging conditions indices between Alternative C240 and the existing conditions baseline in March and April from 1975 to 2005. 66
Figure 4-43. Wood stork spatial foraging conditions for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences in spatial foraging conditions indices between Alternative C240 and the existing conditions baseline in March and April from 1975 to 2005. 67
Figure 4-44. Apple snail adult population density for (a) the existing condition baseline and (b) Alternative C240, and (c) density differences between Alternative C240 and the existing conditions baseline on April 20 of an average rainfall year. 70
Figure 4-45. Marl prairie habitats and locations of the Cape Sable seaside sparrow subpopulations (A, AX, B, C, D, E, and F). 72
Figure 5-1. Proposed location of the Everglades Agricultural Area Reservoir and A-2 Stormwater Treatment Area as well as existing adjacent facilities. 76

Figure 5-2. Everglades Agricultural Area Reservoir annual surface water discharges through structures S-624, S-625, and S-626 volume probability curve (May to April water years) from the Alternative C240 model simulation. 78
Figure 5-3. Contribution of the Everglades Agricultural Area Reservoir and other sources (basin runoff and Lake Okeechobee releases) to the Central Everglades for the current condition and the future condition with the Reservoir. 79
Figure 5-4. Everglades Agricultural Area Reservoir surface water discharges through structure S-628 volume probability curve (May to April water years) from the Alternative C240 model simulation. 83
Figure 5-5. The Restricted Allocation Area for Lake Okeechobee and the Lake Okeechobee Service Area. 85
Figure 5-6. Existing legal users within the area of influence surrounding the Everglades Agricultural Area Reservoir site. 87
Figure 5-7. Lower East Coast Everglades waterbodies and major integrated conveyance canals. 89

ACRONYMS, ABBREVIATIONS, AND UNITS OF MEASURE

ac-ft	acre-feet
C&SF Project	Central and Southern Florida Flood Control Project
CEPP	Central Everglades Planning Project
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
CSSS	Cape Sable seaside sparrow
EAA	Everglades Agricultural Area
ECB	existing conditions baseline
ENP	Everglades National Park
F.S.	Florida Statutes
FEB	flow equalization basin
ft	foot
LOSA	Lake Okeechobee Service Area
m	meter
NESRS	Northeast Shark River Slough
NGVD29	National Geodetic Vertical Datum of 1929
PACR	Post Authorization Change Report
PIR	Project Implementation Report
RECOVER	Restoration, Coordination, and Verification program
RSM	Regional Simulation Model
RSM-BN	Regional Simulation Model – Basins
RSM-GL	Regional Simulation Model – Greater Everglades and Lower East Coast Service Area
SFC	spatial foraging conditions
SFWMD	South Florida Water Management District
SRS	Shark River Slough
STA	stormwater treatment area
TFC	temporal foraging conditions
USACE	United States Army Corps of Engineers
WCA	water conservation area
WRDA	Water Resources Development Act

1 INTRODUCTION

1.1 Overview and Purpose

This document summarizes the technical and scientific data, assumptions, models, and methodology used to support rule development to reserve water for the protection of fish and wildlife in the Central Everglades (**Figure 1-1**). For the purposes of this document, and any subsequent rulemaking for this water reservation, the term "Central Everglades" means Water Conservation Area 3 (WCA-3) and Everglades National Park (ENP). Specifically, fresh water will be provided by the Everglades Agricultural Area (EAA) Reservoir as described in the Central Everglades Planning Project (CEPP) Post Authorization Change Report (PACR; South Florida Water Management District [SFWMD] 2018a) and Final Environmental Impact Statement (United States Army Corps of Engineers [USACE] 2020). The EAA Reservoir is the main storage feature of CEPP, which also includes additional treatment and conveyance features that will improve the quantity, quality, timing, and distribution of flows to the Central Everglades, as described in the CEPP Project Implementation Report (PIR; USACE and SFWMD 2014) and PACR (SFWMD 2018a). The meaning of "water needed to protect fish and wildlife" (i.e., ensuring the health and sustainability of fish and wildlife communities through natural cycles of drought, flood, and population variation) is discussed in **Chapter 2**.

The relationships and evaluations in the PIR (USACE and SFWMD 2014) and PACR (SFWMD 2018a) form the basis of the proposed EAA Reservoir Water Reservation rules. The PACR established relationships among freshwater flows discharged from the EAA Reservoir and the downstream ecologic responses. Key information in this document is based on the PIR and PACR and provides:

- A basis for the water reservation rule;
- A description of the EAA Reservoir, the Central Everglades, and the watershed, which is discussed in **Chapter 3**;
- An overview of the ecosystem and improvements expected after construction and operation of the EAA Reservoir, as identified in the PACR, which is discussed in **Chapter 4**; and
- Identification of water to be prospectively reserved by rule in **Chapter 5**.

The water reservation rules will fulfill federal legal requirements for entering a Project Partnership Agreement with the USACE to construct the EAA Reservoir and other features. Section 601(h)(4) of the Water Resource Development Act of 2000 (WRDA 2000; Public Law 106-541) and the Programmatic Regulations for Implementation of the Comprehensive Everglades Restoration Plan (33 Code of Federal Regulations § 385.26-27) set implementation requirements for Comprehensive Everglades Restoration Plan (CERP) projects. State law, specifically, Section 373.470, Florida Statutes (F.S.), ~~also~~ requires the increased water supplies resulting from a CERP project component ~~to~~ be identified and reserved or allocated by the ~~District~~SFWMD. These federal and state requirements ensure that each CERP project provides benefits for the natural system by protecting water through the SFWMD's reservation or allocation authority. The SFWMD elected to use its reservation authority pursuant to Section 373.223(4), ~~Florida Statutes (~~F.S.~~),~~., to protect water made available by the EAA Reservoir.

Water reservation rules and accompanying water use criteria require water use permit applicants to provide reasonable assurances that their proposed use of water will not withdraw reserved water. The geographic scope of the analysis performed in the PACR and in this document includes surface water discharges from the EAA Reservoir to the Central Everglades.

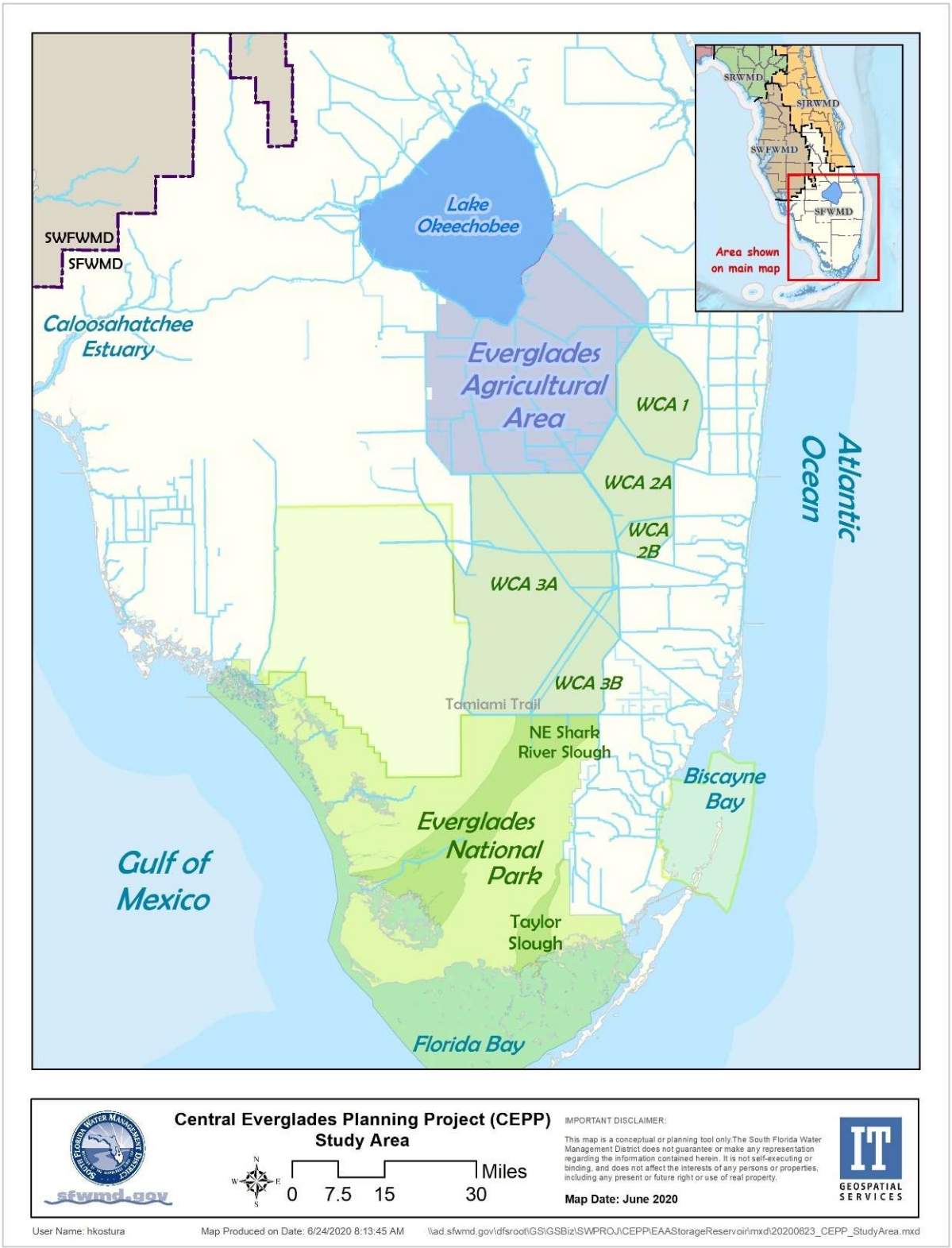


Figure 1-1. Location of the Central Everglades, encompassing Water Conservation Area 3 (3A and 3B) and Everglades National Park.

1.2 Identification of the Water Reservation Waterbody

The water reservation waterbody is the EAA Reservoir (**Figure 1-2**), the project feature proposed for implementation by the CEPP PACR. The proposed aboveground reservoir will have a storage capacity of 240,000 acre-feet (ac-ft) and be designed with a normal full storage water depth of approximately 22.6 feet (ft). The project footprint is approximately 10,500 acres (16 square miles). Major features of the proposed EAA Reservoir are shown in **Figure 1-2**.

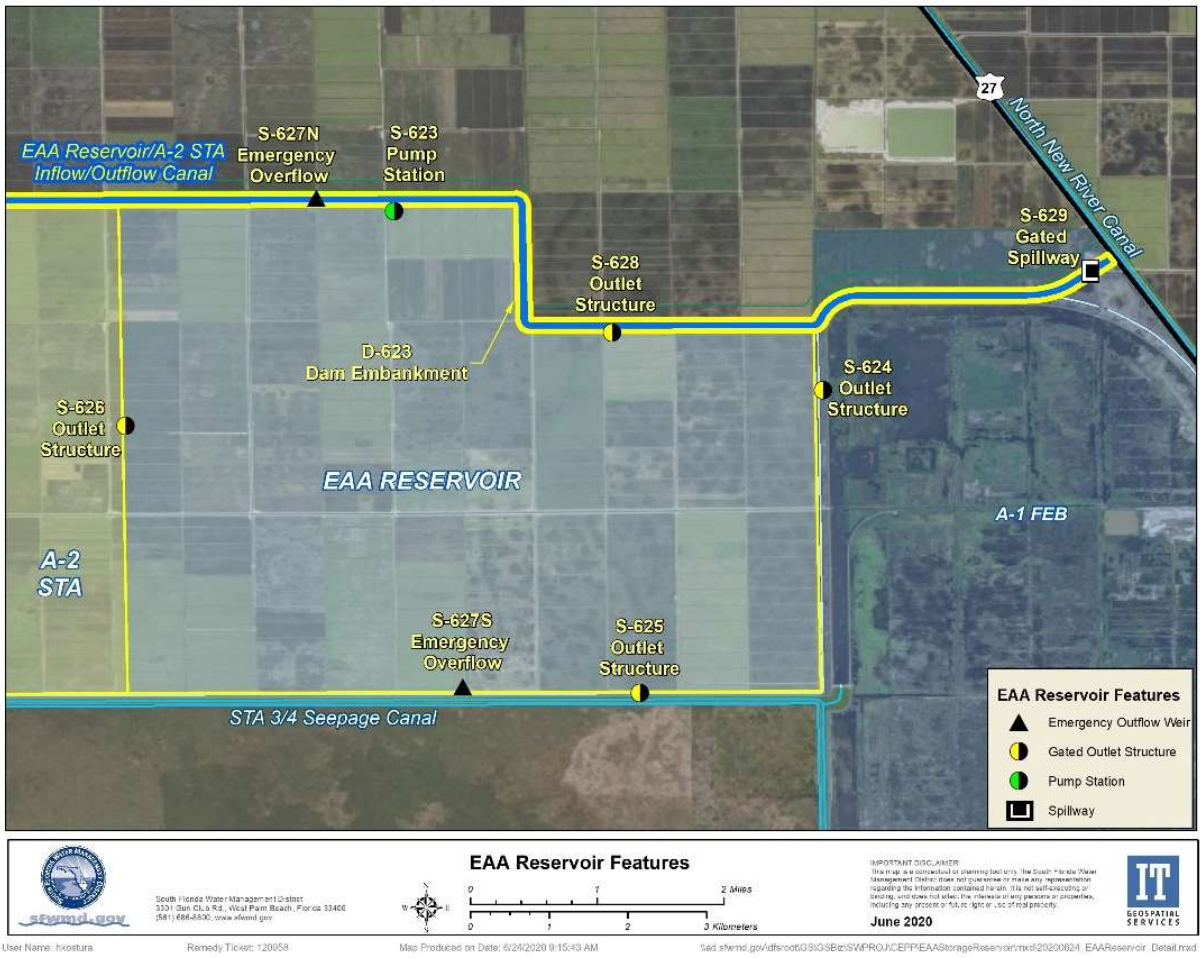


Figure 1-2. General features of the Everglades Agricultural Area Reservoir.

The EAA Reservoir will be adjacent to a stormwater treatment area (EAA A-2 STA), which ~~also is recommended in~~ the PACR also recommends be constructed. These features will work in conjunction with the existing A-1 Flow Equalization Basin (FEB), STA-2, and STA-3/4 to meet state water quality standards (**Figure 1-3**). The reservoir also will include additional conveyance capacity for the segments of the Miami Canal and the North New River Canal within the EAA. EAA Reservoir outflows may be sent to the new EAA A-2 STA (adjacent to and directly west of the reservoir), the existing A-1 FEB, STA-2, and/or STA-3/4. EAA Reservoir ~~outflows~~discharges also may be conveyed back to the Miami Canal or North New River Canal via the reservoir's inflow-outflow canal to supplement regional water supplies.

All surface water released via operation of the S-624, S-625, and S-626 structures in the EAA Reservoir is proposed for reservation from allocation for the protection of fish and wildlife in the Central Everglades. This is further described in **Chapter 5**.

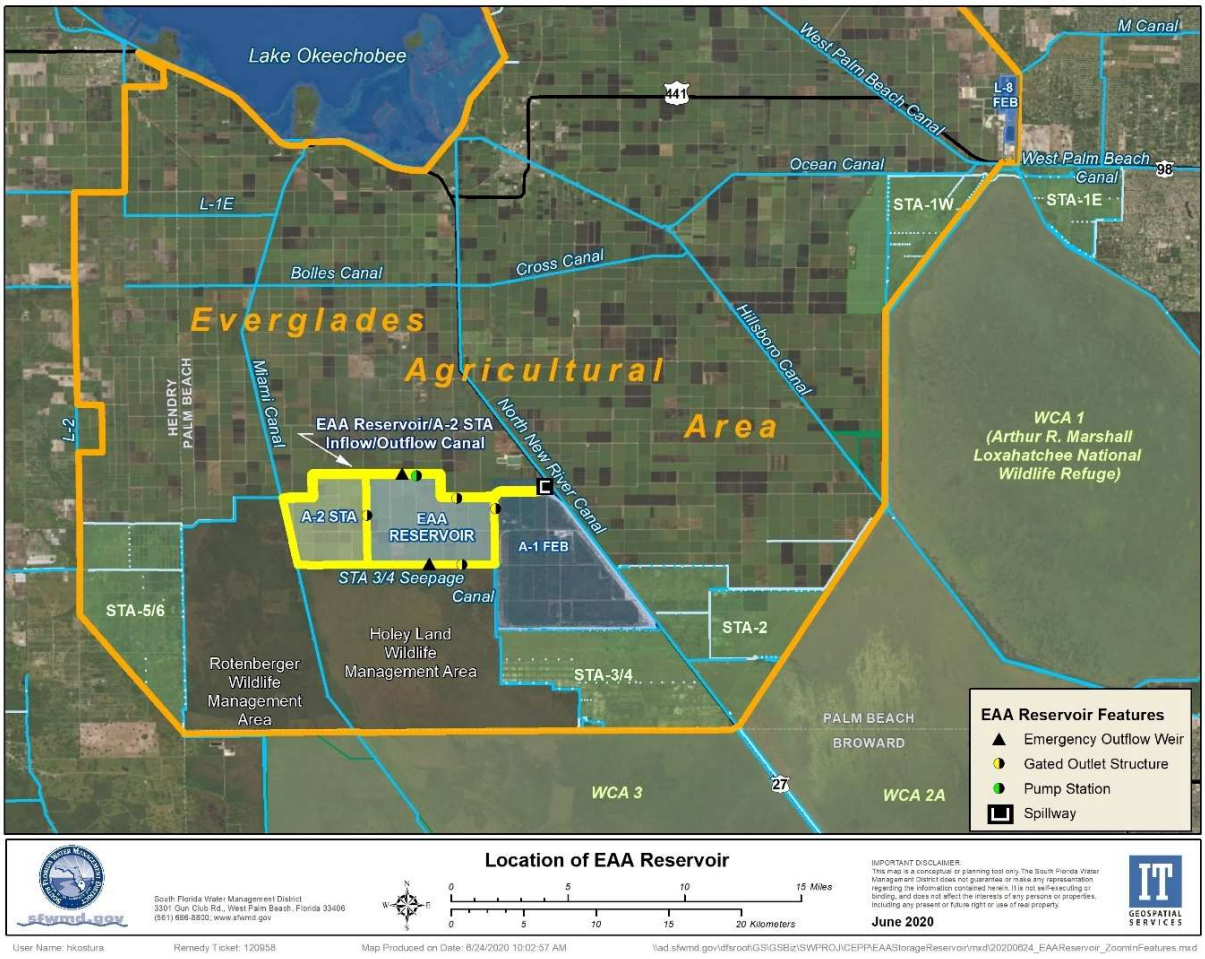


Figure 1-3. Location of the Everglades Agricultural Area Reservoir and Stormwater Treatment Area.

1.3 Comprehensive Everglades Restoration Plan

The Everglades ecosystem has been altered by 120 years of efforts to address flood protection and water supply needs in South Florida. Initiated in 1948, implementation of the federally authorized Central and Southern Florida Flood Control Project (C&SF Project) accelerated alterations to the ecosystem. As a result, the remaining Everglades ecosystem no longer exhibits the functionality, richness, and spatial extent that historically defined the system prior to the C&SF Project. The spatial extent of the Everglades has been reduced by almost 50% as a result of development and agriculture. Water management activities intended to provide flood protection and water supply to developed and agricultural areas resulted in ecosystem-wide changes south of Lake Okeechobee (**Figure 1-4**).

Water that once flowed from Lake Okeechobee south through the Everglades, down Shark River Slough (SRS), and to the southern estuaries has been impounded in the lake and discharged to the northern estuaries (i.e., Caloosahatchee River and St. Lucie estuaries) via regulatory releases through the C-43 and C-44 canals. Prolonged, high-volume discharges from Lake Okeechobee to the northern estuaries, coupled with high nutrient concentrations in Lake Okeechobee and downstream basin water, have resulted in damaging effects to plants and animals that inhabit estuarine environments. Damage to the ecosystem negatively affects the area's economy and takes years to correct. Additionally, discharges to the northern estuaries have significantly changed the hydrology south of Lake Okeechobee. The reduction in sheetflow across the Everglades has changed the landscape through the loss of peat, freshwater marshes, tree islands,

and native flora and fauna, and through the proliferation of invasive species. Loss of freshwater inflow to Florida Bay, south of the Everglades, has increased the bay's salinity and caused adverse effects to estuarine species. Furthermore, South Florida agricultural practices have resulted in high nutrient concentrations in Lake Okeechobee and downstream basin water, causing additional damage to flora and fauna inhabiting these areas.

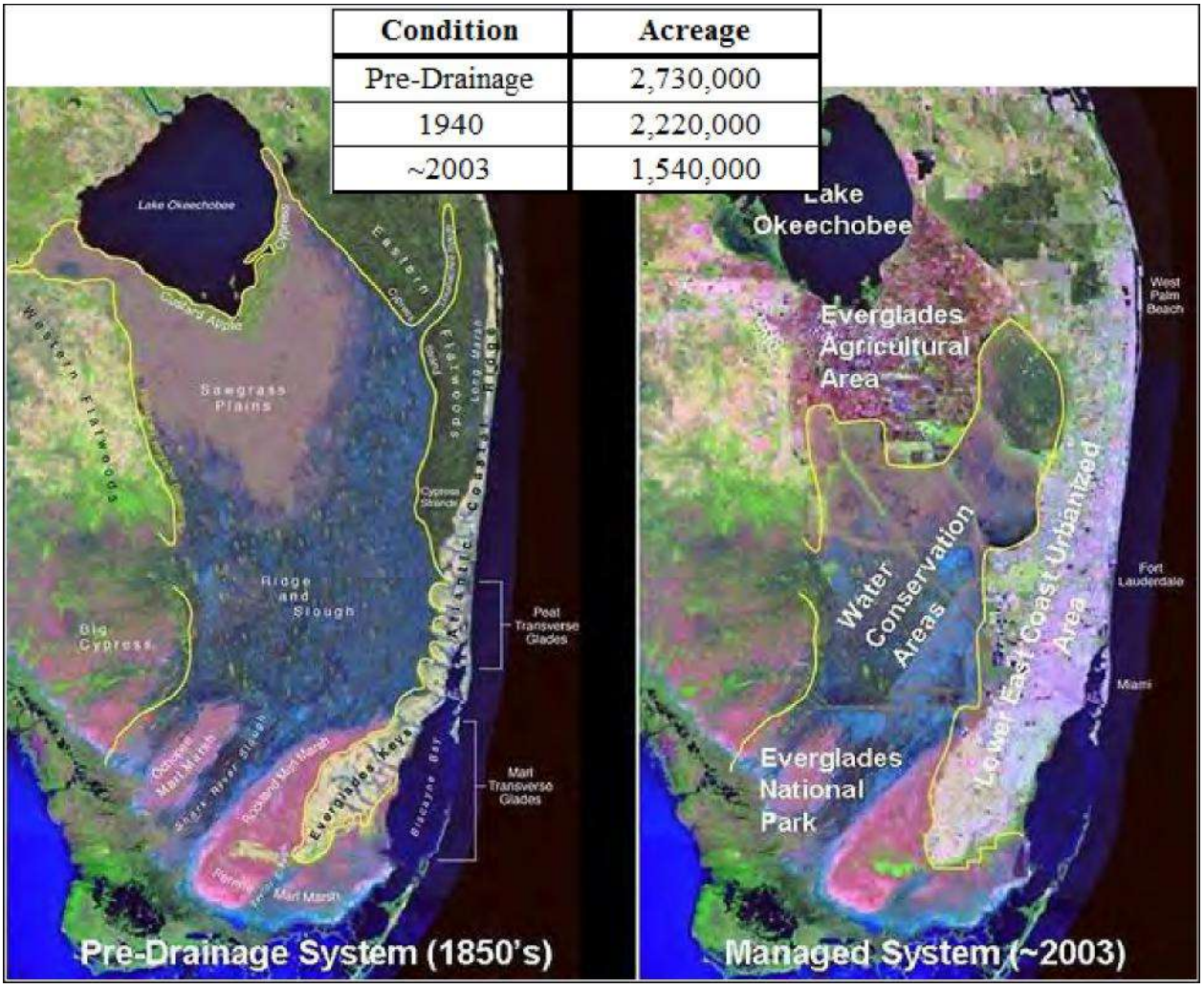


Figure 1-4. Land changes in the Everglades system over time (Modified from: McVoy et al. 2011).

CERP was approved by Congress as a framework for the restoration of the natural system under Section 601 of the WRDA 2000. CERP, as documented in the C&SF Project Comprehensive Review Study (USACE and SFWMD 1999), consists of 68 different components originally planned for implementation over an approximately 40-year period. The purpose of CERP is to modify structural and operational components of the C&SF Project to restore the South Florida ecosystem, including the Everglades, while providing for other water-related needs such as urban and agricultural water supply and flood protection. CERP was designed to restore more natural flows by redirecting water currently discharged to the Atlantic Ocean and Gulf of Mexico to a southern flow across the Everglades similar to pre-drainage conditions (**Figure 1-5**). The 68 components identified in the C&SF Project Comprehensive Review Study (USACE and SFWMD 1999), which include storage, treatment, seepage management, and conveyance modifications, among others, will work together to restore the ecological structure and function of more than 2.4 million acres of the South Florida ecosystem by improving and/or restoring the quantity, quality, timing, and distribution of

water in the natural system from the Kissimmee Basin to Florida Bay. CERP also will address other concerns such as urban and agricultural water supply and maintain existing levels of service for flood protection in areas served by the project.

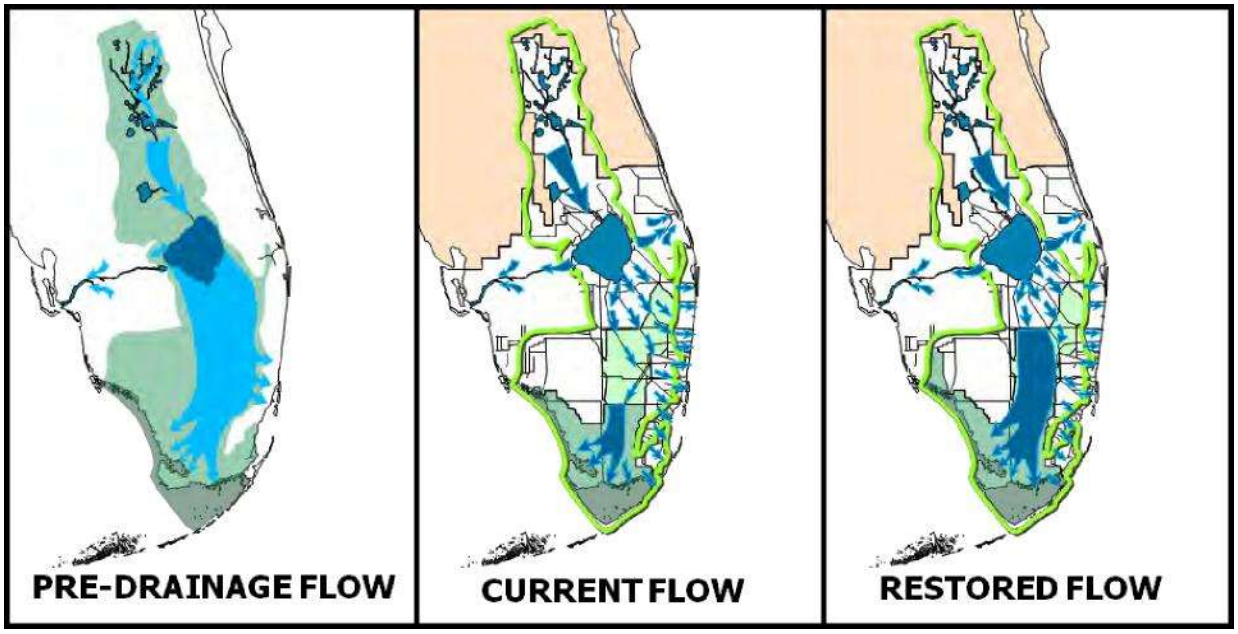


Figure 1-5. Pre-drainage, current, and restored flows to illustrate Comprehensive Everglades Restoration Plan (CERP) restoration.

Since authorization of CERP in the WRDA 2000:

- Three projects were authorized in the WRDA 2007 (Public Law 110-114) and proceeded into construction: Indian River Lagoon-South, Picayune Strand, and Site 1 Impoundment. A fourth project, Melaleuca and Other Exotic Plants Biological Controls, was implemented under the programmatic authority from the WRDA 2000.
- Four projects were authorized in the Water Resources Reform and Development Act of 2014 (Public Law 113-121). The Caloosahatchee River (C-43) West Basin Storage Reservoir, Biscayne Bay Coastal Wetlands Phase I Project, and C-111 Spreader Canal Western proceeded into construction, and detailed design began on the Broward County Water Preserve Area Project.
- CEPP was authorized in the Water Infrastructure Improvements for the Nation Act of 2016 (Public Law 114-322).
- The CEPP PACR was authorized in the America's Water Infrastructure Act of 2018 (Public Law 115-270).

1.4 Central Everglades Planning Project

The CEPP PIR was initiated by the USACE in 2011 in partnership with the SFWMD, the non-federal sponsor of CERP. The PIR was completed in December 2014, the Chief of Engineers report was signed on December 23, 2014, and CEPP was authorized by Congress in Section 1401(4) of the Water Infrastructure Improvements for the Nation Act of 2016 (Public Law 114-322). In 2018, Congress authorized the CEPP PACR in Section 1308(a) of the America's Water Infrastructure Act of 2018 (Public Law 115-270). The PACR modified CEPP to increase the storage, treatment, and conveyance of the new water component of the plan.

The overall purpose of CEPP is to develop a plan to restore water depth, duration, and distribution in WCA-3A, WCA-3B, and ENP to re-establish a landscape characteristic of the pre-drained system that would support a healthy mosaic of plant and animal life. The restored hydrology of the Everglades ecosystem would more closely resemble a naturally occurring, rainfall-driven system with wet and dry cycles essential to flora and fauna propagation. Improved water depth and sheetflow distribution would begin to re-establish the unique ridge, slough, and tree island microtopography that once sustained the vast diversity of species inhabiting the Everglades.

The following subsections describe the components of CEPP, which are organized into four geographic areas: the EAA; northern WCA-3A; southern WCA-3A, WCA-3B, and ENP; and the Lower East Coast protective levee (**Figure 1-6**). Additional information about CEPP is presented in the PIR (USACE and SFWMD 2014), PACR (SFWMD 2018a), and Final Environmental Impact Statement (USACE 2020). Analyses of alternative plans in the PACR partially depended on hydrologic simulation models. The alternative selected to represent CEPP with the EAA Reservoir was called Alternative C240 in the PACR and the Final Environmental Impact Statement. This nomenclature can be found in the description of CEPP benefits in **Chapter 4**.

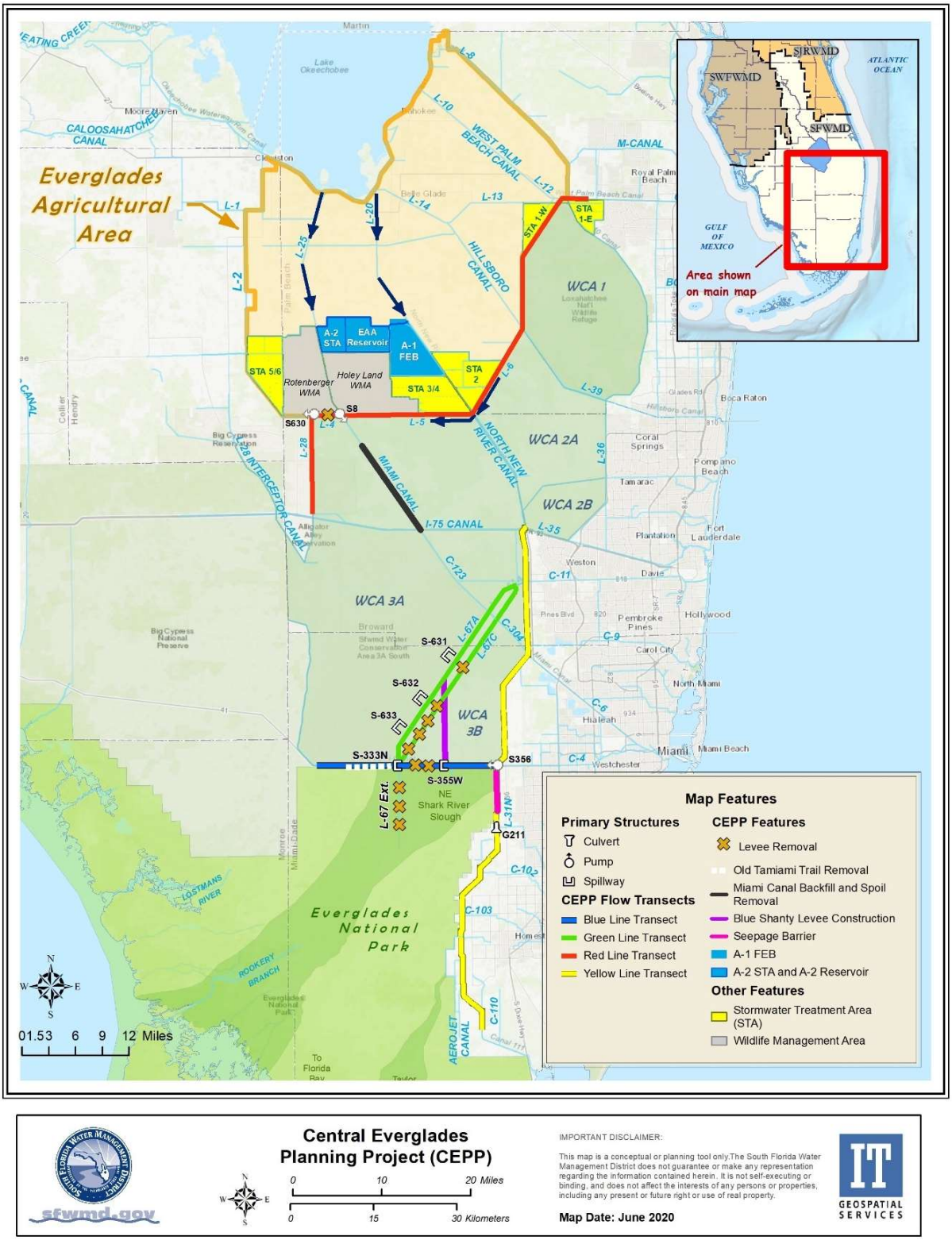


Figure 1-6. The authorized Central Everglades Planning Project components.

1.4.1 Everglades Agricultural Area

The EAA Reservoir and A-2 STA includes construction and operations to divert, store, and treat Lake Okeechobee regulatory releases. Once constructed, the EAA Reservoir will have a storage capacity of 240,000 ac-ft, and the STA will encompass 6,500 acres. These features will work in conjunction with the existing A-1 FEB (60,000 ac-ft), STA-2, and STA-3/4 to meet state water quality standards (**Figure 1-4**). The reservoir project increases conveyance capacity in segments of the Miami Canal and North New River Canal within the EAA by 1,000 and 200 cubic feet per second (cfs). EAA Reservoir outflows may be sent to the new EAA A-2 STA (adjacent to and directly west of the reservoir), the A-1 FEB, STA-2, and/or STA-3/4. EAA Reservoir outflows also may be conveyed to the Miami Canal or North New River Canal via the inflow-outflow canal to supplement regional water supplies for irrigation. The EAA Reservoir will store Lake Okeechobee water currently discharged to the northern estuaries and EAA basin runoff.

The EAA Reservoir may be filled and emptied multiple times each year to handle flows to the STAs. The original congressional authorization of the EAA Reservoir (Component G) had multipurpose CERP benefits to the environment and water supply needs of the region (USACE and SFWMD 1999). The EAA Reservoir combines new and existing storage to provide operational flexibility and efficient use of the available storage consistent with the original congressional authorization. The PACR (SFWMD 2018a) supplements existing legal sources of water while providing a new source of water to the Everglades. The water supplied and benefits accrued to the Central Everglades depend on conveying water from the reservoir to ~~both~~ the Central Everglades and the EAA basin ~~in order~~ to reduce regulatory releases from Lake Okeechobee.

Additional water will be made available for restoration purposes through modified Lake Okeechobee operations and the efficient use of the EAA Reservoir and A-2 STA to improve the quantity, timing, and distribution of environmental deliveries to the WCAs and ENP during the wet and dry seasons. Operational changes to deliver this new water would be conducted in a manner consistent with stage, volume, and/or flow-based restoration targets by 1) treating and delivering water from Lake Okeechobee, water detained by CEPP PACR components, or a combination of both~~,~~; and 2) providing temporary storage for releases from Lake Okeechobee to reduce the harmful effects of flood control releases on the St. Lucie and Caloosahatchee River estuaries. ~~It should be recognized that most~~Most EAA flood control ~~discharge~~discharges currently sent to the WCAs ~~is an~~are important ~~part~~parts of the water ~~budget~~budgets for those areas. Additionally, some regulatory releases from Lake Okeechobee ~~to the WCAs~~ are beneficial to the WCAs, provided the releases have water quality treatment sufficient to maintain compliance with legal and restoration goals. However, there are times when stages in the WCAs are higher than restoration targets. During those times, runoff and regulatory releases to the WCAs can exacerbate short- and long-term impacts due to high stages. The EAA Reservoir will provide an additional 240,000 ac-ft of effective detention volume to attenuate EAA runoff and lake water flows, thus avoiding ~~sending water~~inflows to the WCAs when they are not ready to receive additional water. As a general operational strategy, the EAA Reservoir will be operated to attenuate flows during the wet season and carry over water from September and October into the dry season when releases to the WCAs would be beneficial or cause less harm. A draft project operating plan was included in the PACR~~.~~ (SFWMD 2018a).

1.4.2 Northern Water Conservation Area 3A

Northern WCA-3A includes conveyance features to deliver and distribute existing flows and redirected Lake Okeechobee water through WCA-3A. The key features to ensure spatial distribution and flow directionality of water entering WCA-3A are 1) backfilling 13.5 miles of the Miami Canal between Interstate 75 and 1.5 miles south of the S-8 pump station, and 2) converting the L-4 Canal into a spreader canal by removing 2.9 miles of the southern L-4 levee.

Conveyance features to move water into and through the northwestern portion of WCA-3A include a gated culvert to deliver water from the L-6 Canal to the remnant L-5 Canal; a new gated spillway to deliver water from the remnant L-5 Canal to the western L-5 Canal (during L-6 diversion operations); a new gated spillway to deliver water from STA-3/4 to the S-7 pump station during peak discharge events (the eastern flow route typically is not used during normal operations), including L-6 diversion operations; 13.6 miles of conveyance improvements to the L-5 Canal; a new 360-cfs pump station within the L-4 Canal to retain existing functionality of STA-5 and STA-6 and to maintain water supply to existing legal users, including the Seminole Tribe of Florida; and new gated culverts and an associated new canal to deliver water from the Miami Canal (downstream of S-8, which pulls water from the L-5 Canal) to the L-4 Canal, along with potential design modifications to the existing S-8 and G-404 pump stations.

The Miami Canal would be backfilled to approximately 1.5 ft below the peat surface of the adjacent marsh. Spoil mounds on the east and west sides of the Miami Canal from S-8 to Interstate 75 would be used for backfill material. Refuge for mammals and other upland species would continue to be provided by retaining 22 of the highest priority Florida Fish and Wildlife Conservation Commission enhanced spoil mounds between S-339 (approximately 10 miles south of S-339) and Interstate 75 and by creating additional upland landscape (constructed tree islands) approximately every mile along the entire reach of the backfilled Miami Canal section where ridges and tree islands once existed.

1.4.3 Southern Water Conservation Area 3A, Water Conservation Area 3B, and Everglades National Park

As CEPP moves forward, WCA-3A and WCA-3B will include conveyance features to deliver and distribute water to ENP. The new Blue Shanty Levee (L-67D), extending from Tamiami Trail north to the L-67A Canal, would be constructed. The Blue Shanty Levee would divide WCA-3B into two subunits, a large eastern unit (3B-E) and a smaller western unit, the Blue Shanty Flow-way (3B-W). Hydrologic modeling indicated a new levee is the most efficient means to restore continuous southerly sheetflow through a practicable section of WCA-3B and alleviates concerns regarding effects to tree islands by maintaining lower water depths and stages in WCA-3B-E. The width of the Blue Shanty Flow-way is aligned to the width of the downstream 2.6-mile Tamiami Trail Next Steps bridge, optimizing the effectiveness of both the flow-way and bridge. In the Blue Shanty Flow-way, construction of two gated control structures on the L-67A Canal, removal of the L-67C and L-29 levees within the flow-way, and construction of a gated spillway in the L-29 Canal would enable continuous sheetflow of water from WCA-3A through WCA-3B-W to ENP. A third gated control structure in the L-67A levee and associated gap in the L-67C levee, both outside the flow-way, would improve the hydroperiod of WCA-3B-E. Spoil mounds along the northwestern side of the L-67A Canal, near the three new L-67A structures, would be removed to facilitate sheetflow connectivity with the WCA-3A marsh. An additional gated spillway (S-333N) adjacent to the S-333 structure at the terminus of the L-67A Canal, removal of 5.5 miles of the L-67 extension levee, and removal of approximately 6 miles of Old Tamiami Trail between ENP Tram Road and the L-67 extension levee would facilitate additional deliveries of water from WCA-3A directly to ENP.

1.4.4 Lower East Coast Protective Levee

The Lower East Coast protective levee includes features primarily for seepage management, which are required to mitigate for increased seepage resulting from additional flows into WCA-3B and ENP. A newly constructed 1,000-cfs pump station would replace the temporary S-356 pump station, and a 4.2-mile partial-depth seepage barrier would be built along the L-31N levee south of Tamiami Trail.

CEPP conservatively includes a 4.2-mile long, 35-ft deep tapering seepage barrier if necessary. Uncertainties remain regarding the effectiveness of the CEPP seepage cutoff wall in providing desired stages in ENP marshes while maintaining flood protection and canal stages to the east without limiting

water availability to existing water users and Biscayne Bay. Additional analysis of the CEPP seepage cutoff wall would be conducted during the preconstruction engineering and design phase.

1.5 Benefits of the Central Everglades Planning Project

1.5.1 Meeting Comprehensive Everglades Restoration Plan Goals for Flows to Central Everglades

The original CEPP was the first incremental step in increasing average annual flows to the Central Everglades. It provided approximately 210,000 ac-ft on an average annual basis to the Central Everglades, which is approximately two-thirds of the CERP performance goal. Plan formulation for the PACR attempted to deliver the remaining one-third of new water essential to Everglades restoration consistent with the CERP performance goal by screening different storage features.

The screening analysis compared the pre-CERP baseline (USACE 2005) to the CERPA scenario—the model scenario from the Restoration, Coordination, and Verification program (RECOVER 2005) to update CERP—to establish the CERP goal for flow to the Central Everglades. This analysis identified the CERP goal flow target of approximately 300,000 ac-ft of new water on an average annual basis over the 36-year modeled simulation period (1965 to 2000) for restoration. Early screening suggested high potential for this project to meet or exceed the CERP goal of sending water to the Central Everglades.

The CERP goal flow target became the target for continued PACR plan formulation work. The most cost-effective alternative (R240A) was refined and modeled to optimize its performance based on the operational protocols included in Alternative C360C to become Alternative C240. The operations of Alternatives C360C and C240 broadened the reservoir's function from single-purpose to multi-purpose by conveying water to the Miami Canal and North New River Canal for regional water supplies. Alternative C240 achieved 97% of the CERP goal over the 36-year period of record available from RECOVER. Consistent with CEPP, Alternative C240 was modeled and analyzed over the longer 41-year period of record (1965 to 2005) to evaluate effects of the PACR. Alternative C240 provides an increase of approximately 370,000 ac-ft in average annual flow to the Central Everglades, exceeding the CERP goal of 300,000 ac-ft.

1.5.2 Benefits to the Northern Estuaries

One goal of CERP is to reduce damaging freshwater discharges to the northern estuaries by approximately 80%. In combination with the previously authorized projects, CEPP approaches this goal by providing a 55% flow reduction in damaging discharges and a 63% reduction in the number of mean monthly high-flow discharge events. CEPP helps restore the resiliency of the northern estuaries by reducing the number, duration, and frequency of harmful discharges from Lake Okeechobee. The supplemental storage and treatment proposed in the PACR would reduce the number of discharges by an additional 40% for the Caloosahatchee River Estuary and 55% for the St. Lucie Estuary, in addition to the benefits provided by CEPP. Salinity conditions in the estuaries are improved by reducing the number of discharge events that exceed the preferred salinity envelope by 45% in the Caloosahatchee River Estuary and by 39% in the St. Lucie Estuary.

1.5.3 Benefits to the Central Everglades

In addition to reducing damaging discharges to the northern estuaries, CEPP increases water deliveries to the Central Everglades to an average annual flow of approximately 370,000 ac-ft. This is essential to Everglades restoration and achieves the CERP goal for freshwater deliveries to the Everglades. CEPP also shifts the timing of deliveries, favoring flows during the dry season (November through May) when

downstream infrastructure has adequate capacity to convey the increased flows (**Figure 1-7**). CEPP integrates the new EAA Reservoir and A-2 STA with the existing A-1 FEB, STA-2, and STA-3/4 to meet the project objectives. Under current conditions, STAs have little to no flow during the dry season, which can result in stagnant conditions. CEPP primarily uses STA capacity available during the dry season in STA-2 and STA-3/4. As expected, this results in higher average monthly inflows during dry season months compared to current conditions.

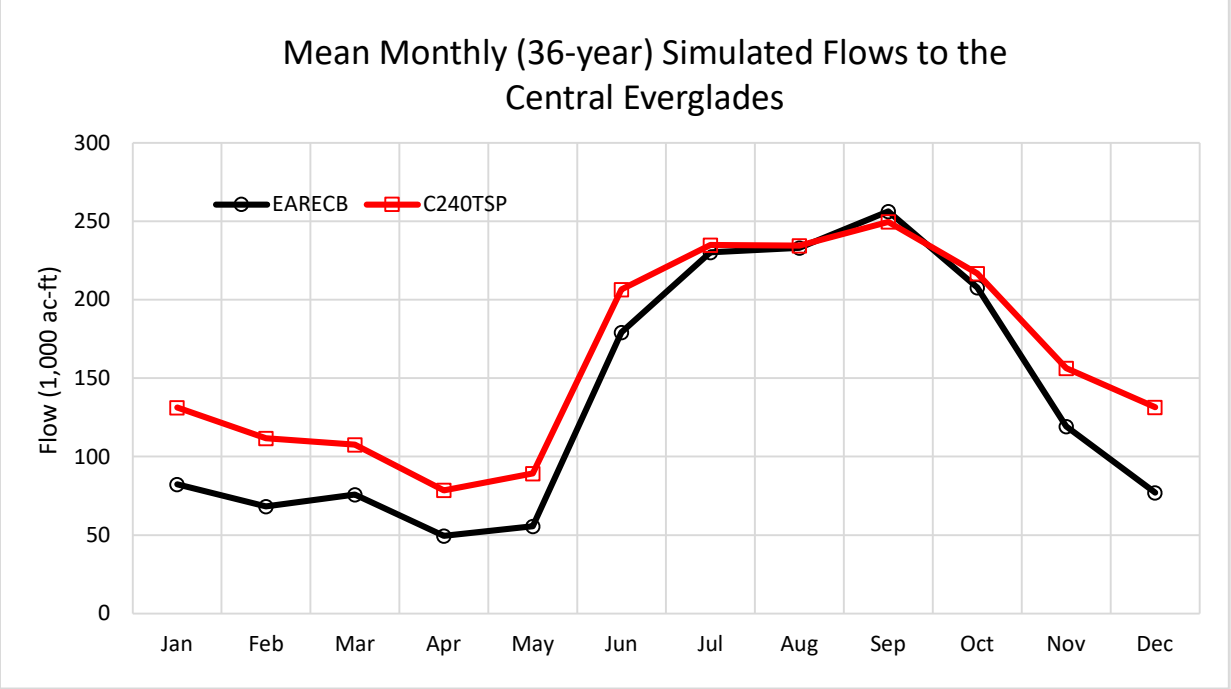


Figure 1-7. Timing of treated flows south into the Central Everglades with the Central Everglades Planning Project (C240TSP) compared to existing conditions (EARECB).

Additional flow will have the following ecological benefits to the Central Everglades:

- Additional water flowing into northern WCA-3A and ENP will help improve and/or restore vegetative communities and habitat for fish and wildlife.
- Additional flow will improve natural processes critical for development of peat soils and tree islands, which are essential features of the Everglades ridge and slough landscape.
- In northwestern WCA-3A, CEPP will improve slough vegetation depths, reducing the time that water ponding depth in the sloughs falls below zero (i.e., fewer dryouts).
- In northwestern WCA-3A, CEPP will provide longer durations (hydroperiods) when the CERP target ponding depths are achieved, which improves slough vegetation suitability.
- In northeastern WCA-3A, CEPP will improve slough vegetation by increasing the duration of beneficial water ponding depths.
- Overland flows will increase under Tamiami Trail and into the northern portions of ENP.
- Additional freshwater overland flow will be provided to central SRS and Taylor Slough and will improve the timing, distribution, and continuity of sheetflow across the Everglades ridge and slough landscape. The benefits of overland flow to central SRS are a continuation of the flows under Tamiami Trail.

2 BASIS FOR WATER RESERVATIONS

2.1 Definition and Statutory Authority

~~A Water Reservation is a legal mechanism to reserve a quantity of water from consumptive use for the protection of fish and wildlife or public health and safety.~~

Section 373.223(4), F.S~~., states the following:~~.:

> *The governing board or the department, by regulation, may reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety. Such reservations shall be subject to periodic review and revision in the light of changed conditions. However, all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest.*

~~Per~~A water reservation is a legal mechanism to reserve a quantity of water from consumptive use for the protection of fish and wildlife or public health and safety. In Association of Florida Community Developers v. Department of Environmental Protection, Division of Administrative Hearings ~~(2006)~~ Case 04-000880RP, ~~it is reasonable to interpret~~ "protection" was reasonably interpreted to mean ensuring the health and sustainability of fish and wildlife communities through natural cycles of drought, flood, and population variation.

When water is reserved pursuant to Section 373.223(4), F.S., it is unavailable for allocation to new or increased consumptive uses. ~~However, existing~~Existing legal uses of water are protected so long as such uses are not contrary to the public interest. An existing legal use is a water use that is authorized in a water use permit pursuant to Part II of Chapter 373, F.S., or is exempt from water use permit requirements.

The Florida Legislature gave broad discretion to the Governing Boards of Florida's five water management districts to exercise judgment in establishing water reservations, taking into consideration the water needs of fish and wildlife or public health and safety, while also balancing the overall district missions. Water management districts are directed to periodically review and revise adopted water reservations as needed to achieve this balance.

It is equally important to understand the limitations of water reservations. Water reservations do not drought-proof a natural system, ensure wildlife proliferation, or establish an operating regime. While Part II of Chapter 373, F.S., authorizes the SFWMD to permit consumptive uses and establish water reservations, it does not authorize the SFWMD to establish operating criteria for the C&SF Project system or CERP projects. The C&SF Project system and CERP project operating criteria are established by the USACE and implemented by the SFWMD through distinct federal and state authorities. C&SF Project and CERP project operating criteria affect the timing and availability of water in the SFWMD; therefore, the operating plans for CERP projects must be consistent with established water reservations and permitted water allocations.

~~The Florida Legislature gave broad discretion to the Governing Boards of Florida's five water management districts to exercise judgment in establishing Water Reservations, taking into consideration the water needs of fish and wildlife or public health and safety while also balancing the overall district missions. Water management districts are directed to periodically review and revise adopted Water Reservations as needed to achieve this balance.~~

The SFWMD has elected to use its water reservation authority conferred by Section 373.223(4), F.S., to prospectively reserve quantities of water in the EAA Reservoir for the protection of fish and wildlife through adoption of water reservation rules. The proposed EAA Reservoir Water Reservation rules support the overall restoration goals and objectives of CEPP. Rulemaking will be based on the technical information and recommendations in this document and in the independent scientific peer review outlined in **Appendix ~~B~~ A**.

2.1.1 Prospective Water Reservation

Subsection 62-40.474(3), Florida Administrative Code, states that water reservations may be adopted prospectively for water quantities anticipated to be made available at a future date. Surface water from the EAA Reservoir will not be made available for the Central Everglades until the reservoir is fully constructed and certified operational by the ~~District's~~SFWMD Governing Board. Therefore, this ~~will be~~is a prospective water reservation.

Pursuant to the *Master Agreement Between the Department of the Army and the South Florida Water Management District for Cooperation in Constructing and Operating, Maintaining, Repairing, Replacing and Rehabilitating Projects Authorized to be Undertaken Pursuant to the Comprehensive Everglades Restoration Plan* (2009), the term "operational" means:

- Construction of the authorized CERP project or a functional portion of the authorized CERP project is physically complete;
- The authorized CERP project or a functional portion of the authorized CERP project has completed an operational testing and monitoring period, where applicable;
- The features of the authorized CERP project or a functional portion of the authorized CERP project meet applicable design and construction standards and, as supported by the results of an applicable operational testing and monitoring period, operate as designed and in accordance with applicable permit conditions and applicable operating manuals; and
- The U.S. Department of the Army and SFWMD have completed and approved in writing the applicable System Operating Manual, Project Operating Manual, and Maintenance, Repair, Replacement, and Rehabilitation Manuals; final as-built drawings have been provided; and Written Notices of Acceptance of Completed Work have been finalized and provided to the non-federal sponsor, unless the U.S. Department of the Army and SFWMD otherwise agree in writing that the non-federal sponsor shall initiate operation, maintenance, repair, replacement, and rehabilitation based on approved interim manuals.

2.2 Water Reservation Rulemaking Process

General rulemaking requirements and procedures are described in Chapter 120, F.S., consistent with state law and SFWMD policy. The generalized process of water reservation rulemaking includes several steps (**Figure 2-1**). The following is a description of the steps completed thus far in the CEPP EAA Reservoir Water Reservation development process. On April 9, 2020, the SFWMD Governing Board authorized publication of a Notice of Rule Development for the CEPP EAA Reservoir Water Reservation. Modeling, analyses, and drafts of this technical document and water reservation rules were then completed. An independent scientific peer review was initiated by the SFWMD in April 2020; a public peer-review session was ~~be~~ held on May 29, 2020; and a final peer-review report was completed by the peer-review panel and provided to the ~~District~~SFWMD on June 15, 2020. The final peer-review report is provided in **Appendix ~~B~~ A** and comments received on the peer review are provided in **Appendices B** and **C** ~~and D~~.

In addition to the SFWMD's recent peer review process, a USACE Agency Technical Review/External Peer Review of the CEPP PIR was completed in October 2013 through collaboration with the USACE Planning Centers of Expertise in compliance with Engineer Circular 1105-2-408, Peer Review of Decision Documents, dated May 31, 2005. The PACR underwent an independent external peer review in accordance with the requirements in Engineer Circular 1165-2-214, Appendix D, and was completed in March 2018.

Public rule development workshops were held on July 14 and August 6, 2020, to gain public input on the ~~Water Reservation project and~~water reservation rulemaking. Public comments, questions, and ~~District~~SFWMD responses given during and after the July 14 ~~workshop~~and August 6 workshops are provided in ~~**Appendix**~~**Appendices D** and **E**. Draft EAA Reservoir Water Reservation rules and revisions to applicable sections of the *Applicant's Handbook for Water Use Permit Applications in the South Florida Water Management District* (SFWMD 2015) ~~will be~~are completed~~ in August 2020~~. Once the water reservation rules are finalized, authorization to publish a Notice of Proposed Rule will be sought from the SFWMD Governing Board in ~~September~~October 2020. The ~~rules will be brought before the Governing Board again in November 2020 for~~ rule ~~adoption. The~~development process has been open and transparent. SFWMD ~~encourages~~staff have encouraged stakeholder review and comment on the draft water reservation rules during public rule development workshops and prior to ~~final rule adoption~~the October 2020 Governing Board meeting.

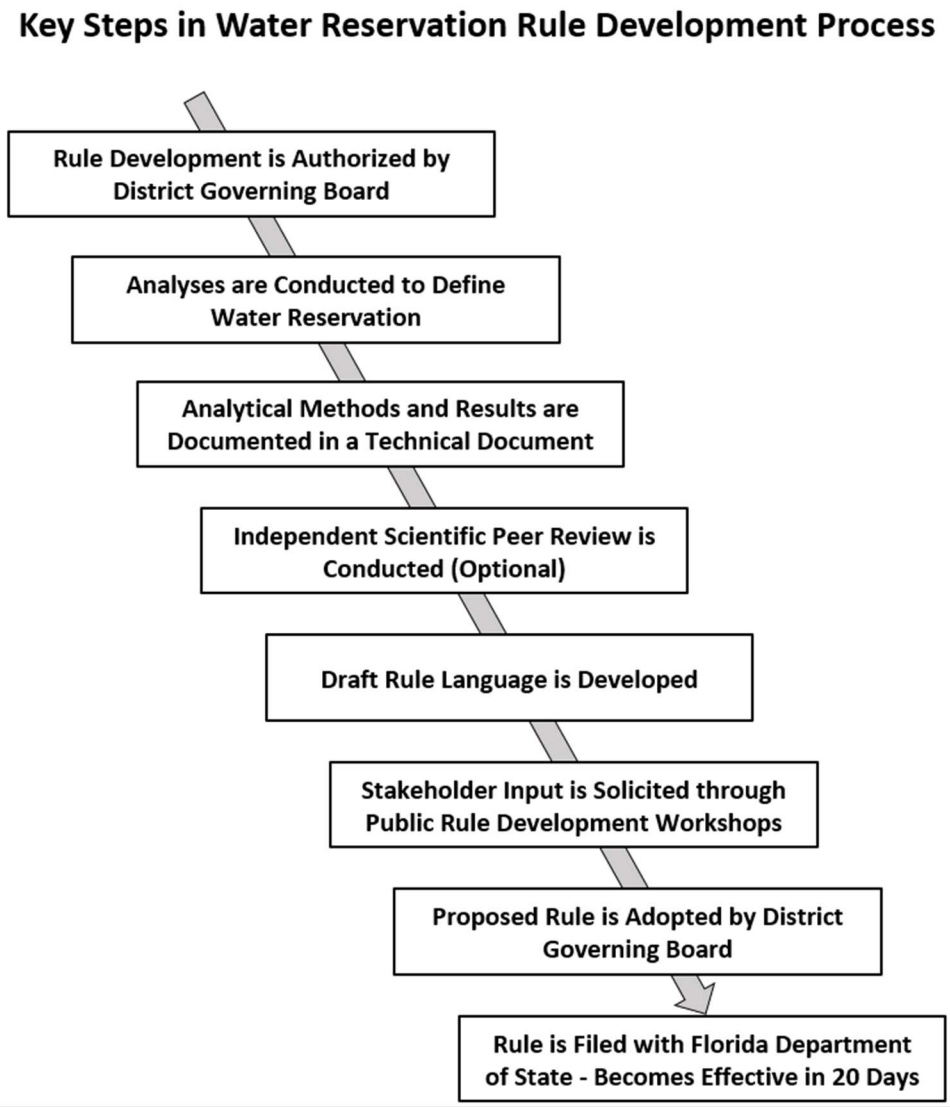


Figure 2-1. Water reservation rule development process.

3 EXISTING CONDITIONS IN THE CENTRAL EVERGLADES WATERSHED

Current C&SF Project operations involve water supply and flood releases to manage stage levels in Lake Okeechobee, the WCAs, and ENP. Impoundment of the natural system, construction of drainage canals and conveyance features, and current C&SF Project operations have disrupted the seasonal pattern of rising and falling water depths in the Central Everglades. These hydrologic changes have contributed to degradation of sawgrass marshes, infilling of slough habitat, and loss of ecologically valuable tree islands. In short, the current system is too wet in some areas and too dry in others.

Additionally, conversion of natural areas for urban and agricultural uses and the network of C&SF Project canals have altered natural flow patterns, causing complete shifts in vegetative communities and dramatic reductions in fish and wildlife populations. The result is reduced water storage capacity in the remaining natural system and an unnatural mosaic of impounded, fragmented, over-inundated, and over-drained marshes.

3.1 Water Conservation Areas 3A and 3B

In response to expansive sheetflow from Lake Okeechobee, seasonal rainfall, and periodic fires, the pre-drainage landscape of WCA-3A and WCA-3B consisted of a complex mosaic of vegetative habitats interspersed on the flat peat bed that accumulated over the last 5,000 years. Construction and operation of the C&SF Project have had unintended and adverse effects on the ecosystems of WCA-3A and WCA-3B, which continue to decline. One of the most well-documented effects of the C&SF Project has been the loss of native flora and fauna due to phosphorus enrichment of this naturally oligotrophic ecosystem (McCormick et al. 1996, 2009; Newman et al. 1998, 2004; Gaiser et al. 2005). However, water reservations are focused on hydrologic needs; therefore, while potential phosphorus effects are addressed, as appropriate, primary emphasis is on responses directly related to hydrologic changes and the benefits of water reservations to wildlife.

Northern WCA-3A has been over-drained and the natural hydroperiods shortened (**Figure 3-1**). Hydrologic changes have caused the loss of the historical ridge and slough patterned landscape (**Figure 3-1**), resulting in a loss of land surface elevation, principally through biochemical soil oxidation and peat fires. **Figure 3-2** displays minimum and maximum changes in soil thickness from 1946 to 1996 (Scheidt et al. 2000). Calculations of soil thickness loss indicate northern WCA-3A lost between 39% and 65% of its organic soil depth during these 50 years.

Decreased hydroperiods and fire in northern WCA-3A have facilitated a shift to plant communities dominated by sawgrass, cattail, and scattered shrubs that lack the structural diversity of native plant communities (**Figure 3-3**; Rutchey 2010). Vegetation and patterning in central WCA-3A most closely resemble pre-drainage conditions (McVoy et al. 2011) and represent some of the best examples of historical Everglades habitat left in South Florida (**Figures 3-1** and **3-3**). This region of the Everglades appears to have changed little since the 1950s (which was already post-drainage) and contains a mosaic of tree islands, wet prairies, sawgrass stands and ridges, and aquatic sloughs similar to those reported by Loveless (1959). Southern and eastern WCA-3A primarily is affected by high water, lack of seasonal variability, and prolonged periods of inundation (ponding) created by impoundment structures (i.e., L-67A, L-67C, and L-29 levees). Extended hydroperiods within southern and eastern WCA-3A have negatively impacted tree islands (**Figure 3-4**) and caused fragmentation of sawgrass ridges, resulting in the loss of historical landscape patterning.

Within WCA-3B, the ridge-slough-tree island structure has been severely compromised by the virtual elimination of overland sheetflow since construction of the L-67 Canal and levee system in the early 1960s (**Figure 3-1**). WCA-3B has become a primarily rain-fed compartment, experiencing very little overland flow. It primarily has turned into a sawgrass monoculture (**Figure 3-3**), where relatively few sloughs or tree islands remain (**Figure 3-4**).

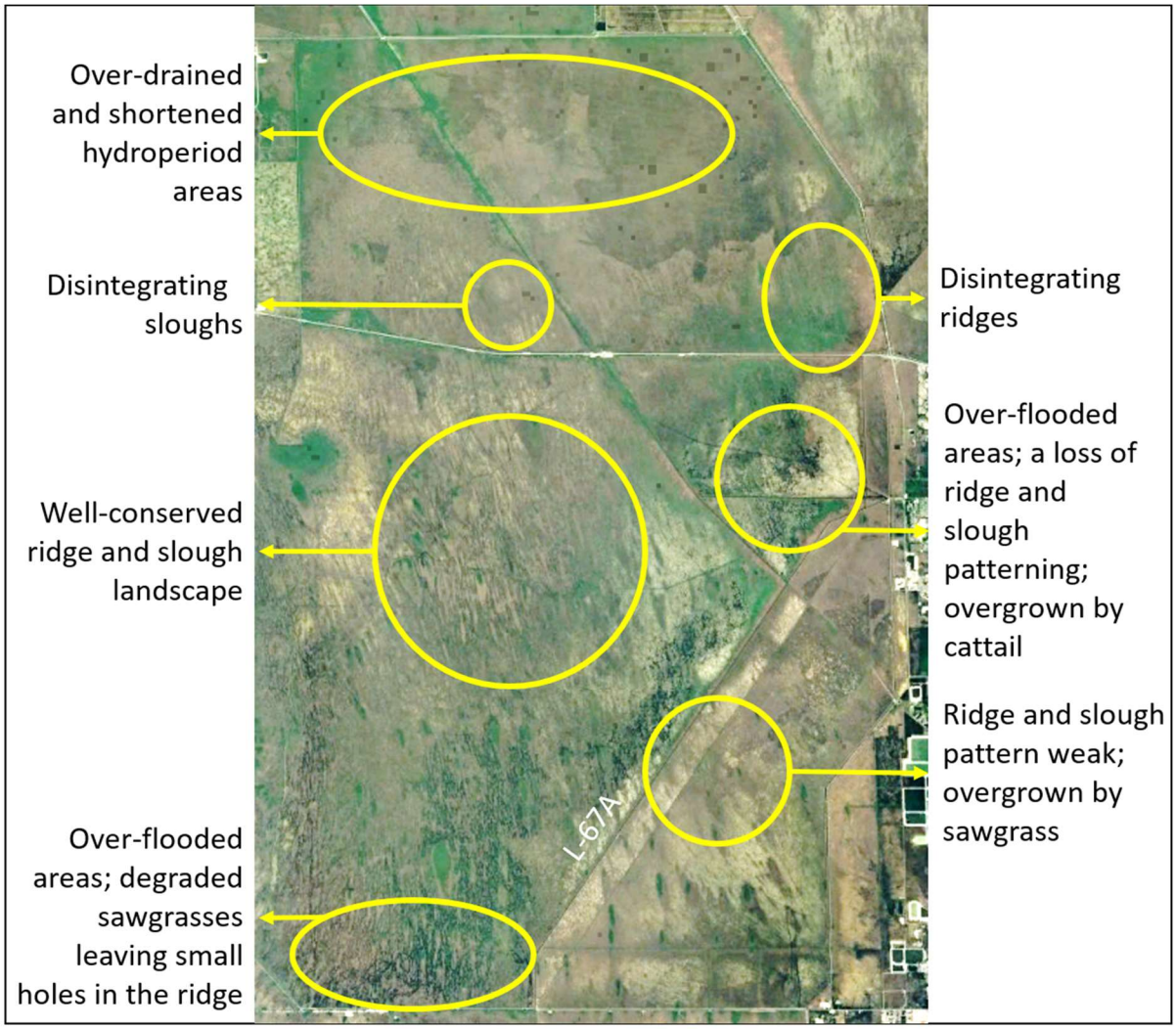


Figure 3-1. Water Conservation Areas 3A and 3B landscape vegetation conditions in August 2017 (Image from: Google Earth).

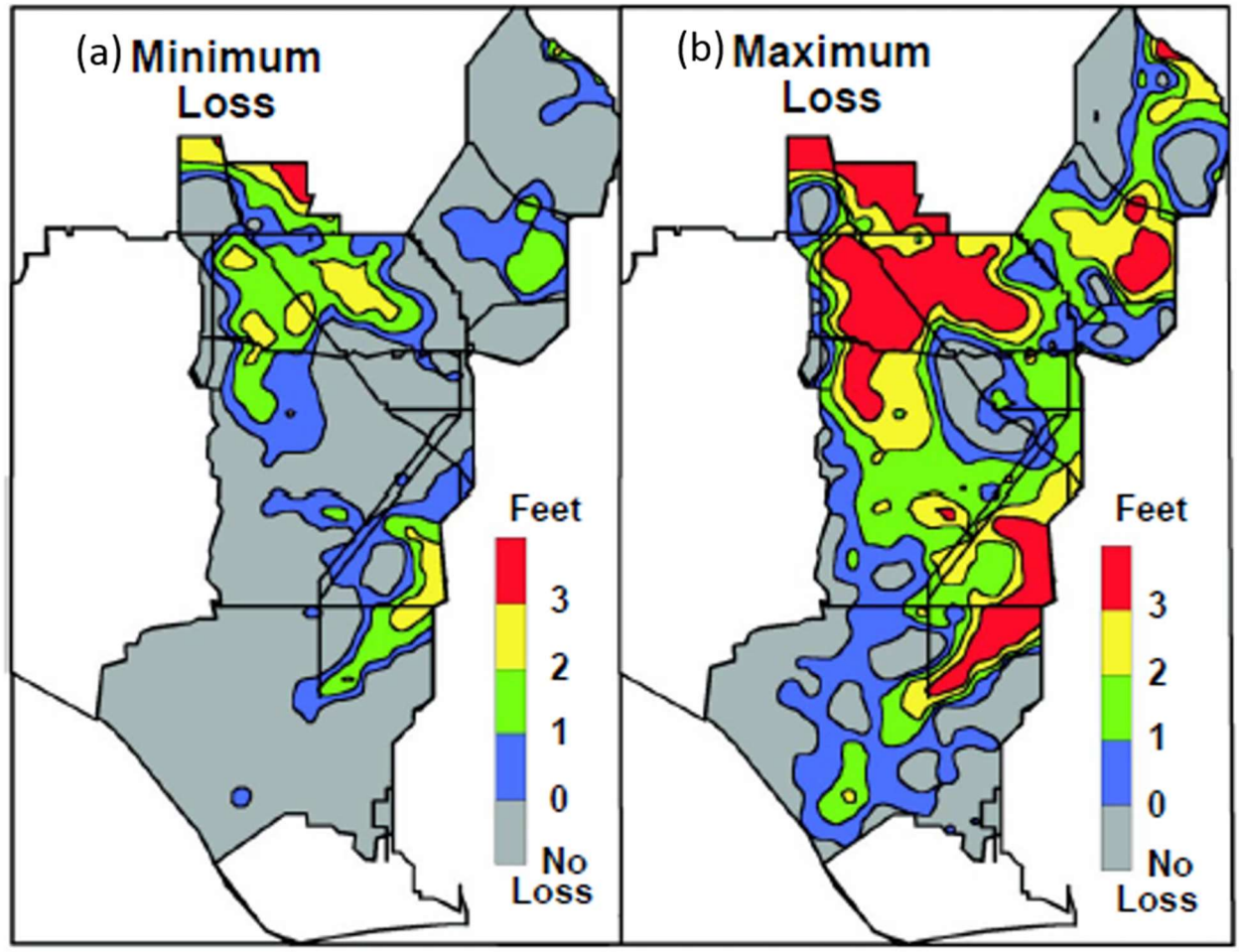


Figure 3-2. (a) Minimum and (b) maximum changes in soil thickness (feet) between 1946 to 1996 in the Central Everglades (From: Scheidt et al. 2000).

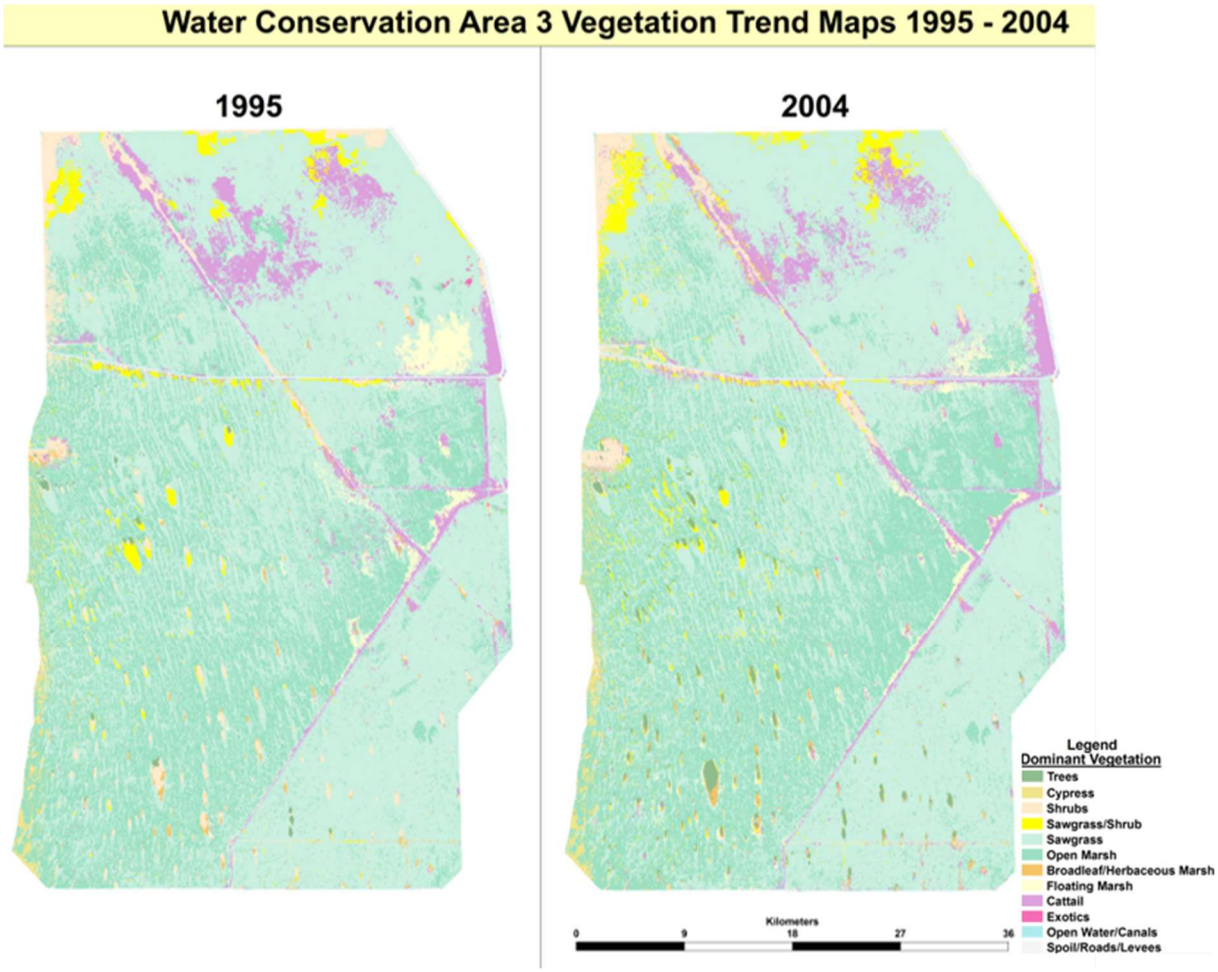


Figure 3-3. Changes in landscape vegetation patterns in Water Conservation Areas 3A and 3B between 1995 (left) and 2004 (right) (From: Rutchey et al. 2005).

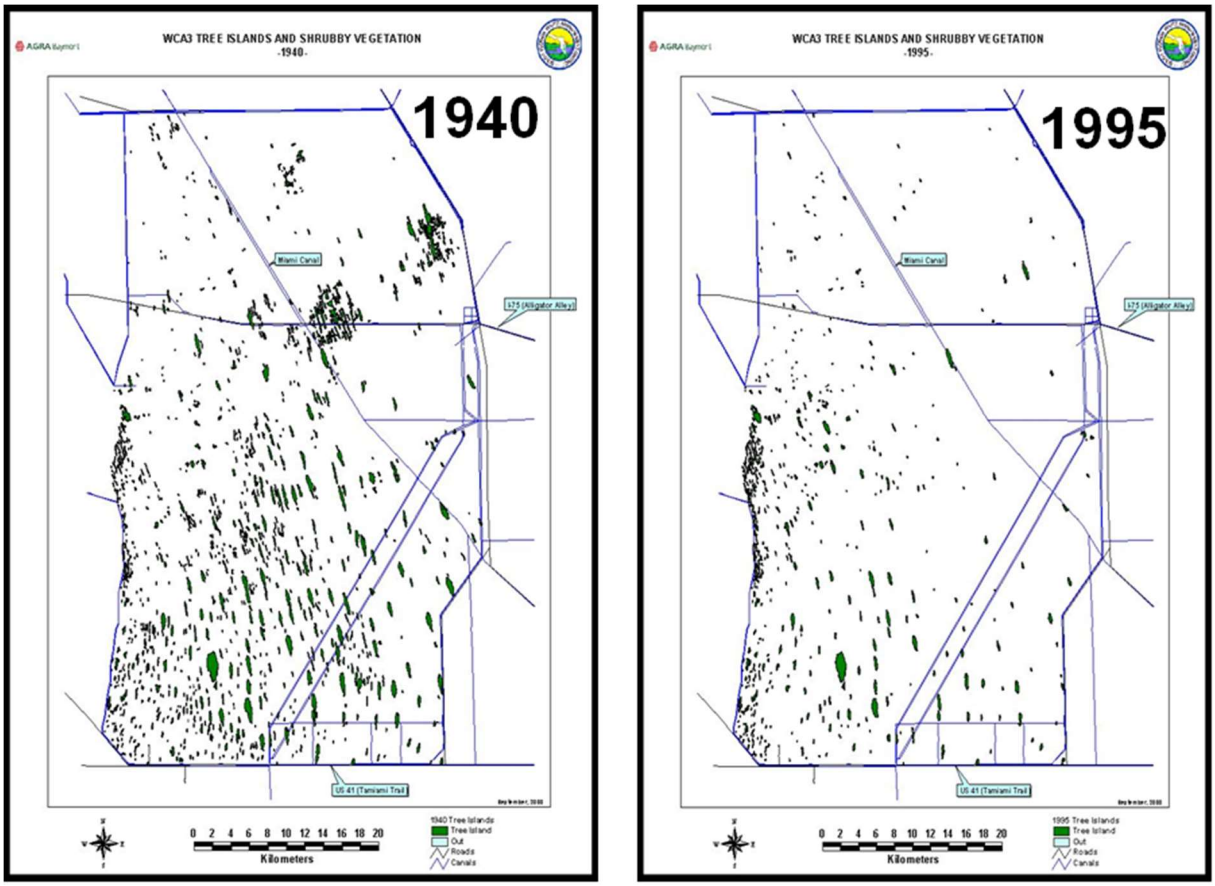


Figure 3-4. Tree island loss in Water Conservation Areas 3A and 3B from 1940 to 1995 (From: Patterson and Finck 1999).

3.2 Everglades National Park

ENP experiences many of the same environmental issues as WCA-3A and WCA-3B. One notable problem is the extreme drydowns (hydroperiod and ponding depth) that occur during many dry seasons. Although reduced rainfall is typical during the dry season, the historical Everglades system did not experience water levels below ground surface for many consecutive water years. The extreme drydowns occur because of the limited capability to store Lake Okeechobee outflows for delivery to the Central Everglades, current C&SF Project operations, and water loss through seepage along the eastern levees. The drydowns result in substantial peat subsidence, muck fires, reduced fish populations, loss of foraging habitats for wading birds, peat collapse due to saltwater intrusion, reduced biodiversity, and degradation associated with an onslaught of invasive plants and animals. Also, the United States Environmental Protection Agency found that from 1946 to 1996, more than 3 ft of peat soil was lost from Northeast Shark River Slough (NESRS), similar to southeastern WCA-3B, due to soil oxidation and peat fires (Scheidt et al. 2000) (**Figure 3-2**). Subsidence and fires damage the substrate, limit water retention, and alter vegetative communities, reducing the number of prey species available for breeding populations of wading birds.

4 IMPROVEMENTS TO HYDROLOGIC CONDITIONS, HABITATS, AND FISH AND WILDLIFE RESOURCES

This chapter discusses the predicted benefits of implementing the proposed CEPP EAA Reservoir Water Reservation (i.e., the authorized CEPP Alternative C240). The evaluation of benefits was based on the results of modeling simulations, environmental impact statements, scoping documents for similar projects, scientific literature, direct observation, project design reports, and reasonable scientific judgments. This chapter compares application of the SFWMD's Regional Simulation Model – Greater Everglades and Lower East Coast Service Area (RSM-GL) (version 2.3.2) for the simulation period (1965 to 2005) for Alternative C240 to the existing conditions baseline (ECB) assumptions, which represent the systemwide infrastructure and operations that were in place when the PACR was initiated by the SFWMD (2018a).

The primary modeling for the CEPP PACR (SFWMD 2018a) was evaluated based on outputs from the SFWMD's Regional Simulation Model (RSM) (SFWMD 2005a,b). The RSM is a robust and complex regional-scale model that covers the entire South Florida system with two implementations: Regional Simulation Model – Basins (RSM-BN) covers the northern part of the system and RSM-GL covers the southern extent (SFWMD 2010, 2011). The RSM Hydrologic Simulation Engine was peer-reviewed in 2005 (Chin et al. 2005), and the Management Simulation Engine and revised Hydrologic Simulation Engine were peer-reviewed again in 2019 (Bras et al. 2019). The RSM passed 25 verification tests (10 overland flow, 10 groundwater, and 5 mixed) and includes 83 benchmarks (West Consultants and CDM 2012). As part of the CEPP process, the RSM-BN and RSM-GL underwent USACE validation for engineering software and were classified as "allowed for use" for South Florida applications in August 2012. The RSM is the premier and most accepted tool for regional hydrologic simulation and planning in South Florida and has been used to plan for more than $20 billion of authorized capital infrastructure improvements and to support updates to operational permits and USACE water control plans. Recent projects supported by the RSM include the following:

- CEPP (2010-2012; PACR [2017-2018])
- Lake Okeechobee Watershed Restoration Project (2017-2019)
- Western Everglades Restoration Project (2017-2019)
- Everglades Restoration Transition Plan (2016)
- Combined Operational Plan (2018-2019)

Alternative C240 is expected to reduce damaging freshwater discharges from Lake Okeechobee to the northern estuaries and redirect this water south through EAA canals to the EAA Reservoir. The EAA Reservoir would provide storage capacity for attenuation of high flows to the ~~EAA~~ A-2 STA, which would reduce phosphorus concentrations in the water to meet required water quality standards. During the planning process, STAs are sized to meet a long-term flow-weighted mean average of 13 parts per billion of phosphorus ~~using the Dynamic Model for Stormwater Treatment Areas~~ across a wide range of hydrologic conditions, including wet years~~-~~, using the Dynamic Model for Stormwater Treatment Areas (Walker and Kadlec 2011). The treated water will be distributed across the northwestern boundary of WCA-3A to restore more natural quantity, timing, and distribution of waters through WCA-3A and WCA-3B to ENP.

Environmental impacts include both direct and indirect effects. Under Council on Environmental Quality regulations, direct effects are "caused by the action and occur at the same time and place," while indirect effects "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 Code of Federal Regulations 1508.8). Under the National Environmental Policy Act, one purpose of an environmental impact assessment is to identify, at

an early stage, the environmental issues deserving of study and de-emphasizing insignificant issues, narrowing the scope of the environmental impact statement accordingly (40 Code of Federal Regulations 1501.1). The resource conditions that were evaluated for the CEPP EAA Reservoir Water Reservation include hydrology, habitat, fish, and wildlife.

This document evaluates the hydrologic output of the RSM-GL and ecological output of the United States Geological Survey's Joint Ecosystem Model Program under the ECB and Alternative C240. All analyses compare the ECB to Alternative C240. The RSM-GL was used to verify the southern distribution and sheetflow improvements associated with Alternative C240 in the hydrologic model domains, including gauges, flow transects, and indicator regions (**Figure 4-1**). Annual transect flow is the long-term average of total overland flows across a lined landmark (e.g., T5 in northwestern WCA-3A), usually perpendicular to primary flow directions. The indicator region is a collection of cells that represent an area of ecologic interest. Also, indicator regions provide a visual reference for multiple performance measures. The calculation method and locations where the performance measure graphic applies were defined by RECOVER (2005). Hydrologic changes were assessed with normalized duration curves, average annual overland flows, and average annual water budgets. A normalized duration curve refers to a ponding duration curve relative to land surface elevation. When "ac-ft" are given in average annual overland flows and average annual water budgets, this refers to analysis of an average annual water budget over the 41-year period of hydrologic model simulation (1965 to 2005).

The ecological models developed by the Joint Ecosystem Model Program were used as evaluation tools to aid in the prediction and determination of an acceptable range of hydrologic factors as they relate to the persistence and success of key fish and wildlife species (Romañach et al. 2011a,b). The hydrologic and ecological outputs were evaluated for selected years representative of dry, average, and wet rainfall conditions. Analyses of rainfall data in Central and South Florida were fitted to annual rainfall for the entire project area using normal and log-normal probability distributions. The results of the analysis indicate the SFWMD receives a regional annual average rainfall of 53.0 inches (134 centimeters), a dry annual average of 44.3 inches (112 centimeters), and a wet annual average of 62.5 inches (158 centimeters). ~~Using the above statistics~~These values were used as a guide~~,~~ to select representative years corresponding to annual SFWMD rainfall ~~were selected~~ (Sculley 1986, Alaa and Abtew 1999). In addition, annual rainfall for the antecedent year should be considered. In other words, the annual rainfall preceding the selected year should be consistent. In summary, 1978 was selected to represent an average rainfall year, 1989 a dry year, and 1995 a wet year.

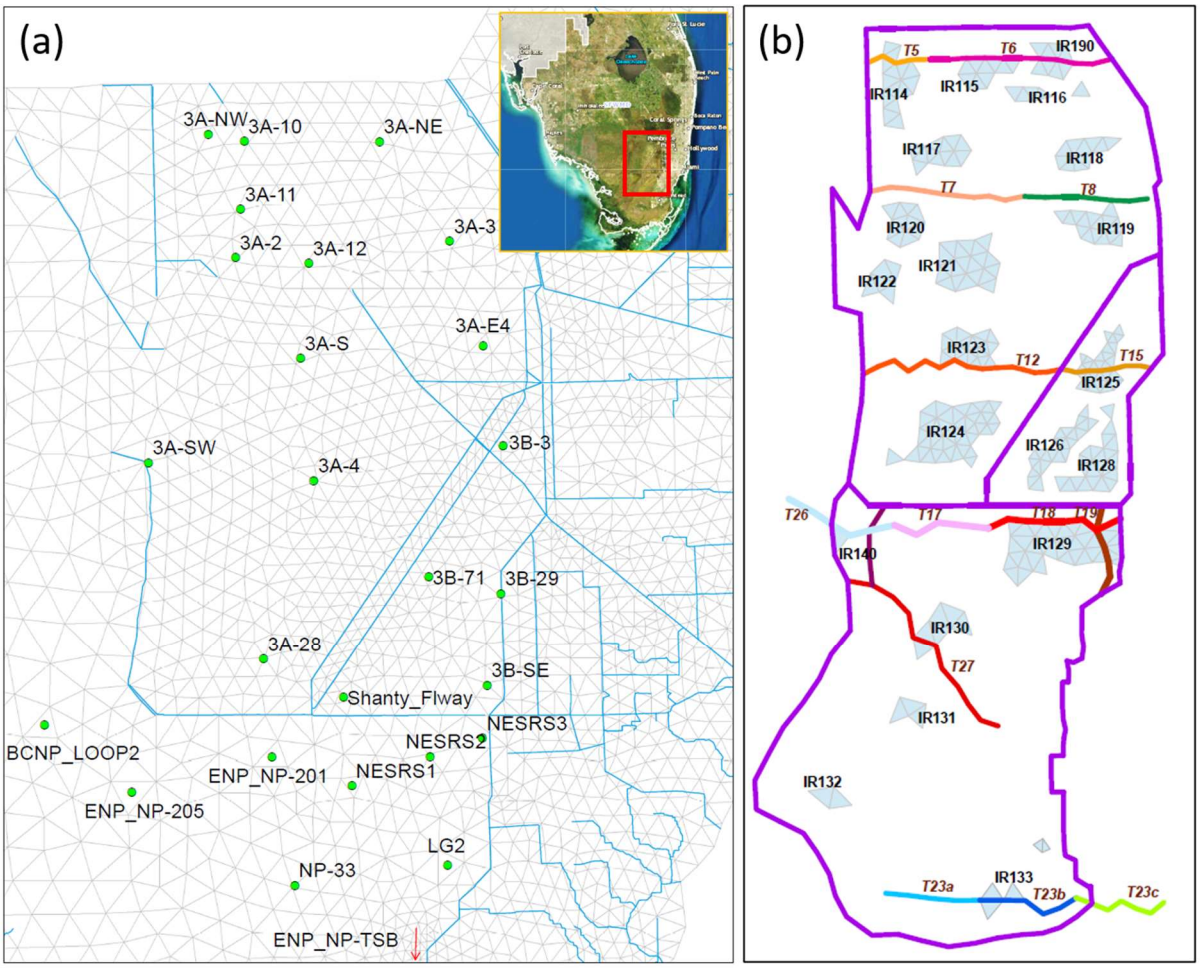


Figure 4-1. The Regional Simulation Model for the Greater Everglades and Lower East Coast Service Area (RSM-GL) domain with (a) gauges; and (b) flow transects (e.g., T5) and indicator regions (e.g., IR114).

4.1 Hydrologic Conditions

4.1.1 Hydroperiod, Ponding Depth, and Overland Flow

This section provides a general overview of regional hydrologic changes for Alternative C240 compared to the ECB. Hydrologic performance within a spatial area results from the combined effect of Alternative C240 components and operations identified throughout the project area. In general, the RSM-GL predicted significantly improved hydroperiods and ponding depths in both the long-term average (1965 to 2005) and dry (e.g., 1989) rainfall year conditions in northern WCA-3A and SRS (**Figures 4-2** and **4-3**). These changes are because Alternative C240 distributes almost all its additional water through the CEPP-designed L-4 spreader canal across northern WCA-3A (**Figure 4-4**). By contrast, hydroperiods increased (an improvement) in eastern WCA-3B and ponding depths decreased (neutral change) in northern WCA-3B long term (**Figures 4-2** and **4-3**). These changes in WCA-3B are caused by less water entering eastern WCA-3A from WCA-2A and the water is routed to the Blue Shanty Flow-way and ENP.

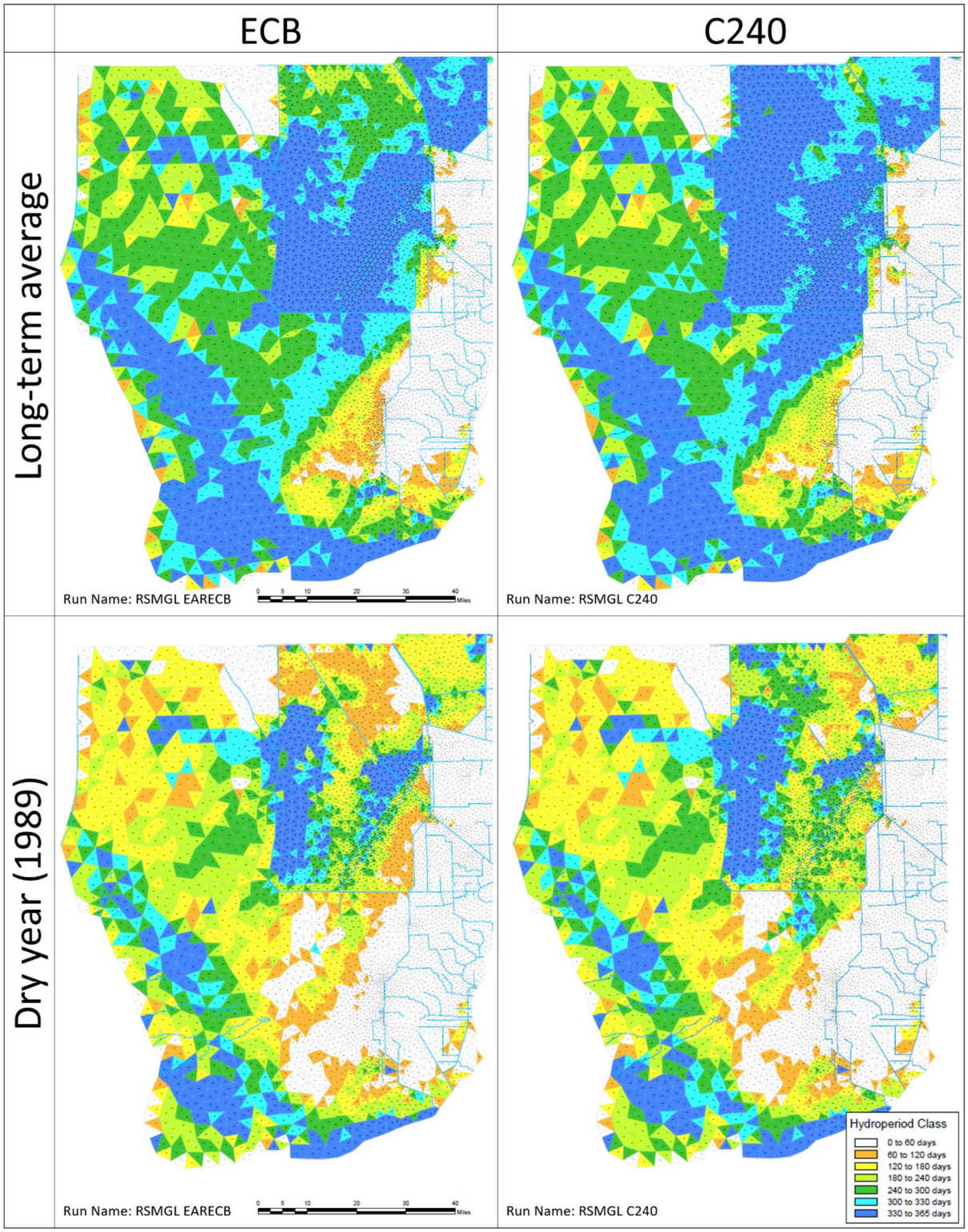


Figure 4-2. Modeled hydroperiod during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative C240 (right).

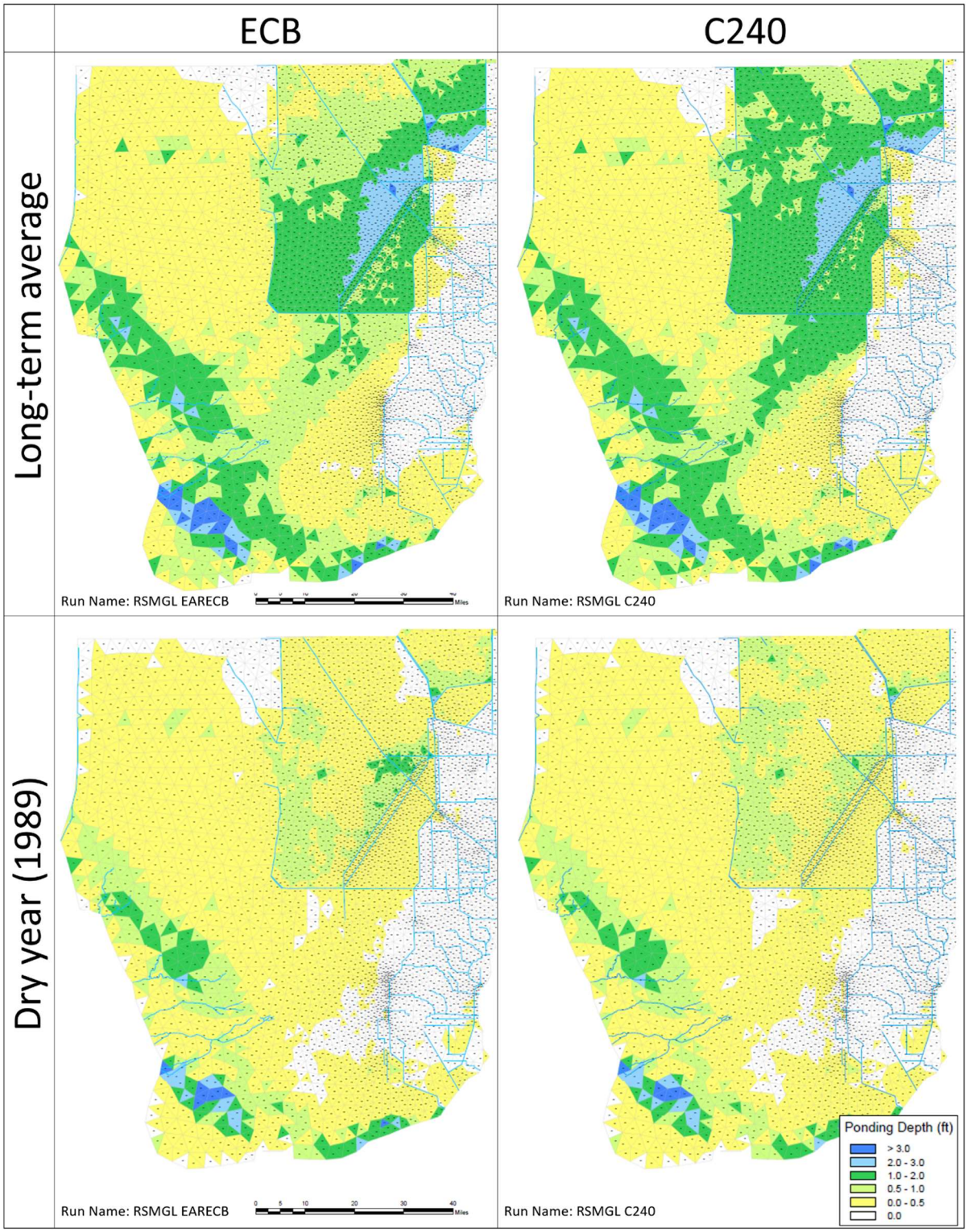


Figure 4-3. Modeled ponding depth during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative C240 (right). The modeled ponding depth was computed by accumulating daily ponding depths for the water year and dividing by the number of days when the ponding depth was greater than zero.

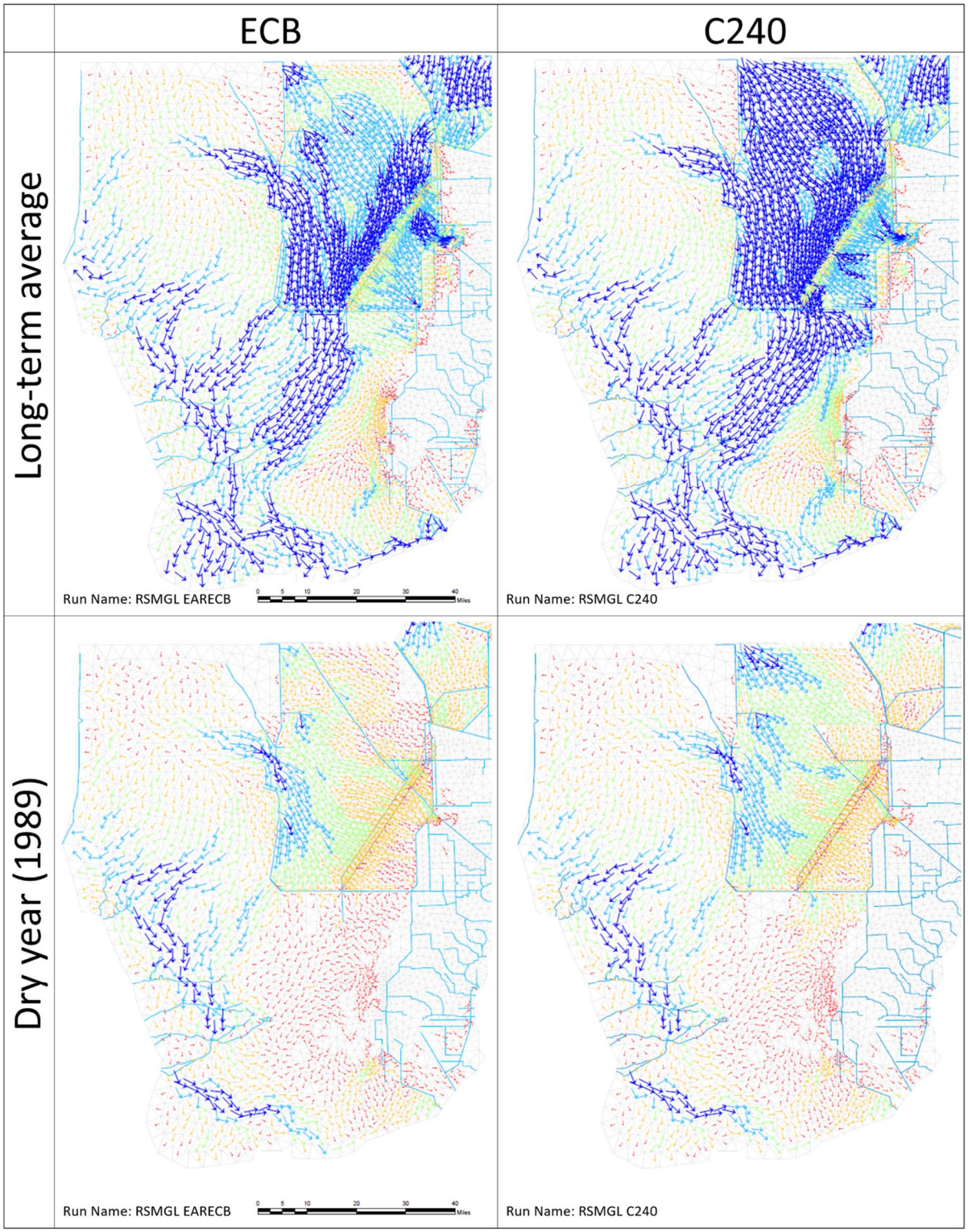


Figure 4-4. Modeled surface water flow vectors during long-term (1965 to 2005) average rainfall (top) and dry (bottom) year conditions for the existing conditions baseline (left) and Alternative- C240 (right). The vector plots ~~are to~~ provide the reader with overall flow directionality (arrow direction) and magnitude (arrow size and color) relative to other model cells.

4.1.2 Water Conservation Areas 3A and 3B

In general, hydrologic improvements associated with Alternative C240, including increased flows, longer hydroperiods, and less frequent marsh drydowns, result in improved habitats for fish and wildlife. Annual inflows to WCA-3A increase from approximately 1.8 million to 2.1 million ac-ft (19% increase) under Alternative C240 compared to the ECB (**Figure 4-5**). Annual outflows from WCA-3A also increase by approximately 17% under Alternative C240 compared to the ECB, resulting in a net annual increase of 38,600 ac-ft under Alternative C240 (**Figure 4-5**). To avoid adverse increases to the frequency, duration, and peak stages of WCA-3A high-water conditions with this net increase in WCA-3A inflows, annual structural outflows from WCA-3A through S-151 (to WCA-3B), S-333 (to NESRS), S-12 (to western SRS), S-343/S-344 (to the Big Cypress National Preserve), and S-345D/S-345F/S-345G (to the Blue Shanty Flow-way), combined, increase from approximately 1.2 million ac-ft for the ECB to 1.5 million ac-ft for Alternative C240 (24% increase).

Because WCA-3A covers approximately 481,000 acres (752 square miles), hydrologic differences between the ECB and Alternative C240 are characterized at representative gauges throughout WCA-3A (**Figure 4-1a**). Within northwestern WCA-3A, by adding 0.7 ft of water during ponded times, the annual hydroperiod is extended 17% during drydowns, resulting in reduced soil oxidation for Alternative C240 (**Figure 4-6**). Within northeastern WCA-3A, enhanced inflows under Alternative C240 extend the annual hydroperiod by 26% during drydowns (**Figure 4-7**). Slightly lower increases in ponding depth and annual hydroperiod with Alternative C240 were observed for stages within east-central WCA-3A (**Figure 4-8**). Within eastern WCA-3A, ponding depths increased by approximately 0.1 ft during ponded times, but the annual hydroperiod decreased 5% (**Figure 4-9**). No significant depth or annual hydroperiod changes are expected within central (**Figure 4-10**) and southern WCA-3A (**Figure 4-11**). In **Figures 4-6** to **4-11**, the solid brown line represents the existing conditions baseline, and the red dashed line represents Alternative C240.

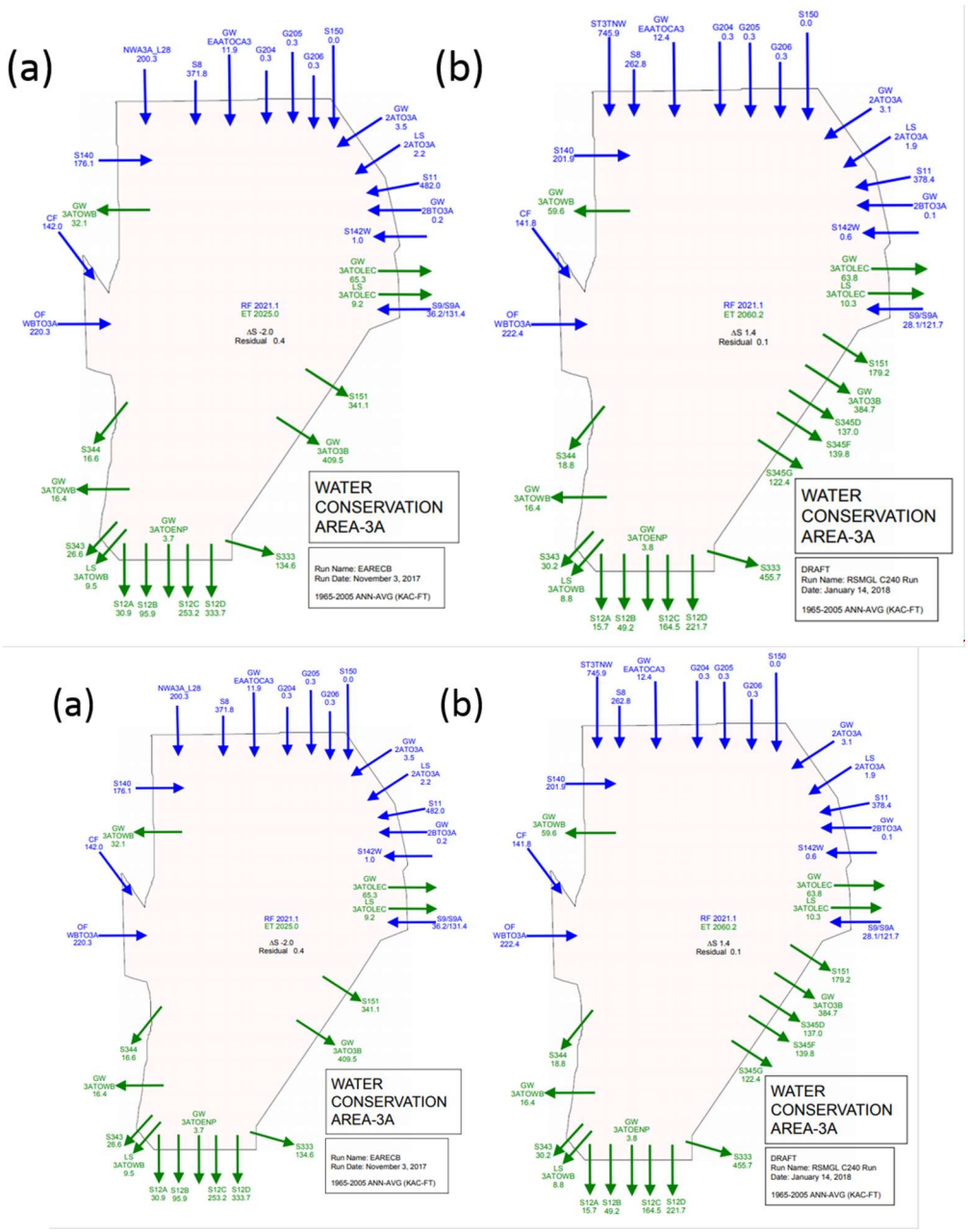


Figure 4-5. Water Conservation Area 3A water budget for (a) the ~~(a)~~ existing conditions baseline, and (b) Alternative C240. The arrows do not necessarily correspond to the locations of water control structures. ~~Direction of the arrows~~Arrow direction represents the flow direction based on the annual average calculation. Structural flows can only go in one direction. For groundwater (GW) and levee seepage (LS) flows, it is possible, on a daily time step, for flows to go either direction, depending on the head difference (OF = overland flow).

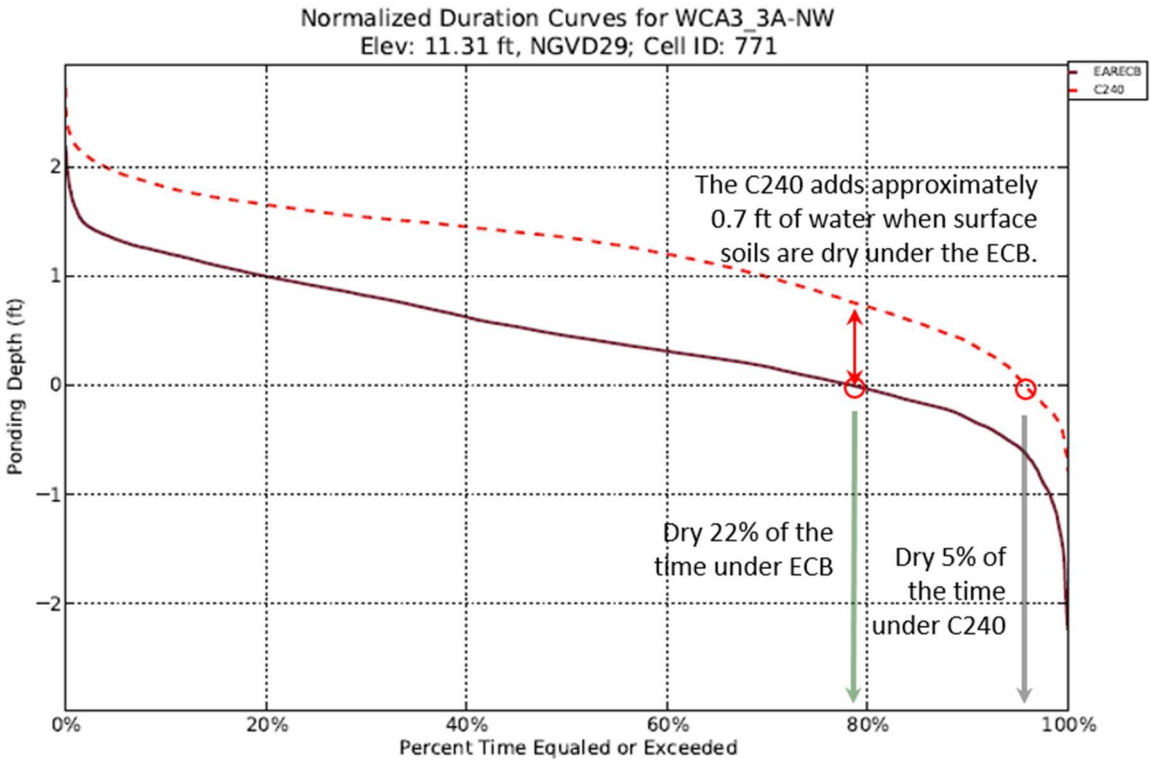


Figure 4-6. Northwestern Water Conservation Area 3A normalized duration curves.

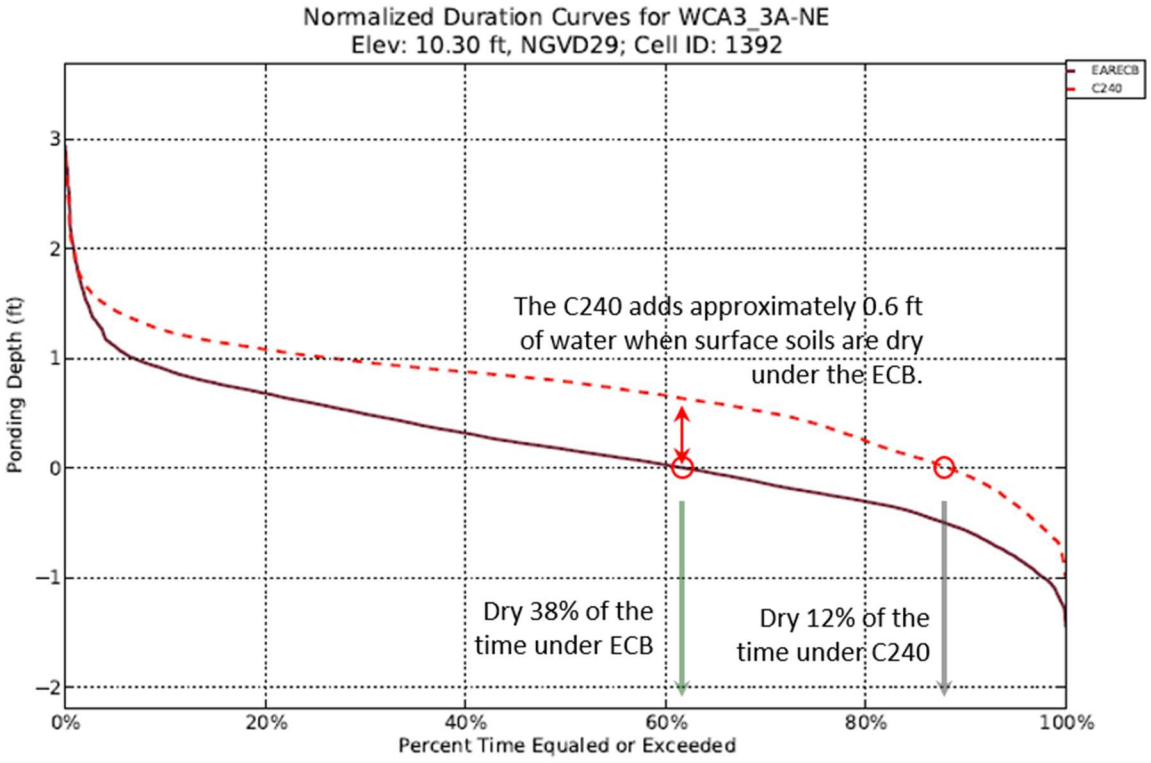


Figure 4-7. Northeastern Water Conservation Area 3A normalized duration curves.

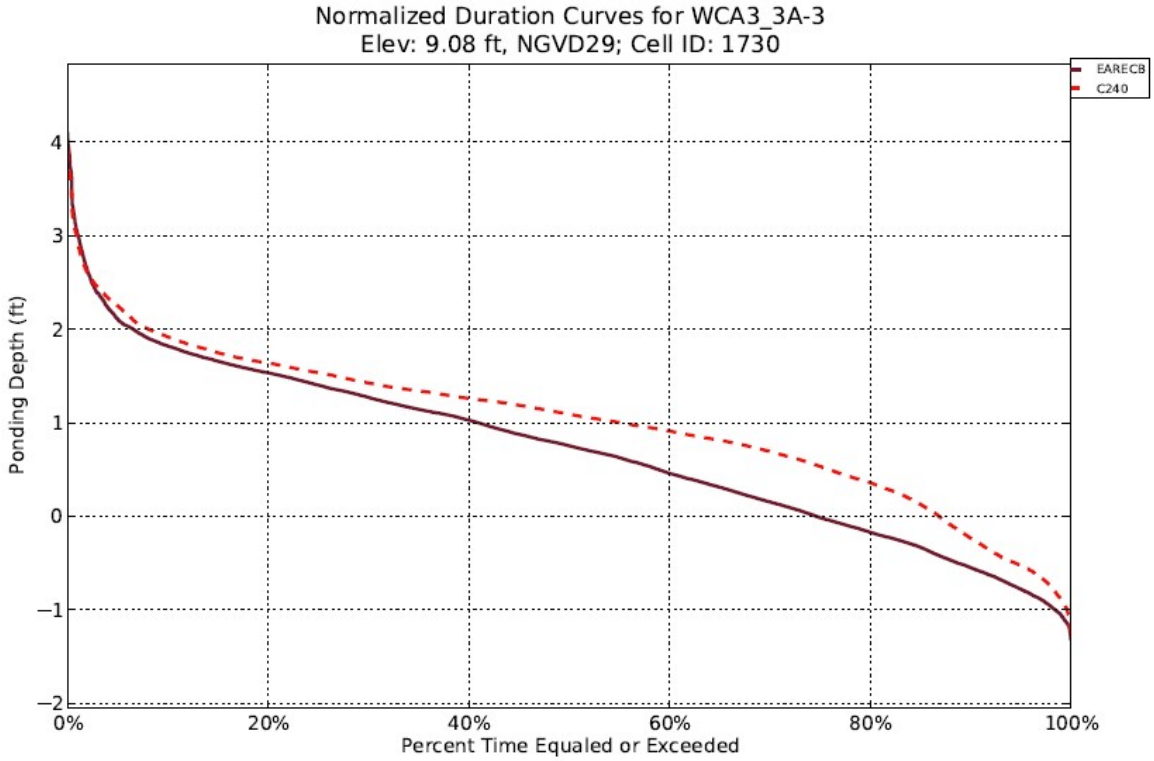


Figure 4-8. East-central Water Conservation Area 3A normalized duration curves.

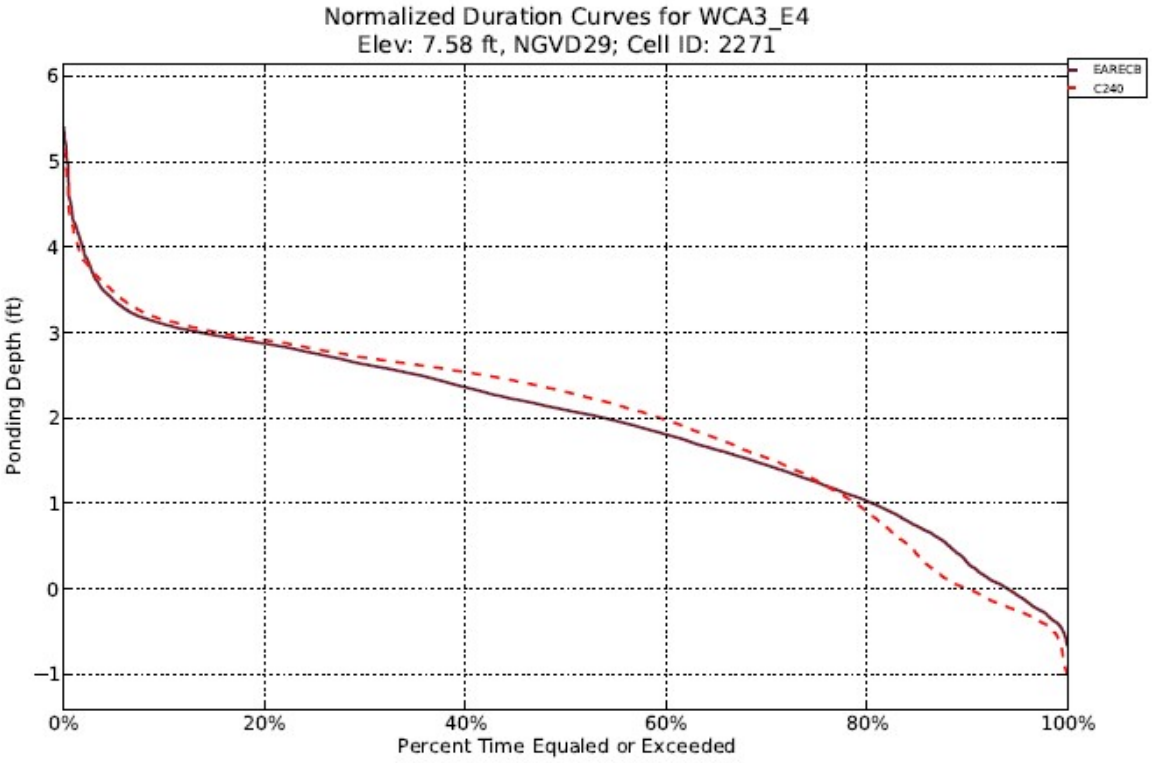


Figure 4-9. Eastern Water Conservation Area 3A normalized duration curves.

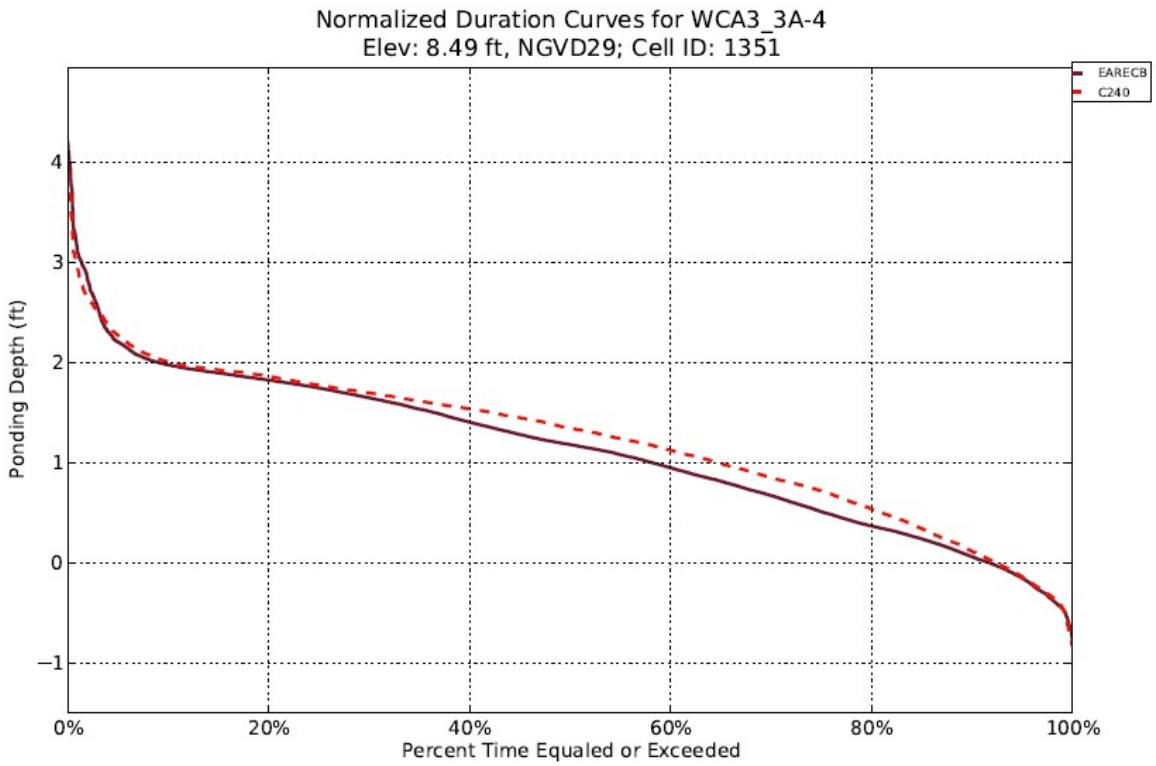


Figure 4-10. Central Water Conservation Area 3A normalized duration curves.

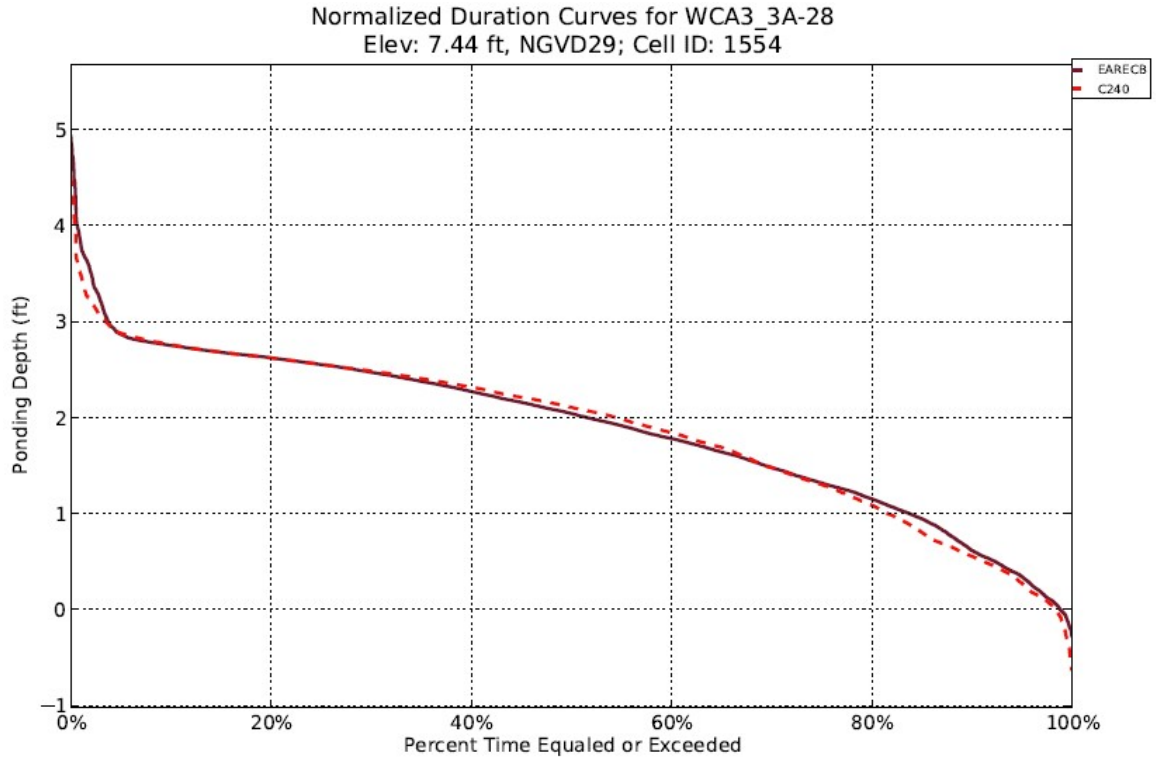


Figure 4-11. Southern Water Conservation Area 3A normalized duration curves.

Alternative C240 increases annual inflows from WCA-3A to WCA-3B from 751,000 to 976,000 ac-ft (30% increase) compared to the ECB (**Figure 4-12**). Annual outflows from WCA-3B to the L-29 Canal and NESRS increase from 42,000 to 259,000 ac-ft under Alternative C240 (approximately 500% increase) due to new overland flows of 255,000 ac-ft (**Figure 4-12**). Although annual structural outflows east from WCA-3B through S-31 and S-337 culverts decrease from 133,000 ac-ft for the ECB to 108,000 ac-ft for Alternative C240 (19% decrease), increased groundwater and levee seepage result in a small increase (1%) in outflows.

Under Alternative C240, the targeted inflows to eastern WCA-3B change ponding depths in northern (decrease) and central (increase) WCA-3B by approximately 0.2 ft for all hydrologic conditions, while there are no ecologically significant changes to annual hydroperiods (**Figures 4-13** and **4-14**). Within the Blue Shanty Flow-way and the downgradient L-29 Canal, ecologically significant increases in annual hydroperiods are not found, despite the addition of 0.3 to 0.7 ft of water during ponded times (**Figure 4-15**), because the inflows and outflows are relatively high and equal. Without Alternative C240, water levels drop to 0 ft approximately 4% of the time because the region is compartmentalized and rainwater has no outlet (**Figure 4-15**). With Alternative C240, water levels drop to 0 ft only 2% of the time because the inflows are high enough to keep the sloughs hydrated year-round (a critical performance measure). ~~This~~The extended hydroperiod is expected to improve conditions for fish and wildlife, especially during the dry season.

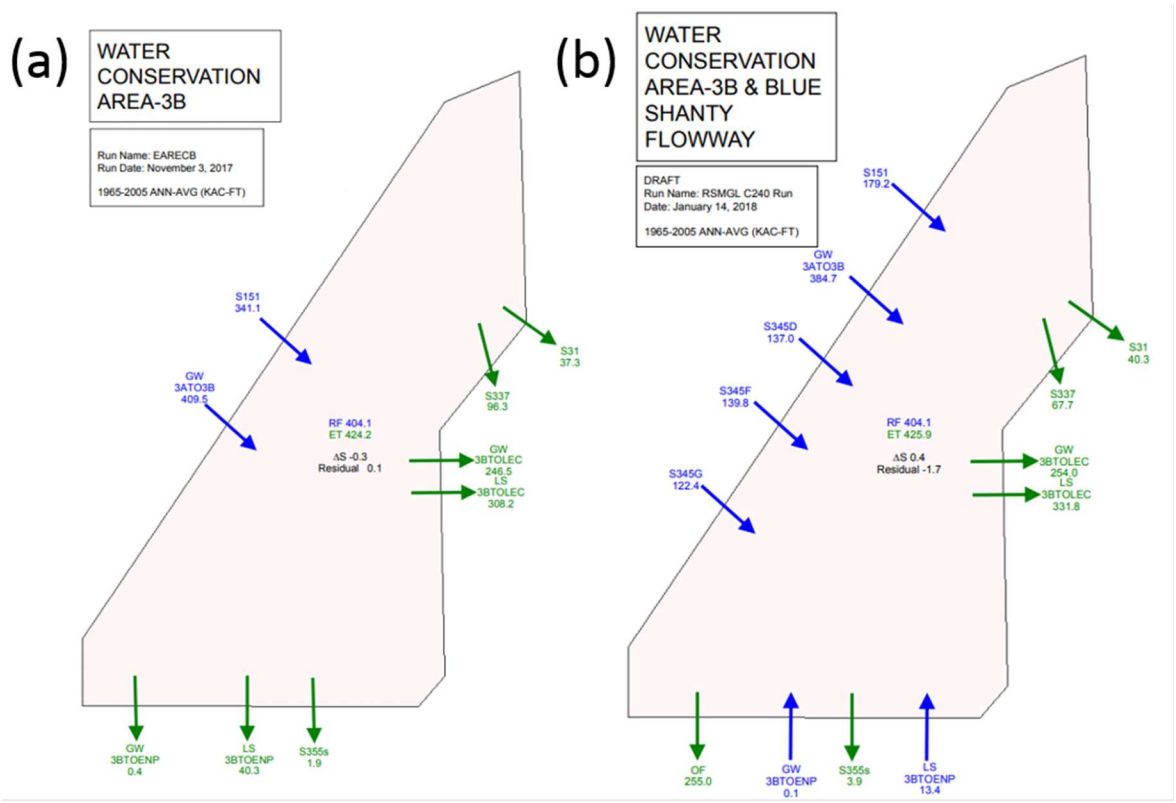


Figure 4-12. Water Conservation Area 3B water budget for the (a) existing conditions baseline and (b) Alternative C240. The arrows do not necessarily correspond to the locations of water control structures. The S-151 and S-345D structures discharge water north of the Blue Shanty Levee. The S-345F and S-345G structures discharge water into the Blue Shanty Flow-way.

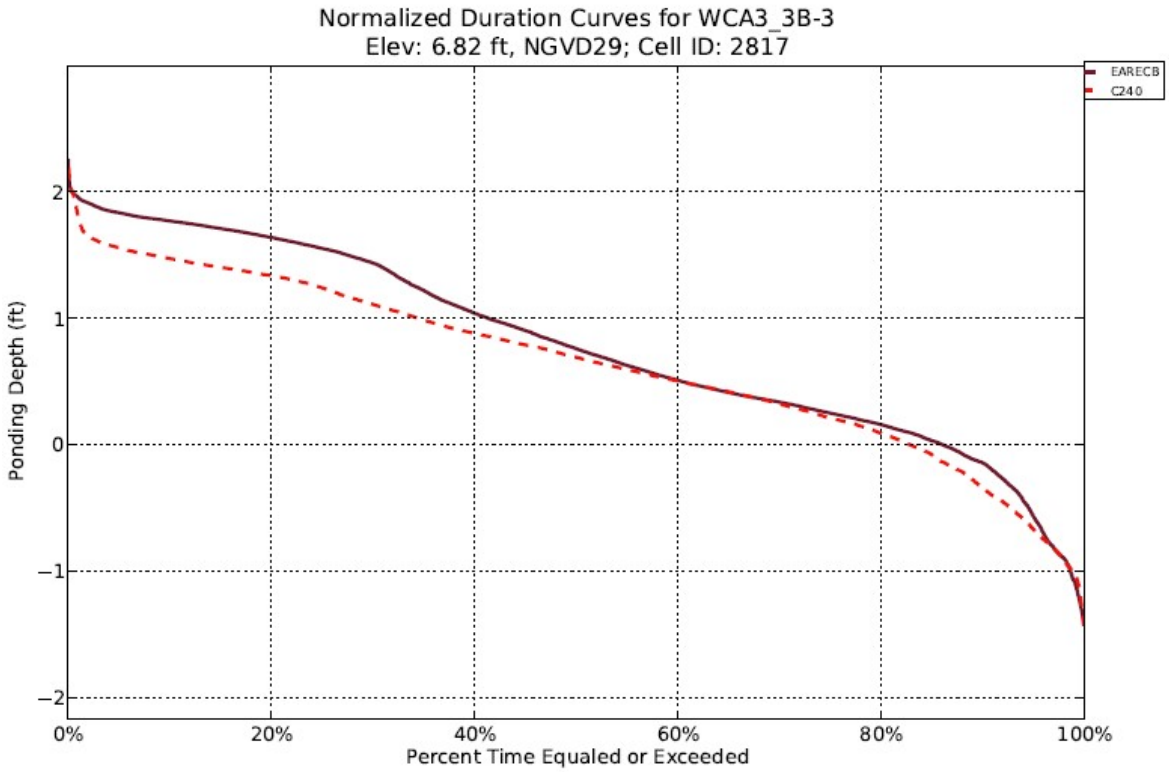


Figure 4-13. Northern Water Conservation Area 3B normalized duration curves.

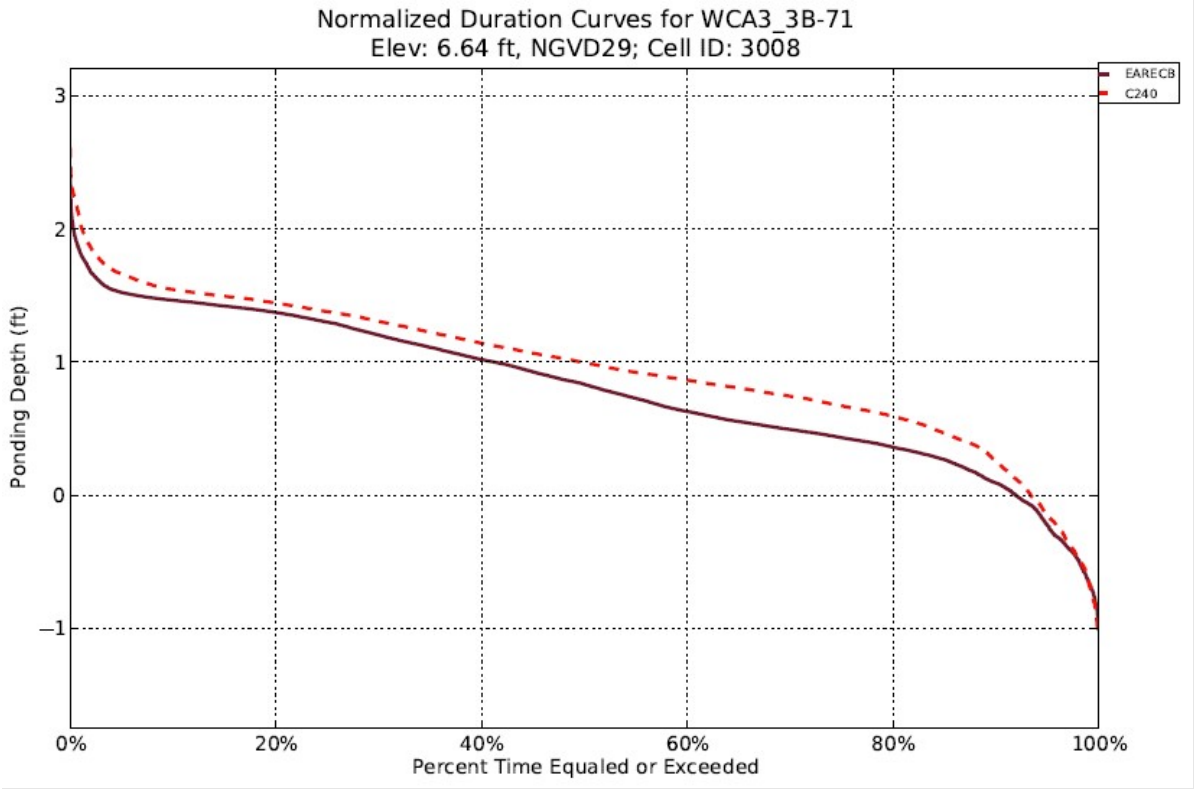


Figure 4-14. Central Water Conservation Area 3B normalized duration curves.

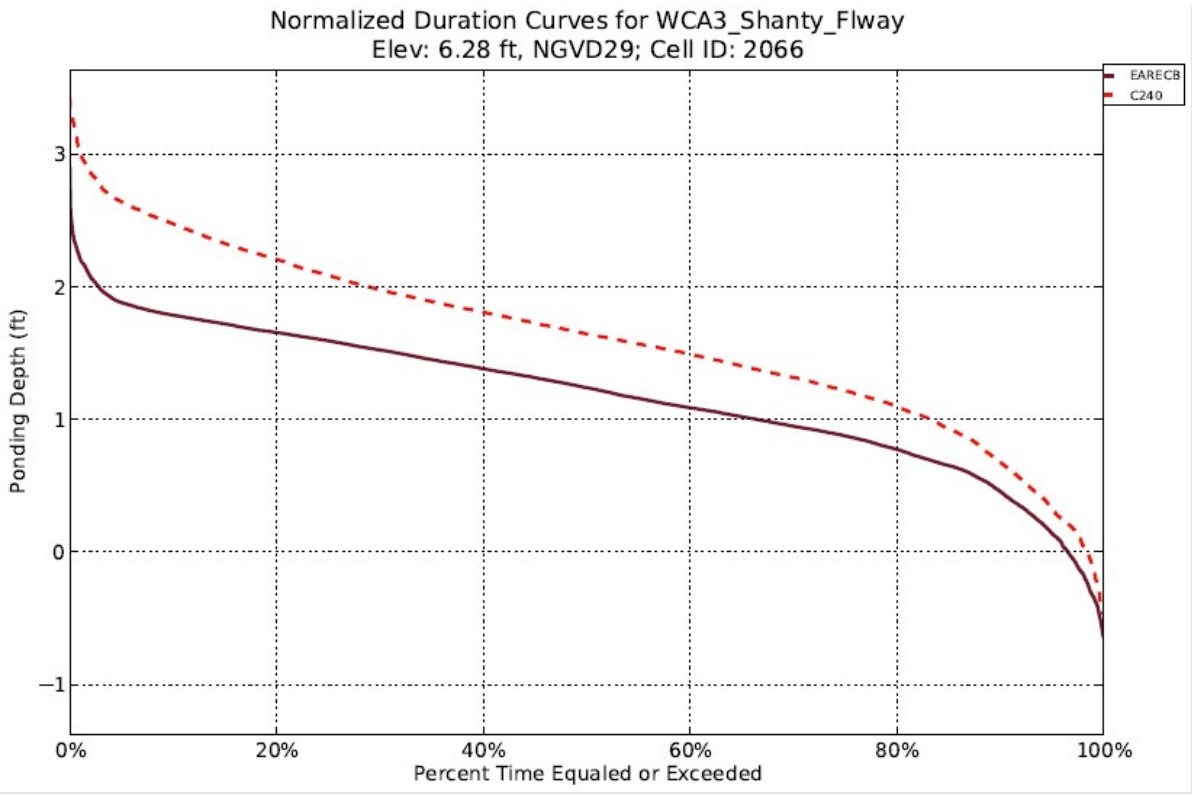


Figure 4-15. Water Conservation Area 3B Blue Shanty Flow-way normalized duration curves.

4.1.3 Northeast Shark River Slough

Annual overland inflows to NESRS (across Transect 18; **Figure 4-1b**) increase from 73,000 ac-ft (ECB) to 794,000 ac-ft under Alternative C240 (**Figure 4-16**), providing an ecological benefit for fish and wildlife species in areas currently experiencing extremely dry conditions for long periods. In addition to enhanced southward overland flows from WCA-3B (**Figure 4-12**), Alternative C240 increases annual inflows to NESRS by an additional 321,000 ac-ft from S-333 (originating from the L-67A Canal) and 67,900 ac-ft from S-356 (originating from the Tamiami Canal) to the L-29 Canal. Stage duration curves for the L-29 Canal are provided in **Figure 4-17**. The 9.7 ft National Geodetic Vertical Datum of 1929 (NGVD29) maximum operational limit prescribed for Alternative C240 is not constraining during any time within the model simulation period (1965 to 2005). L-29 Canal stages exceed 8.5 ft NGVD29 during only approximately 5% of the simulation period within the eastern L-29 Canal segment under Alternative C240. Within NESRS, by adding approximately 0.6 ft during ponded times, the annual hydroperiod is extended 11% during drydowns with Alternative C240 (**Figure 4-18**). Likewise, similar hydrologic improvements are observed farther south in SRS (see long-term average rainfall for Alternative C240 output in **Figures 4-2** and **4-3**).

Increased water depths and hydroperiods within historically deepwater SRS are expected to alleviate severe drydowns in areas with shallow-water peripheral wetlands along the eastern boundary of the Everglades. Alternative C240 will substantially benefit vegetation by decreasing the amount of time water levels ~~go~~are below 0 ft by 19% and increasing water depths by approximately 1 ft when surface soils are dry under the ECB (**Figure 4-19**).

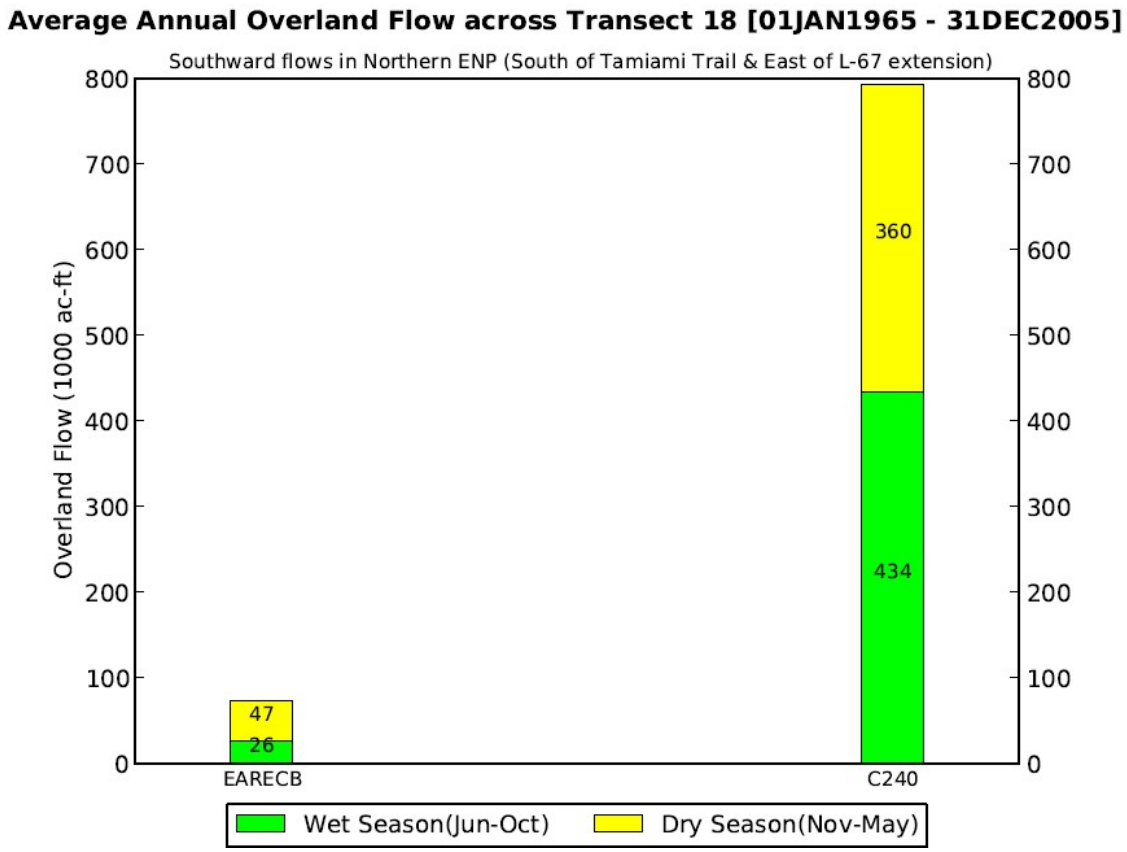


Figure 4-16. Average annual overland flow across Transect 18 in Northeast Shark River Slough.

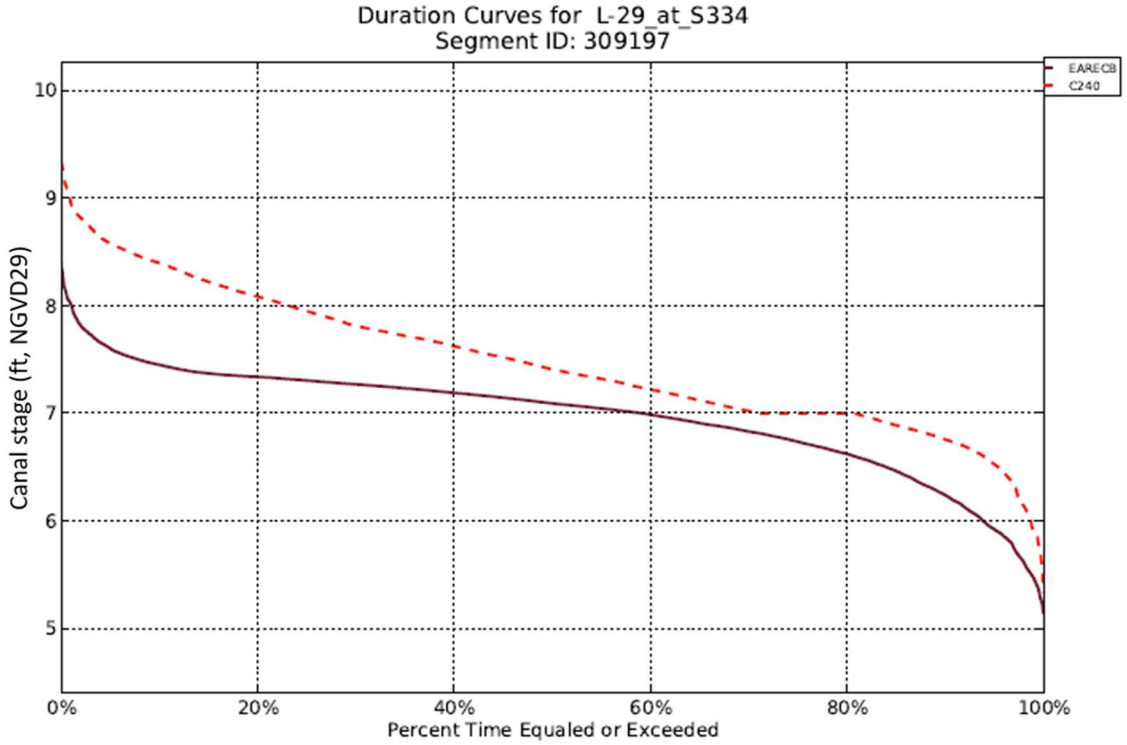


Figure 4-17. Water Conservation Area 3B Blue Shanty Flow-way stage duration curve.

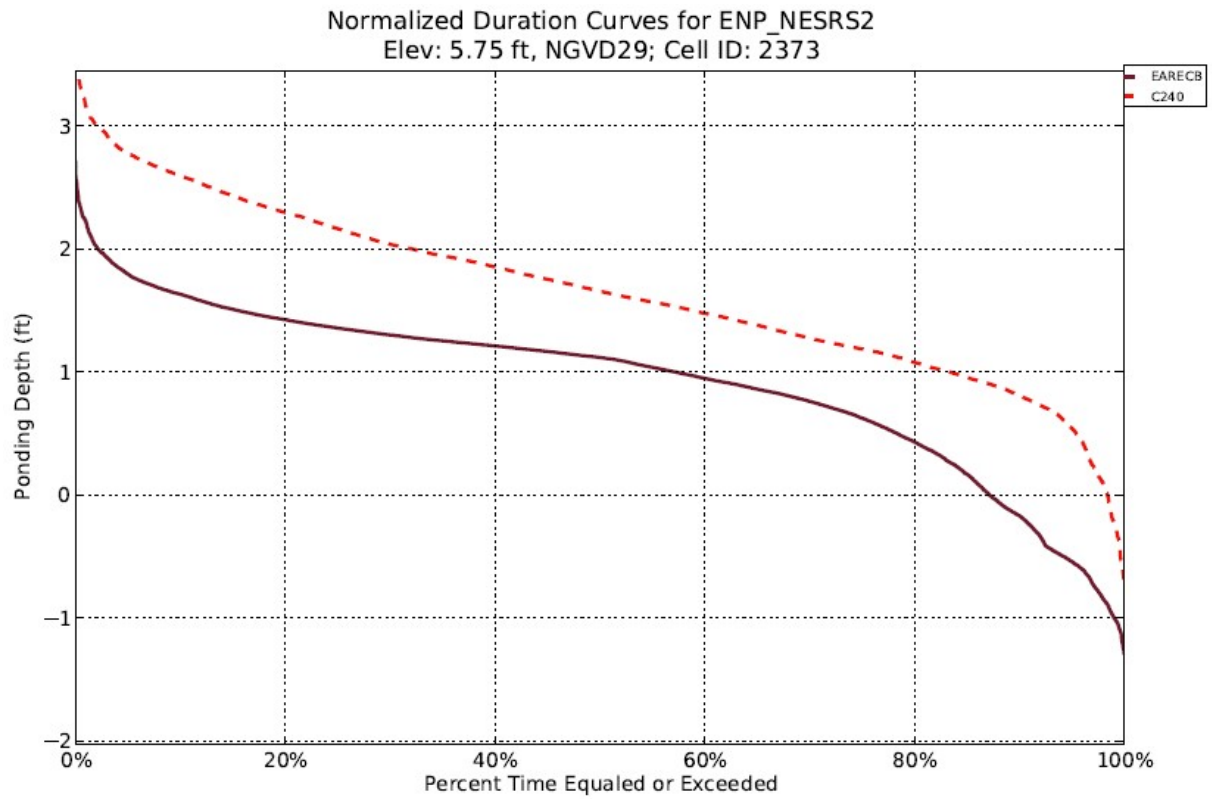


Figure 4-18. Northeast Shark River Slough normalized duration curves.

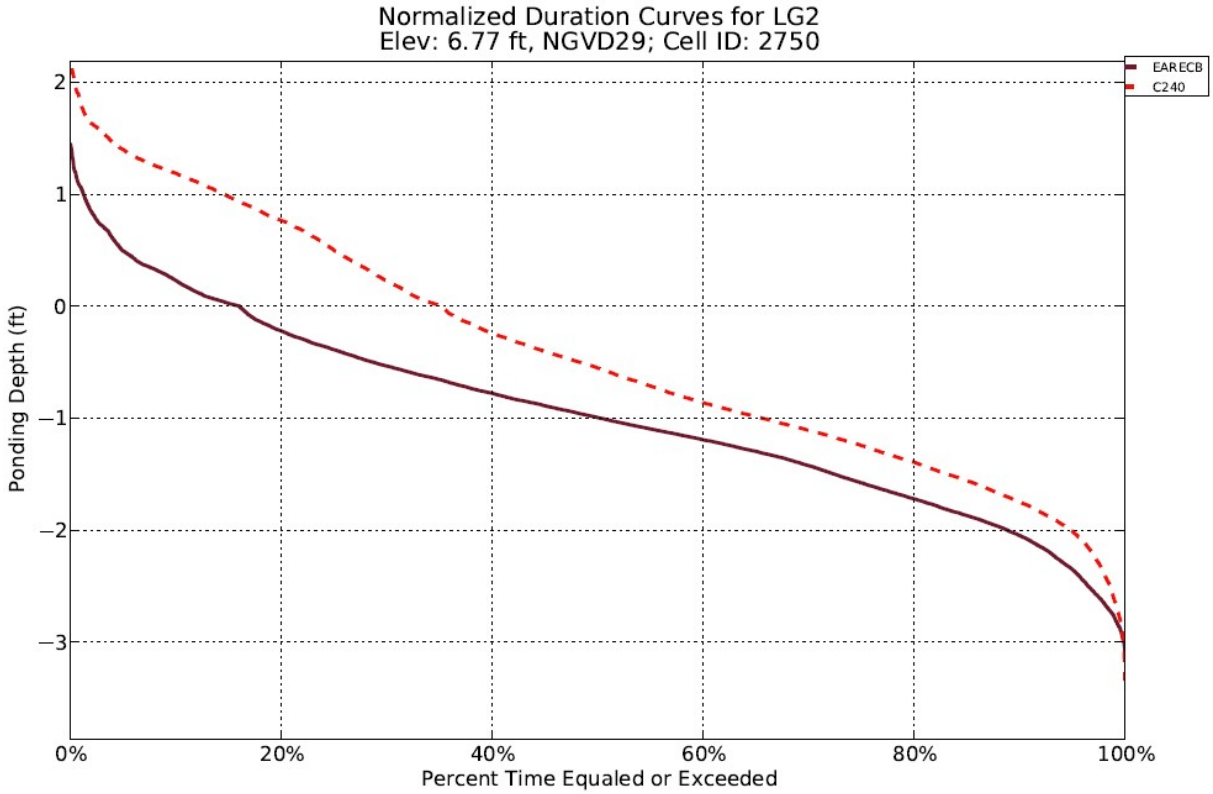


Figure 4-19. Eastern Everglades National Park normalized duration curves.

4.1.4 Western Shark River Slough

Located west of the L-67 extension levee and bounded to the north by Tamiami Trail, western SRS is influenced primarily by rainfall and water management operations at the S-12 structures. Under the Everglades Restoration Transition Plan, use of the S-12 structures and the seasonal sequential closure periods, beginning at S-12A (November 1 to July 14) and S-12B (January 1 to July 14), are meant to move water from WCA-3A into SRS while providing conditions for Cape Sable seaside sparrow (CSSS) Subpopulation A nesting and breeding. Modification to the Everglades Restoration Transition Plan seasonal closure periods for S-12A and S-12B was not considered during CEPP PACR preliminary screening and alternative formulation (SFWMD 2018a), based on USACE consideration of the United States Fish and Wildlife Service (2016) Biological Opinion for the Everglades Restoration Transition Plan.

Annual overland flow to SRS from WCA-3A across RSM-GL Transect 17 decreased 20,000 ac-ft (5%) with Alternative C240 relative to the ECB (**Figure 4-20**). Compared to the ECB, ponding depths within northern ENP (NP-201) are similar during 30% of deepest conditions for Alternative C240, while ponding depths decrease approximately 0.2 ft during 30% of shallowest conditions for Alternative C240 (**Figure 4-21**). Proceeding west, the NP-205 monitoring gauge (used as an indicator for CSSS Subpopulation A hydrology) similarly indicates a 0.1- to 0.3-ft decrease in ponding depth under all hydrologic conditions compared to the ECB (**Figure 4-22**), indicative of improved habitat for the CSSS.

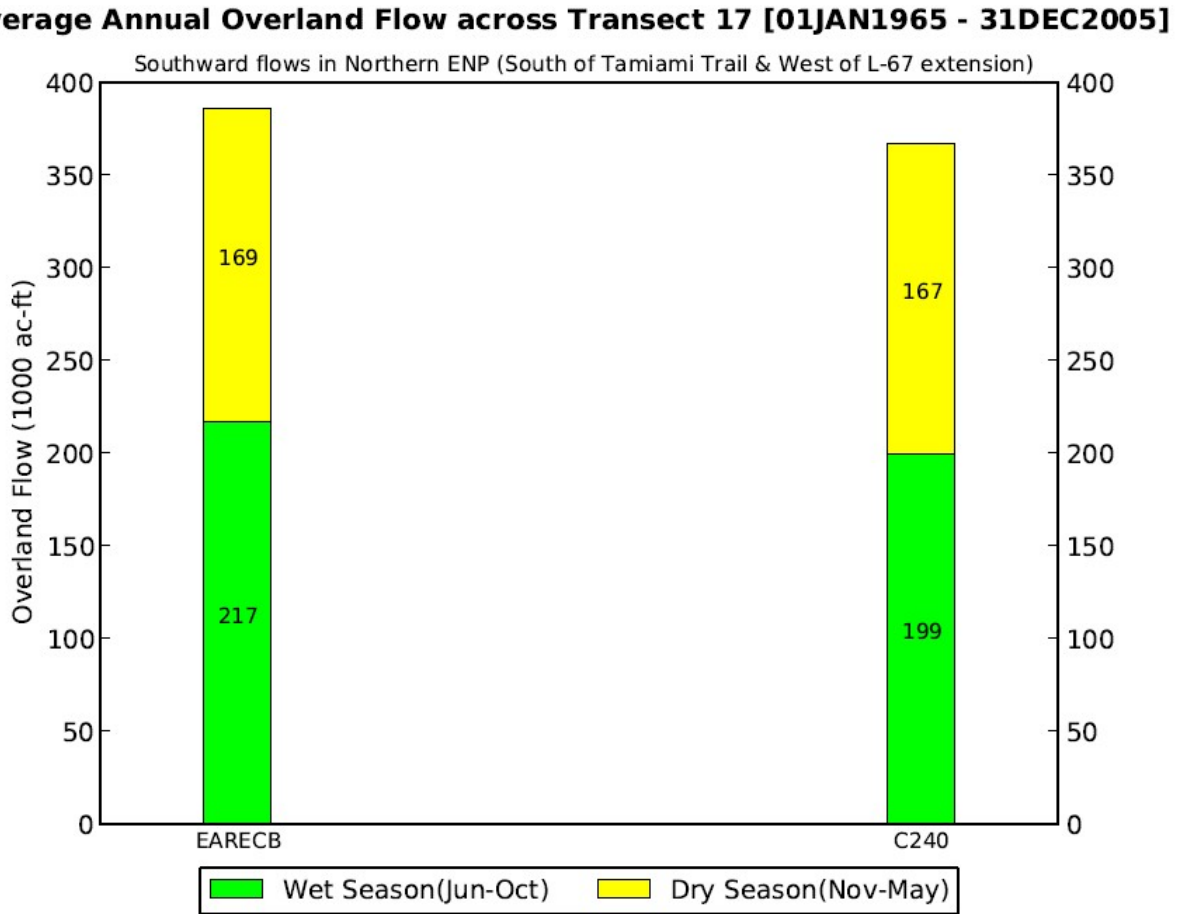


Figure 4-20. Average annual overland flow from WCA-3A to Shark River Slough across Transect 17.

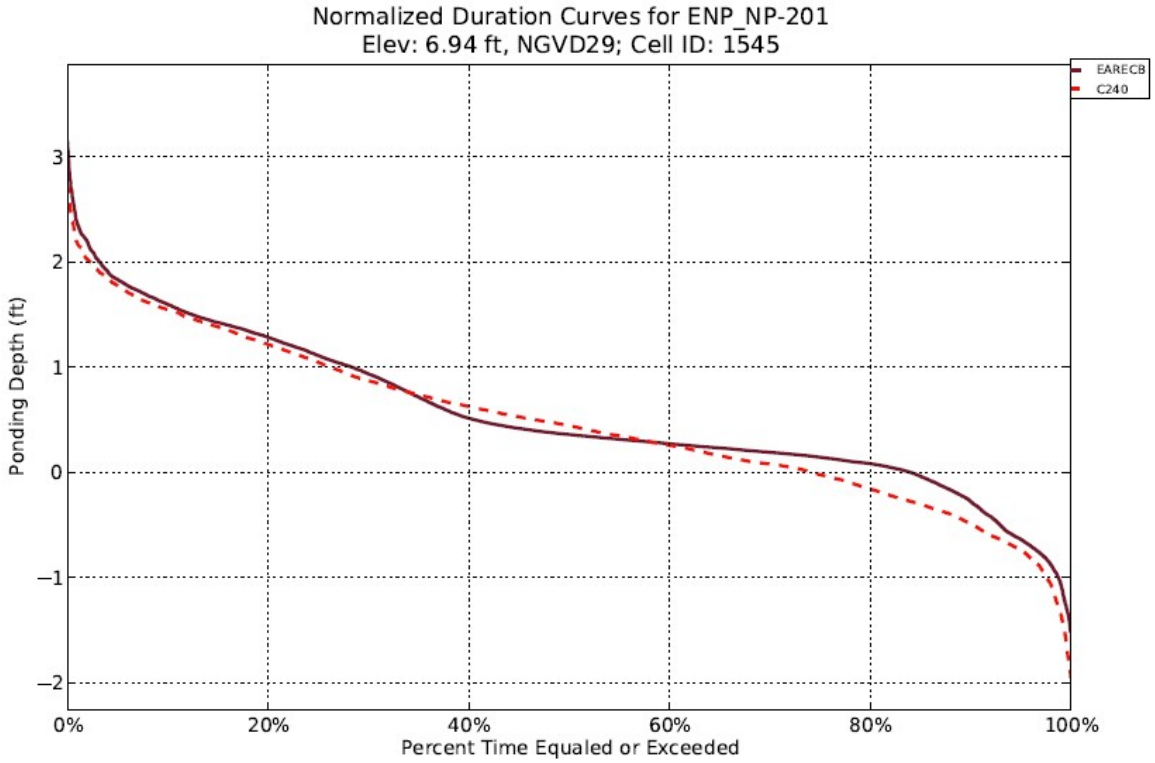


Figure 4-21. Northern Everglades National Park normalized duration curves.

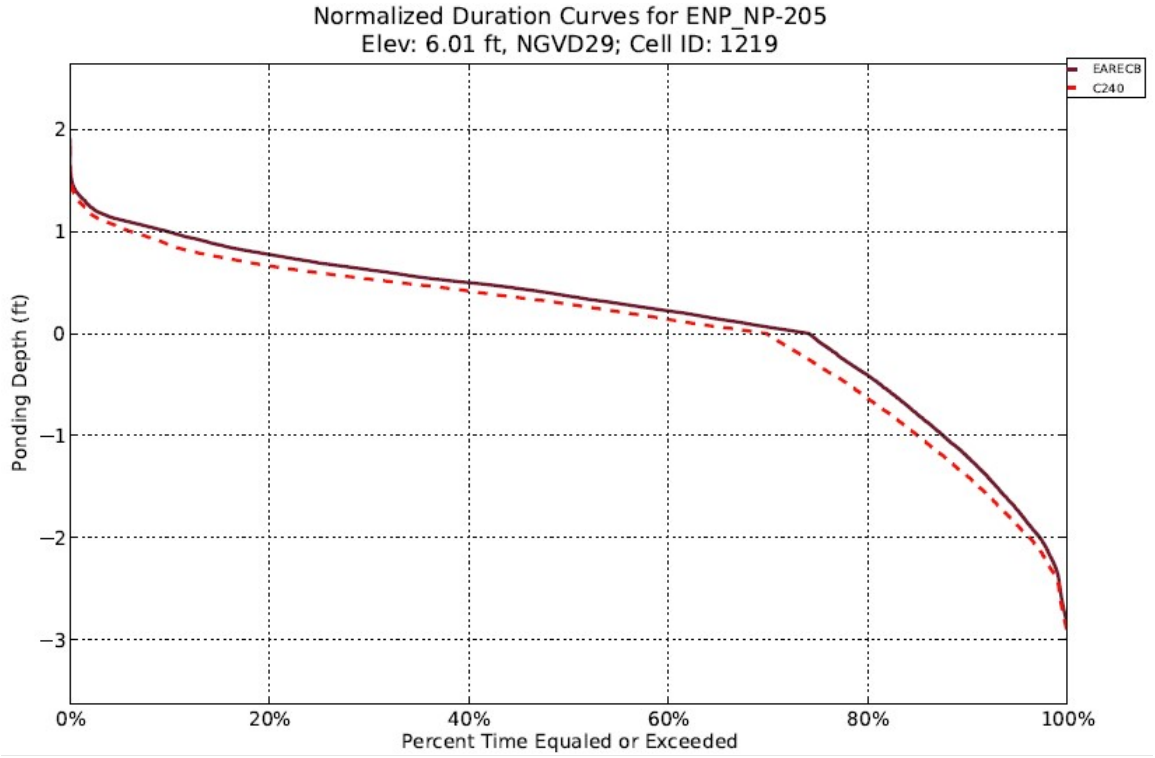


Figure 4-22. Northwestern Everglades National Park normalized duration curves.

~~In contrast, within~~Within central SRS, by adding 0.3 ft during ponded times, the annual hydroperiod is extended approximately 5% for Alternative C240 compared to the ECB (**Figure 4-23**), which indicates a potential degradation of CSSS habitat in the shallow-water edges of SRS. Ponding depths within central SRS ~~demonstrate~~reflect a combined response to the hydrologic changes previously indicated for NESRS and western SRS; the resultant combined annual transect flows within central SRS (Transect 27) increase from 618,000 ac-ft with the ECB to 828,000 ac-ft (34% increase) for Alternative C240 (**Figure 4-24**).

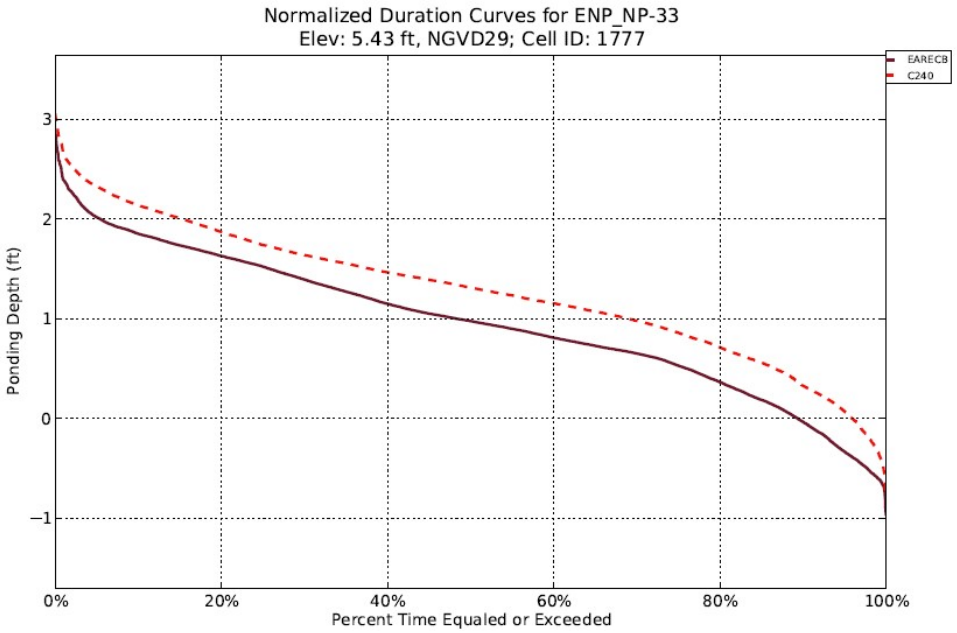


Figure 4-23. Central Everglades National Park normalized duration curves.

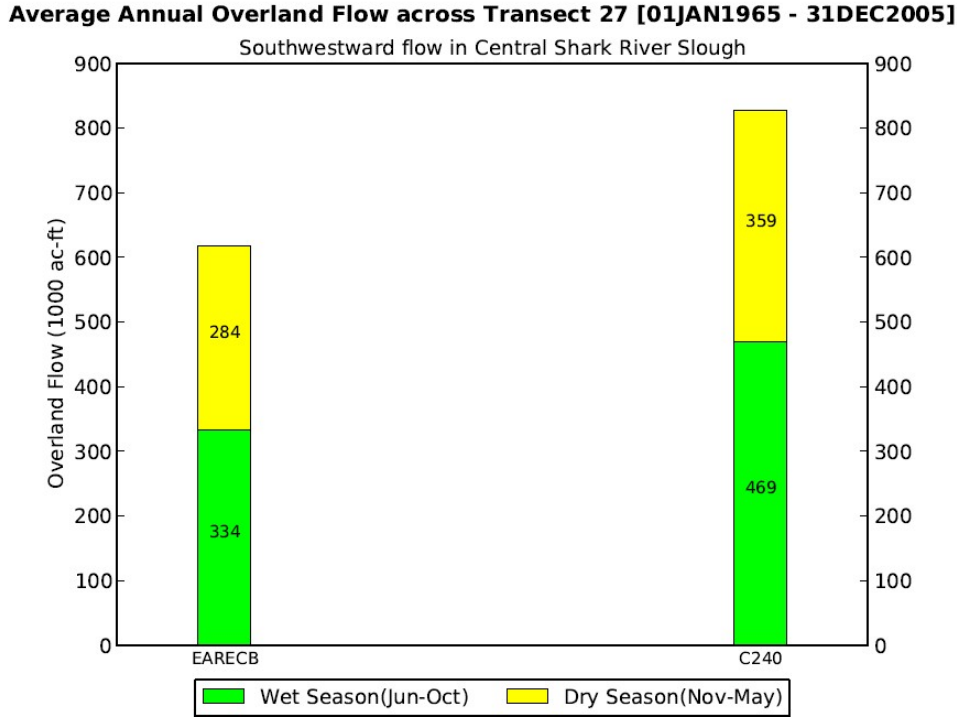


Figure 4-24. Average annual overland flow across Transect 27 in central Shark River Slough.

4.1.5 Taylor Slough

Ponding depths in Taylor Slough increased 0.1 to 0.3 ft during average hydrologic conditions, and annual hydroperiods extended approximately 10% for Alternative C240 compared to the ECB (**Figure 4-25**). Although these numbers are small compared to the large SRS and WCA-3A flows, they are ecologically significant when considering the importance of keeping these systems hydrated for as long as possible.

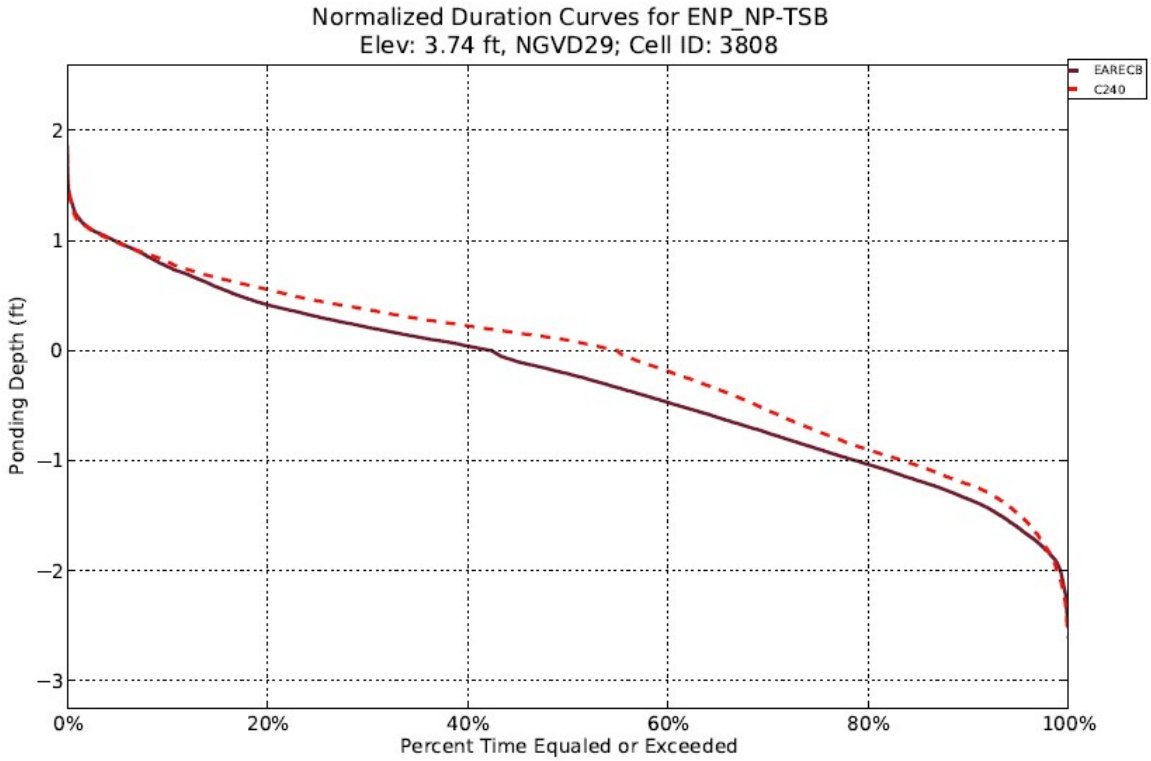


Figure 4-25. Taylor Slough normalized duration curves.

4.2 Habitats

4.2.1 Central Everglades

Alternative C240 provides demonstrably improved hydrologic conditions and is expected to benefit restoration objectives in the Central Everglades. Due to changes in the quantity, distribution, and timing of water entering the Central Everglades ecosystem under Alternative C240 (**Figures 4-2** to **4-4**), long-term improvements to wetland hydrology will enhance the sustainability of ridge and slough vegetation. Modeling results in northwestern and northeastern WCA-3A suggest Alternative C240 will decrease the amount of time water levels go below 0 ft by 21% and 17% and increase water depths by 0.7 ft and 0.4 ft, respectively, when surface soils are dry under the ECB (**Figures 4-26** and **4-27**). The extended hydroperiod will result in less soil oxidation across northern WCA-3A, thereby promoting wetland vegetation growth and peat accretion, while reducing the potential for high-intensity fires. According to the flow experiments in the Decomp Physical Model (Saunders et al. 2019), enhanced sheetflow in northwestern WCA-3A (approximately 340% increase; **Figure 4-28**) will help restore and sustain the microtopography, directionality, and spatial extent of ridges and sloughs and may improve the health of tree islands in the ridge and slough landscape (Wetzel et al. 2005).

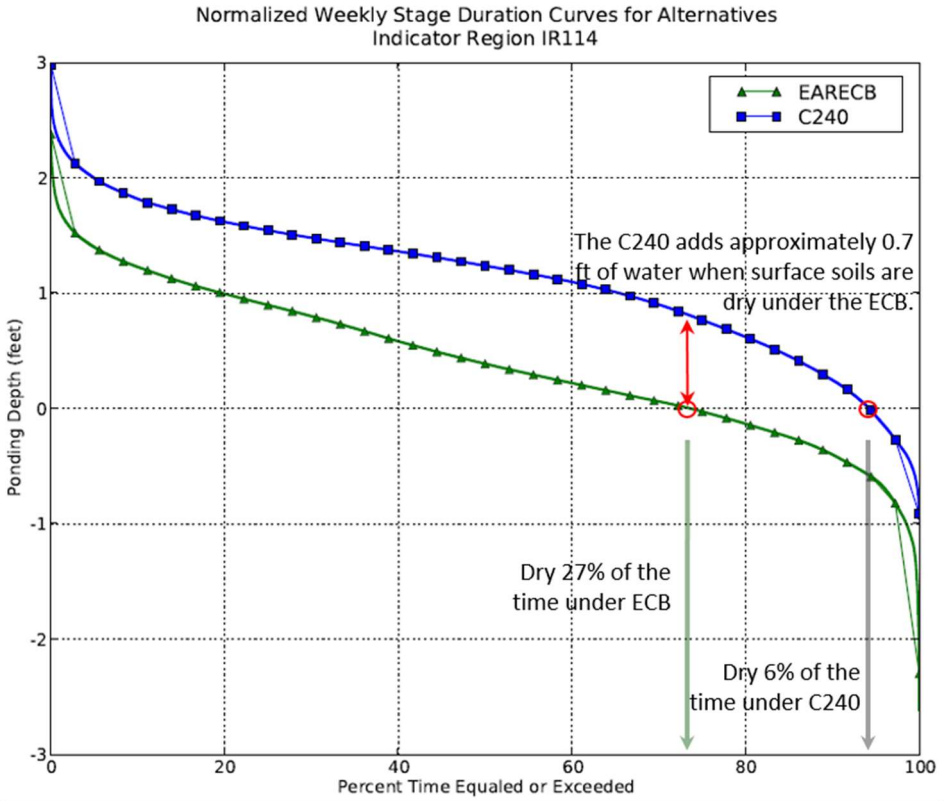


Figure 4-26. Normalized duration curves for northwestern Water Conservation Area 3A.

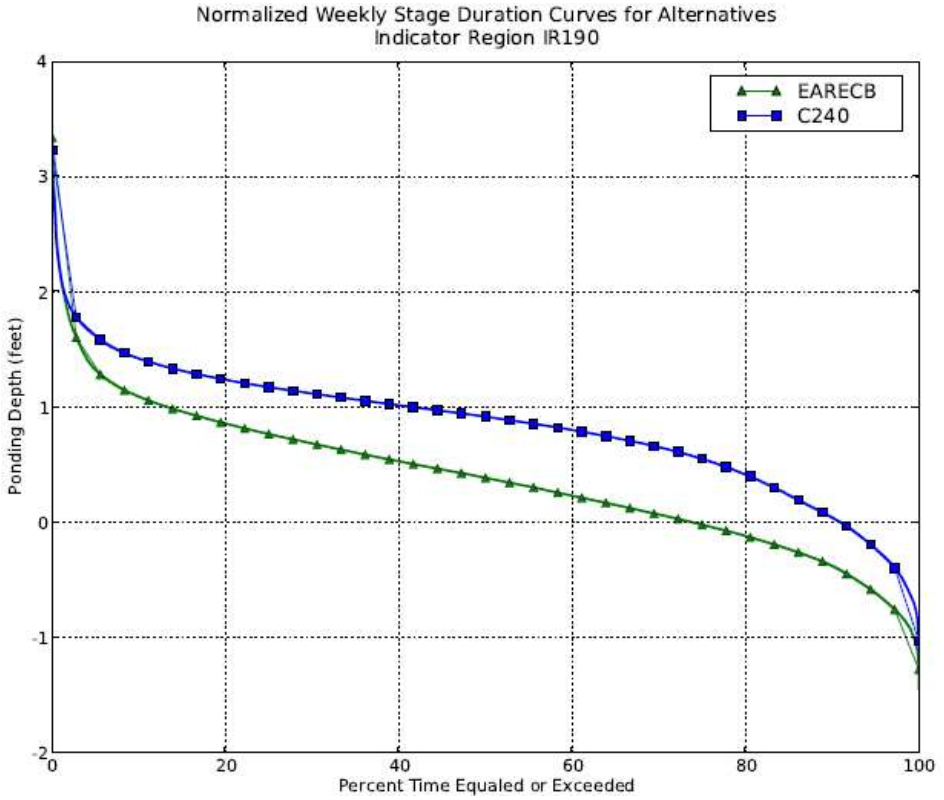


Figure 4-27. Normalized duration curves for northeastern Water Conservation Area 3A.

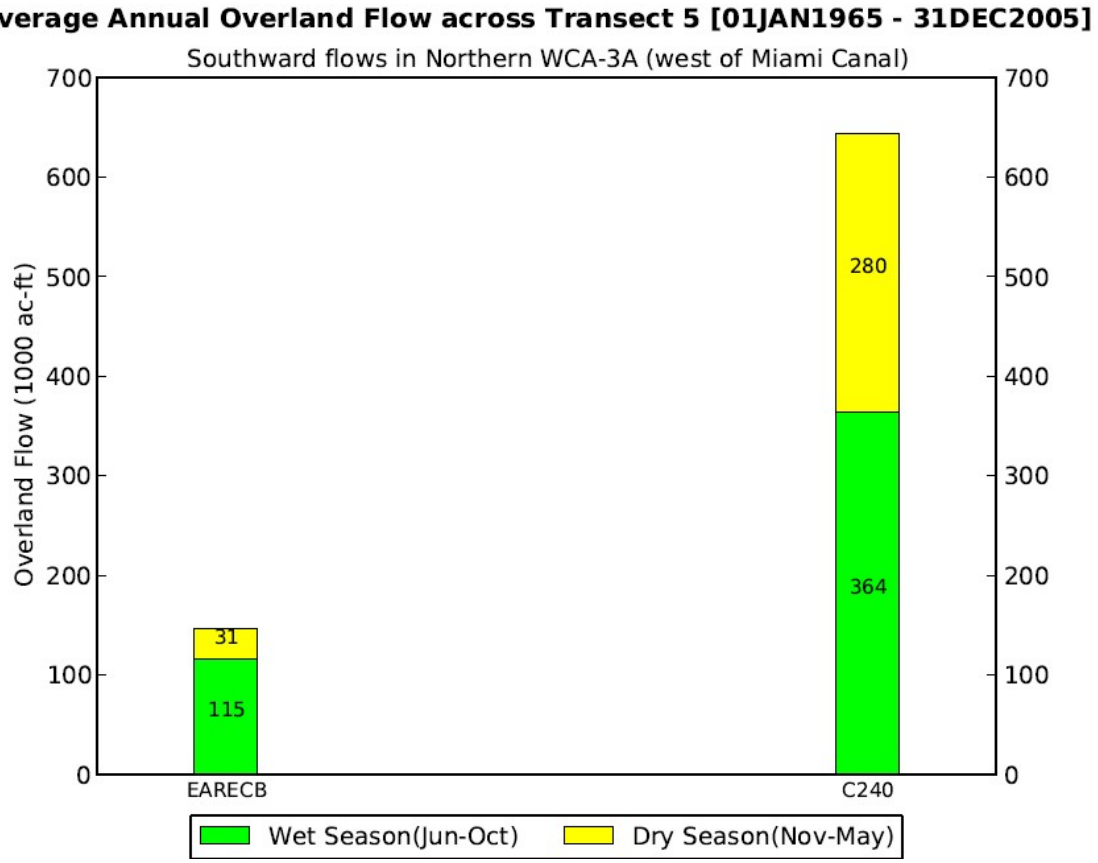


Figure 4-28. Average annual overland flow in northern Water Conservation Area 3A (west of the Miami Canal).

Alternative C240 is expected to have a moderate beneficial effect on vegetation in northern WCA-3A because of the enhanced sheetflow and extended hydroperiod. However, rehydration may result in expansion of cattail due to the mobilization of phosphorus that occurs when peat soils are oxidized (Newman et al. 1998) as well as increased nutrient loads via overland flow. Nutrient loading may continue under Alternative C240. Although recent spatial sampling is unavailable to document changes in soil chemistry, the areas at greatest risk for phosphorus release upon rewetting are those closest to north-central WCA-3A near the Miami Canal, where increases in phosphorus per unit volume have occurred (Bruland et al. 2007). However, the long-term flow-weighted concentration of phosphorus is expected to be below 13 parts per billion, which is comparable to natural background levels. It is difficult to know exactly how vegetation in the northern region will respond to increased flows associated with Alternative C240; however, the risks associated with increased phosphorus concentrations are low compared to the benefits of the project.

Proceeding south approximately 10 miles, the amount of time water levels go below 0 ft decreases 11% and water depths increase 0.3 ft when ponding depths are approximately 1 ft for Alternative C240 compared to the ECB (**Figure 4-29**). Alternative C240 acts to rehydrate northern WCA-3A, promoting peat accretion, reducing the potential for high-intensity fires, and facilitating the transition from upland to wetland vegetation.

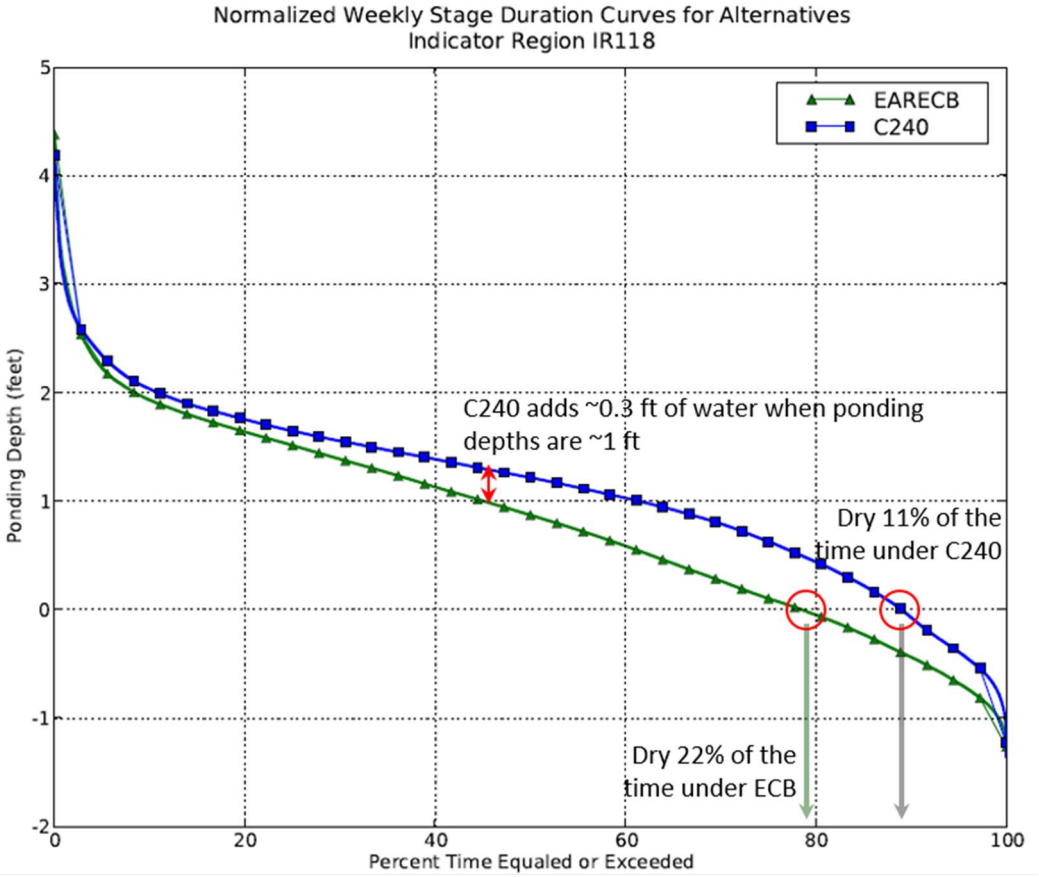


Figure 4-29. Normalized duration curves for northeastern Water Conservation Area 3A.

Rehydration of previously dry areas within north-central WCA-3A could temporarily mobilize nutrients within the water column; however, this is not expected to be a significant issue because portions of WCA-3A north of Interstate 75 experience annual dryout and rehydration with no significant downstream impact under the ECB. The introduction of phosphorus into previously unimpacted areas (i.e., central and southern WCA-3A) might cause vegetation shifts, providing a minor adverse effect. Chaing et al. (2000) suggested phosphorus loading can alter Everglades plant communities through increased plant productivity, tissue phosphorus storage, soil phosphorus enrichment, and shifts in plant species composition. Previous studies have shown that slough and sawgrass communities have been replaced by cattail-dominated communities when soil phosphorus concentrations increase, generally exceeding 500 milligrams per kilogram (Davis et al. 1994, Newman et al. 1998, Rutchey et al. 2008, McCormick et al. 2009). However, Craft et al. (1995) and Chaing et al. (2000) observed no significant change in macrophyte species diversity or expansion of cattails in study plots receiving nutrient additions during the 2 and 4 years, respectively, of their studies. Vegetation that can assimilate nutrients directly from the water column (e.g., periphyton-*Utricularia* complex) are the most sensitive to nutrient enrichment, and their communities shift in response to enrichment, as evidenced by the replacement of phosphorus-sensitive species with phosphorus-tolerant species (McCormick et al. 1996, Gaiser et al. 2005, Gaiser 2009, Newman et al. 2004).

Many areas of WCA-3A, particularly within central WCA-3A, still contain good quality wetland habitat, consisting of tree islands, sawgrass marshes, wet prairies, and aquatic sloughs. Vegetation and patterning in central WCA-3A most closely resemble pre-drainage conditions and represent some of the best examples of remnant Everglades habitat in South Florida. Although hydrology in these areas remains mostly unaffected by Alternative C240 compared to the ECB (**Figure 4-30**), maintenance of existing conditions within this region of the project area is desirable as ridge and slough habitat is well conserved.

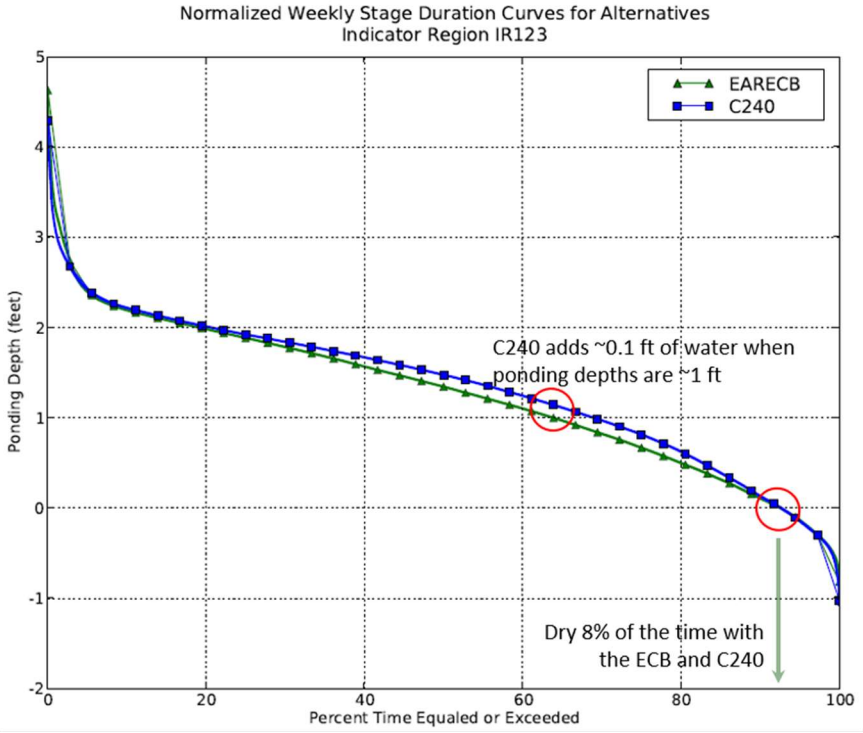


Figure 4-30. Normalized duration curves for central Water Conservation Area 3A.

High water levels during the wet season are essential to maintain quality wet prairie and emergent slough habitat. However, prolonged high water levels (i.e., during both the wet and dry seasons) and extended hydroperiods have resulted in vegetation shifts within southern WCA-3A, which negatively impact tree islands and fragment sawgrass ridges, resulting in loss of historical landscape patterning (**Figure 3-1**). Alternative C240 brings annual peak water levels down by 0.4 ft (**Figure 4-31**), which is expected to reduce the potential for flooding stress on tree islands. However, neither Alternative C240 nor the ECB reduces average water levels or duration in southern WCA-3A; therefore, major shifts in vegetation are not anticipated within this region, providing a negligible effect.

Typical Everglades vegetation, including tree islands, wet prairies, sawgrass marshes, and aquatic sloughs, occurs throughout WCA-3B. However, within WCA-3B, the ridge and slough landscape has been severely degraded by the virtual elimination of overland sheetflow due to the L-67 Canal and levee system. WCA-3B has become a primarily rain-fed system with shorter hydroperiod sawgrass marshes and relatively few sloughs and tree islands. Loss of sheetflow to WCA-3B has accelerated soil loss, reducing elevations of the remaining tree islands and making them vulnerable to high water stages.

Compared to the ECB, Alternative C240 decreases ponding depths within central WCA-3B approximately 0.1 ft during 40% of deepest conditions and increases ponding depths approximately 0.1 ft during 30% of shallowest conditions (**Figure 4-32**). The seasonal decrease in ponding depths in central WCA-3B results from less water entering eastern WCA-3A (from WCA-2A), water routed to the Blue Shanty Flow-way and ENP, and a shift in flow timing. The timing shift refers to more water being stored in the EAA Reservoir for release during drier conditions. ~~In contrast~~Compared to the ECB, Alternative C240 increases ponding depths approximately 0.1 ft in southern WCA-3B during all ponded times ~~compared to the ECB~~ (**Figure 4-33**). Although these changes could have positive (deeper water conditions during the dry season in central WCA-3B) and negative (flooding stress in southern WCA-3B) effects, the effects are not ecologically significant. As such, long-term shifts in vegetation, water quality, tree island sustainability, or use by wildlife are not anticipated in comparison to the ECB.

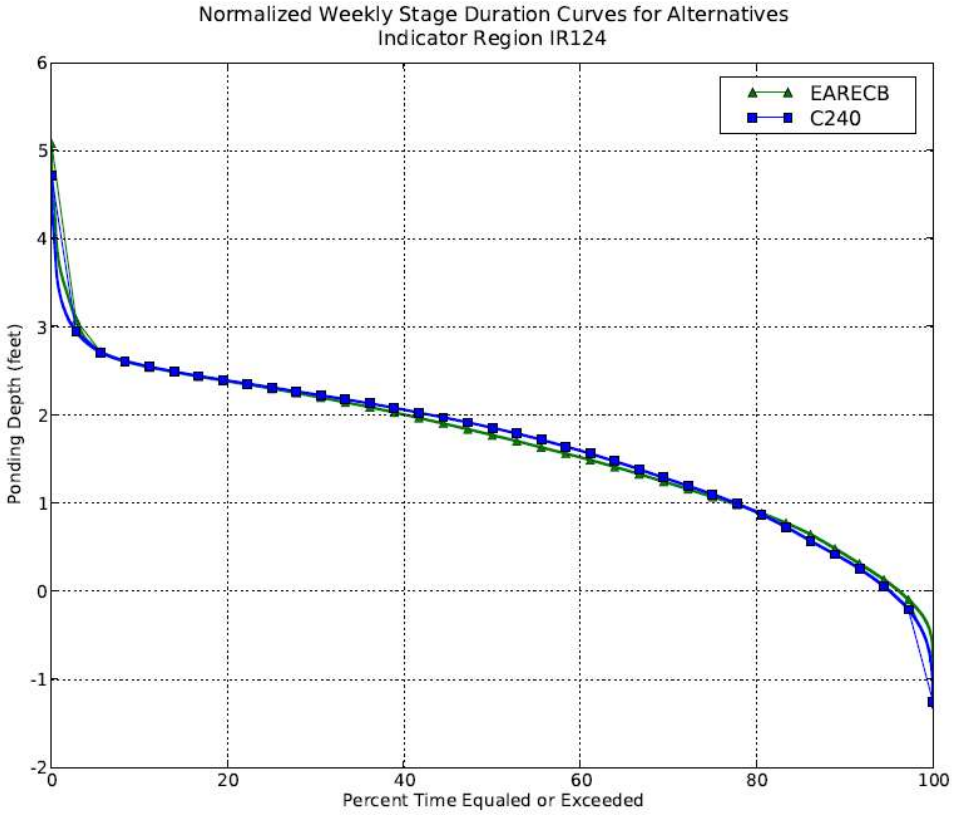


Figure 4-31. Normalized duration curves for southern Water Conservation Area 3A.

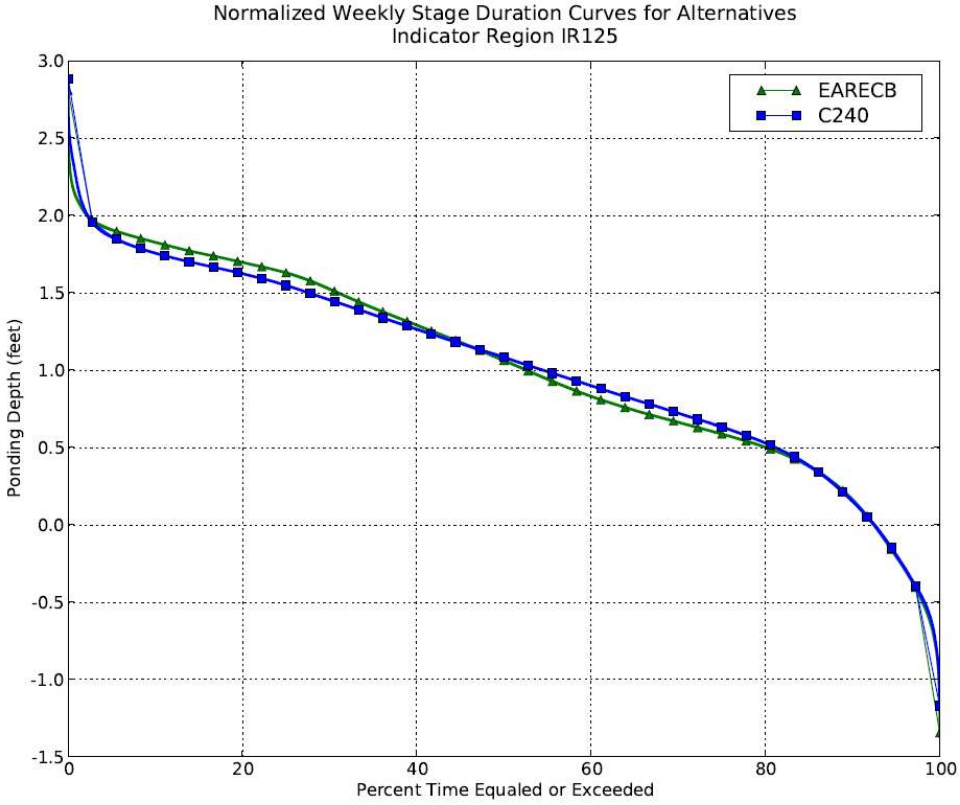


Figure 4-32. Normalized duration curves for central Water Conservation Area 3B.

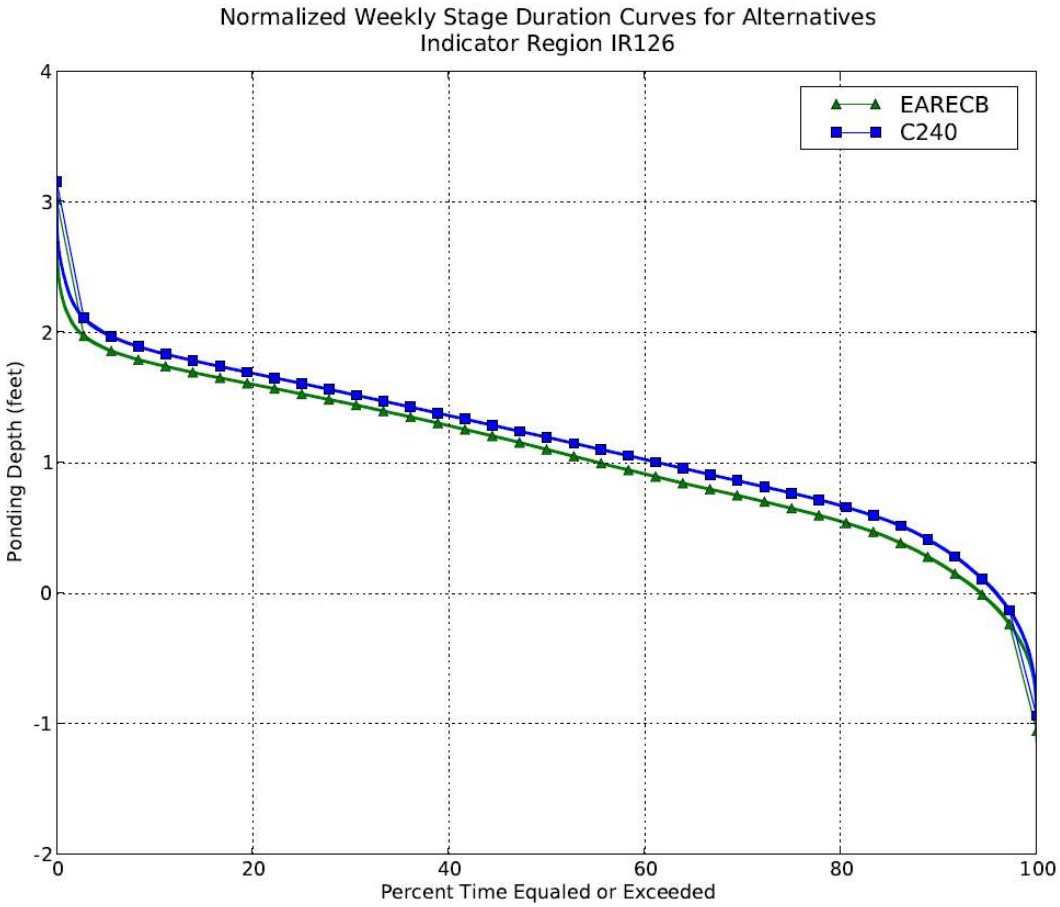


Figure 4-33. Normalized duration curves for southern Water Conservation Area 3B.

Existing compartmentalization and water management practices result in flows through NESRS that are significantly lower than pre-drainage conditions. The consequence of lower flows has been lower wet season depths, more frequent and severe drydowns in sloughs, and reduction in the extent of shallow-water edges. Over-drainage in peripheral wetlands along the eastern boundary of NESRS has caused shifts in community composition, invasion by exotic woody species, and increased susceptibility to fire. Implementation of Alternative C240 is expected to continue the benefit of rehydrating NESRS (**Figure 4-34**) by increasing annual overland flows to NESRS compared to the ECB (**Figure 4-16**), providing long-term ecological benefits. Resumption of sheetflow and related patterns of hydroperiod extension will help restore pre-drainage water depth patterns and the complex mosaic of the Everglades' vegetation communities.

Reduction in the number and duration of dry events in NESRS is a major environmental benefit because extended hydroperiods will reduce soil oxidation, decrease fire potential, promote peat accretion, and aid in the restoration of historical wetland vegetation communities. Alternative C240 will decrease the duration of dry events, calculated for the modeling period (1965 to 2005) along the SRS (indicator regions 129, 130, 131, and 132), to 13 weeks, which is 3 weeks shorter than the average duration of dry events for the ECB (**Figure 4-35**). Additionally, the results under Alternative C240 show similar performance in the average duration of dry conditions in four indicator regions of a pre-drained Everglades system (NSM462 in **Figure 4-35**). Therefore, Alternative C240 has fewer dry weeks than the ECB and has a similar extent of drydowns relative to a pre-drained Everglades, which achieves the project goal of rehydrating NESRS.

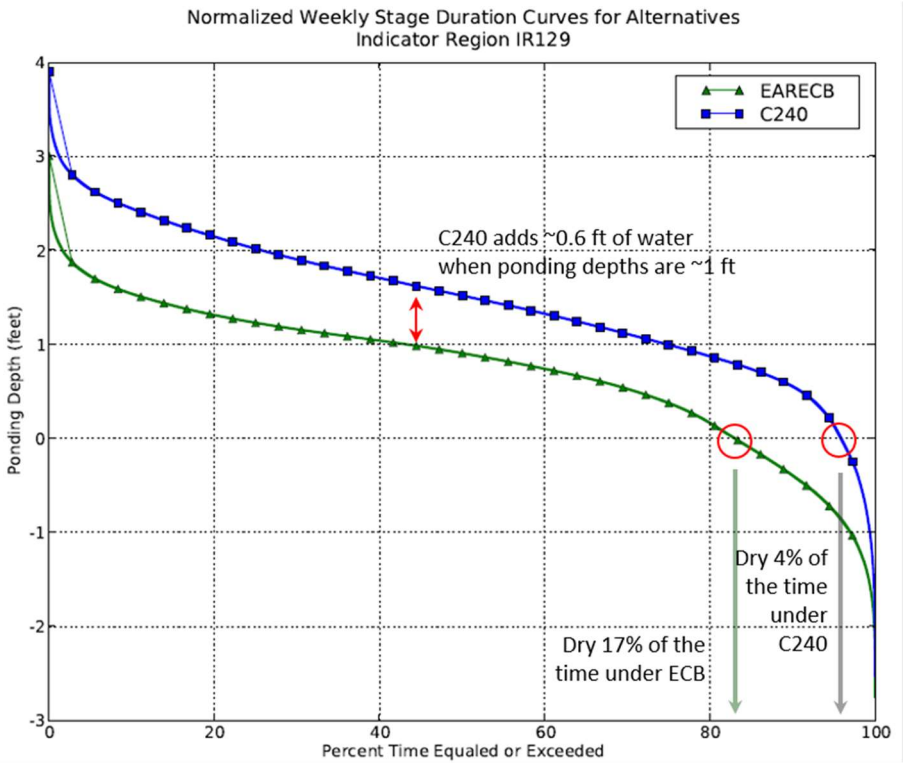


Figure 4-34. Normalized duration curves for Northeast Shark River Slough.

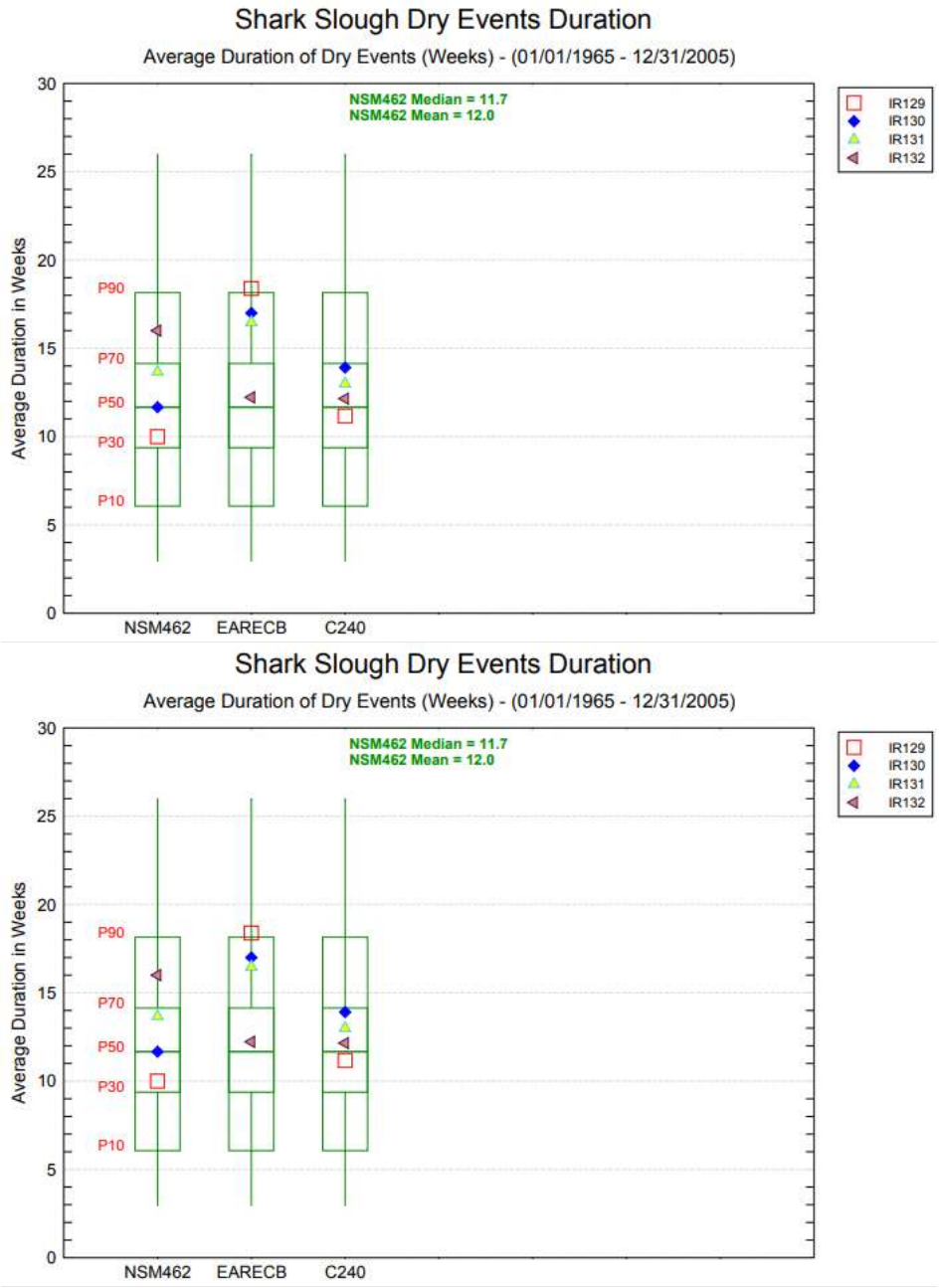


Figure 4-35. A weekly count of dry events in four indicator regions ~~in~~within Shark River Slough between 1965 and 2005 under a pre-drained hydrologic condition (NSM462), the existing conditions baseline (~~ECB~~EARECB), and Alternative C240 (C240). The box-whisker plot represents the Natural System Model (version 4.62) distributions for ridge and slough habitat south of Tamiami Trail. The model simulates ~~the hydrologic response of~~ a pre-drained Everglades system; it does not attempt to simulate the pre-drained hydrology. Instead, recent climatic data are used to simulate the pre-drained hydrologic response to current hydrologic input.

There is a long-term, moderate increase in the overland flow rates in NESRS and Taylor Slough. The added fresh water will lower the rate of saltwater intrusion in the mangroves of the southwestern coastal areas and Florida Bay. These flows will reduce coastal salinities and maintain hydrologic and ecological connectivity.

Overland flows also help maintain the ridge and slough patterns in all of SRS. The average annual increase in sheetflow in central SRS (Transect 27) increases 210,000 ac-ft (34% increase) under Alternative C240 compared to the ECB (**Figure 4-24**). The average annual southward sheetflow to Taylor Slough in southern ENP (Transect 23B) increases 19,000 ac-ft (29% increase) for Alternative C240 compared to the ECB (**Figure 4-36**).

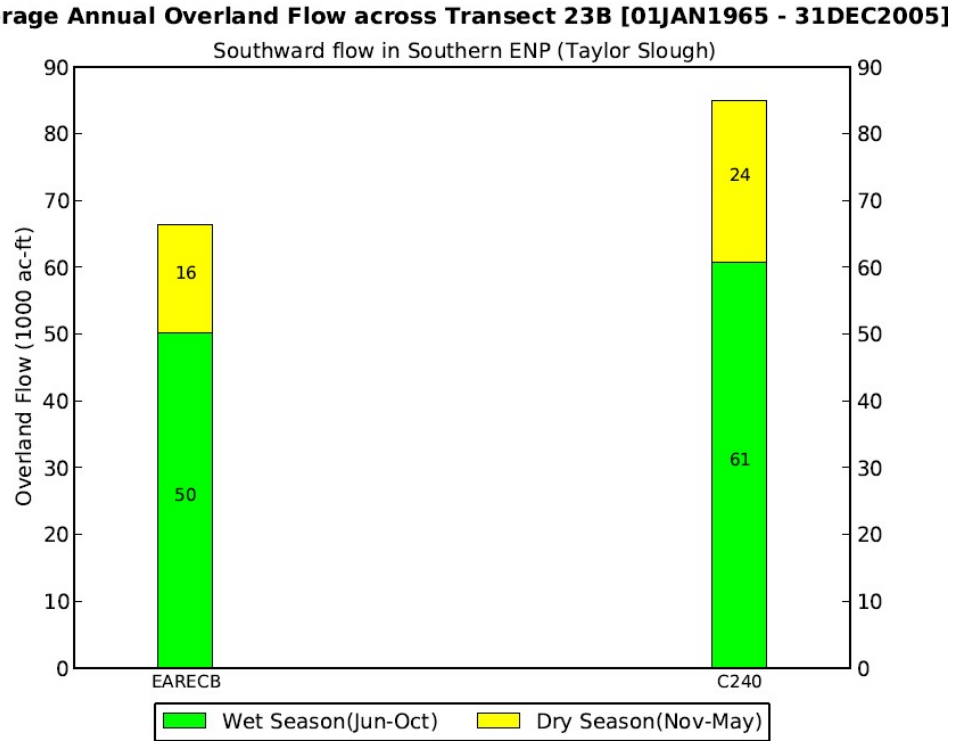


Figure 4-36. Average annual overland flow in southern Everglades National Park.

The Everglades, a phosphorus-limited system, historically received most phosphorus through rainfall, with average total phosphorus concentrations of less than 0.01 milligram per liter (McCormick et al. 1996). A rapidly growing population and industrial agriculture increased total phosphorus inputs in the WCAs and ENP; however, a series of STAs has removed phosphorus before it enters the ecosystem since 1993 and, recently, areas within ENP have shown total phosphorus concentrations of less than 0.01 milligram per liter (Julian et al. 2019). One concern is additional flow will provide greater phosphorus loads and could cause vegetation changes within NESRS. The periphyton-*Utricularia* complex will be the most sensitive to nutrient enrichment (Gaiser et al. 2005). Potential effects on vegetation and species community composition within NESRS and ENP cannot be fully determined at this time. Water quality in the study area will continue to be monitored.

Non-native and invasive plant infestations in the Central Everglades may be exacerbated by soil disturbance, increased nutrients, and hydrologic modification. Many non-native and invasive species are flourishing in a variety of habitats and negatively affecting the ecology throughout the Everglades. Non-native and invasive plant species most frequently are encountered in disturbed areas and areas where water quality has been impacted by increased nutrient loads. Construction or hydrologic modification under Alternative C240 is not expected to influence the spread or establishment of invasive and nuisance plant species.

4.2.2 Slough/Open Water Marsh

Deep slough communities occurred throughout the pre-drainage ridge and slough region of the Everglades (McVoy et al. 2011). Sloughs within the Central Everglades have been degraded by compartmentalization, resulting in reduced sheetflow, depths, and inundation durations, altered vegetation community structure, and expansion of wet prairie and sawgrass marsh communities. Overland sheetflow has been virtually eliminated from WCA-3B due to the L-67 Canal and levee system, resulting in loss of deep water sloughs and dominance of shorter hydroperiod, dense sawgrass marsh. Vegetative trends within ENP also include conversion of slough/open-water marsh communities to shorter hydroperiod sawgrass marshes (Davis and Ogden 1994, Davis et al. 1994, Armentano et al. 2006). Increases in SRS sheetflow under Alternative C240 (**Figure 4-16**) provide a long-term impact on the hydroperiod as the region will be dry only 4% of the time, compared to 17% under the ECB (**Figure 4-34**). With Alternative C240, much of NESRS will see substantial rehydration, which will promote sheetflow due to redistribution of flows from WCA-3A and WCA-3B to ENP. This will improve hydroperiods and water depths while reducing the frequency and severity of drydown events (**Figure 4-35**), which can cause a transition of shallower wet prairies to slough/open-water marsh communities.

4.2.3 Wet Marl Prairies

Wet marl prairies occur on marl soils and exposed limestone and experience the shortest hydroperiods of the slough/marsh/prairie wetland complex. Marl prairies occur in the southern Everglades along the eastern and western peripheries of SRS. Areas within the eastern marl prairies along the ENP boundary suffer from over-drainage, reduced water flow, exotic tree invasion, and frequent human-induced fires (Lockwood et al. 2003, Ross et al. 2006). ~~To~~Thus, increased water flows are needed to alleviate the perpetually drier conditions and associated problems~~, increased water flows are needed~~ in this area. Alternative C240 provides long-term, moderate benefits to vegetation because increased hydroperiods within the eastern marl prairies may alleviate some of the problems associated with drier conditions and promote a shift in community composition (**Figure 4-19**).

Within the western marl prairies, decreased annual overland flows (**Figure 4-20**) and subsequent reductions in hydroperiod (**Figures 4-21** and **4-22**) would ~~promote vegetation transition, increasing~~increase the area of marl prairie within CSSS Subpopulation- A. Proceeding west to southern Big Cypress National Preserve, however, Alternative C240 is expected to provide a negligible effect on the vegetation community as the vast majority of western marl prairies that currently are over-drained ~~would~~will experience no hydrologic changes~~, providing a negligible effect on the vegetation community under Alternative C240 compared to the ECB~~ (**Figure 4-37**).

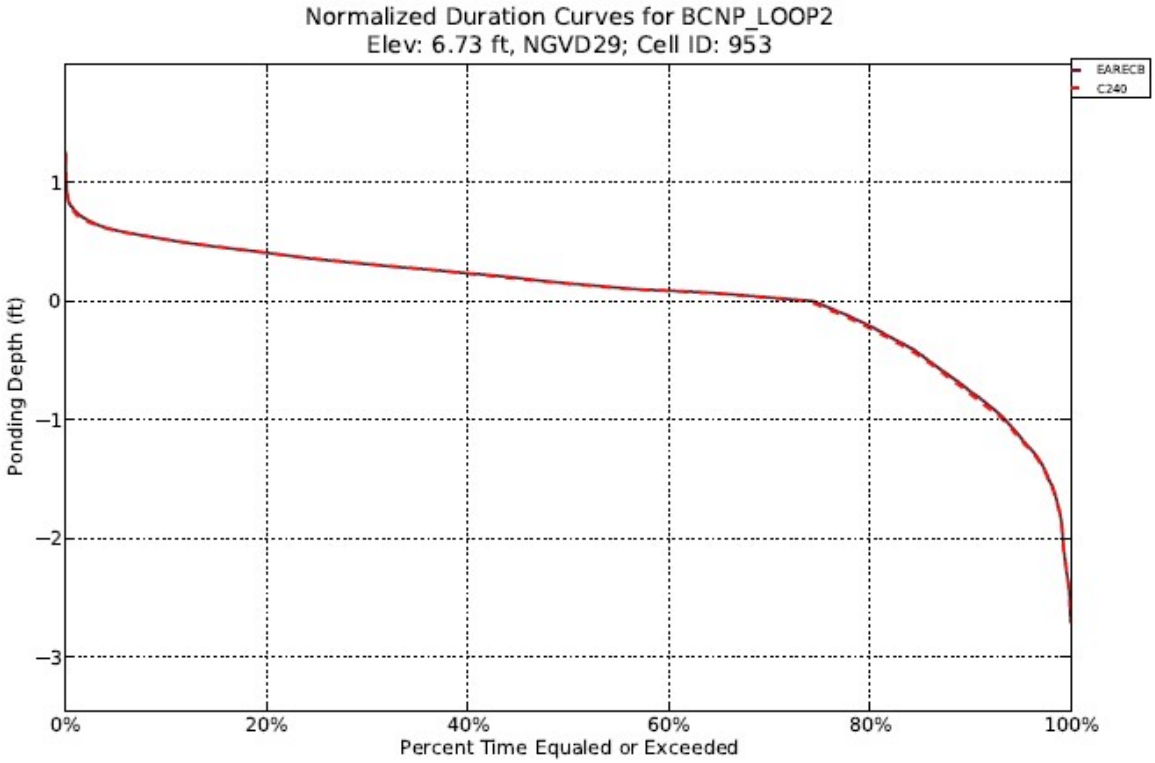


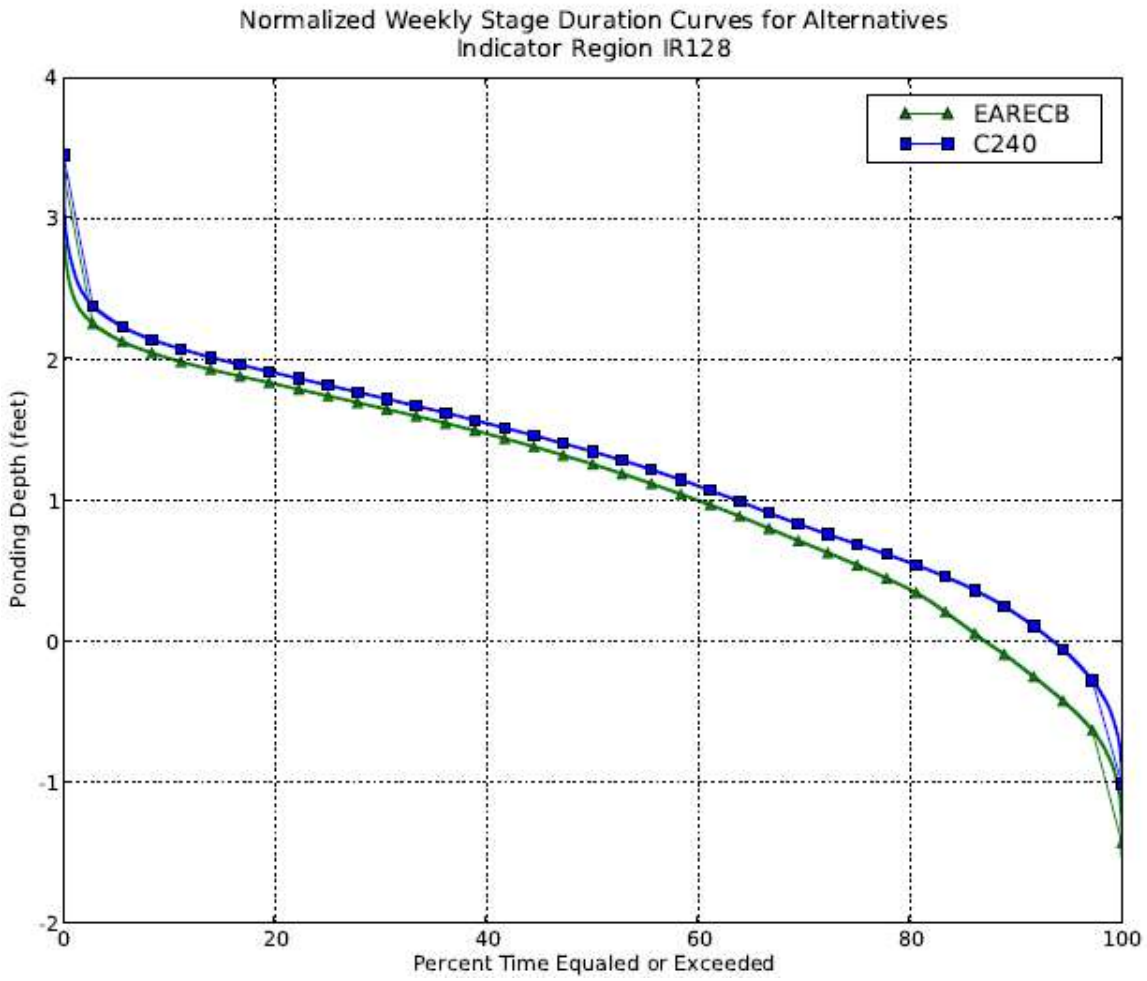
Figure 4-37. Normalized duration curves in southern Big Cypress National Preserve.

4.2.4 Tree Islands

Hydrologic restoration may not be conducive to new tree island creation in northeastern WCA-3A, where tree islands once were plentiful, but now few remain. Despite beneficial effects of Alternative C240 reducing damaging drydown durations (26% increase in hydroperiod), adding approximately 0.4 ft water during the wettest 5% periods when deep water can stress vegetation on tree islands is a concern (**Figure 4-7**). However, because water depths on the marsh surface are predicted to be 1 ft or less 80% of the time for Alternative C240, this is beneficial to existing tree islands.

Proceeding south, central and southern WCA-3A are expected to respond similarly (**Figures 4-30** and **4-31**). Tree islands in central WCA-3A are in optimum hydrology. However, Alternative C240 does not lower the damaging ponding depths or improve the ecological condition of tree islands in southern WCA-3A compared to the ECB. Thus, benefits are deemed negligible.

Moving into WCA-3B (not including the Blue Shanty Flow-way), implementation of Alternative C240 will provide no improvement ~~on~~to the ecological condition of tree islands in central WCA-3B (**Figure 4-32**). In southeastern WCA-3B, Alternative C240 reduces damaging drydown durations approximately 7% by adding approximately 0.1 ft water during ponded times (**Figure 4-38**). Although these numbers are small compared to the area of major improvements (i.e., northern WCA-3A), given WCA-3B is compartmentalized and becomes a rain-fed system, even slight increases in hydroperiods associated with enhanced sheetflow will increase sediment redistribution to tree islands and ridges and help restore historical sloughs.


Normalized Weekly Stage Duration Curves for Alternatives
Indicator Region IR128
EARECB
C240
Ponding Depth (feet)
Percent Time Equaled or Exceeded
4
3
2
1
0
-1
-2
0
20
40
60
80
100

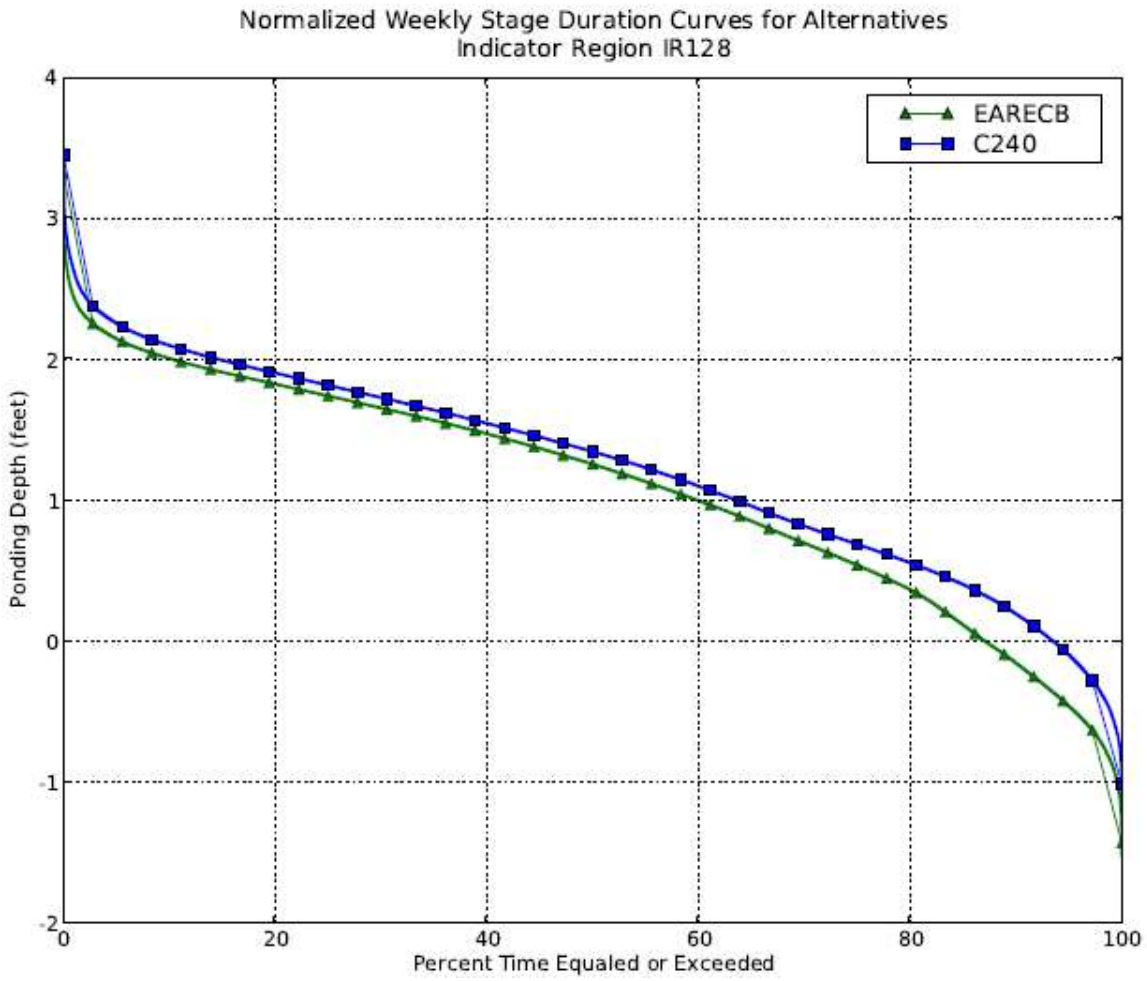


Figure 4-38. Normalized duration curves in southeastern Water Conservation Area 3B.

4.2.5 Shark River Slough

In SRS, where tree islands rise high above the surrounding marsh, the potential for flooding stress is practically nonexistent. Instead, ENP is faced with a reduction in tree islands due to intensive fires that move across the marshes and burn tree island peat soils, leaving only rocky outcroppings. The objective of Alternative C240 is to prevent extensive drydowns and extend hydroperiods. **Figure 4-39** shows a marsh surface hydrology for Alternative C240 that reduces drydown durations approximately 5% by increasing water depth approximately 0.2 ft during ponded times relative to the ECB, which provides rehydration benefits.

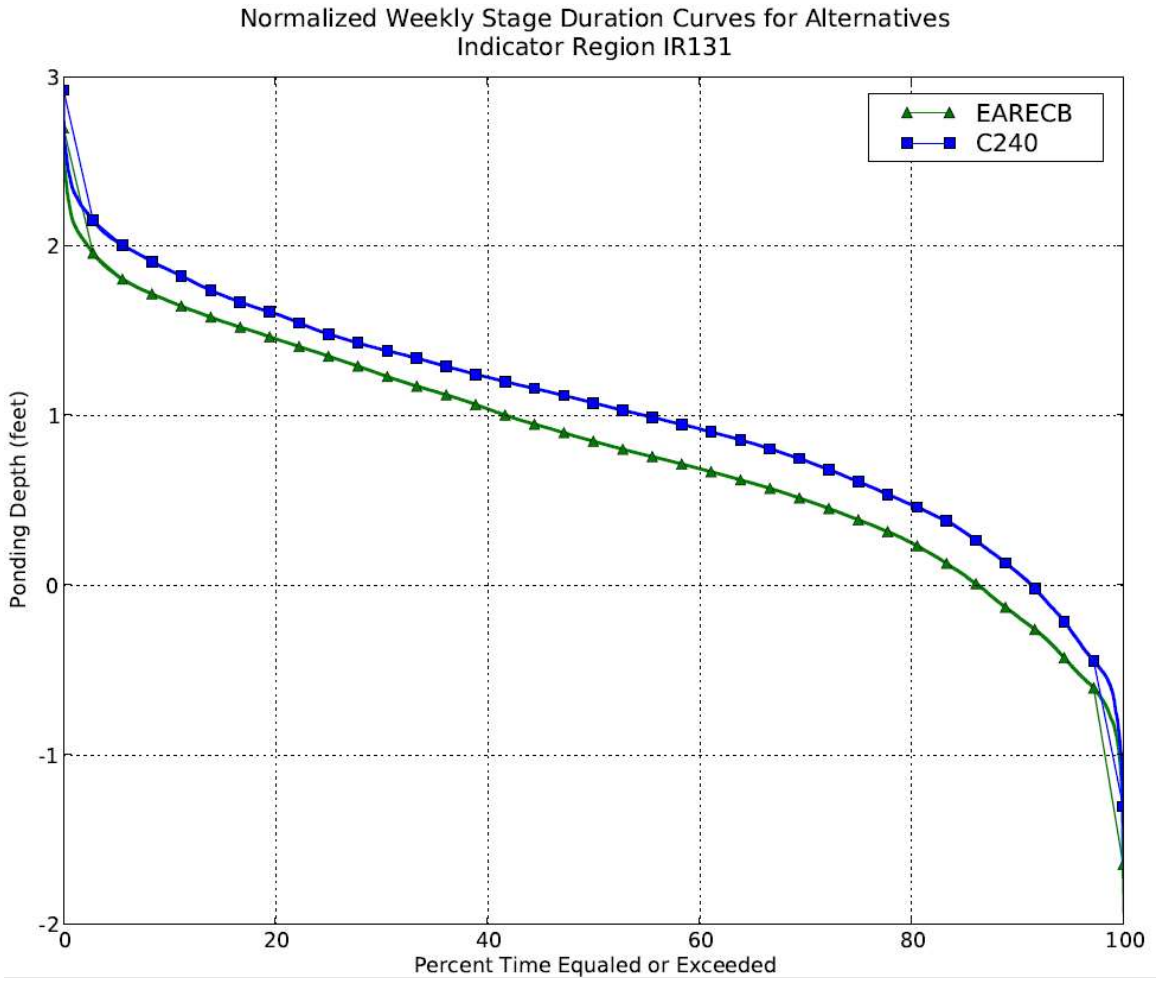


Figure 4-39. Normalized duration curves in Shark River Slough.

4.2.6 Hydrologic Summary

In this technical document, central WCA-3A (indicator region 123; **Figure 4-30**) serves as a reference location where the ridge-slough-tree island landscape is the most preserved. The current hydrology in this location is similar to ~~the hydrology~~a pre-drained Everglades predicted by the Natural System Model and, as such, is more of a comparative reference site rather than a target. Because the Central Everglades was a ~~rather~~relatively uniform, spatially homogeneous ridge and slough landscape over WCA-3A and ENP, average depth, maximum depth, and hydroperiod in central WCA-3A are extrapolated across the project area (**Table 4-1**). Note that the goal of restoration is not to make water depths across the system as deep as central WCA-3A; however, that is one consideration that determines the composite picture of how the Everglades are to be restored.

A highly anticipated outcome of Alternative C240 is an increase ~~of~~in water depths and hydroperiods in over-drained wetlands such as northern WCA-3A and NESRS (**Table 4-1**). The conditions created by Alternative C240 will considerably improve average water depths and hydroperiods, showing similar performance measures to central WCA-3A. Therefore, major hydrologic improvements are expected to produce long-term benefits to these areas and the fishes and wildlife living therein. The ~~area~~ northwestern portion of western marl prairies near the S-12 structures are at high risk for additional drying because there is less water sent to the S-12 structures under Alternative C240 (**Figure 4-5**). In ~~the majority of the~~most western marl prairies within northern ENP and southern Big Cypress National Preserve, no additional water

is expected, and the area likely will remain over-drained and at risk from muck fires and further soil oxidation. ~~On the contrary~~However, a reduction in peak water levels and hydroperiods is expected to alleviate flooding stress in areas of excessive ponding, such as eastern and southern WCA-3A (**Table 4-1**). The new water routed to the Blue Shanty Flow-way from WCA-3A to ENP will moderately increase the drying out of northern and central WCA-3B but will lengthen hydroperiods and deepen water levels in southern WCA-3B (**Table 4-1**). As WCA-3B has become a primarily rain-fed system, returning to a flowing system in some areas can be considered a progressive step towards ecosystem restoration. In general, the overall impact of hydrologic changes to the landscape is expected to be small in WCA-3B. As a result of the negligible outcome, the CEPP adaptive management option to increase flows from the new S-633 structure into WCA-3B will assess an incremental increase in ponding depths over a 15- to 20-year interval to allow sloughs, ridges, and tree islands to re-establish microtopography.

Table 4-1. A summary comparison of hydrologic conditions under the existing conditions baseline and Alternative C240 across the project regions.

Region	Average Water Depth (ft)		Maximum Water Depth (ft)		Hydroperiod (days)		Figure
	ECB	C240	ECB	C240	ECB	C240	
Northwestern WCA-3A	0.4	1.2	2.3	3	262	338	4-26
Northeastern WCA-3A	0.4	0.9	3.4	3.2	270	332	4-27
Eastern WCA-3A	2.1	2.3	5.5	5.3	343	328	4-9
Central WCA-3A	1.3	1.5	4.6	4.3	337	338	4-30
Southern WCA-3A	1.8	1.9	5.1	4.7	350	346	4-31
Northern WCA-3B	0.8	0.7	2.3	2.2	313	302	4-13
Central WCA-3B	1.1	1.1	2.8	2.9	335	335	4-32
Southern WCA-3B*	1.2	1.6	2.9	3.4	350	357	4-15
Northeast SRS	0.9	1.5	3.0	3.9	302	350	4-34
Eastern ENP	-1.0	-0.5	1.5	2.1	58	128	4-19
Northwestern ENP	0.4	0.3	1.9	1.9	270	255	4-22
Southern BCNP	0.2	0.2	1.3	1.3	270	270	4-37

BCNP = Big Cypress National Preserve; C240 = Alternative C240; ECB = existing conditions baseline; ENP = Everglades National Park; ft = foot; SRS = Shark River Slough; WCA = Water Conservation Area.
* Within the Blue Shanty Flow-way.

4.3 Fish and Wildlife Resources

This section evaluates the fish and wildlife simulations from the United States Geological Survey Joint Ecosystem Model Program for the ECB and Alternative C240. Effects on key indicator species, including state and federally listed species, are summarized in **Table 4-2**. This table is based on a combination of the models presented in this technical document, model output from the ~~PACR~~ PIR (USACE and SFWMD 2014), an understanding of the biology and environmental requirements of each species, and the best professional judgment of federal and state ecologists working on Everglades restoration projects. Although changes in water quality could affect the prey forage base by altering vegetation composition or structure, modeling tools are not available to compare such changes under the ECB and Alternative C240. Instead, water quality will continue to be monitored, potential effects will be evaluated, and options in the CEPP adaptive management plan will be implemented, if necessary.

Table 4-2. Comparison of effects on key indicator species, including federally and state-listed threatened and endangered species, under the existing conditions baseline and Alternative C240.

Species	Existing Conditions Baseline	Alternative C240
Crayfish	Crayfish production is greatly reduced from historical levels at sites where shortened hydroperiod and declined groundwater level decrease reproduction and growth but increase mortality of crayfish.	Extended hydroperiods will increase crayfish density in northern WCA-3A, WCA-3B, and portions of ENP, particularly within SRS.
American Alligator	Lack of water and a short hydroperiod within northern WCA-3A and NESRS ~~are not suitable habitats~~make these areas unsuitable habitat for the American alligator.	Rehydration within northern WCA-3A and extended hydroperiods within NESRS increase the spatial extent and quality of suitable habitat for the American alligator. Due to rehydration of previously drained areas, particularly in northern WCA-3A and northeastern ENP, implementation of Alternative C240 would greatly improve alligator habitat suitability.
Wood Stork	Support for improved ecological conditions for wood storks is hampered by short hydroperiods, shallow depths, or dense vegetation in ENP, northern WCA-3A, and WCA-3B.	Moderate beneficial effects for habitat and foraging conditions for wood storks throughout portions of the Central Everglades are expected. An analysis by the South Florida Natural Resources Center (Beerens 2013) of wood stork foraging potential indicated improved foraging conditions in northern WCA-3A, WCA-3B, and ENP due to improved fish abundance, vegetation, and hydrology.
Tricolored Heron, Little Blue Heron, and Reddish Egret	Population declines of these species are attributed to loss and degradation of suitable habitat due to short hydroperiods, shallow depths, or dense vegetation.	Extended hydroperiods in the WCAs and ENP are expected to have a moderate beneficial effect on these species through improved fish abundance and altered vegetation composition or structure.
Roseate Spoonbill	Roseate spoonbills lost historical nesting ground along the southwestern coast of the Everglades in the SRS and ~~Lostman's~~Lostmans Slough estuaries. Since completion of the South Dade Conveyance System in 1982, altering water deliveries to Taylor Slough and northeastern Florida Bay, roseate spoonbill nesting effort has shifted to the northwestern region of Florida Bay.	A small but long-term improvement to the spatial extent of suitable nesting and foraging habitat for roseate spoonbills is anticipated due to the southern distribution and sheetflow improvements associated with Alternative C240 in the mainland estuary zones of ENP.
Snail Kite	Lack of water and undesirable vegetation within northern WCA-3A and ENP ~~are not suitable habitats~~make these areas unsuitable habitat for apple snails (main prey of snail kites). Southeastern WCA-3A would continue to experience extended hydroperiods due to ponding along the L-67A and L-29 levees. High water levels and extended hydroperiods have resulted in vegetation shifts within WCA-3A, degrading snail kite critical habitat.	Longer hydroperiods and desirable vegetation shifts within northern WCA-3A are expected to increase suitable habitat for apple snails, thereby increasing the spatial extent of suitable foraging opportunities for snail kites, providing a beneficial effect. Alternative C240 produces greater depths and hydroperiods in northwestern WCA-3A relative to the existing conditions baseline.

Species	Existing Conditions Baseline	Alternative C240
Cape Sable Seaside Sparrow	Disruption of the seasonal pattern of rising and falling water depths has resulted in up to 60 consecutive dry days during the CSSS nesting season (March 1 to May 15) for 3 or more consecutive years, degrading the CSSS critical habitat in wet marl prairies along the eastern and western edges of SRS and along the eastern edge of Taylor Slough in southeastern ENP.	A mixed effect for CSSS nesting and habitat conditions is expected in critical habitat areas. An overall decline in marl prairie hydrologic suitability within designated subpopulation regions could lead to long-term adverse effects on CSSS habitat suitability under Alternative C240. However, habitat improvements in adjoining areas may warrant further consideration as the Joint Ecosystem Model results illustrate the complexity of marl prairie hydrologic suitability.
Eastern Indigo Snake	High terrestrial levees along the Miami Canal have become an artificial refuge for the eastern indigo snake.	Habitat loss from backfilling the Miami Canal and removal of 50% of its adjacent levees in northern WCA-3A is expected to be mitigated by the restoration of tree islands and construction of new tree islands in northern WCA-3A.
Florida Panther	High terrestrial levees along the Miami Canal have become a refuge and hunting ground for the Florida panther.	Habitat loss from backfilling the Miami Canal and removal of 50% of its adjacent levees in northern WCA-3A is expected to be mitigated by the restoration of tree islands and construction of new tree islands in northern WCA-3A.
Everglades Mink	Lack of water and a short hydroperiod limit the range of Everglades mink to the shallow freshwater marshes and swamps of ENP, near Tamiami Trail. Shortened hydroperiods decrease the distribution and abundance of small fish species upon which the Everglades mink feeds.	A minor beneficial effect for habitat and foraging conditions for Everglades mink is expected because of extended hydroperiods within northern WCA-3A and ENP, particularly within marl prairies.

CSSS = Cape Sable seaside sparrow; ENP = Everglades National Park; NESRS = Northeast Shark River Slough; SRS = Shark River Slough; WCA = water conservation area.

The following subsections discuss the model output of key indicator species under the ECB and Alternative C240 in the Central Everglades (**Table 4-3**). The period of model simulation (1965 to 2005) captures a range of climatic events in the Central Everglades, including the 1970-1975 droughts and the brief El Niño (wet period) in 1972. Other notable drought years ~~captured~~ include 1985, 1988, 1989, 1998-1999, 2001, and 2004. The simulation period also captures significant rainfall years, including 1969, 1983, 1994-1995, 1997 (the highest El Niño event on record), and the 2005 hurricane season. The population density of apple snails was simulated for 1995 to 2005 because the model was developed with daily water depth and temperature provided by the Everglades Depth Estimation Network starting in 1992. All ~~the~~ modeling for this technical document should be consistent with models in the PIR (USACE and SFWMD 2014) and PACR (SFWMD 2018a). As such, the discussion of crayfish responses was not modeled but is based on an understanding of the ecological and environmental requirements of the species.

Table 4-3. A comparison of ecological model output and simulation period.

Section	Taxa	Model Output	Simulation Period	Representative Rainfall Year
4.3.1	Small Fish	Population density	1965 to 2005	1989 (dry), 1978 (average), 1995 (wet)
4.3.3	Alligators	Habitat suitability index	1966 to 2005	1989 (dry), 1978 (average), 1995 (wet)
4.3.4	Wading Birds	Spatial foraging condition, temporal foraging condition	1975 to 2005	Not applicable
4.3.5	Apple Snail	Population density	1995 to 2005	2004 (dry), 2000 (average), 1995 (wet)
4.3.6	Cape Sable Seaside Sparrow	Habitat suitability index	1965 to 2005	Not applicable

4.3.1 Small Fish

High densities of small fish characterized the pre-drainage Everglades ecosystem; thus, maximizing small fish densities is an objective of Everglades restoration. Because fish dominate the prey community in both biomass and abundance, they are an important energy source for higher trophic levels such as wading birds, alligators, and larger fish. Estimations of prey fish can be used as a general measure of trophic conditions in the Everglades.

The density of small (i.e., <8 centimeters) freshwater fish is assessed primarily for livebearers and killifishes using a statistical relationship between hydrologic parameters and the small fish monitoring data collected from 1996 through 2006 within WCA-3A, WCA-3B, SRS, and Taylor Slough (Trexler and Goss 2009, Donalson et al. 2010). Under the ECB, projected densities range from 12 to 17 small fish per square meter in the central and southern portions of WCA-3A and WCA-3B, while densities are less than 8 small fish per square meter in ENP during an average rainfall year (**Figure 4-40a**). Implementation of Alternative C240 is expected to have a negligible effect on small fish species throughout much of the Central Everglades (**Figure 4-40b**). However, in northern WCA-3A and SRS, small fish densities increase 78% to 100% and 10% to 78%, respectively, under Alternative C240 due to enhanced overland flows and fewer drydown events (**Figure 4-40c**). The average of daily percent differences in small fish density for the entire model domain increases approximately 68%, 186%, and 29% during an average rainfall (1978), a dry (1989), and a wet (1995) year, respectively (**Figure 4-40c**,**d**,**e**), providing the benefit of enhanced prey density for higher trophic level predators. For all years of the model simulation period (1965 to 2005), implementation of Alternative C240 increased small fish density by approximately 130% compared to the ECB. Introduction or expansion of non-native fish species due to changes in water distribution is not likely to occur; however, the extent of invasion is uncertain at this time.

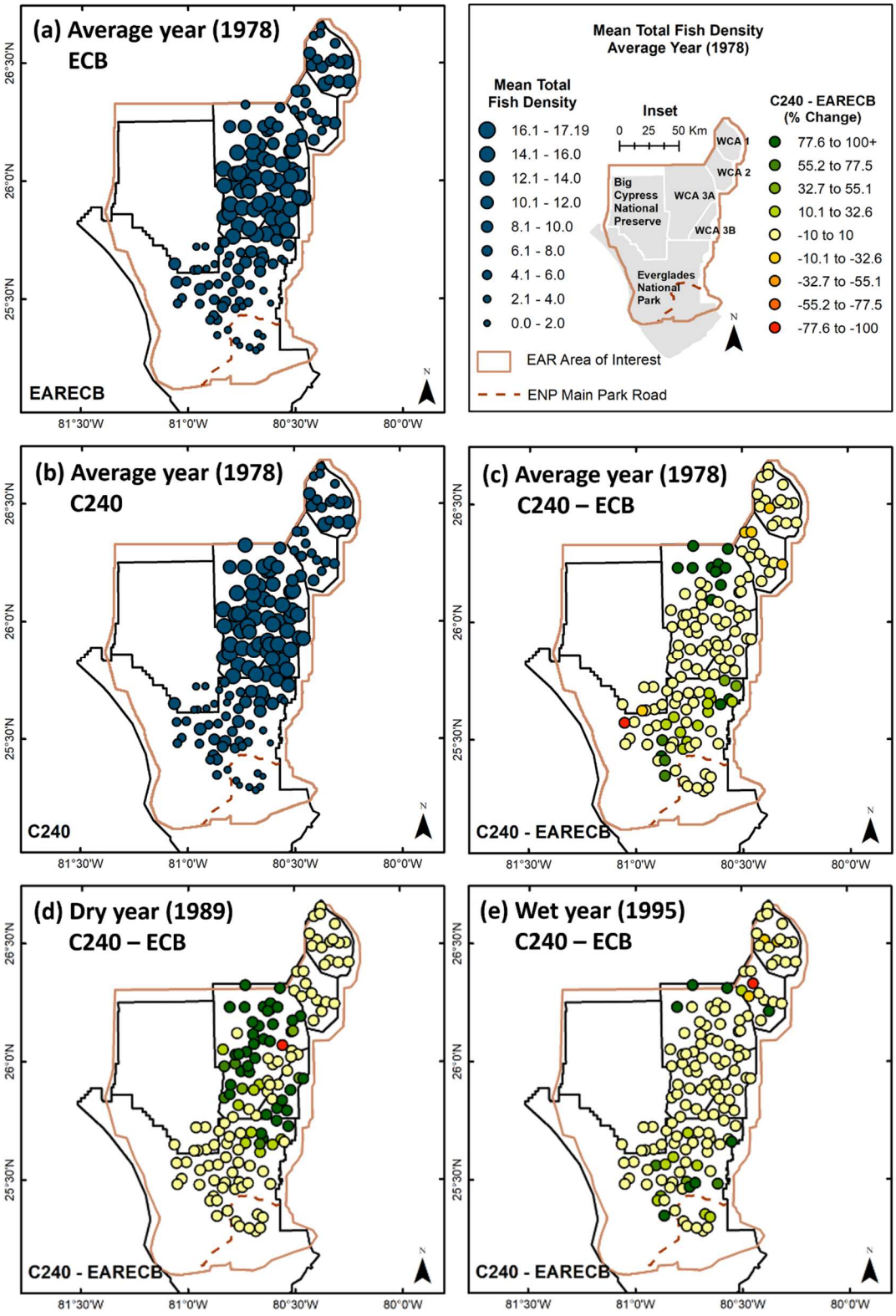


Figure 4-40. Mean total fish density ~~is presented~~ for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences between Alternative C240 and the existing conditions baseline for an average rainfall year. Only percent differences between the models are presented for (d)~~-~~ a dry year and (e) a wet year.

4.3.2 Crayfish

Everglades crayfish (*Procambarus alleni*) and slough crayfish (*Procambarus fallax*) are ~~critically important~~critical components of the Everglades food web, serving as primary dietary components of higher trophic level species, including fish, amphibians, alligators, wading birds, and mammals such as raccoons and river otters (Kushlan and Kushlan 1979). White ibis heavily depend on crayfish species during nesting; therefore, the production and availability of crayfish are important components for white ibis recovery (Dorn et al. 2011).

Crayfish species composition and abundance within the Central Everglades are linked to hydroperiod and ponding depth (Acosta and Perry 2001), with both species being most abundant in marshes that dry seasonally. The Everglades crayfish commonly is found in marshes with a hydroperiod of 7 to 9 months, while the slough crayfish prefers marshes with slightly longer hydroperiods of 10 to 11 months but also is found in perennially flooded habitats. Populations of both species are strongly limited by predatory fishes and can exhibit significant population growth after periodic dry disturbances (Dorn and Cook 2015).

Because the Joint Ecosystem Model Program does not have a crayfish model, crayfish responses to hydrologic improvements presented herein are based on hydrologic evaluations (**Table 4-1**) and an understanding of the environmental ecology requirements of the species. Even slight increases in hydroperiods in sloughs with shallow to moderate water depths and occasional dry conditions associated with Alternative C240 likely would increase slough crayfish production within the over-drained northern WCA-3A and eastern WCA-3B. Everglades crayfish production would increase if hydroperiods within ENP marl prairie were extended by 3 to 4 months (Acosta and Perry 2002). However, Alternative C240 would not extend hydroperiods by this duration; therefore, Everglades crayfish population growth would remain limited by short hydroperiods. Slight declines in hydroperiod under Alternative C240 would further limit Everglades crayfish production in western marl prairies near the S-12 structures. Also, Alternative C240 likely would have a negligible effect on crayfish production in the southern Big Cypress National Preserve based on hydrologic evaluations. It has become evident in recent years that the western marl prairies are disproportionally important for wading bird foraging (Cook and Baranski 2019, Cocoves et al. in review) and might be critical for supporting coastal supercolonies, a major CERP objective; however, Alternative C240 will provide no improvement in this respect. Therefore, the overall effect of Alternative C240 on crayfish production~~, when comparing~~ in the combined spatial region~~,~~ appears marginally positive.

4.3.3 Alligators

A keystone species in the Everglades ecosystem, the American alligator (*Alligator mississippiensis*) depends on spatial and temporal patterns of water fluctuations that affect courtship and mating, nesting, and habitat use (Brandt and Mazzotti 2000). Historically, American alligators were most abundant in peripheral Everglades marshes and freshwater mangrove habitats but are now most abundant in canals and the deeper slough habitats of the Central Everglades. Water management practices, including drainage of peripheral wetlands and elevated salinity in mangrove wetlands as a result of decreased freshwater flows, have limited occurrence of alligators in these habitats (Craighead 1968, Kushlan 1990, Mazzotti and Brandt 1994).

A habitat suitability index developed for the American alligator (Shinde et al. 2014), and used for RECOVER, can predict the potential effects of Alternative C240 and the ECB (**Figure 4-41**). The habitat suitability index measures habitat suitability annually for five components of alligator production: 1) land cover suitability, 2) breeding potential (female growth and survival from April 16 of the previous year to April 15 of the current year), 3) courtship and mating (April 16 to May 31), 4) nest building (June 15 to July 15), and 5) egg incubation (nest flooding from July 1 to September 15) (South Florida Natural Resources Conservation Center 2013). The results show that alligator habitats are limited to the relatively wet areas of central and southern WCA-3A, WCA-3B, NESRS, and coastal areas of ENP under the ECB

(**Figure 4-41a**), while the habitat suitability scores notably increase in northern WCA-3A and NESRS under Alternative C240 (**Figure 4-41b**).

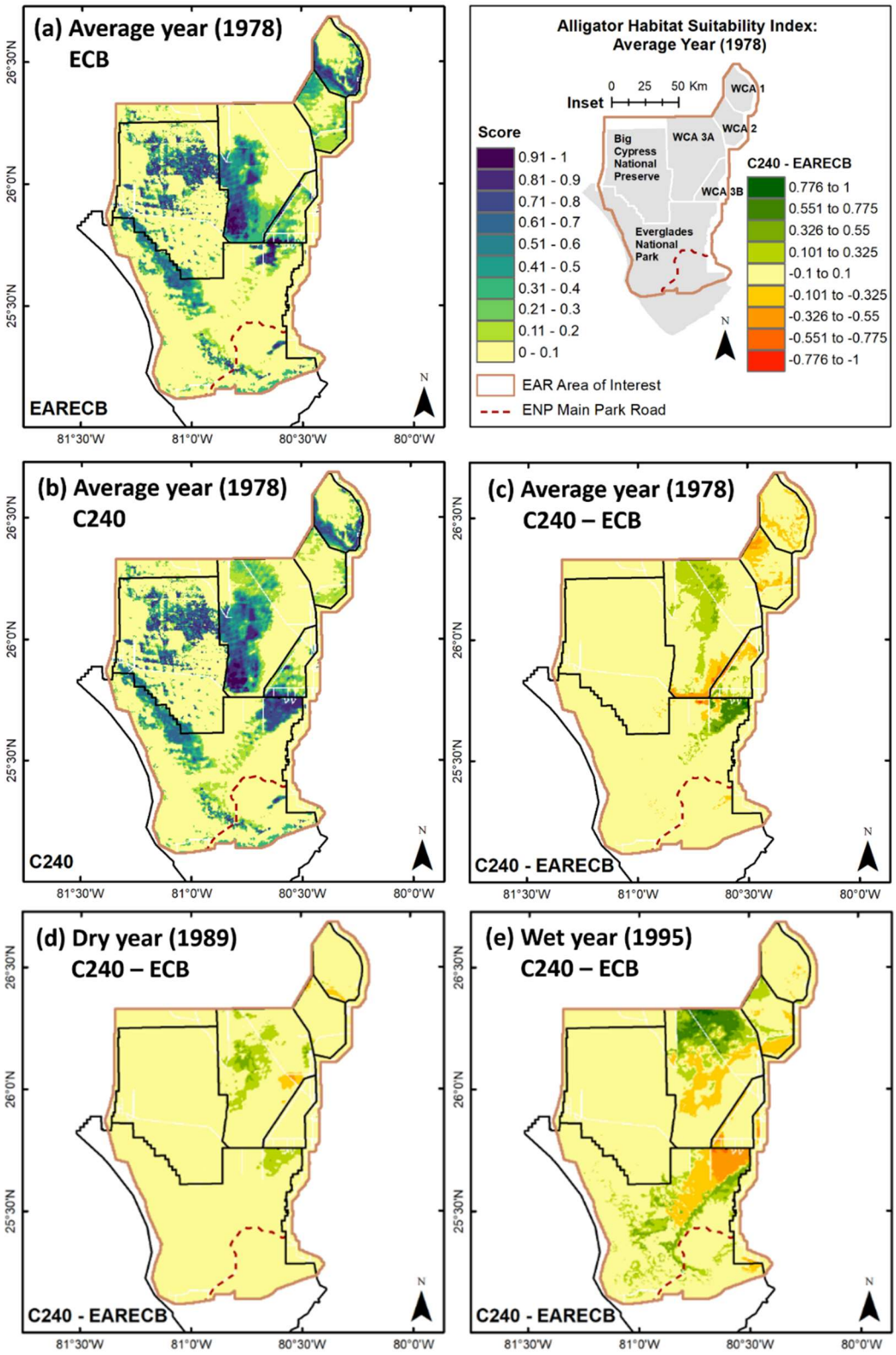


Figure 4-41. Habitat suitability index score for (a) the existing condition baseline and (b) Alternative C240, and (c) habitat suitability index differences between Alternative C240 and the existing conditions baseline for an average rainfall year. Only differences in the habitat suitability index between the models are presented for (d) a dry year and (e) a wet year.

Comparison between the models shows the lift (Alternative C240 minus ECB > 0) of an index of alligator growth and survival at sites in northern and central WCA-3A and NESRS during an average rainfall year (**Figure 4-41c**). The average of percent differences in the habitat suitability index for the entire model domain increases approximately 6%, 18%, and 7% during an average rainfall (1978), a dry (1989), and a wet (1995) year, respectively (**Figure 4-41c**,**d**,**e**), providing a moderate benefit during dry conditions. This habitat suitability index captures spatial shifts. It increases in 197,407 acres (308 square miles) but also decreases in 138,616 acres (217 square miles) during an average rainfall year (1978), resulting in a net increase of habitat suitability in 58,791 acres (91 square miles). For all years in the model simulation period (1966 to 2005), Alternative C240 increased habitat suitability by 20% compared to the ECB, indicating an overall benefit to alligator production.

The decline of habitat suitability for an average rainfall year with Alternative C240 occurs in portions of northern WCA-3B and southeastern WCA-3A against the L-67A and L-29 levees (**Figure 4-41c**) due to decreases in ponding depth and hydroperiod. The reduced inflows from WCA-3A (**Figure 4-12**) decrease ponding depths and hydroperiods in northern WCA-3B (**Figure 4-13**). Enhanced continuous sheetflow from WCA-3A through WCA-3B as a result of Blue Shanty Flow-way operation also shortens hydroperiods in southeastern WCA-3A (**Figure 4-2**). For a wet hydrologic year (e.g., 1995), large areas of central WCA-3A and SRS become too wet for alligator breeding and nesting, reducing alligator habitat suitability for Alternative C240 compared to the ECB (**Figure 4-41e**). However, American alligators are mobile and will move in response to unfavorable high-water conditions from flooded habitats to open-water/slough and wet prairies due to the enhanced hydrologic connectivity. Therefore, hydroperiod improvements within WCA-3A and ENP are expected to have a very valuable and long-term benefit on the spatial extent and quality of suitable habitat for the American alligator.

4.3.4 Wading Birds (White Ibis, Wood Stork, and Great Egret)

Historically, the short hydroperiod wetlands within ENP have been important for wading bird foraging during the early breeding season, with birds shifting to longer hydroperiod wetlands as the dry season progresses. Hydrologic patterns that produce a maximum number of patches with high prey availability (i.e., high water levels at the end of the wet season and low water levels at the end of the dry season) are necessary for high reproductive outputs for wood storks and other wading birds (Gawlik 2002, Gawlik et al. 2004, Boyle et al. 2014). Therefore, restoration of sheetflow and historical hydropatterns would provide long-term improvement to wetland habitats (elevation and microtopography) that would support prey densities conducive to successful wading bird foraging and nesting.

The Wader Distribution Evaluation Model (Beerens et al. 2015), a tool to predict how white ibis (*Eudocimus albus*), wood stork (*Mycteria americana*), and great egret (*Ardea alba*) distributions respond to prey resources linked to hydrologic variables, was used to evaluate and predict changes to wading bird foraging habitat in the Central Everglades. The model determines spatially explicit changes in foraging conditions for wading birds relative to baseline scenarios from bird and hydrologic data collected during surveys between 2000 and 2009. Using a multi-model approach, a wading bird foraging index was produced from a spatial foraging conditions (SFC) model and a temporal foraging conditions (TFC) model. The SFC model predicts wading bird patch abundance over time at a fixed spatial scale (400 meters), while the TFC model predicts daily abundance across space (patch quality). The resulting indices represent proxies for different components of patch dynamics: patch abundance (i.e., the spatial area of suitable foraging patch) is reflected by the SFC model, and patch quality (i.e., temporally in terms of how many birds use a patch) within suitable foraging depths (e.g., white ibis: -4.9 to +32 centimeters, wood stork: -8.7 to +45 centimeters, great egret: -1.7 to +41 centimeters) is reflected by the TFC model. The product of these two indices (i.e., SFC × TFC) is a foraging index to account for both processes.

The results show that areas with a high abundance of foraging patches are limited to the relatively wet areas in central and southern WCA-3A, WCA-3B, SRS, and coastal ENP under the ECB for both the white ibis (**Figure 4-42a**) and wood stork (**Figure 4-43a**). In contrast, the abundance of foraging patches is lower in areas with conditions that are too dry (northern WCA-3A and the eastern boundary of the ENP for both the white ibis and wood stork) or too wet (eastern WCA-3A along the L-67A Canal for the wood stork). The perpetually drier areas make tree islands, which are used by large numbers of wading birds for nesting, extremely vulnerable to fires and nesting predation. For example, the Alley North colony in northeastern WCA-3A (proximate to indicator region 118; **Figure 4-29**) is one of the largest nesting aggregations of wading birds in North America, capable of supporting more than 50,000 nests when hydrologic conditions are appropriate. However, under the ECB, the area is prone to drying early in the nesting season, which can reduce the colony's attractiveness to nesting birds, allow mammalian predators (i.e., raccoons) access to the colony, and cause large-scale nest abandonment. Relatively wet conditions are good for wading bird foraging and nesting because they would restore spatial extent of ridges and sloughs and could improve the health of tree islands in the ridge and slough landscape. However, increasing flooding also may create more frequent water level reversals during critical wading bird foraging periods, causing declines in nesting success for wading birds.

Implementation of Alternative C240 would provide long-term, improved foraging conditions for wading birds in northern WCA-3A, southeastern WCA-3B, and northeastern ENP, particularly in NESRS (**Figures 4-42c** and **4-43c**), due to improved hydrology, prey abundance, and changes to vegetation structure. Under Alternative C240, an abundance of white ibis foraging patches (i.e., SFC) in March and April from 1975 to 2005 increases in approximately 264,000 acres (413 square miles) of northern WCA-3A and NESRS but decreases in 70,000 acres (109 square miles) of eastern WCA-3A against the L-67A levee compared to the ECB (**Figure 4-42c**). The abundance of wood stork foraging patches for the same period increases in approximately 297,000 acres (464 square miles) of northern WCA-3A, NESRS, and southeastern WCA3B but decreases in 135,000 acres (211 square miles) of southeastern WCA-3A (**Figure 4-43c**). Increased use of southeastern WCA-3B by wood storks and the eastern marl prairies by both white ibis and wood storks appears to be associated with increased hydroperiods (**Figures 4-38** and **4-19**). However, the predicted declines in eastern WCA-3A against the L-67A levee do not make intuitive sense given what is known of wading bird foraging ecology. Specifically, the predicted decline in hydroperiods in the ponded areas of eastern WCA-3A under Alternative C240 (**Figure 4-9**) would be expected to improve foraging patches for wading birds, yet the model forecasts a 10% to 32% decrease in foraging patch abundance. This might be because the hydrologic conditions and wading bird distributions that were used to create the model (from 2000 to 2009 surveys) did not include some of the unique conditions expected with restoration, such as areas with relatively long hydroperiods (greater prey production) that also have relatively shallow depths (increased prey availability). Between 2000 and 2009, these two conditions did not exist together; thus, the benefits of such conditions to foraging birds might not be recognized in the current model output.

Over the entire simulation period (1975 to 2005), implementation of Alternative C240 increased the quality of white ibis foraging patches (TFC) by 3.5% but decreased wood stork foraging indices (SFC × TFC) by 2.1% compared to the ECB. The quality of great egret foraging patches (TFC) decreased 1.1% for Alternative C240 compared to the ECB. These results suggest implementation of Alternative C240 will have a negligible effect on foraging patch quality throughout much of the Central Everglades.

A key CERP goal is to re-establish historical wading bird foraging and colonial nesting habitats in the mainland estuary zones of ENP. An evaluation of hydropatterns during the 2018 nesting season suggests that dry marl prairies during the previous dry season preceding extended flooding during the early dry season resulted in early nesting, extended periods of optimal foraging conditions, and formation of large colonies in coastal areas (Cook and Baranski 2019). While redirected and enhanced inflows to NESRS from the Blue Shanty Flow-way would help improve habitat suitability for CSSS in the western marl prairie, the

same change in timing and magnitude of inundation and recession likely would further limit prey availability for wading birds in this critical area (**Figure 4-40c**). An expected outcome of Alternative C240 is to slightly decrease hydroperiods and provide a slightly negative effect on wading birds in the western prairies (**Figures 4-42c** and **4-43c**). As such, Alternative C240 alone will not provide the hydrologic and foraging conditions needed to recover historical coastal populations of wading birds.

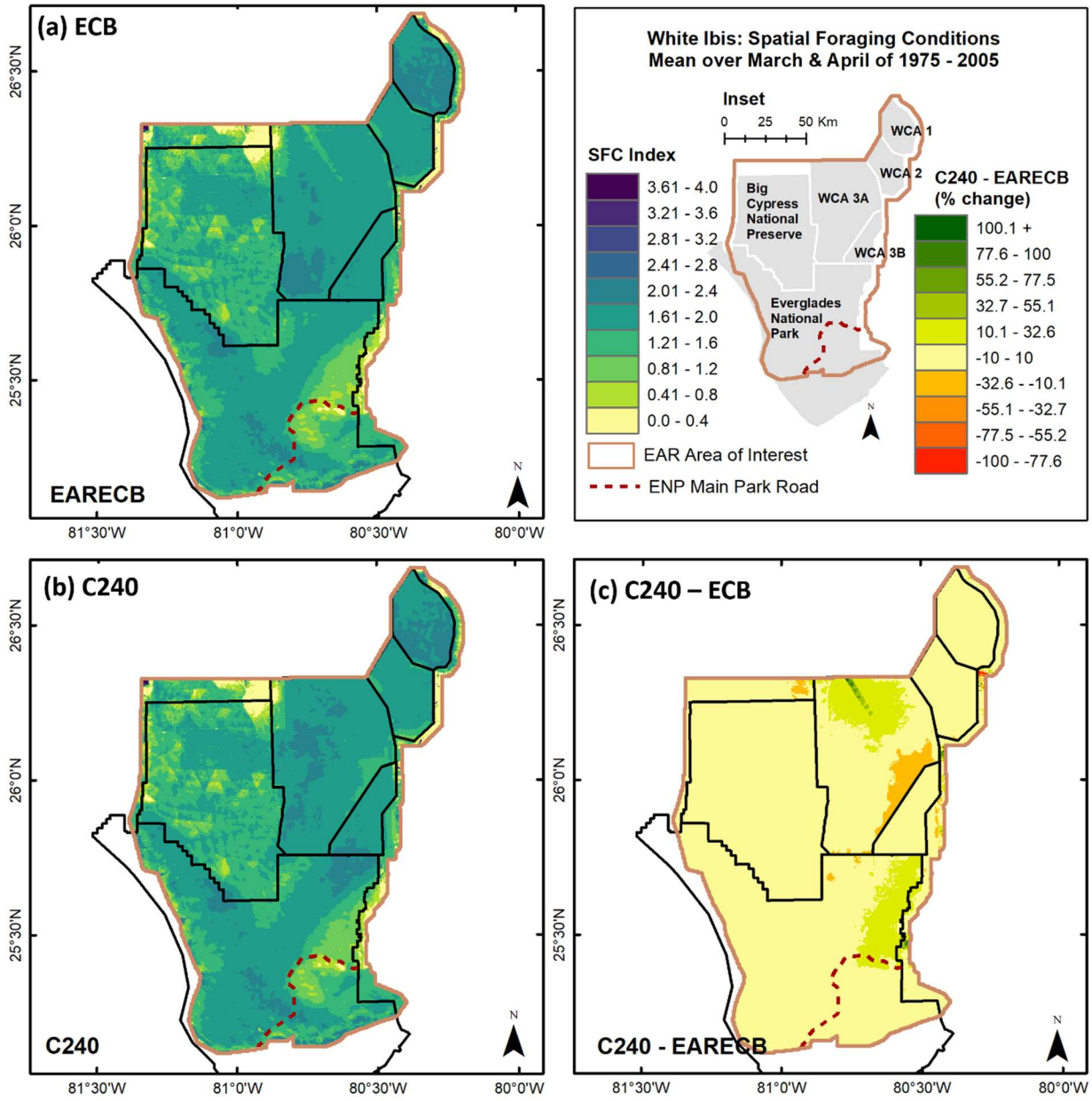


Figure 4-42. White ibis spatial foraging conditions is presented for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences in spatial foraging conditions indices between Alternative C240 and the existing conditions baseline in March and April from 1975 to 2005.

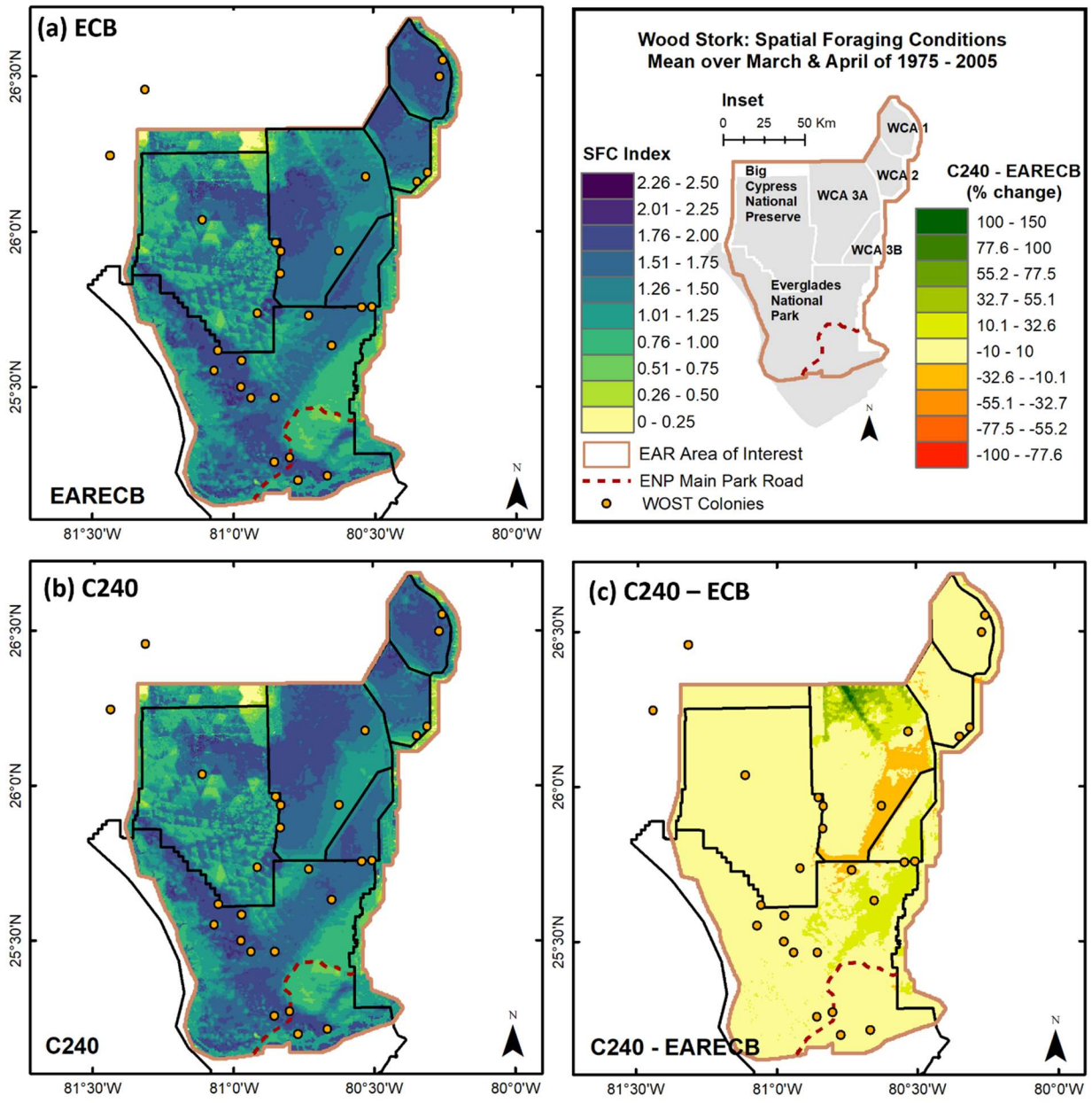


Figure 4-43. Wood stork spatial foraging conditions for (a) the existing condition baseline and (b) Alternative C240, and (c) percent differences in spatial foraging conditions indices between Alternative C240 and the existing conditions baseline in March and April from 1975 to 2005.

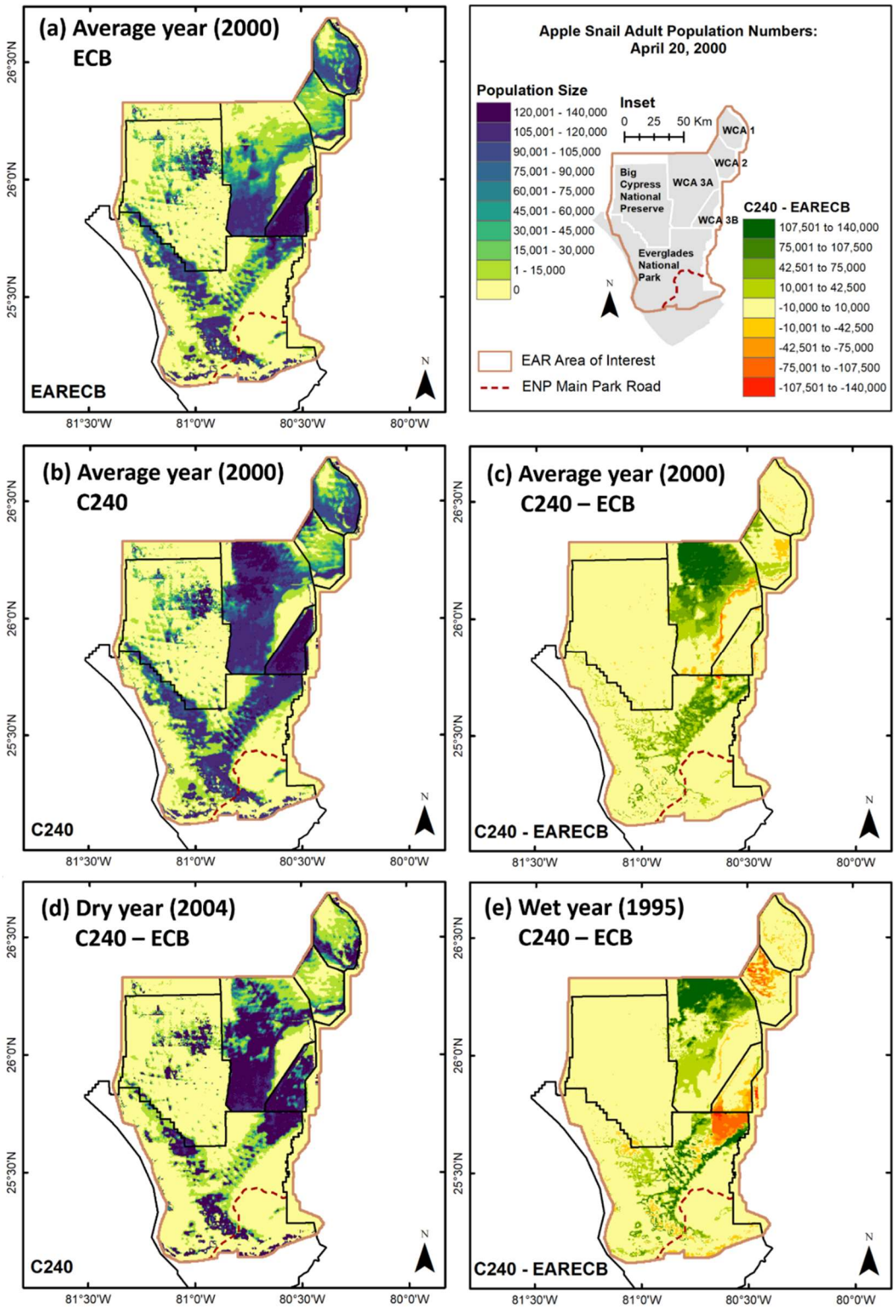
4.3.5 Apple Snail

The snail kite (*Rostrhamus sociabilis*) has a highly specialized diet composed almost entirely of apple snails (*Pomacea paludosa*), which are found in palustrine, emergent, long-hydroperiod wetlands. As a result, the snail kite's survival directly depends on the hydrology and water quality of its habitat (United States Fish and Wildlife Service 1999). Suitable foraging habitat for the snail kite typically is a combination of low-profile marsh and shallow open water clear enough to search for apple snails. Areas of sparse emergent vegetation enable apple snails to climb near the surface to feed, breathe, and lay eggs, while also making them easily seen from the air by foraging snail kites.

The purpose of the apple snail population model, EverSnail, is to describe the dynamics of the apple snail population as a function of hydrology and temperature (Darby et al. 2015). The abundance and size distribution of snails are simulated and can be calculated for any day with input data. Adult snail population size during a given year is a product of egg production, and thus environmental conditions, from the previous year. The model was developed using the Everglades Depth Estimation Network, and outputs begin in 1992. Results are shown for adult snails (larger than 20 millimeters) in 160,000-m^2 cells (400-m × 400-m model grid) during the spring (April 20), before that year's reproductive period (**Figure 4-44**). End of spring results are shown because that is the population of snails of the size class consumed by the endangered snail kite.

The results show that areas with high apple snail densities (0.56 to 0.87 snails per square meter) are limited to relatively wet areas in central and southern WCA-3A, WCA-3B, NESRS, and coastal ENP under the ECB (**Figure 4-44a**). In contrast, apple snails are virtually absent (fewer than 0.09 snails per square meter) in areas with conditions that are too dry (northern WCA-3A and marl prairies in ENP) or too deep (eastern WCA-3A along the L-67A Canal), as approximately 0.2 snails per square meter are necessary to support snail kite foraging (Darby et al. 2012). Estimates of apple snail densities can be linked to a local abundance of snail kite nests within a 2-kilometer radius from the sampling site (Cattau et al. 2014), and according to modeling, the relative wet areas can support approximately 9 to 12 snail kite nests.

Rehydration and vegetation shifts within northwestern WCA-3A and marl prairies in ENP, combined with decreases in the frequency and duration of extremely low water stages in these areas, are expected to increase the abundance of adult apple snails under Alternative C240 compared to the ECB (**Figure 4-44c**). Comparison between the models shows the lift (Alternative C240 minus ECB > 0) of apple snail densities at sites in northern and central WCA-3A, SRS, and coastal areas during an average rainfall year (**Figure 4-44c**). The models indicate that as apple snail densities increase by 0.69 to 0.78 snails per square meter, the probability of local abundance of snail kite nests increases by a factor of approximately 2.5 (Cattau et al. 2014). In contrast, a decline of apple snail densities in the deeper- water edges within eastern WCA-3A appears to be caused by increases in average ponding depth by approximately 0.2 ft (**Figures 4-9** and **4-10**). The average of the percent differences in adult apple snail population numbers for the entire model domain increases approximately 47%, 61%, and 19% during an average rainfall (2000), a dry (2004), and a wet (1995) year, respectively (**Figure 4-44c**,**d**,**e**), providing a moderate benefit during dry conditions. On average, ~~the number of acres where~~ adult apple snail population numbers are predicted to increase under Alternative C240 compared to the ECB ~~includes~~in approximately 471,000 acres (735 square miles) but decrease in 153,000- acres (239 square miles) during dry and wet years, resulting in a net increase of adult apple snail population numbers in 318,000 acres (496 square miles) of the Central Everglades. For all years of the model simulation period (1995 to 2005), implementation of Alternative C240 increased apple snail population numbers by 41% compared to the ECB, thereby increasing the spatial extent of suitable foraging opportunities and enhanced prey density for snail kites.


(a) Average year (2000)
ECB
EARECB
Apple Snail Adult Population Numbers:
April 20, 2000
Population Size
120,001 - 140,000
105,001 - 120,000
90,001 - 105,000
75,001 - 90,000
60,001 - 75,000
45,001 - 60,000
30,001 - 45,000
15,001 - 30,000
1 - 15,000
0
Inset
0 25 50 Km
WCA 1
WCA 2
WCA 3A
WCA 3B
Big Cypress National Preserve
Everglades National Park
C240 - EARECB
107,501 to 140,000
75,001 to 107,500
42,501 to 75,000
10,001 to 42,500
-10,000 to 10,000
-10,001 to -42,500
-42,501 to -75,000
-75,001 to -107,500
-107,501 to -140,000
EAR Area of Interest
ENP Main Park Road
(b) Average year (2000)
C240
C240
(c) Average year (2000)
C240 – ECB
C240 - EARECB
(d) Dry year (2004)
C240 – ECB
C240
(e) Wet year (1995)
C240 – ECB
C240 - EARECB
26°30'N
26°0'N
25°30'N
81°30'W
81°0'W
80°30'W
80°0'W
N

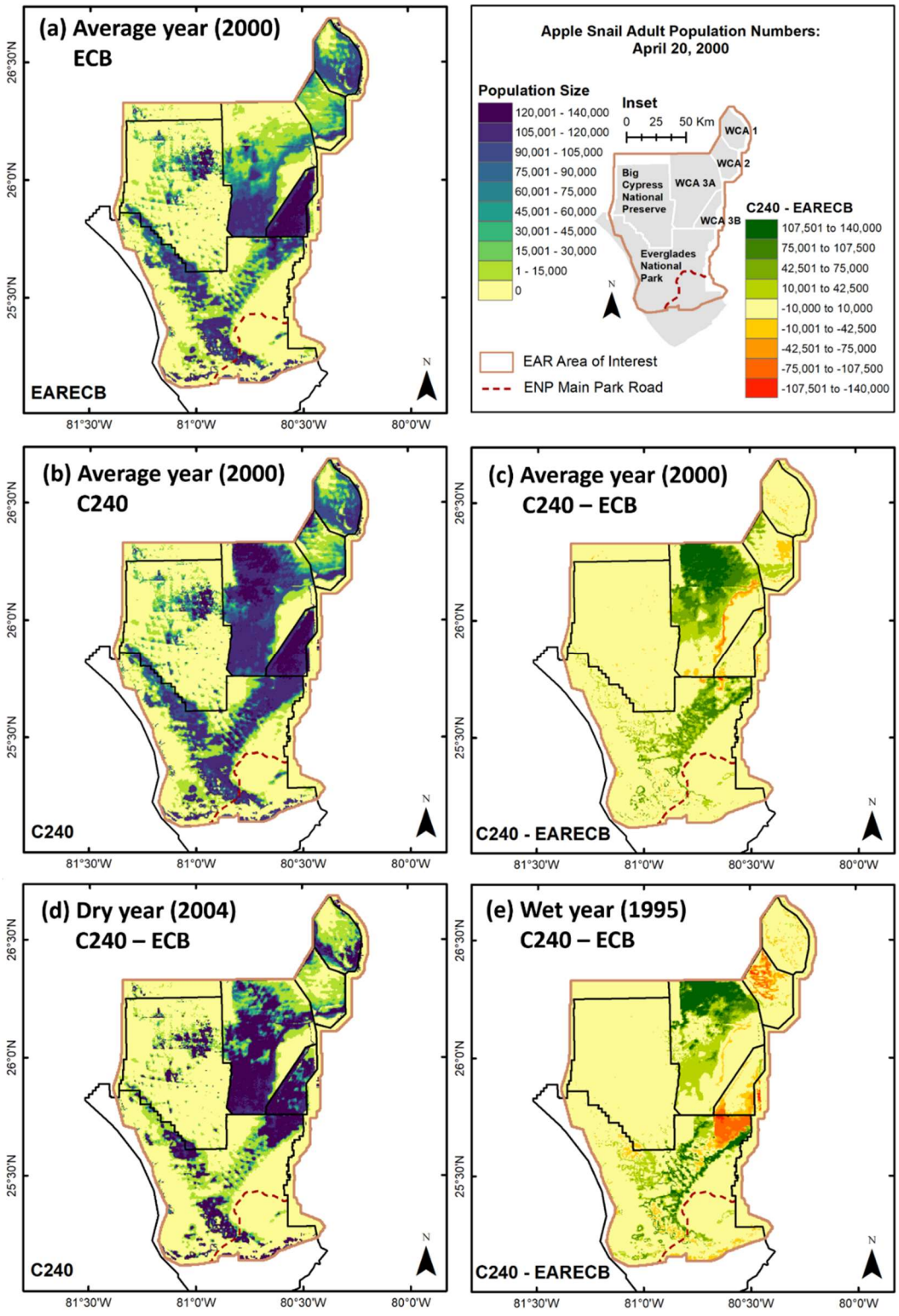


Figure 4-44. Apple snail adult population density for (a) the existing condition baseline and (b) Alternative C240, and (c) density differences between Alternative C240 and the existing conditions baseline on April 20 of an average rainfall year. Only differences in the densities between the models are presented for (d) a dry year and (e) a wet year.

4.3.6. Cape Sable Seaside Sparrow

Presently, the known distribution of the CSSS is restricted to two areas of marl prairies east and west of SRS within ENP and Big Cypress National Preserve and the edge of Taylor Slough in the Southern Glades Wildlife and Environmental Area in Miami-Dade County. CSSS surveys resulted in a range map that divided the CSSS into six separate subpopulations (A through F; **Figure 4-45a**), with Subpopulation A as the only subpopulation west of SRS (Curnutt et al. 1998).

The CSSS builds nests low to the ground, 14 to 17 centimeters above the substrate. Male CSSS call for mates and set up territories when water levels drop below ground surface. Breeding behavior can be interrupted when water levels rise above ground surface. Therefore, it is important to maintain water levels below ground surface for at least 60 days during the CSSS nesting season (March 1 to July 15). The CSSS marl prairie model is a temporally and spatially explicit ecological planning tool that simulates hydrologic suitability of marl prairie habitats based on CSSS survey presence data threshold ranges (Pearlstine et al. 2016). The CSSS marl prairie model evaluates hydrologic suitability with four metrics: 1) average wet season (June to October) water depths, 2) dry season (November to May) water depths, 3) discontinuous annual hydroperiod (May to April of the following year), and 4) maximum continuous dry days during the nesting season (March 1 to July 15). Output is provided as a percent-to-target met by the hydrologic scenario.

When comparing Alternative C240 with the ECB, there are negligible changes (±10 differences in habitat suitability index) within 68% of critical CSSS habitat areas. Improvements to marl prairie hydrologic suitability are found within Subpopulations A, northern AX, B, C, and F, where habitat suitability scores increase in 17,969 acres (28 square miles) (**Figure 4-45c**). Enhanced inflows into SRS will alleviate some of the problems associated with extremely dry conditions in the eastern boundary of the Everglades (e.g., drought, fire, invasion of woody plants) and promote a shift in vegetation communities to marl prairies by increasing hydroperiods (**Figure 4-19**). In contrast, the lift in northern Subpopulations A and AX within the western counterparts is caused by decreases in hydroperiod under Alternative C240 compared to the ECB (**Figures 4-21** and **4-22**), which would reduce the potential for water level reversals drowning CSSS nests. Enhanced inflows into SRS also would reduce the extent of shallow-water edges in areas adjacent to SRS. Moderate declines in hydrologic suitability would occur along the shallow regions of southern Subpopulations AX and E that abut SRS, where habitat suitability scores decrease in 37,695 acres (58 square miles) under Alternative C240 compared to the ECB (**Figure 4-45c**).

The increased distances between Subpopulation A and other eastern subpopulations might be a problem given the limited dispersal capacity of the CSSS (Van Houtan et al. 2010). Some loss in habitat quality will occur west of Subpopulations E and F, which will increase the isolation of Subpopulation A. This effect likely is negligible, however, because there already appears to be little migration between the eastern and western marl prairies. Therefore, the overall negative impact on marl prairie hydrologic suitability from Alternative C240 relative to the ECB of the combined spatial regions within designated CSSS subpopulations appears relatively minor (19,726 acres [30 square miles]). Hydrologic suitability for marl prairie and the CSSS also ~~expands~~increases along the expanded hydrologic fronts to the east in the eastern prairies and to the north in the western prairies. Therefore, habitat improvements in adjoining areas will result in overall positive effects on CSSS habitat suitability.

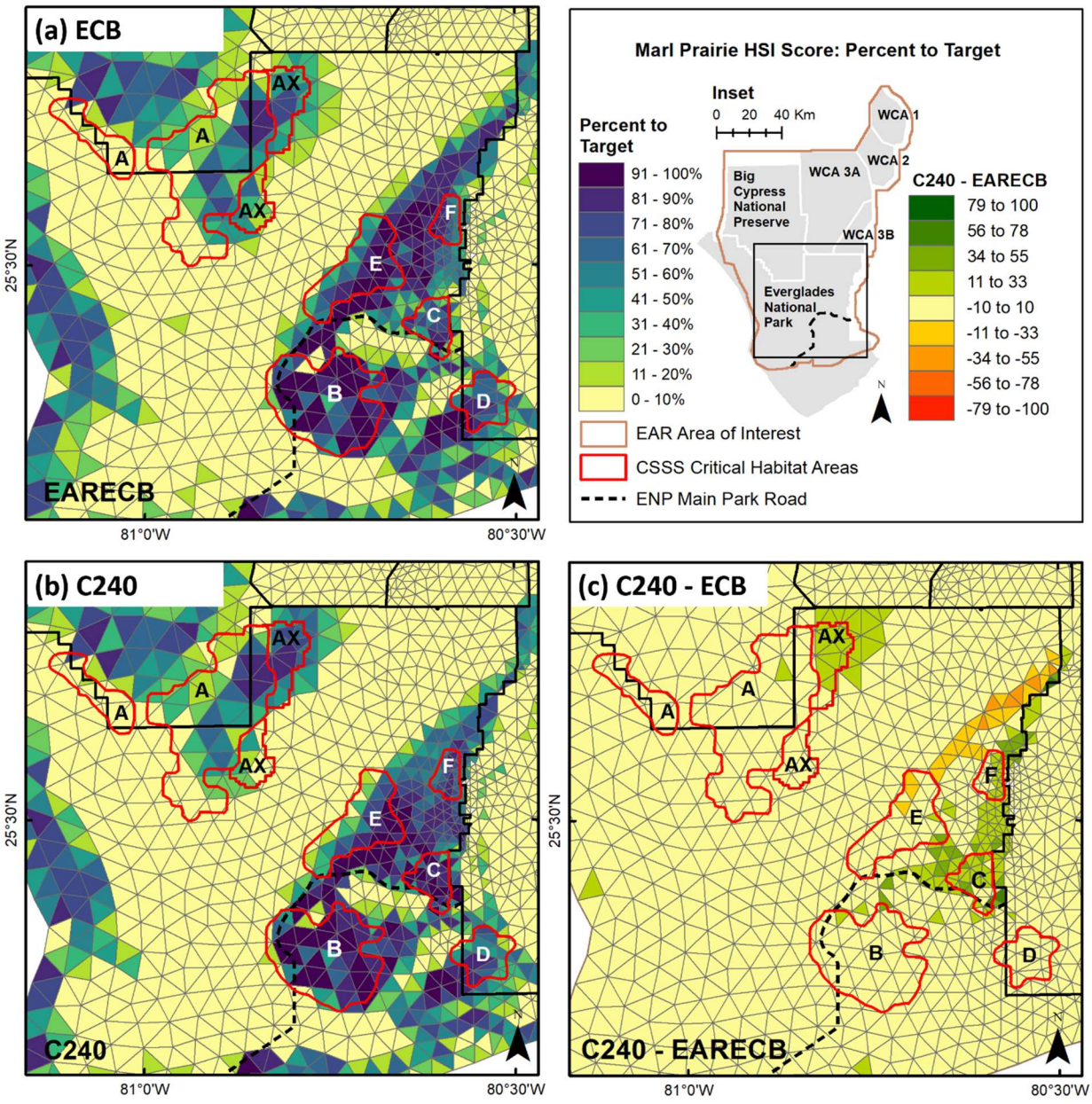


Figure 4-45. Marl prairie habitats and locations of the Cape Sable seaside sparrow subpopulations (A, AX, B, C, D, E, and F). The habitat suitability index score, expressed as percent to target, is presented for (a) the existing conditions baseline, (b) Alternative C240, and (c) the differences in percent to target between the existing conditions baseline and Alternative C240.

4.3.7 Ecological Summary

Additional water flowing into northern WCA-3A from the EAA Reservoir would help restore aquatic habitat for fish and wildlife, while improving natural processes critical for ~~the development of~~developing peat soils and tree islands. Improved overland flows into northern ENP and related patterns of increased water depths and shorter drydowns would help restore a historically deepwater habitat such as SRS. Expansion of wet prairies along the eastern boundary of ENP would reduce the potential for high-intensity fires and exotic tree invasion, while promoting hydrologic and ecological connectivity. Thus, due to changes in quantity, distribution, and timing of water entering the Central Everglades, long-term improvements to wetland hydrology and desirable vegetation shifts would improve essential habitat for Everglades fish and wildlife populations.

Depending on elevation and microtopography, enhanced sheetflow would produce a variety of wetland habitats capable of supporting prey densities conducive to successful foraging and nesting of large predators. Aquatic invertebrates, such as apple snails and crayfish, would rapidly colonize newly rehydrated areas under Alternative C240, providing minor to moderate beneficial effects within northern WCA-3A and NESRS. Similarly, moderate percentage gains in fish density are expected to occur within northern WCA-3A and NESRS due to rehydration. Other areas within and adjacent to SRS also are expected to experience appreciable gains in apple snail and fish density due to extended hydroperiods. Increases in stages and hydroperiods in rehydrated areas would facilitate transition from upland to wetland vegetation through contraction of sawgrass marshes and expansion of wet prairies and, in deeper regions, to sloughs. Submerged aquatic plants are associated with sloughs and provide structure for growth of periphyton, a primary energy source of invertebrates and small fishes.

The CEPP PIR and PACR ~~also includes~~include an Adaptive Management Plan (Annex D of the PACR [SFWMD 2018a]) that provides the strategies to address prioritized project uncertainties that will be faced as the project progresses toward achieving restoration goals and objectives while remaining within constraints. The ~~CEPP~~ Adaptive Management ~~(AM)~~ Plan ~~(Annex D of the PACR [SFWMD 2018])~~ includes a broad, ~~system-wide~~systemwide monitoring program. Site-specific monitoring programs in WCA-3A and SRS, relevant to EAA Reservoir operation, include fish density, wading bird nesting success, alligator health, snail kite distributions, soil oxidation risk, tree island inundation, periphyton nutrient content, hydroperiods, and ponding depths. The Adaptive Management Plan is designed to regularly evaluate the hydrologic influences of water deliveries downstream on these keystone features within the WCAs and ENP. If changes in the downstream ecology are found to be inconsistent with CERP restoration goals, then a CEPP Adaptive Management Science Team and a Water Management Engineering Team will convene possible operational solutions; solutions that may require design refinements for the delivery of clean water to northern WCA-3A and a system-level analysis of EAA Reservoir operations, FEB management, STA status, and climatic disturbances.

The EAA Reservoir will provide long-term beneficial effects to wetland vegetation communities and perform well overall for higher trophic level species. Extended hydroperiods are good for foraging and nesting of wading birds and alligators because they would restore the spatial extent of ridges and sloughs, increasing the abundance of suitable habitat. In addition, an increase in density of important prey populations will directly benefit wading birds and alligators. Negative responses in foraging ~~condition~~index (wading birds) and habitat suitability (alligators) were found in southeastern WCA-3A because of shortened hydroperiods. However, the negative impact on foraging and habitat conditions from Alternative C240 relative to the ECB of the combined spatial regions appears relatively small compared to overall net benefits, particularly in northern WCA-3A and SRS. Improved water depth and sheetflow distribution also will enhance habitat connectivity of highly mobile species that can avoid unfavorable conditions. Therefore, hydroperiod improvements in over-drained portions of WCA-3A, ENP, and adjoining shallow-water areas

are expected to provide long-term benefits to the spatial extent of suitable foraging and nesting habitat for higher trophic level species.

5 IDENTIFICATION OF WATER TO BE RESERVED

5.1 Water Made Available by the Project

A component of establishing a water reservation pursuant to Section 373.223(4), F.S., is the identification of locations and seasonal quantities of water, which in the judgment of the applicable water management district Governing Board, may be required for the protection of fish and wildlife or public health and safety. Rules that withhold such waters from allocation are drafted when there is a reasonable expectation that demands for waters from the identified source(s) will occur at a time of year and in an amount, singularly or cumulatively, to reduce the availability of water needed for the protection of fish and wildlife. This section identifies the water associated with the EAA Reservoir project that is ~~needed~~necessary for the protection of fish and wildlife.

The CEPP EAA Reservoir Water Reservation will prospectively reserve from allocation all surface water ~~released~~ discharged from the EAA Reservoir through the S-624, S-625, and S-626 structures ~~from the EAA Reservoir that is~~and directed to the Lower East Coast Everglades waterbodies for the protection of fish and wildlife. State regulatory rules allow water reservations to be adopted prospectively for water anticipated to be made available from a project to be constructed in the future. The water to be reserved prospectively for the EAA Reservoir is consistent with the fish and wildlife benefits outlined in **Chapter 4**, the PIR (USACE and SFWMD 2014), the PACR (SFWMD 2018a), and the USACE (2020) Final Environmental Impact Statement. Protection of project waters under state regulatory authority is a prerequisite of a Project Partnership Agreement~~, which is needed for authorization and appropriation of a CERP project component.~~ between the SFWMD and USACE to jointly construct the CEPP EAA Reservoir.

This prospective water reservation rule is based on the fully constructed and operational project, as described in the PACR and its Draft Project Operation Manual. Section 373.223(4), F.S., states that water reservations shall be subject to periodic review and revision in ~~the~~ light of changed conditions. The ~~District~~SFWMD can review and revise the reservation rule to address changed conditions and new data. The water reservation rule will become effective 20 days after it is filed with the Department of State. The reservation and criteria in Section 3.11.6 of the *Applicant's Handbook for Water Use Permit Applications in the South Florida Water Management District* (SFWMD 2015), incorporated by reference in Rule 40E-2.091, Florida Administrative Code, will be revised before the EAA Reservoir is deemed operational, including an approved system or project operating manual, and any difference between the quantity of water actually made available and the quantity simulated will be reconciled. Surface water from the EAA Reservoir will not be made available for the Central Everglades until the reservoir is fully constructed and certified as operational by the ~~District's~~SFWMD Governing Board. Reserved water will ~~then~~ be conveyed to the Lower East Coast Everglades ~~Waterbody~~waterbodies consistent with the final project operating manual.

5.1.1 Water Stored Within the Reservoir and Conveyed to the Natural System

The major facilities contained in the PACR consist of the EAA Reservoir and A-2 STA (**Figure 5-1**). Total reservoir storage capacity is approximately 240,000 ac-ft. The PACR provides an increase of approximately 370,000 ac-ft in average annual flow to the Central Everglades, which exceeds the CERP goal of 300,000 ac-ft. ~~The EAA Reservoir and A-2 STA will be located north of the Holey Land Wildlife Management Area and west of the A-1 FEB. The EAA Reservoir has a project footprint of approximately 10,500 acres and the A-2 STA will cover 6,500 acres to the west, abutting the Miami Canal. Average ground elevation is approximately 10.0 ft NGVD29, and the maximum operational depth for the reservoir is 22.6 ft.~~ The purpose of the EAA Reservoir is to capture EAA runoff and regulatory releases from Lake Okeechobee for delivery to the Central Everglades (WCA-3A, WCA-3B, and ENP), while maintaining the pre-project

capability to provide flood control and water quality treatment for existing EAA basin runoff and a portion of Lake Okeechobee regulatory releases. Water stored in Lake Okeechobee and subject to the lake's regulation schedule will not benefit fish and wildlife until it is stored in the EAA Reservoir and discharged to the natural system through structures S-624, S-625, or S-626. The EAA Reservoir also enhances regional water supplies, which increases the water available to meet environmental needs. During the preconstruction engineering~~,~~ and design phase, the EAA Reservoir components will be assessed in further detail (as described in Appendix A, Section A.10.1.5 of the PACR [SFWMD 2018a]).

~~Additional "new" water~~Water identified by the PACR will not be available for the natural system until the ~~facility~~EAA Reservoir is fully constructed and operational. Operation of the EAA Reservoir will improve the quantity, timing, and distribution of environmental water deliveries to WCA-3A, WCA-3B, and ENP during the wet and dry seasons. Operational changes to deliver this new water would be conducted in a manner consistent with stage, volume, and/or flow-based restoration targets by treating and delivering water from Lake Okeechobee, water detained by PACR components, or a combination of both and by providing temporary storage for releases from Lake Okeechobee to reduce the harmful effects of flood control releases on the Caloosahatchee River and St. Lucie estuaries.

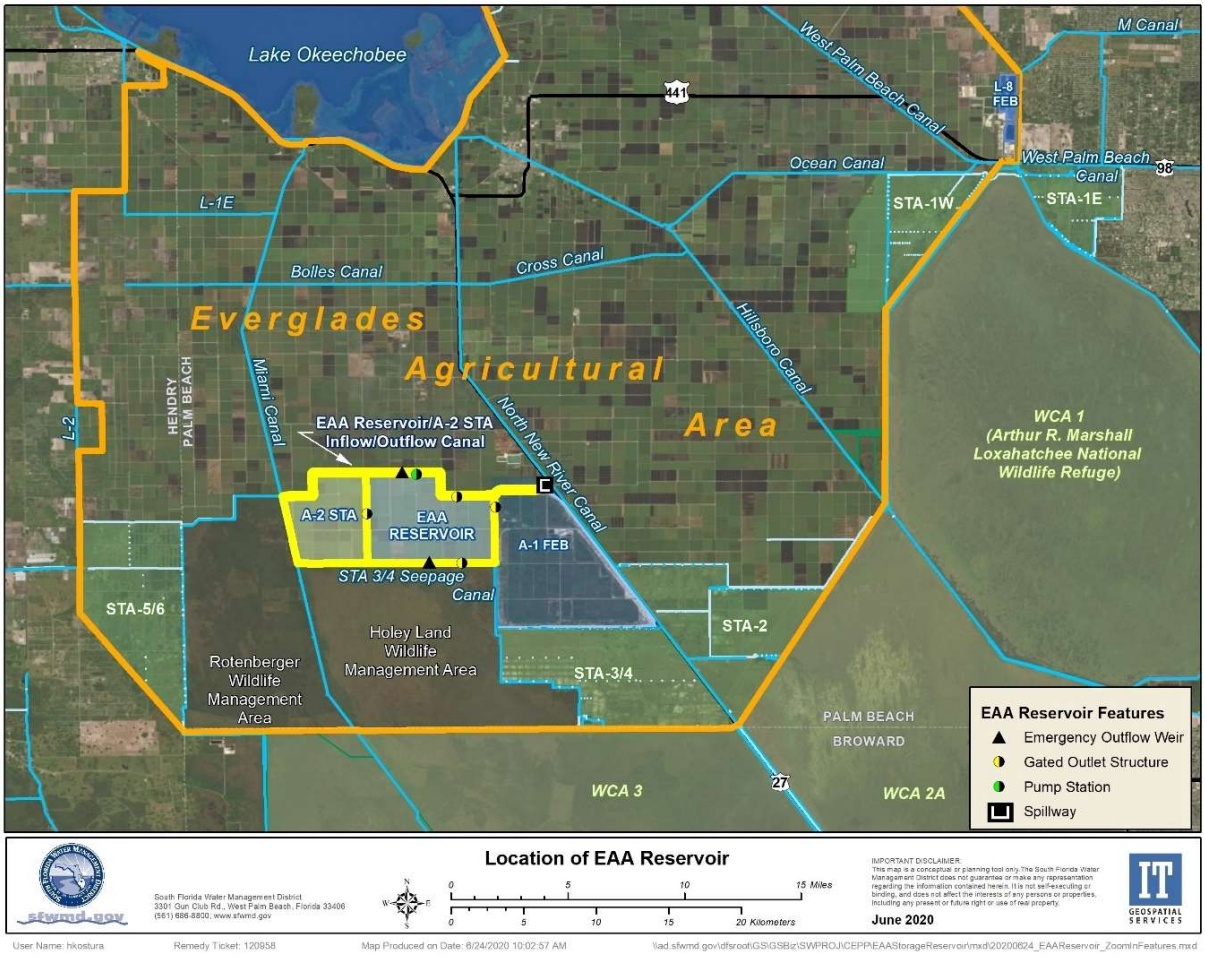
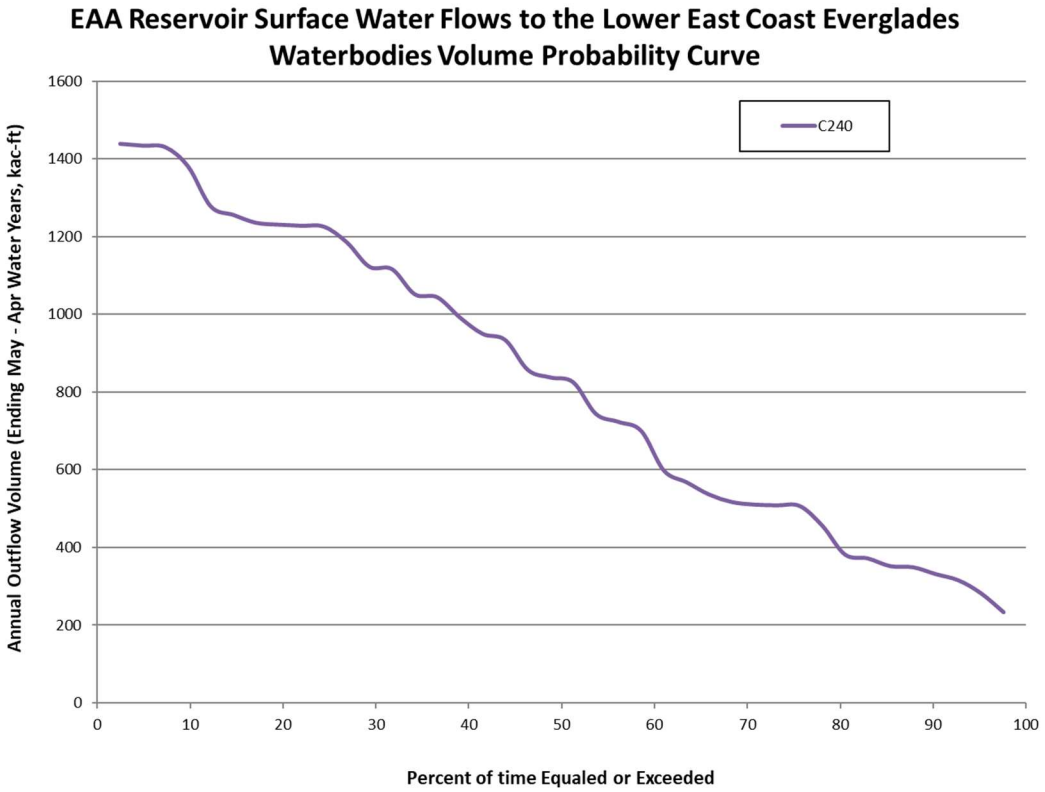


Figure 5-1. Proposed location of the Everglades Agricultural Area Reservoir and A-2 Stormwater Treatment Area as well as existing adjacent facilities.

To identify the quantity, timing, and distribution of water for the natural system, a probabilistic approach was selected during the PIR planning process. This approach used a volume probability curve based on the

period of ~~record~~simulation (1965 to 2005). With the Alternative C240 model simulation, a volume probability curve of the EAA Reservoir (**Figure 5-2**) shows the annual ~~outflow~~water year discharge volumes from the reservoir through the S-624, S-625, and S-626 structures are directed to the EAA A-2 STA, STA-2, STA-3/4, or A-~~-~~1- FEB, then discharged to the Lower East Coast Everglades waterbodies. Specifically, structure S-624 discharges water to the A-1 FEB, structure S-625 discharges water to STA-3/4, and structure S-626 discharges water to the EAA A-2 STA. Model simulations of the draft operating protocol predict the EAA Reservoir, together with existing and planned infrastructure~~, indicate the EAA Reservoir could~~ and a modified Lake Okeechobee schedule, will convey 825,000 ac-ft ~~of surface water, on~~ during an average annual ~~basis, to the~~ water year (May to April), thereby increasing existing ~~STAs, EAA A-2 STA, and A-1 FEB.~~flows on average annually to the Central Everglades by 370,000 ac-ft over the period of simulation (**Figure 5-3**).

~~The EAA Reservoir provides an additional 240,000 ac-ft of effective detention volume to attenuate EAA basin runoff and Lake Okeechobee regulatory releases, rather than sending the water to the WCAs when they are not ready to receive additional water. As a general operational strategy, the EAA Reservoir attenuates flows during the wet season and carry over water into the dry season when releases to the WCAs would be beneficial or cause less harm. The full suite of environmental benefits to downstream fish and wildlife occurs when the EAA Reservoir is filled and emptied multiple times throughout the year. Periodically, water from the EAA Reservoir may be released from the S-628 structure to the EAA via the inflow-outflow canal to the Miami Canal and North New River Canal. This water is not reserved for fish and wildlife.~~



Model simulation data are averaged by water year (May to April) for EAA Reservoir releases toward the Central Everglades (362,000 ac-ft) for consistency with water quality analyses, while the increase in flows to the Central Everglades is averaged by calendar year (370,000 ac-ft). The volume difference between the two methods can be attributed to the truncation of the last year in the period of simulation. Hurricanes Katrina and Wilma made landfall in August and October 2005, respectively, after the end of the water year.

More details about the interaction of the Dynamic Model for Stormwater Treatment Areas, RSM-BN, and RSM-GL to support the PACR and the quantification of water discharged by the EAA Reservoir and reaching the Central Everglades can be found in **Appendix F**.

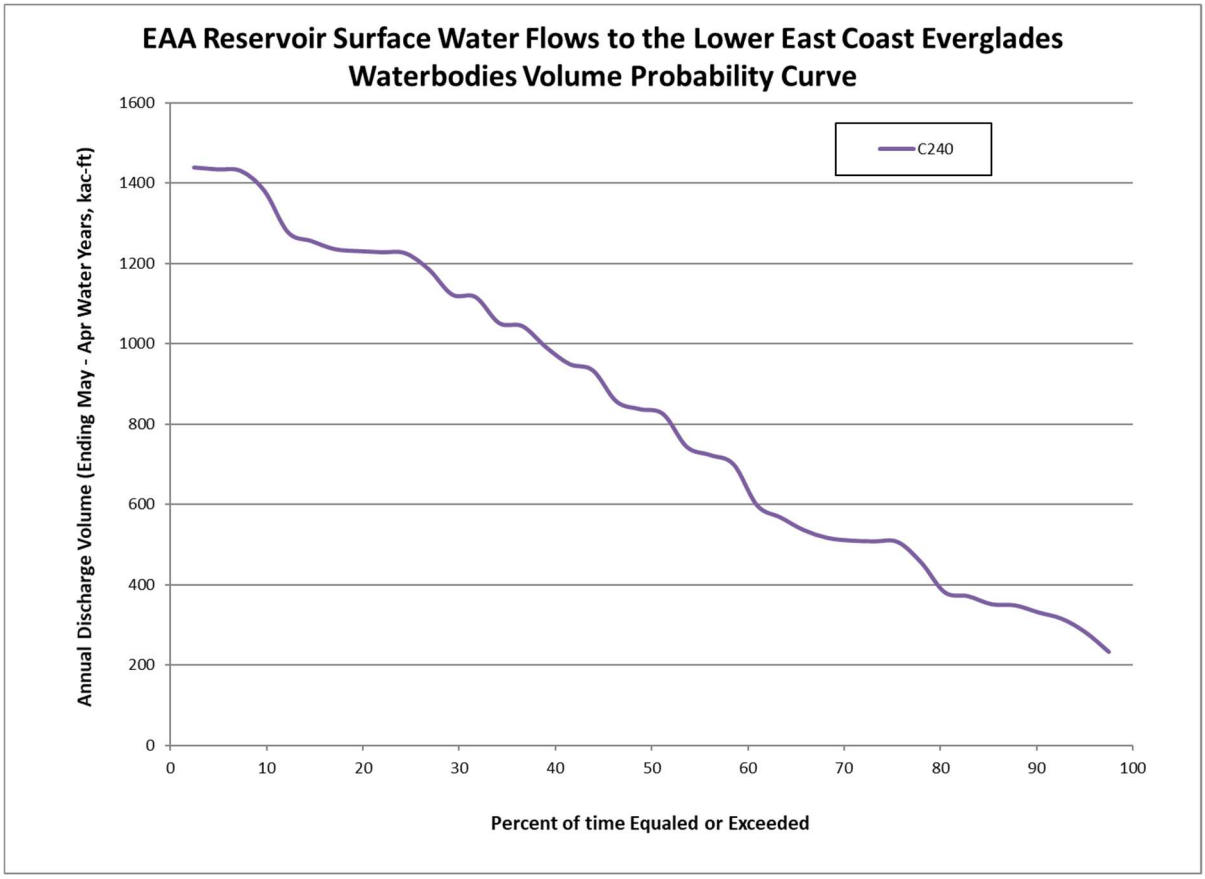


Figure 5-2. Everglades Agricultural Area Reservoir ~~outflow volume probability curve~~ annual surface water discharges through ~~Structures~~structures S-624, S-625, and S-626 volume probability curve (May to April water years) from the Alternative C240 model simulation.

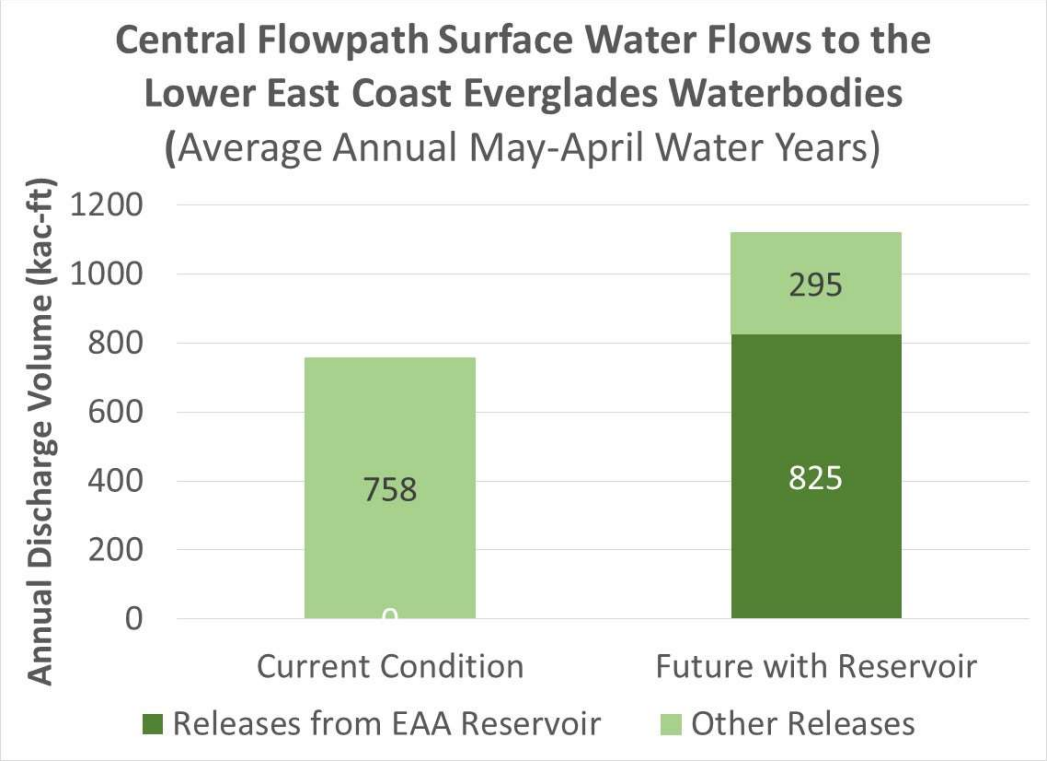


Figure 5-3. Contribution of the Everglades Agricultural Area Reservoir and other sources (basin runoff and Lake Okeechobee releases) to the Central Everglades for the current condition and the future condition with the Reservoir.

The operational strategies are intended to meet the goals, purposes, and benefits outlined in the PACR by improving the quantity, quality, timing, and distribution of water for the natural system while providing for other water-related needs. The modeling evaluations completed in the PACR (SFWMD 2018a) show that the full suite of environmental benefits to downstream fish and wildlife occurs when the EAA Reservoir is filled and emptied multiple times throughout the year. Discharges through the S-628 structure provide more operational flexibility to store water in the reservoir, which ~~enables~~allows for 370,000 ac-~~-~~ft of additional water on average annually ~~beyond~~above the ~~existing condition~~ECB to be delivered to the Central Everglades to maximize benefits for fish and wildlife. These goals, purposes, and benefits will not be fully realized until completion of construction and implementation of the CEPP and PACR components~~.~~ and potentially revision of the Lake Okeechobee regulation schedule to adjust the class limits for the Lake Okeechobee inflows and climate forecasts. Coinciding with EAA Reservoir completion, operational planning to revise the Lake Okeechobee regulation schedule and the EAA Reservoir operation manual is expected to be complete in 2027.

Upon completion of the EAA Reservoir, the reservoir complex will operate in conjunction with the existing A-1 FEB and STAs. As additional details are developed during the design phase, the operational criteria for the EAA Reservoir will become more refined. The following initial guidance is based on the results of the optimization for the CEPP PACR hydrologic modeling, which included all CEPP features:

- The EAA Reservoir accepts EAA basin runoff when the reservoir depth is below 22.6 ft.
- The EAA Reservoir accepts Lake Okeechobee water when the reservoir depth is below 20.0 ft.
- The EAA Reservoir could provide water to the Miami Canal and North New River Canal when excess capacity is available beyond restoration flows, if the reservoir depth is higher than 8.2 ft.
- EAA Reservoir discharges discontinue when the reservoir depth is below 0.5 ft.

- No supplemental water supply is provided to the EAA Reservoir to prevent its dryout.

Initial operation of the EAA Reservoir will be monitored for embankment and structural stability, especially during initial filling operations. In addition, the quality of the water discharged from the EAA Reservoir would be monitored to ensure compatibility with the inflow assumptions and discharge requirements for STA-3/4, STA-2, the EAA A-2 STA, and the Central Everglades. Operational decisions regarding the volume of EAA Reservoir discharges sent to STA-3/4, STA-2, and the EAA A-2 STA would consider the vegetative health as well as the maximum monthly and annual limitations of the receiving treatment cells.

~~These goals, purposes, and benefits will not be fully realized until completion of construction and implementation of the CEPP and PACR components. The final Project Operating Manual assumes completion of all CEPP components. The manual will undergo several updates and refinements over time by USACE and District, as explained in Section 6 and Annex C of the PACR (SFWMD 2018). The triggers, thresholds, and knowledge gained over time will be used in future modeling and updates, and the Project Operating Manual will be developed in coordination with, and consistent with, the CEPP Adaptive Management Plan. Modifications and/or revisions to the manual will occur during subsequent project phases.~~

Over time, the USACE and SFWMD will update and refine the manual, as explained in Section 6 and Annex C of the PACR (SFWMD 2018a). Development of the Project Operating Manual is an iterative process that will continue throughout the life of the project. The manual will be updated ~~at periodic intervals~~periodically during the detailed design, construction, operational testing, and monitoring phases of the project. ~~Refinements to the operating criteria in the manual will be made as more project design details, data, operational experience, and general information are gained during these project phases.~~In the Final Environmental Impact Statement (USACE 2020), the USACE stated that project assurances, a Savings Clause analysis, and operating manuals would be updated, as necessary, during pre-construction engineering and design.

In addition to the Project Operating Manual, the Lake Okeechobee regulation schedule may need to be updated. Hydrologic modeling conducted for the PIR to optimize performance incorporated the 2008 Lake Okeechobee Regulation Schedule management bands; however, it reduced the maximum allowable releases to store more water in the lake to optimize systemwide performance and ensure compliance with the Savings Clause. The USACE currently is conducting a study to update the 2008 Lake Okeechobee Regulation Schedule (i.e., Lake Okeechobee System Operating Manual), which is expected to be complete by the end of 2022. Depending on the outcome of that study, additional changes to the lake's schedule may be needed to make similar adjustments to the maximum allowable releases to realize all the benefits of CEPP and the EAA Reservoir. If changed conditions and new data result, the SFWMD intends to review and revise the reservation rule to address the changes.

5.2 Effects of the Proposed Everglades Agricultural Area Reservoir on Existing Legal Users

When establishing a water reservation, all existing legal users of water shall be protected so long as such use is not contrary to the public interest [Section 373.223(4), F.S.]. To analyze seepage from the EAA Reservoir complex, several modeling scenarios were performed, including three-dimensional MIKE SHE/MIKE 11 modeling, two-dimensional SEEP/W groundwater modeling, and a three-dimensional MODFLOW model recalibration of the A-1 test cells. A passive management modeling scenario that included a cutoff wall, at a depth of -34.1 ft North American Vertical Datum of 1988 (NAVD88), showed that without the EAA Reservoir inflow-outflow seepage pumping, a difference of more than 0.25 ft, determined to be an impact threshold, would extend approximately 2.7 miles north of the project boundary

and 2.6 miles south into Holey Land Wildlife Management Area under steady-state conditions. There are no existing legal users of groundwater within those distances. The existing legal users of surface water within those distances are provided in **Table 5-1**. The existing legal users of surface water withdraw from the Miami Canal and North New River Canal, which have water level elevations maintained by the SFWMD. The water elevations remain the same under Alternative C240; therefore, no impacts to the availability of water are expected for existing legal users.

Table 5-1. Existing legal users surrounding the Everglades Agricultural Area Reservoir site.

Project	Water Use Permit	Application	Surface Water Source in the Area of Interest	
			L-19 Canal	L-23/L-24 Canal
Star Ranch Enterprises	50-00045-W	101012-1	X	
Star Farms Corporation	50-00191-W	101011-24	X	
Okeelanta Corporation	50-00656-W	190725-16	X	X
Halasco	50-08963-W	140513-6	X	
Sugar Farms Co-Op	50-08986-W	181001-16	X	X
ECP and Non-ECP Components	50-11070-W	160520-28		X
Star Ranch Enterprises West Farm	50-00092-W	190619-5	X	

The project is underlain by naturally occurring hydrogeologic formation water (connate water) with chloride ion concentrations that progressively increase with depth (Reese and Wacker 2009). To prevent mounding of water table elevations and to minimize the transport and/or upconing of chloride ion concentrations as a result of the project, active seepage scenarios were performed, including depth increases to the cutoff wall and EAA Reservoir inflow-outflow canal on the northern boundary of the reservoir and stage control in the reservoir's inflow-outflow canal (via three 200-cfs seepage pumps). Active management modeling scenarios indicate seepage from the EAA Reservoir can be fully captured, mitigating any potential seepage impacts. To further minimize water level impacts north of the EAA Reservoir, the SFWMD and USACE jointly recommend inclusion of an additional seepage canal within the EAA Reservoir and A-2 STA (Alternative 3 of the USACE [2020] Final Environmental Impact Statement) to increase operational flexibility within the EAA Reservoir inflow-outflow canal during pumping operations.

5.2.1 Water ~~Stored in the EAA Reservoir that is~~ Not Reserved for the Protection of Fish and Wildlife

Water was not quantified in the PACR (SFWMD 2018a) or Final Environmental Impact Statement (USACE 2020) for other water-related needs in the Lake Okeechobee Service Area (LOSA), which includes the EAA~~, in the PACR or EIS~~. However, water stored in the EAA Reservoir may be provided to the Miami and/or North New River canals within the EAA to maintain canal stages used for supplemental irrigation. Discharges may be made from the EAA Reservoir through the S-628 structure to the Miami and/or North New River canals via the reservoir's inflow-outflow canal. According to the Draft Project Operating Manual (Annex C of the PACR [SFWMD 2018a]), water stored in the EAA Reservoir can be used for water supply deliveries to meet EAA irrigation needs only when the reservoir stage is above 8.2 ft and the Miami and/or North New River canal stages are below their maintenance stages.

~~Any withdrawal of water~~ Water released from the ~~Miami and North New River canals must be consistent with allocations in existing water use permits. Based on~~ EAA Reservoir through structure S-628 is not reserved. Model simulations of the ~~additional water stored in~~draft operating protocol predict the EAA Reservoir, ~~the Draft Project Operating Manual,~~together with existing and planned infrastructure and ~~modeling conducted for the PACR,~~a modified Lake Okeechobee schedule, will convey 82,000 ac-ft of

surface water ~~on~~during an average ~~annually~~annual water year through structure S-628 (**Figure 5-~~3~~4**~~) could be conveyed through the S-628 structure~~) to the Miami and/or North New River canals to maintain canal stages in the EAA. This amount represents approximately 9% of the total discharge from the EAA Reservoir ~~while exceeding the CERP target flow goal to the Central Everglades. Water discharged from the EAA Reservoir will be~~ that is available to existing water users in ~~in~~ the EAA in addition to water ~~stored~~ in Lake Okeechobee. Any withdrawal of water from the Miami and/or North New River canals must be consistent with the SFWMD's water use permitting criteria. Section 6.9.1.3 and Annex C of the PACR (SFWMD 2018a) contain additional information.

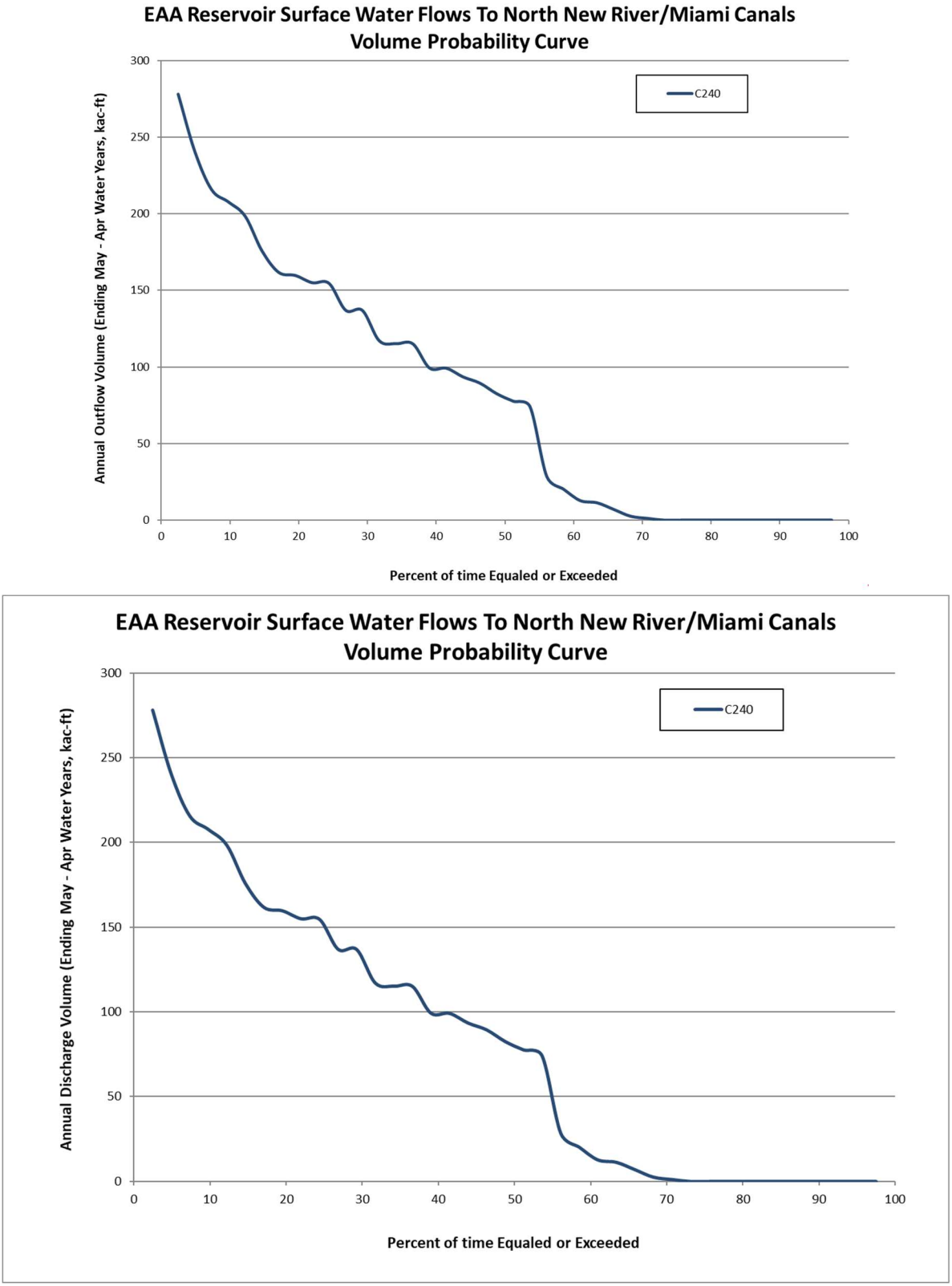


Figure 5-~~3~~4. Everglades Agricultural Area Reservoir ~~flow~~surface water discharges through structure S-628 volume probability curve (May to April water years) from the Alternative C240 model simulation.

Existing legal users in ~~the~~ LOSA will continue to rely ~~upon~~on Lake Okeechobee and EAA runoff to meet ~~their~~ supplemental irrigation needs when the EAA Reservoir is constructed and operational. Annex B ~~in~~of the PACR (SFWMD 2018a) and Environmental Impact Statement (USACE 2020) includes the Savings Clause analysis, which confirmed that existing legal sources of water supply will not be transferred. The EAA Reservoir does not change or shift the sources of water available to existing legal users in LOSA, including the EAA and the Seminole Tribe of Florida's Brighton and Big Cypress Reservations. The water supply level of service for ~~the~~ LOSA will be preserved ~~by~~through implementation of the project and will not be changed by the water reservation. ~~The~~ By virtue of water being stored in the EAA Reservoir, under certain conditions, more water from Lake Okeechobee will be available to water users in the EAA basin during dry events, benefitting regional water supply. The Alternative C240 model ~~run~~simulation showed an increase in the volume delivered to LOSA from Lake Okeechobee during water shortage events. Over the entire simulation period, the average annual volume delivered to LOSA during the eight driest events increased by 6,000- ac--ft with the inclusion of the reservoir. ~~By virtue~~The average annual volume delivered to the Seminole Tribe of ~~water being stored in EAA Reservoir, under certain conditions, additional water~~Florida's Brighton and Big Cypress Reservations also increased during the driest events, but it was a smaller volume commensurate with demand. The Final Environmental Impact Statement (USACE 2020) describes when future Savings Clause analyses will ~~reach existing legal water users in the EAA basin. Although the EAA Reservoir will capture water, it does change or shift the sources of water available to existing legal users in the LOSA, including the EAA.~~ be conducted.

5.3 ~~Protection of~~ Risk to Project Waters

To evaluate ~~the protection of~~ project water and the risk ~~associated with~~of consumptive uses, the following areas were evaluated to determine if project waters ~~would~~could be diminished: 1) the surrounding upstream watershed, including surface water and groundwater withdrawals in the vicinity of the project, 2) waters reserved within the EAA Reservoir for the natural system, and 3) waters downstream of the EAA Reservoir discharge structures. Based on SFWMD staff analysis of existing withdrawals, as described below, existing legal uses are not contrary to the intent of this project and do not reduce the project benefits.

5.3.1 Upstream Watershed Evaluation

Water use rules were used to evaluate the potential risk of future increases in consumptive uses. The use of surface water from Lake Okeechobee is capped at a base condition established between April 1, 2001, and January 1, 2008, within LOSA. The water use rules generally are referred to as the LOSA Rule. The LOSA Rule is the regulatory component of the Lake Okeechobee Minimum Flow and Minimum Water Level (MFL) recovery strategy. **Figure 5-~~4~~5** depicts the geographic region of the LOSA Restricted Allocation Area. The permitting criteria constituting the LOSA Rule is laid out in Section 3.2.~~1F~~1.F of the *Applicant's Handbook for Water Use Permit Applications in the South Florida Water Management District* (SFWMD 2015). The 2018 Lower East Coast Water Supply Plan Update (SFWMD 2018b) contains ~~the full scope~~a detailed explanation of the LOSA Rule and its role in protecting the water resources of the area.

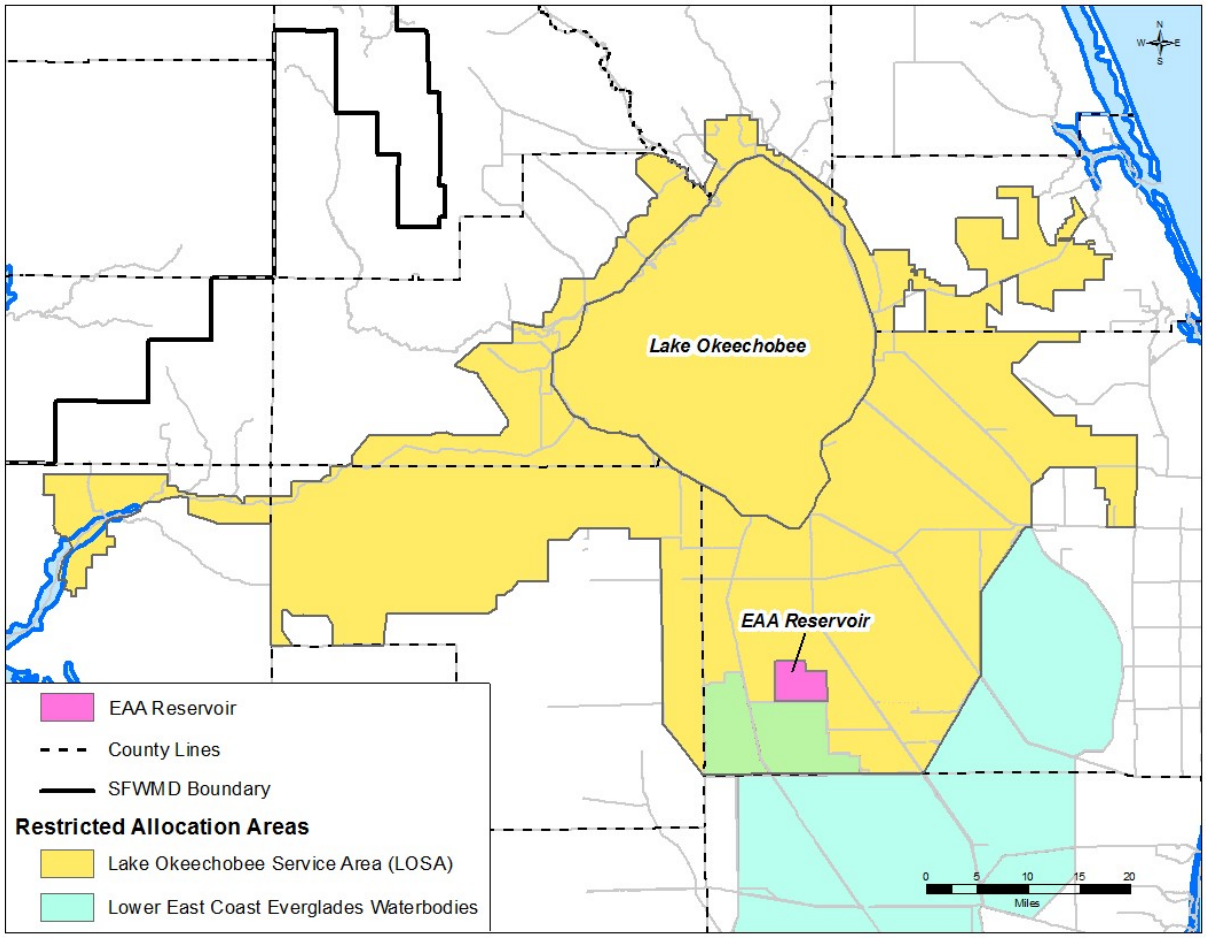
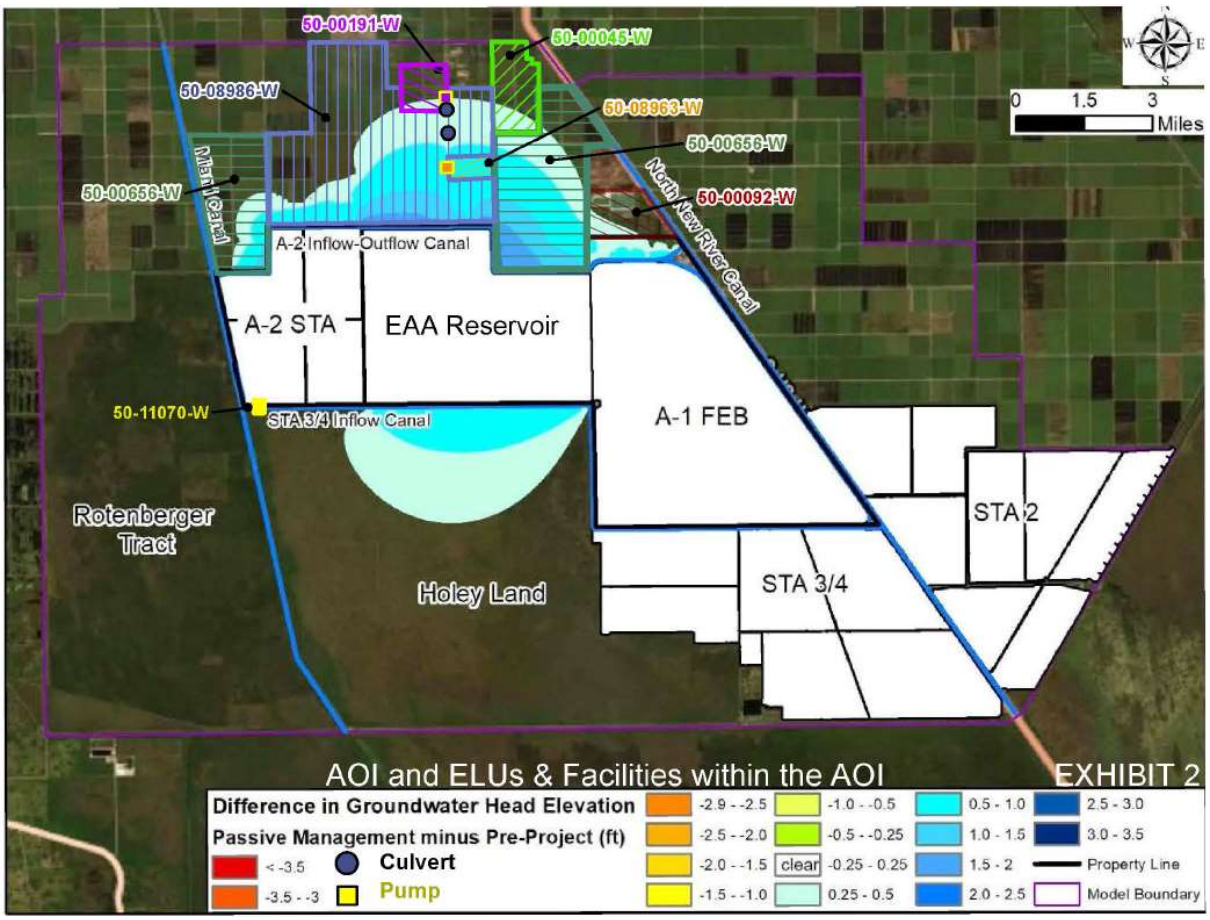


Figure 5-~~4~~5. The Restricted Allocation Area for Lake Okeechobee and the Lake Okeechobee Service Area.

The upstream evaluation considered a smaller subbasin within the EAA and LOSA that includes the area immediately south of Lake Okeechobee between the Miami and North New River canals and the areas surrounding the EAA Reservoir (**Figure 5-~~5~~6**). Existing surface water withdrawals identified near the EAA Reservoir are shown in **Figure 5-~~5~~6** and listed in **Table 5-1**. Adjacent existing legal users rely solely on surface water from the Miami and/or North New River canals, which are maintained by the SFWMD through current operations. New allocations or increases in the current ~~allocation~~allocations to existing legal users are ~~not expected due to~~only allowed if the ~~existing~~criteria laid out in the LOSA Restricted Allocation Area rule~~.~~ are met. The 2018 Lower East Coast Water Supply Plan Update (SFWMD 2018b) projected a reduction in agricultural water demands in the EAA due to the removal of more than 18,500 acres of sugarcane from production as a result of the planned construction of the EAA Reservoir. There are no existing legal users ~~withdrawing~~of groundwater ~~in~~within the area~~.~~ of influence (**Figure 5-6**). Additional information about impacts to existing legal users is provided in **Appendix ~~A~~G** of this document.


50-00191-W
50-00045-W
50-08986-W
50-08963-W
50-00656-W
50-00656-W
50-00092-W
Main Canal
North New River Canal
A-2 Inflow-Outflow Canal
A-2 STA
EAA Reservoir
50-11070-W
STA 3/4 Inflow Canal
A-1 FEB
STA 2
Rotenberger Tract
Holey Land
STA 3/4
0 1.5 3
Miles
AOI and ELUs & Facilities within the AOI
EXHIBIT 2
Difference in Groundwater Head Elevation
Passive Management minus Pre-Project (ft)
< -3.5
-3.5 - -3
-2.9 - -2.5
-2.5 - -2.0
-2.0 - -1.5
-1.5 - -1.0
-1.0 - -0.5
-0.5 - -0.25
clear
-0.25 - 0.25
0.25 - 0.5
0.5 - 1.0
1.0 - 1.5
1.5 - 2
2.0 - 2.5
2.5 - 3.0
3.0 - 3.5
Culvert
Pump
Property Line
Model Boundary

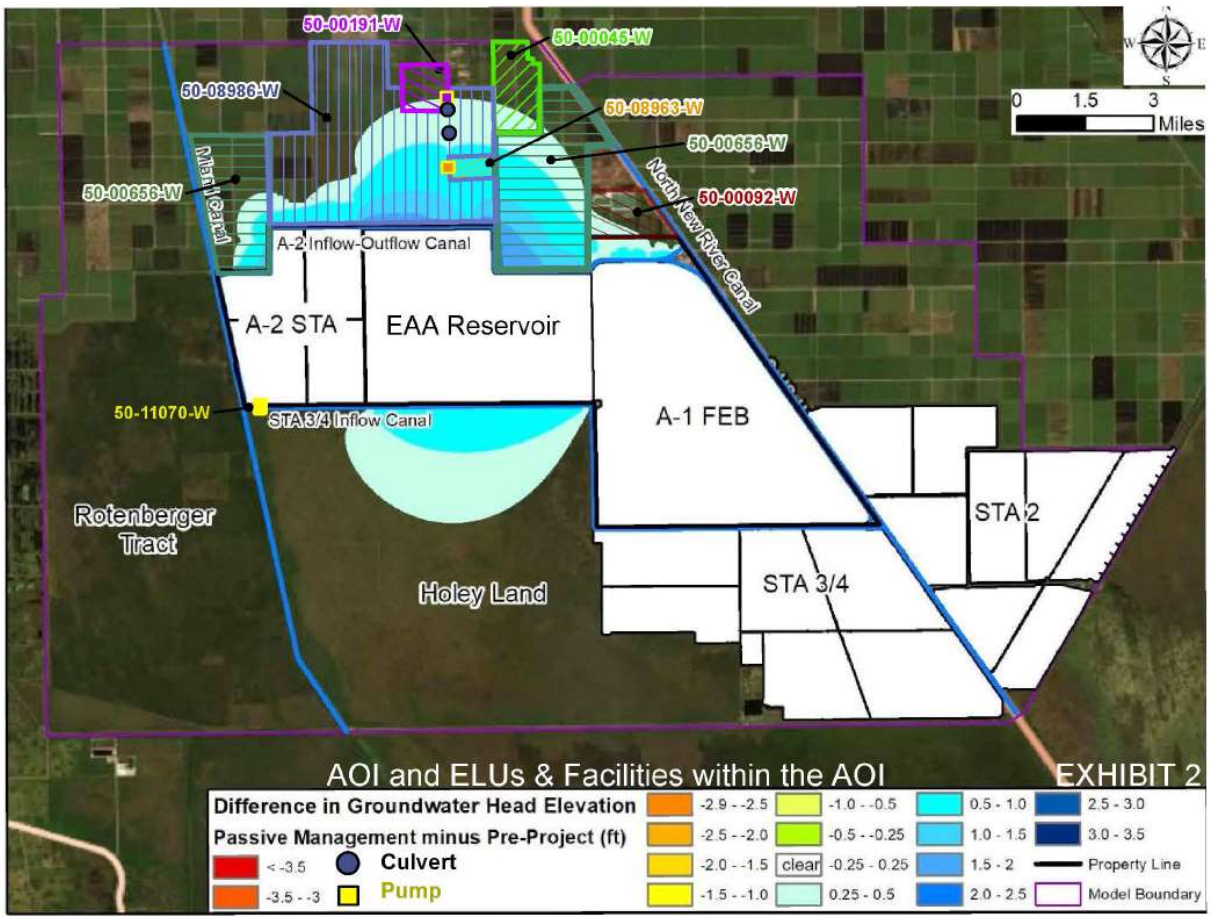


Figure 5-~~5~~6. Existing legal users within the area of influence surrounding the Everglades Agricultural Area Reservoir site.

5.3.2 Water Stored Within the Everglades Agricultural Area Reservoir

The CEPP EAA Reservoir Water Reservation rule will prospectively reserve from allocation all ~~project~~ water ~~directed~~discharged from the EAA Reservoir through the S-624, S-625, and S-626 structures to the Lower East Coast Everglades waterbodies ~~through the S-624, S-625, and S-626 structures~~. Any new water use permit application, or existing permittee seeking an increase in allocation, would have to comply with the LOSA Rule described above and ~~the provision in~~meet the conditions for permit issuance described in Rule 40E-2.301, Florida Administrative Code, which requires an applicant to demonstrate they are not withdrawing reserved water.

5.3.3 Downstream Watershed Evaluation

The potential risk of future consumptive uses downstream of the EAA Reservoir discharge structures were evaluated. Waters stored within the EAA Reservoir will flow south to the Lower East Coast Everglades waterbodies via outflow structures from the EAA A-2 STA, A-1 FEB, STA-2, or STA-3/4. Surface water discharged from the EAA A-2 STA, A-1 FEB, STA-2, or STA-3/4 for the protection of fish and wildlife will be directed to lands in public ownership, including WCA-3A, WCA-3B, and ENP.

There is another Restricted Allocation Area rule south of the EAA Reservoir, the Lower East Coast Regional Water Availability Rule, which covers the Lower East Coast Everglades waterbodies (**Figure 5-~~6~~7**) and is contained in Subsection 3.2.1.E of the *Applicant's Handbook for Water Use Permit*

Applications in the South Florida Water Management District (SFWMD 2015). The Lower East Coast Regional Water Availability Rule is a component of the Everglades Minimum Flow and Minimum Water Level (MFL) recovery strategy, set forth in Chapter 40E-8, Florida Administrative Code, and assists in implementing the SFWMD's objective to ensure that water necessary for Everglades restoration is protected from consumptive uses. The Lower East Coast Regional Water Availability Rule was established in 2007 and covers more than 1.5 million acres, including WCAs 1, 2A, 2B, 3A, and 3B; the Holey Land and Rotenberger wildlife management areas; and the freshwater portions of ENP. The Lower East Coast Regional Water Availability Rule also includes the integrated conveyance systems that are hydraulically connected to and receive water from the Lower East Coast Everglades waterbodies, such as C&SF Project primary canals and the secondary and tertiary canals that derive water from the primary canals. Net increases in volume or changes in timing on a monthly basis of direct surface water and indirect groundwater withdrawals from the Restricted Allocation Area are prohibited over that resulting from base condition uses permitted as of April 1, 2006. Allocations over the base condition water use are allowed only through sources detailed in Subsection 3.2.1.E.5 of the Restricted Allocation Area rule, such as certified project water, implementation of offsets, alternative water supply, terminated or reduced base condition water use that existed as of April 1, 2006, or available wet season water.

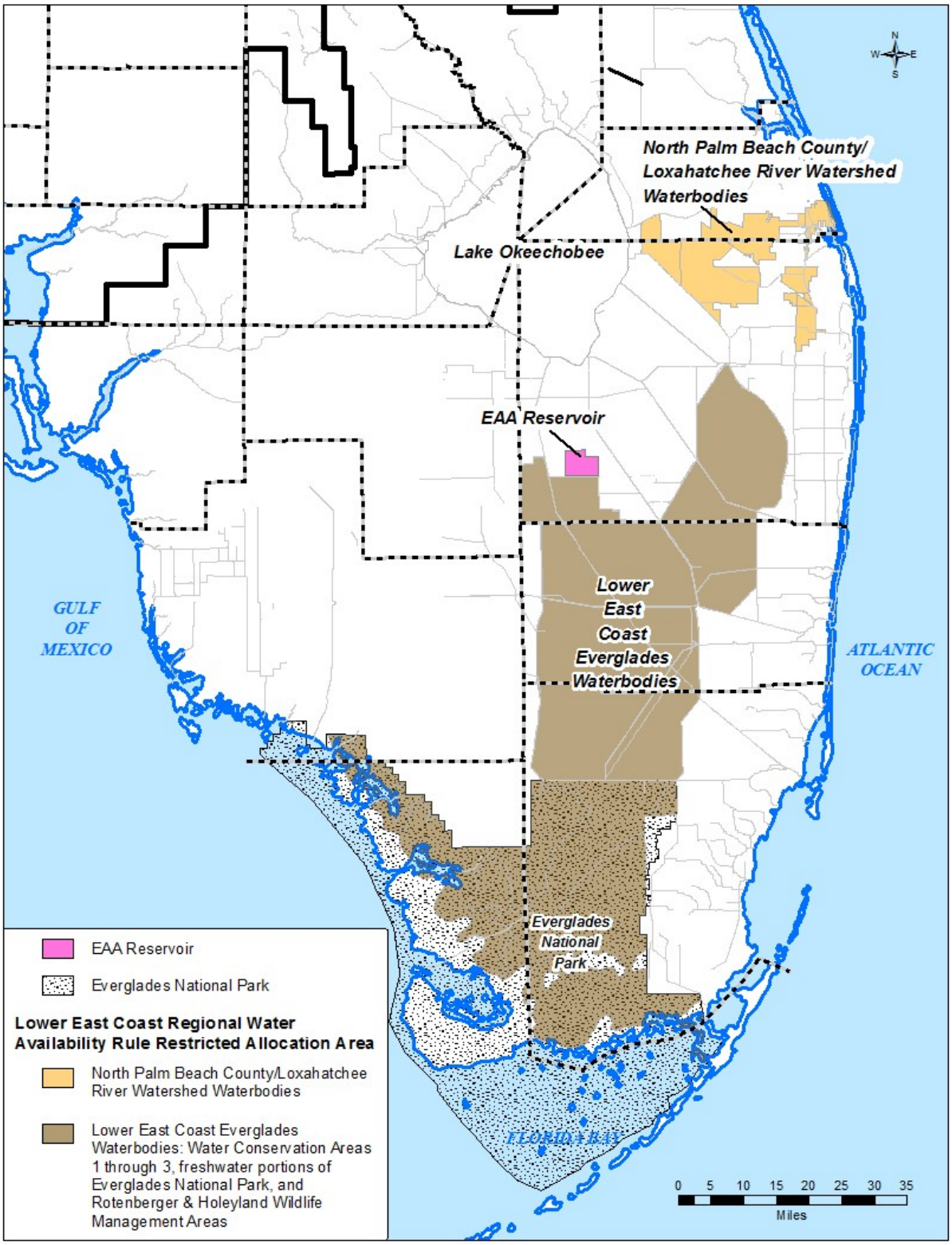


Figure 5-~~6~~7. Lower East Coast Everglades waterbodies and major integrated conveyance canals.

LITERATURE CITED

Acosta, C.A. and S.A. Perry. 2001. Impact of hydropattern disturbance on crayfish population dynamics in the seasonal wetlands of Everglades National Park, USA. Aquatic Conservation: Marine and Freshwater Ecosystems 11:45-57.

Acosta, C.A. and S.A. Perry. 2002. Spatial and temporal variation in crayfish production in disturbed marl prairie marshes of the Florida Everglades. Journal of Freshwater Ecology 17:641-650.

Alaa, A. and W. Abtew. 1999. Regional rainfall frequency analysis for Central and South Florida. Technical Publication WRE #380. South Florida Water Management District, West Palm Beach, FL.

Armentano, T.V., J.P. Sah, M.S. Ross, D.T. Jones, H.C. Cooley, and C.S. Smith. 2006. Rapid responses of vegetation to hydrological changes in Taylor Sough, Everglades National Park, Florida, USA. Hydrobiologia 569:293-309.

Beerens, J.M. 2013. CEPP RSM WADEM Spatial Foraging Conditions Model Output: WADEM: Wader Distribution Evaluation Modeling. Department of Biological Sciences, Florida Atlantic University, Boca Raton, FL. Report Submitted to U.S. Army Corps of Engineers, 11 March 2013, Cooperative Agreement Number W912HZ-10-2-0024.

Beerens, J.M., P.C. Frederick, E.G. Noonburg, and D.E. Gawlik. 2015. Determining habitat quality for species that demonstrate dynamic habitat selection. Ecology and Evolution 5:5,685-5,697.

Boyle, R.A., N.J. Dorn, and M.I. Cook. 2014. Importance of crayfish prey to nesting white ibis (*Eudocimus albus*). Wetlands 37:19-29.

Brandt, L.A. and F.J. Mazzotti. 2000. Nesting of the American alligator (*Alligator mississippiensis*) in the Arthur R. Marshall Loxahatchee National Wildlife Refuge. Florida Field Naturalist 28(3):122126.

Bras, R.L., V.M. Ponce, and D. Sheer. 2019. Peer review of the Regional Simulation Model. Technical report prepared for South Florida Water Management District, West Palm Beach, FL.

Bruland, G.L., T.Z. Osborne, K.R. Reddy, S. Grunwald, S. Newman, and W.F. DeBusk. 2007. Recent changes in soil total phosphorus in the Everglades: Water Conservation Area 3. Environmental Monitoring and Assessment 129:379-395.

Cattau, C.E., P.C. Darby, R.J. Fletcher Jr., and W.M. Kitchens. 2014. Reproductive responses of the endangered snail kite to variations in prey density. Journal of Wildlife Management 784:620-631.

Chaing, C., C.B. Craft, D.W. Rogers, and C.J. Richardson. 2000. Effect of 4 years of nitrogen and phosphorus additions on Everglades plant communities. Aquatic Botany 68:61-78.

Chin, D.A., J.A. Dracup, N.L. Jones, V.M. Ponce, R.W. Schaffranek, and R. Therrien. 2005. Peer review of the Regional Simulation Model. Technical report prepared for South Florida Water Management District, West Palm Beach, FL.

Cook, M.I. and M. Baranski. 2019. South Florida wading bird report. Volume 24. South Florida Water Management District, West Palm Beach, FL.

Craft, C.B., J. Vymazal, and C.J. Richardson. 1995. Response of Everglades plant communities to nitrogen and phosphorus additions. Wetlands 15:258-271.

Craighead, F.C. 1968. The role of the alligator in shaping plant communities and maintaining wildlife in the southern Everglades. The Florida Naturalist 41(1-2).

Curnutt, J.L., A.L. Mayer, T.M. Brooks, L. Manne, O.L. Bass, D.M. Fleming, M.P. Nott, and S.L. Pimm. 1998. Population dynamics of the endangered Cape Sable seaside-sparrow. Animal Conservation 1:11-21.

Darby P.C., I. Fujisaki, and D.J. Mellow. 2012. The effects of prey density on capture times and foraging success of course-hunting adult snail kites. Condor 114:755-763.

Darby, P.C., D.L. DeAngelis, S.S. Romañach, K. Suir, and J. Bridevaux. 2015. Modeling apple snail population dynamics on the Everglades landscape. Landscape Ecology 30(8):1,497-1,510.

Davis, S.M. and J.C. Ogden. 1994. Everglades: The Ecosystem and its Restoration. St. Lucie Press, Delray Beach, FL.

Davis, S.M., L.H. Gunderson, W.A. Park, J.R. Richardson, and J.E. Mattson. 1994. Landscape dimension, composition, and functioning in a changing Everglades ecosystem, pp. 419-444. In: S.M. Davis and J.C. Ogden (eds.), Everglades: The Ecosystem and its Restoration. St. Lucie Press, Delray Beach, FL.

Department of the Army and SFWMD. 2009. Master Agreement Between the Department of the Army and the South Florida Water Management District for Cooperation in Constructing and Operating, Maintaining, Repairing, Replacing and Rehabilitating Projects Authorized to be Undertaken Pursuant to the Comprehensive Everglades Restoration Plan. SFWMD Contract Reference No.: 4600001759. August 13, 2009.

Donalson, D., J. Trexler, D. DeAngelis, and A. Lo Galbo. 2010. Prey-based freshwater fish density performance measure (Greater Everglades aquatic trophic levels). DECOMP Performance Measure Documentation Sheet. United States Army Corps of Engineers, Jacksonville, FL.

Dorn, N.J. and M.I. Cook. 2015. Hydrological disturbance diminishes predator control in wetlands. Ecology 96:2,984-2,993.

Dorn N.J., M.I. Cook, G. Herring, R.A. Boyle, J. Nelson, and D.E. Gawlik. 2011. Aquatic prey switching and urban foraging by the white ibis *Eudocimus albus* are determined by wetland hydrological conditions. Ibis 153:323-335.

Florida Division of Administrative Hearings. 2006. Association of Florida Community Developers, et al. versus Department of Environmental Protection, et al. Division of Administrative Hearings Case Number 04-000880, Final Order February 24, 2006, affirmed 943 So. 2d 989 (Florida Fourth District Court of Appeals 2006).

Gaiser, E. 2009. Periphyton as an indicator of restoration in the Florida Everglades. Ecological Indicators 9:S37-S45.

Gaiser, E.E., J.C. Trexler, J.H. Richards, D.L. Childers, D. Lee, A.L. Edwards, L.J. Scinto, K. Jayachandran, G.B. Noe, and R.D. Jones. 2005. Cascading ecological effects of low-level phosphorus enrichment in the Florida Everglades. Journal of Environmental Quality 34:717-723.

Gawlik, D.E. 2002. The effects of prey availability on the numerical response of wading birds. Ecological Monographs 72(3):329-346.

Gawlik, D.E., G. Crozier, and K.H. Tarboton. 2004. Wading bird habitat suitability index, pp. 111-127. In: K.C. Tarboton, M.M. Irizarry-Ortiz, D.P. Loucks, S.M. Davis, and J.T. Obeysekera, Habitat Suitability Indices for Evaluation Water Management Alternatives. Technical Report, South Florida Water Management District, West Palm Beach, FL.

Julian, II, P., A. Freitag, G.G. Payne, S.K. Xue, and K. McClure. 2019. Chapter 3A: Water Quality in the Everglades Protection Area. Volume 1 – 2018 South Florida Environmental Report. South Florida Water Management District, West Palm Beach, FL.

Kushlan, J.A. 1990. Wetlands and wildlife, the Everglades perspective. In: R.R. Sharitz and J.W. Gibbons (eds.), Freshwater Wetlands and Wildlife. CONF-8603101, DOE Symposium Ser. No. 61, Office of Scientific and Technical Information, United States Department of Energy, Oak Ridge, TN.

Kushlan, J.A. and M.S. Kushlan. 1979. Observations on Crayfish in the Everglades, Florida, U.S.A. Crustaceana Supplement 5:115-120.

Lockwood, J.L., M.S. Ross, and J.P. Sah. 2003. Smoke on the water: The interplay of fire and water flow on Everglades restoration. Frontiers in Ecology and the Environment 1(9):462468.

Loveless, C.M. 1959. The Everglades Deer Herd Life History and Management. Technical Bulletin Number 6, Federal Aid Project W-39-R. Florida Game and Freshwater Fish Commission. 104 pp.

Mazzotti, F.J. and L.A. Brandt. 1994. Ecology of the American alligator in a seasonally fluctuating environment, pp. 485-505. In: S.M. Davis and J.C. Ogden (eds.), Everglades: The Ecosystem and its Restoration. St. Lucie Press, Delray Beach, FL.

McCormick, P.V., P.S. Rawlik, K. Lurding, E.P. Smith, and F.H. Sklar. 1996. Periphyton water quality relationships along a nutrient gradient in the northern Everglades. Journal of the North American Benthological Society 15:433-449.

McCormick, P.V., S. Newman, and L. Vilchek. 2009. Landscape responses to wetland eutrophication: Loss of slough habitat in the Florida Everglades, USA. Hydrobiologia 621:105-114.

McVoy, C.W., W.P. Said, J. Obeysekera, J.A. VanArman, and T.W. Dreschel. 2011. Landscapes and Hydrology of the Predrainage Everglades. University Press of Florida, Gainesville, FL.

Newman, S., J. Schuette, J. Grace, K. Rutchey, T. Fontaine, and K. Reddy. 1998. Factors influencing cattail abundance in the northern Everglades. Aquatic Biology 60:265-280.

Newman, S., P.V. McCormick, S.L. Miao, J.A. Laing, W.C. Kennedy, and M.B. O'Dell. 2004. The effect of phosphorus enrichment on the nutrient status of a northern Everglades slough. Wetlands Ecology and Management 12:63-79.

Patterson, K. and R. Finck. 1999. Tree islands of the WCA3 aerial photointerpretation and trend analysis project summary report. St. Petersburg, Florida: Geonex Corporation. Report to the South Florida Water Management District, West Palm Beach, FL.

Pearlstine, L., A. Lo Galbo, G. Reynolds, J. Parsons, T. Dean, M. Alvarado, and K. Suir. 2016. Recurrence intervals of spatially simulated hydrologic metrics for restoration of Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) habitat. Ecological Indicators 60:1,252-1,262.

~~Reese, R.S. and M.A. Wacker. 2009. Hydrogeologic and hydraulic characterization of the surficial aquifer system, and origin of high salinity groundwater, Palm Beach County, Florida. United States Geological Survey Scientific Investigations Report 2009-5113. 83 pp.~~

RECOVER. 2005. RECOVER's Initial Comprehensive Everglades Restoration Plan Update Report. Restoration Coordination and Verification, United States Army Corps of Engineers Jacksonville District, Jacksonville, FL and South Florida Water Management District, West Palm Beach, FL.

Reese, R.S. and M.A. Wacker. 2009. Hydrogeologic and hydraulic characterization of the surficial aquifer system, and origin of high salinity groundwater, Palm Beach County, Florida. United States Geological Survey Scientific Investigations Report 2009-5113. 83 pp.

Romañach, S.S., C. Conzelmann, A. Daugherty, J.L. Lorenz, C. Hunnicutt, and F.J. Mazzotti. 2011a. Joint Ecosystem Modeling (JEM) Ecological Model Documentation Volume 1: Estuarine Prey Fish Biomass Availability v1.0.0.

Romañach, S.S., C. Conzelmann, A. Daugherty, J.L. Lorenz, C. Hunnicutt, and F.J. Mazzotti. 2011b. Joint Ecosystem Modeling (JEM) Ecological Model Documentation Volume 2: Roseate Spoonbill (*Platalea ajaja*) Landscape Habitat Suitability Index v1.0.0.

Ross, M.S., J.P. Sah, J.R. Snyder, P.I. Ruiz, D.T. Jones, H. Colley, R. Trabieso, and D. Hagayari. 2006. Effect of hydrology restoration on the habitat of the Cape Sable seaside sparrow. Annual report of 2005-2005. Unpublished report to the U.S. Army Corps of Engineers, Jacksonville, FL. Southeast Environmental Research Center, Florida International University, Miami, FL.

Rutchey, K. 2010. Map of tree island loss from 1940-1995 in Water Conservation Area 3. South Florida Water Management District, West Palm Beach, FL.

Rutchey K., L. Vilchek, and M. Love. 2005. Development of a vegetation map for Water Conservation Area 3. Technical Publication ERA #421. South Florida Water Management District, West Palm Beach, FL.

Rutchey, K., T. Schall, and F. Sklar. 2008. Development of vegetation maps for assessing Everglades restoration progress. Wetlands 28(3):806-816.

Saunders J.C., C.-M. Carlos, S. Newman, J. Harvey, J. Lewis, J. Choi, L. Soderqvist, R. Jaffé, and P. Regier. 2019. Decomp Physical Model data synthesis: Landscape budget models of water, sediment, and sediment phosphorus across the L-67C Canal backfill treatment area. In: 2007 South Florida Environmental Report – Volume I. South Florida Water Management District, West Palm Beach, FL.

Scheidt, D., J. Stober, R. Jones, and K. Thornton. 2000. South Florida ecosystem assessment: Everglades water management, soil loss, eutrophication and habitat. United States Environmental Protection Agency, Region 4, EPA 904-R-00-003. 48 pp.

Sculley, S.P. 1986. Frequency analysis of SFWMD rainfall. Technical Publication 86-6. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2005a. Regional Simulation Model – Theory Manual. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2005b. Regional Simulation Model – Hydrologic Simulation Engine (HSE) User Manual. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2010. Calibration and validation of the Glades and Lower East Coast Service Area application of the Regional Simulation Model, Sept 2010. Hydrologic & Environmental Systems Modeling Department, Everglades Restoration, South Florida Water Management District, West Palm Beach, Florida.

SFWMD. 2011. Model documentation report (DRAFT): RSM Glades-LECSA—Alternative "H" V1.0. USACE DASR Project 12-WCA Decomp and Sheetflow Enhancement-Part 1. MSR 358 Final Array. Hydrologic & Environmental Systems Modeling Section, South Florida Water Management District, West Palm Beach, FL. November 15, 2011. 57 pp.

SFWMD. 2015. Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District. South Florida Water Management District, West Palm Beach, FL. September 7, 2015.

SFWMD. 2018a. Central Everglades Planning Project Post Authorization Change Report-Feasibility Study and Draft Environment Impact Statement. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2018b. 2018 Lower East Coast Water Supply Plan Update-Planning Document. South Florida Water Management District, West Palm Beach, FL.

Shinde, D., L. Pearlstine, L.A. Brandt, F.J. Mazzotti, M.W. Parry, B. Jeffery, and A. Lo Galbo. 2014. Alligator Production Suitability Index Model (GATOR–PSIM v. 2.0): Ecological and Design Documentation. South Florida Natural Resources Center, Everglades National Park, Homestead, FL. Ecological Model Report. SFNRC Technical Series 2014:1.

South Florida Natural Resources Conservation Center. 2013. An Evaluation of Central Everglades Planning Project (CEPP) alternatives using the Alligator Production Suitability Model. Ecosystem Restoration, South Florida Ecosystem Office, Homestead, FL.

Trexler, J.C. and C.W. Goss. 2009. Aquatic fauna as indicators for Everglades restoration: Applying dynamic targets in assessments. Ecological Indicators 9:S108-119.

United States Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Southeast Region, Atlanta, GA.

United States Fish and Wildlife Service. 2016. Biological Opinion for the Everglades Restoration Transition Plan. South Florida Ecological Services Office, Vero Beach, FL.

~~United States Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Southeast Region, Atlanta, GA.~~

USACE. 2005. Central and Southern Florida Project Comprehensive Everglades Restoration Plan Programmatic Regulations Pre-CERP Baseline. United States Army Corps of Engineers, Jacksonville District, Jacksonville, FL.

USACE. 2020. Final Environmental Impact Statement for Central and Southern Florida, Everglades Agricultural Area (EAA), Florida. United States Army Corps of Engineers, Jacksonville District, Jacksonville, FL. January 2020.

USACE and SFWMD. 1999. Central and Southern Florida Project Comprehensive Review Study: Final Integrated Feasibility Report and Programmatic Environmental Impact Statement. United States Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL.

USACE and SFWMD. 2014. Central Everglades Planning Project: Final Integrated Project Implementation Report and Environmental Impact Statement. United States Army Corps of Engineers, Jacksonville District, Jacksonville, FL, and South Florida Water Management District, West Palm Beach, FL. Revised December 2014.

Van Houtan, K.S., O.L. Bass Jr., J. Lockwood, and S.L. Pimm. 2010. Importance of estimating dispersal for endangered bird management. Conservation Letters 3:260-266.

Walker, Jr., W.W. and R.H. Kadlec. 2011. Modeling phosphorus dynamics in Everglades wetlands and stormwater treatment areas. Critical Reviews in Environmental Science and Technology 41:430-446.

West Consultants and CDM. 2012. Regional Simulation Model implementation: Verification and additional verification tests. Technical Report. South Florida Water Management District, West Palm Beach, FL.

Wetzel, P.R., A.G. van der Valk, S. Newman, D.E. Gawlik, T. Troxler-Gann, C. Coronado-Molina, D.L. Childers, and F.H. Sklar. 2005. Maintaining tree islands in the Florida Everglades: Nutrient redistribution is the key. Frontiers in Ecology and the Environment 3:370-376.

APPENDICES

APPENDIX A:
FINAL PEER REVIEW REPORT ON THE DRAFT TECHNICAL DOCUMENT TO SUPPORT THE CENTRAL EVERGLADES PLANNING PROJECT EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION

This appendix contains the final peer-review report provided by the independent, scientific peer--review panel contracted to review and assess the technical methods and scientific approaches employed by the South Florida Water Management District (SFWMD) to develop a water reservation for the Everglades Agricultural Area (EAA) Reservoir, as outlined in the April and May 2020 versions of the draft *Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation*. The technical document contains the science, data, methodologies, analyses, and scientific and technical assumptions employed in each analysis upon which the water reservation is based. The final peer-review report guided the SFWMD in completing the water reservation rule development process.

Final Conclusions and Comments on the Draft Technical Document:

"Technical document to support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation."

Peer Reviewers:

Donald L. DeAngelis
Senior Scientist
U. S. Geological Survey
Wetland and Aquatic Research Center
Davie, FL 33314

Nathan J. Dorn
Professor of Biological Sciences
Florida Atlantic University
Davie, FL 33314

June 15, 2020

General Remarks

This report follows up on our initial review of the technical document. Dong Yoon Lee were very helpful in addressing the comments that we made on the original draft document. Our comments below state our conclusions and contain a few additional comments. In the comments below, the individual peer reviewers, DLD and NJD, are identified, but both reviewers agree with all of the comments.

Hydrologic Evaluations

In the initial evaluation of the Technical document of the C240 EAA Reservoir Water Reservation it was noted (by NJD) that the procedure of analyzing hydrologic change was good overall, but in a few cases the ponding depth and other hydrological evaluations were difficult to understand. In particular I (NJD) could not tell what sort of wetland would be made in NESRS nor how deep the water would become in E and SE WCA 3A; the ponding depth evaluations (gauge vs. IR) gave either different impressions or were spatially limited. In the public presentation on 29 May the SFWMD addressed this confusion and presented some direct comparisons of existing and projected (EAA Reservoir) hydrological conditions for several regions against one another. The new presentations were helpful and NJD was satisfied that the ponding depths in NESRS would be more like the intact ridge slough system (central WCA 3A) rather than the over-ponded reaches of SE WCA 3A.

The SFWMD presentation of hydrological conditions in SE WCA 3A was expanded, beyond the presentation in the document, to cover projected hydrologic conditions in a couple additional regions. This allowed clarity about depths near the Miami Canal and hydroperiods in the eastern and western portions of SRS. It also addressed the projected shifts in SE WCA 3A more comprehensively; the conditions created by the EAA Reservoir will make average depths slightly deeper but will bring the annual peak levels down. This is an important, though modest expected benefit for protection of the remaining ridges and tree islands.

In the SFWMD presentation they also directly compared the projected hydrologic conditions in northern WCA 3A (west and east) to central WCA 3A and the evaluations looked favorable and considerable ecological benefit can be expected in those northern parts of the system.

During the presentation period the SFWMD also responded to the concerns about WCA 3B. The general evaluation of hydroperiods, what was Fig. 4-2 in the original report, was replaced by a new figure in the public presentation that demonstrated hydroperiod shifts for a longer period of record than just an average or dry year. The updated figure clarified some small benefits of lengthened hydroperiods and deeper water in WCA 3B (south and central). The problem caused by additional drying out northern WCA 3B was acknowledged and discussed as an area for adaptive management and/or a future project.

<u>Remaining suggestions/concerns</u>

The final document should make the summary comparisons of hydrological conditions across regions explicit. Pointing out the increased averages (Northern WCA 3A), decreased highs (SE WCA 3A) and the similarity of some regions to central WCA 3A helps to justify the benefit to the Ridge-Slough landscape and the associated fish and wildlife. It was not completely clear whether the hydrological contrasts came from indicator regions or gauges and that should be stated in the figure legends in the document.

The primary small benefit in SE WCA 3A is just to bring down the annual peak levels and that should be noted. Overall, it seems the ecological benefits are somewhat marginal because averages will still be higher and the effects on foraging wading birds are net negative. Along with the over-dry conditions in WCA 3B, the conditions in SE WCA 3A should be an area considered for continued adaptive management in the future, consistent with the discussion we had with the SFWMD scientists during the public meeting.

After the presentation I (NJD) was also concerned about the way the hydrological situation in western SRS was characterized as "historically high water (slide 48 in the presentation)." It appears that it can only be characterized as high water from a CSSS perspective (i.e., a bird that needs seasonally low water conditions) whereas it does not seem that it could be considered historically high if we took a long-term wetland ecology perspective on the hydrological conditions in western SRS (McVoy et al. 2011; sloughs just north and east of the Ochopee marl marsh). Furthermore, from a multispecies, wetland fish and wildlife perspective (the broader focus of this review of the Water Reservation) it does not appear that the western SRS can be considered high. I suggest that the conflict of characterization should be acknowledged somewhere in this final report.

Phosphorus

We understand, as was noted in the public hearing, that the statutory authority granted to the SFWMD's Governing Board under Chapter 3763.223(4), Florida Statutes, is limited to the protection of fish and wildlife and public health and safety, so does not extend to the issue of phosphorus.

Nonetheless, DLD had questions on the original technical document regarding phosphorus in the Central Everglades. One question regarded the allowable concentration released through the STAs. This was answered that the STAs are sized and operated to meet a long term flow-weighted mean average of 13 ppb phosphorus. The Water Quality-based Effluent Limitation (WQBEL) standard for STA operations allows individual years to exceed this value up to 19 ppb in a single year.

A second question was whether release of water into northern WCA-3A may lead to some phosphorus mobilization, which could affect the vegetation community, though how much might be released is unknown. The response was that the section will be rewritten to note that NW and NE benefits are similar with regard to increased ponding and reduced amount of time water is below 0, and that all over-drained areas subject to soil oxidation have some risk of nutrient release upon rehydration. The area at greatest risk of phosphorus release are likely closest to central WCA-3A in close proximity to the Miami canal, where increases in phosphorus per unit volume occurred.

Overall, the risks associated with some increased phosphorus input with increased flow and rehydration of some locations are low compared to the benefits of the project.

B. Ecological Evaluations

General

In our original peer review of the performance metrics we were confused about the ways the ecological evaluations were being made and our concerns broke down to:

1) How the net systemwide benefits were being summarized and expressed (acres or % rise in indices),

2) Why the evaluations were done on average years vs. for long periods of record,
3) Why evaluations were only conducted in relative terms (i.e., change from existing), and
4) A general desire for more explanation of the models and attempts to explain for some of the unexpected projections.

In the public presentation on 29 May the SFWMD addressed all four issues. The first issue was addressed directly by explanation of some of the aggregated terms. The second was explained as a limitation, the evaluation years are simply the type of evaluation they can receive from the USGS Joint Ecosystem Modelling JEM) lab. The third issue was addressed by showing existing conditions in absolute indices or abundances along with the relative change. The fourth concern was partially addressed for wading birds by digging into the model to explain some of the systemwide responses. The additional explanation and materials provided after the public presentation produced some clarification but also some additional confusion about the metrics used to summarize responses. Our concerns about the fish, wading bird, and apple snail metrics are mentioned below in each section.

Wading Birds

In my (NJD) original evaluation of the responses in WCA 3B it appeared that model projected a response of storks that could not be synthesized with the hydrologic and fish responses (i.e., marginal changes in hydrologic conditions and no changes in the fish). The public presentation still showed basically no response of the fish, except in dry years, but the hydrologic change in southern and central WCA 3B was clarified so that I could make better sense of the benefits to storks in that region.

In our first evaluation we had confusion about the summary of the expected response of the wading birds overall (systemwide) and to the conditions in eastern WCA 3A (i.e., why were they negative). We discussed the overall negative response of storks and small systemwide improvement for ibises. Part of the loss to wading bird foraging habitat overall was purported to have been caused by lots of wetland landscape (lots of grid cells) in the southern part of ENP with small % losses in quality. We are not sure what that means hydrologically, but that produced a bit of uncertainty. The conditions causing negative scores in eastern WCA 3A also could not be fully evaluated by the time of the public presentation.

Remaining concerns

The overall benefit to the wading birds was rather modest and the reason for the decreased foraging habitat quality in southern ENP and eastern WCA 3A should be addressed to some degree in order to determine the hydrological reasons for the offsets. It was noted (DLD) that the eastern WCA 3A area is also poor habitat for apple snails in all of the evaluations in Darby et al. (2015). This suggests that it might be too deeply flooded almost all of the time. On the other hand, the maps of apple snail population number subsequently supplied by Dong Yoon Lee show substantial apple snail populations occurring only during the wet year (1995), which might suggest that the area may be too dry ordinarily. Although our guess is that the SE WCA 3A is too deeply ponded, it would be good to get clarification of what the hydrologic conditions of this area are.

The maps of white ibis and wood stork in the draft document (Figures 4-39a,b) show only the differences C240-EARECB. After the public meeting, maps of the individual EARECB and C240 maps for the two species were provided. However, the individual EARECB and C240 maps have poor resolution, so it is difficult to distinguish variations of habitat quality. The maps show what seems to be reasonably

good conditions for both wading birds over most of the area, so it may be that the negative effect in eastern WCA 3A by Figure 4-39a,b are not important.

We were also supplied with histograms of 'Wood Stork Foraging Index', 'Great Egret Landscape Abundance', and 'White Ibis Landscape Abundance'. These show percent change in foraging index or in landscape abundance for each year from 1975 through 2005. According to these histograms, both the wood stork and great egret seem to have a substantial number of negative percentage changes, although the white ibis is largely positive. We make some comments on how these histograms were calculated under the 'Fish' section, and our comments there are relevant to the wading birds histograms also.

In my initial review I (NJD) suggested that the mention of enhancing wading bird nesting at the SW coast (ENP) should be removed because the C240 EAA Reservoir could would not produce any benefit based on the model runs for wading birds, or fish or hydroperiods that could increase crayfish production. Based on the presentation and responses of the SFWMD it appears that foraging conditions actually might get slightly worse in southern and SW ENP. If mention of that restoration goal remains in the final technical document then it should be explicit that no substantial benefits or even a slight negative effect can be expected.

Fish

It was helpful to get follow-up maps from the SFWMD on the individual estimates of fish density for both EARECB and C240. However, the histogram 'Total Fish Density' was at first confusing, as it shows 'percentage change in total fish density'. Every year in the figure shows positive benefits of C240 to fish, often between 100 and 200 percent and twice over 300 percent. This did not seem reasonable, so we inquired with Dong Yoon. In responses with DLD, he was very helpful in explaining the way that JEM performed the calculations for these histograms. What JEM did was take the difference C240 - Baseline (where Baseline = EARECB) and divide by Baseline for every day of a year in each PSU, then add all these percentages together and average them. We believe that this will bias the result toward those days and PSUs where there was a very low Baseline fish density and a large percentage increase of fish. Because certain regions (e.g., northwest WCA 3A) that initially had low fish densities, will see substantial percentage increases in fish density from C240, whereas other areas that already high Baseline levels may see only modest percentage change, the former will dominate and create high positive percentage gains for every year. Although it is good to see these positive values, we are not sure that it is an important indicator of overall fish (prey) production produced by C240.

On the other hand, the plot of 'Cumulative Small Fish Density', which indicates a steady increase of difference in fish cumulative density between C240 and EARECB, seems to be a good indicator of the improvement for fish under C240. We believe the improvement in the northern WCA 3A and NESRS is substantial and even in average years those areas could experience density increases of 20-50%. Increased production in those places should have substantial effects on prey availability for egrets and storks when fish concentrate in the late dry season.

We assume the wading bird histograms were constructed in the same way as the fish histograms, so we are not sure what weight to give them as indicators of change under C240.

Crayfish

The responses of crayfish cannot be easily evaluated for the C240 because of the lack of models for evaluation. During the public presentation, the District provided some new indications about hydroperiods in the eastern marl prairies and that was helpful. Nevertheless, eastern marl prairies of ENP will have hydroperiods of only 2-4 months with the C240. With such short hydroperiods the benefit to crayfish will be quite limited (Acosta and Perry 2000) except perhaps right near the eastern side of SRS (*P. alleni* production). The positive effect of C240 on crayfish production (*P. fallax*) in northern WCA 3A appear likely based on the hydrological evaluations (i.e., average depths of 1.2 ft) as they were presented in the public meeting; sloughs with shallow-moderate water depths and occasional dry conditions will generally produce higher densities of *P. fallax* (Dorn and Cook 2015; Dorn 2010).

Alligators

Alligator responses to the EAA Reservoir were positive in the original presentation and the public presentation, but systemwide the response suffered from some unexplained negative responses in the SE portion of WCA 3A near the flow-way in an average year. After further evaluation, the presentation of the new hydroperiod map presented on 29 May (slide 35) indicated that the hydroperiods will be somewhat shortened against Tamiami Trail and the southern part of the L67A. Altogether we found this evaluation encouraging because there is a clear net benefit to the alligator production.

Apple snails

The SFWMD provided additional model output detail during and after the May 29 public presentation. Spatially, the biggest benefits to apple snails of the C240 EAA Reservoir will be seen in NESRS and in northern WCA 3A. From the additional model output, in the form of a histogram of the Adult Apple Snail Population, it appears the annual systemwide increase in projected densities range from ~20%-125% (41% average). The larger increases are projected to come in dry or average precipitation years. However, the histogram is like that of the fish and wading birds; that is, it plots 'percent change in Adults Apple Snail Population' against year, this time from 1995 through 2005, as provided by the EverSnail model. It is likely again that the average will be biased by days and PSUs that have extremely low Baseline (EARECB) values and large percentage increases. This may not be a good indicator of absolute population benefit.

The maps of apple snail numbers for years 1995, 2000, 2002, and 2004 provide a good picture of the differences between EARECB and C240 under different annual conditions. However, some improvements can be suggested towards interpretation of the maps. Ranges of population sizes are given, which are associated with colors. However, what are important for snail kite habitat are the apple snail densities. First, the abundances, which are from the model EverSnail (Darby et al. 2015), are for 400 x 400 m, or 160,000 m^2 pixels. Therefore, from the population ranges given in the figures for apple snail, we can calculate densities. The translations to densities are shown in column 2 of Table 1 (DLD). Estimates of apple snail densities have been linked to estimates of presence and numbers of snail kite nests within 2 km of the sampling site (Cattau et al. 2014). The estimates are given in a graph in their Figure 1B. Rough estimates taken off the graph are given in the third column. According to Figure 2 of Cattau et al. (2014), virtually all those nests would fledge at least one young.

Table 1. Apple snail population size, density, and estimate snail kite nests within 2 km radius of apple snail sampling site.

Population size (apple snails per 400m pixel)	Population density (apple snails per m^2)	Estimated snail kite nests (within 2 km radius of sample)
140,000	0.875	12
120,000	0.75	11
105,000	0.656	10
90,000	0.56	9
75,000	0.46	8
60,000	0.375	7
40,000	0.25	6
30,000	0.1875	4
15,000	0.09375	3

The following interpretations of habitat quality in Table 2 have been suggested by Dr. Stephanie Romañach, USGS (personal communication).

Table 2. Interpretations by Dr. Romañach of effect of apple snail densities on snail kite habitat quality

Category	density ($1/m^2$)	logic
Very good	$\geq$1.2	Interpretation of Cattau et al. 2014
Good	0.4-1.2	Interpretation of Cattau et al. 2014
Fair	0.2-0.4	Interpretation of Darby et al. 2012
Poor	0.1-0.2	Interpretation of Darby et al. 2012
Very poor	<0.1	unsure

The maps of apple snail densities for EARECB and C240 clearly show some differences between the two model outputs. However, it would be useful to try to show better resolution within each of these maps, if possible to be able to show the categories represented in Table 2. The scale bar currently only shows the C240-EARECB difference. More information is available in the data and should be shown in the maps if possible.

Cape Sable Seaside Model

In our (DLD) initial evaluation of the effects of the project on the endangered Cape Sable Seaside Sparrow (CSSS), we noted that the project would have mixed effects on the species population. We note that the public presentations on May 29 and additional information sent afterwards helped clarify the situation.

Figure 4-34 shows that the increased flows into Everglades National Park will have some impacts on the marl prairie habitat of the sparrow. The changes proposed here appears to lower water levels and improve habitat conditions in Subpopulation A, raise water levels to improve habitat conditions in Subpopulations C and F, and minimize impacts to Subpopulations B and E. The proposed changes will affect some of the current habitat positively and some negatively. Some of the positive effects will occur in the habitat of Subpopulation A. This is important, as Subpopulation A has not shown much sign of recovery since a large population decline in the early 1990s.

Subpopulation B currently holds the largest number of sparrows. Along with Subpopulation E it is considered part of the core habitat for the CSSS. It is shown to get very slight positive effect. The greatest positive effects will be to the northeast, in Subpopulations C and F, and importantly, in areas between Subpopulations C and E and C and F. These changes will also increase the connectivity between these three subpopulations.

Some loss in habitat quality will occur north and west of Subpopulation F. This may slightly increase the isolation of Subpopulation A. This may be only a minor effect, however, as there already appears to be little dispersal between Subpopulation A and the other subpopulations. Therefore, the chances of immigration to Subpopulation A will continue to be small, with only a little change. Therefore, the overall effects of the project on the CSSS appears to be positive.

Adaptive management

The need for flexibility and future adaptive management should be acknowledged explicitly somewhere. It might need its own small section in the document. The original technical document briefly mentioned use of a structure or two (perhaps one on the L67A) that could be used for adaptive management. While it certainly looks like this additional water should provide substantial benefits to the landscape and wildlife and fishes living therein, there remains a significant degree of uncertainty with any model when compared with full reality (i.e., water quality challenges, climate change, plus surprising hydrologic dynamics, habitat shifts, and species responses).

Citations

Acosta, C. A. and S. A. Perry. 2002. Spatial and temporal variation in crayfish production in disturbed marl prairie marshes of the Florida Everglades. *Journal of Freshwater Ecology* 17: 641-650.

Cattau, C.E., Darby, P.C., Fletcher Jr, R.J. and Kitchens, W.M., 2014. Reproductive responses of the endangered snail kite to variations in prey density. *The Journal of wildlife management*, *78*4: 620-631.

Darby, P.C., DeAngelis, D.L., Romañach, S.S., Suir, K. and Bridevaux, J., 2015. Modeling apple snail population dynamics on the Everglades landscape. *Landscape ecology*, *30*: 1497-1510.

Dorn, N. J. 2010. Final Report: Habitat suitability models for Everglades and Slough crayfish. US Geological Survey Joint Ecosystem Modelling lab.

Dorn, N. J. and M. I. Cook. 2015. Hydrological disturbance diminishes predator control in wetlands. *Ecology* 96: 2984-2993.

McVoy, C. W., W. P. Said, J. Obeysekera, J. A. VanArman and T. Dreschel. 2011. Landscapes and Hydrology of the Predrainage Everglades. University of Florida Press, Gainesville, FL.

APPENDIX B:
SUMMARY OF PEER-REVIEW AND PUBLIC COMMENTS, QUESTIONS, AND DISTRICT RESPONSES ON THE DRAFT TECHNICAL DOCUMENT TO SUPPORT THE CENTRAL EVERGLADES PLANNING PROJECT EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION

This appendix provides a summary of comments and questions from the independent, scientific peer-review panel and the public received before, during, and after the public Everglades Agricultural Area (EAA) Reservoir peer-review session held on May 29, 2020 (agenda attachedbelow). Responses given by the South Florida Water Management District (SFWMD or District) to the comments and questions received during and following the May 29 Sessionpeer-review session are also provided here.

The primary objectivesobjective of the public peer-review session were to receive and respond to comments and questions from the peer-review panel on the technical methods and scientific approaches employed by the SFWMD to develop a water reservation for the EAA Reservoir, as outlined in the April and May 2020 versions of the draft *Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation*. The technical document contains all of the science, data, methodologies, analyses, and scientific and technical assumptions employed in each analysis upon which the water reservation is based.

A secondary objective was to ensure an understanding of the technical guidance provided to the SFWMD to date and hear public comments and questions about the water reservation and draft technical document. All verbal and written comments, questions, and DistrictSFWMD responses given before, during, and after the public peer-review session were reviewed by SFWMD, staff and, where appropriate, they were addressed in subsequent drafts of the technical document.

Schedule
EAA Reservoir Water Reservation
Web-Based Peer Review Session
May 29, 2020

9:00 AM – 9:15 AM	Introductions and Objectives
MORNING SEGMENT:	
9:15 AM – 10:30 AM	SFWMD Presentations • Water Reservations Overview • EAA Reservoir Background/Purpose • Description of Hydrologic Benefits • Description of Benefits to Fish and Wildlife • Identification of Water to be Reserved
10:30 AM – 11:00 AM	Summary of Peer Review Panel Assessment of Draft Technical Document
11:00 AM – 11:45 AM	Additional Peer Review Panel Questions and Comments
11:45 AM – 12:30 PM	**Public Comment (Q &A)** **(All Questions will be Received from the Public via Zoom Q & A Feature)**
LUNCH BREAK:	
12:30 PM – 1:00 PM	Lunch
AFTERNOON SEGMENT:	
1:00 PM – 1:05 PM	Format for Afternoon Session
1:05 PM – 2:00 PM	Collaborative Peer Review Panel Discussion • Development of Final Peer Review Report Outline and Writing Assignments • Development of Outstanding Questions for SFWMD
2:00 PM – 3:00 PM	**Public Comment (Q & A)** **(All Questions will be Received from the Public via Zoom Q & A Feature)**
3:00 PM – 3:15 PM	Wrap Up and Next Steps
3:15 PM	Adjourn

The draft Technical Document is available at https://www.sfwmd.gov/our-work/water-reservations on the ***EAA Reservoir*** tab. **COMMENTS ON THE DRAFT TECHNICAL DOCUMENT ARE REQUESTED TO BE SUBMITTED BY FRIDAY, JUNE 12TH** to Toni Edwards at tedwards@sfwmd.gov. Phone: (800) 432-2045, ext. 6387 or (561) 682-6387.

Comment No.	Commenter	Question/Comment	District Response
Q&A Following Each Presentation and During Public Comment Periods at the May 29 Peer-Review Session			
1	Jim Vaughn	How is this going to clean the water?	**Matt Morrison**: The reservoir will deliver water to the stormwater treatment areas (STAs) to clean the water before it is delivered to the Everglades.
2	Anonymous Attendee	Can you further elaborate on where the 825,000 acre feet of water from the reservoir goes?	**Leslye Waugh**: All ~~the~~ 825,000 acre-feet (ac-ft ~~avg annual~~) during an average water year leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
3	Anna Upton	If 370,000 acre-feet of the 825,000 acre-feet goes to the Everglades, where does the rest of the water (455,000 acre feet) go?	**Lesley Waugh**: ~~The~~ 825,000 ac-ft ~~avg annual is~~ during an average water year is the amount of water that will be leaving the reservoir through the ~~3~~three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the water conservation areas (WCAs) is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000 ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. ~~-~~All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually (water year) leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
4	Shannon Estenoz	What is the process for determining the definition of "protection" in the state statute? Will it match restoration goals or could someone argue that protection is tied simply to some baseline which will be a much lower bar.	**Don Medellin**: ~~Chapter~~Section 373.223(4), Florida Statutes (F.S.), requires that the water be reserved for the protection of fish and wildlife or for public health and safety. ~~-~~In this reservation effort, water is being reserved for the protection of fish and wildlife.~~-~~ Linkages between hydrology and ecology have been established using previous hydrologic modeling (completed ~~with [~~under the Central Everglades Planning Program [CEPP]) and more recent ecological modeling from the United States Geological Survey (USGS; as part of the reservation process) to determine the anticipated benefits to fish and wildlife downstream in WCA-3 and Everglades National Park (ENP). Water discharged from the reservoir through the S-624, S-625, and S-626 structures is the water ~~that is~~ being protected under this prospective water reservation.
5	Dr. Nathan Dorn (Peer Reviewer)	In reference to Leslye's presentation, she mentioned too very large volumes or water at the end of her presentation, 825,000 acre-feet and 370,000 which is related to this project. Can she just explain those two numbers one more time?	**Leslye Waugh**: The 825,000 ac-ft ~~is~~ average annually (water year) is the amount of water that will be leaving the reservoir through the ~~3~~three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. ~~So, the~~The 370,000 ac-ft of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000

Comment No.	Commenter	Question/Comment	District Response
			ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs.
6	Dr. Nathan Dorn (Peer Reviewer)	The 825,000 is already being added?	**Leslye Waugh**: The 825,000 ac-ft average annually (water year) is new water plus existing water that gets stored in the reservoir and released to the three structures to storage features. Of all the water sent to the WCAs, we are increasing that flow by 370,000 ac-ft.
7	Dr. Donald DeAngelis (Peer- Reviewer)	That just means the reservoir turns over 3 times annually?	**Leslye Waugh**: The water levels will be going up and down, so every year it can discharge different volumes.
8	Celeste DePalma	I can't see other people's questions so I don't know if this was already asked but if the Everglades Agricultural Area (EAA) Reservoir annual flow will be 825k ac-ft, does that mean that only 370K ac-ft of water is for the Everglades out of the 825K?	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir ~~to~~via the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000- ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually (water year) leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
9	Celeste DePalma	825-370=455…where does the remaining 455k ac-ft of water go?	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir to the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000- ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. -All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
10	Thomas Van Lent	Will there be a reservation for the water currently going to the EPA in addition to the increment related to CEPP?	**Jennifer Brown**: Historically, the District's water reservations have focused on reserving water associated with restoration projects. However, water that is presently in the WCAs is protected from increased allocations by the Lower East Coast Regional Water Availability Rule found in Section 3.0 of the *Applicant's Handbook for Water Use Permitting within the South Florida Water Management District*.

Comment No.	Commenter	Question/Comment	District Response
11	Ansley Samson	My remaining question is whether there is additional new water in the 825K over the 370K. If so where is it going?	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir through the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000 ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. ~~-~~All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually (water year) leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
12	Celeste DePalma	I don't understand where the remaining 455,000 ac-ft of water goes. If it's not going to the Everglades, who gets that water?	**Lesley Waugh**: I can address it again when we get to the Q&A portion, but it all goes to the Everglades. There's already existing water that goes to the Everglades (some years over 1 million ac-ft~~.)~~.), but the EAA Project adds 370,000 ac-ft average ~~annual~~annually above the existing flows to the Everglades. The 825,000 ac-ft~~. avg. annual~~ average annually (water year) from the reservoir to the ~~Flow Equalization Basin~~flow equalization basin (FEB) and ~~Stormwater Treatment Areas (~~STA~~)~~ is counting existing and new water. The additional flows of 370,000 ac-ft~~.~~ to the Everglades is just talking about new water.
13	Diana Umpierre	Can the modeling data (input and outputs) be put in South Florida Water Management District (SFWMD) FTP site? Thanks.	**Walter Wilcox**: Yes, for the hydrology and water quality data, it is the same material posted back in 2018 during the planning study. We can certainly repost it. Is your question restricted to hydrology, or ecology modeling also? **Fred Sklar**: The USGS ecological modeling data can be placed into a set of directories at the same FTP site Walter mentioned.
14	Anna Upton	Matt, thanks for replying. The discussion didn't answer my question. I understand that 370,000 ac-ft of the total 825,000 ac-ft goes to the Everglades. Where does the rest of the water go?	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir ~~to~~through the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000 ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. ~~-~~All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually (water year) leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.

Comment No.	Commenter	Question/Comment	District Response
15	Diana Umpierre	Why not extend the period of simulation to latest data (more recent years than 15 years ago) given climatic changes that are changing rate of precipitation and drought?	**Walter Wilcox**: Extending the model simulation period is a significant work effort (includes updates to many models, boundary conditions, and climate drivers) and is being finalized for the 1965-2016 period by the Interagency Model Center for the upcoming Lake Okeechobee Systems Operating Manual effort.
16	Matthew Schwartz	During wet years when massive amounts of water are being dumped to the northern estuaries, there is no shortage of water in either the STAs or the WCAs. In fact, they're full. How will you push more water into the STAs during these periods to decrease discharges to the estuaries? STAs are not "inline filters" and dirty water must sit in them to be cleaned.	**Matt Morrison**: During wet years, water will be directed to available storage and treatment. Depending on the extreme of wet conditions and available downstream storage and treatment capacity, some releases to the northern estuaries may still occur. Also note that water does not sit in STAs unless it is extremely dry and we are trying to keep the vegetation hydrated. During normal and wet STA operation, water moves through the STAs for treatment. The storage in the system allows for the metering of steady constant flow across the STAs and helps minimize pulses that occur without storage, which improves treatment capabilities.
17	Diana Umpierre	What's the accuracy of topographic data over the WCAs? Last I recall Light Detection and Ranging (LiDAR) doesn't do well in the WCAs.	**Walter Wilcox**: Topographic data sets used in the various models do not rely on LiDAR, but rather are composite data sets using information from a variety of sources. A general rule of thumb related to topographic accuracy in the Everglades is ±0.5 ft.
18	Anna Upton	Lesley, I see your response to Celeste and appreciate you answering it during Q&A. I understand why, as water managers, you're distinguishing what is "new" water, but if 370,000 acre-feet of the 825,000 acre-feet is going to the Everglades, I would still like to know where the rest of the water (455,000 acre-feet) leaving the reservoir goes.	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir ~~to~~through the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000 ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. -All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
19	Dr. Nathan Dorn (Peer Reviewer)	The colored hydroperiod map Walter just presented, is that an update from the map in the Tech Doc we reviewed earlier?	**Dong Yoon Lee**: Yes, the map presented by Walter Wilcox is different from ones presented in the draft Technical Document. The map in the Technical Document shows selected years representing average, dry, and wet years, while the Walter's map is a grand mean of the entire model simulation period (1965 to 2005). We will put this new map in the Technical Document you reviewed earlier.
20	Dr. Donald DeAngelis (Peer Reviewer)	Are there any upper limits on phosphorus concentrations that will be coming out of the STAs?	**Walter Wilcox**: ~~In the~~During planning, STAs are sized and operated to meet a long--term flow-weighted mean average of 13 parts per billion (ppb) phosphorus. The water quality-based effluent limitation (WQBEL)

Comment No.	Commenter	Question/Comment	District Response
			standard for STA operations allows individual years to exceed this value, up to 19 ppb in a single year.
21	Diana Umpierre	Have the Comprehensive Everglades Restoration Plan (CERP) "goals" been revisited/re-analyzed by RECOVER since 2005? We have more historic and prediction data in the past 15 years.	**Fred Sklar**: CEPP used the most updated information at the time. ~~The~~ The Restoration, Coordination, and Verification program (RECOVER ~~Performance Measures~~) performance measures used to find the "best" restoration plan for CEPP are also used here in our discussion of the need for a reservation. Most RECOVER "goals" were based on predicted ecology using the Natural System Model (NSM).
22	Celeste DePalma	Thank you Leslye. I'm still confused, so if you can break it down even more that would be best. So, we have 825k ac-ft annual average flow (sometimes higher, but let's stick with the 825,000 total for now). If 370,000 out of the 825,000 is new water flowing to the Everglades, what is the 455,000 remaining? Please break down what is existing water in the 455,000 ac-ft and what is still new water out of that remaining 455,000 ac-ft. Thanks.	**Leslye Waugh**: The 825,000 ac-ft ~~avg annual is~~ average annually (water year) is the amount of water that will be leaving the reservoir ~~to~~through the three structures to the storage facilities. It includes existing water and new water brought in by the reservoir. The 370,000 ac-ft ~~avg annual~~average annually of additional water to the WCAs is above the existing water that is provided. So, having the reservoir, we are able to add, across that orange line, 370,000 ac-ft. That is not all the water that is going to the WCAs, that is water above what is going to the WCAs. -All ~~the~~ 825,000 ac-ft ~~avg annual~~average annually leaving the reservoir from the three identified structures to adjacent storage and treatment facilities goes to the Everglades.
23	Jeremy McBryan	Do the modeling results presented today assume the 2008 Lake Okeechobee Regulation Schedule (LORS2008) and the Lake Okeechobee Watershed Restoration Project (LOWRP) in effect?	**Matt Morrison**: The existing conditions baseline (ECB) and future without project are LORS2008. The project does not include the LOWRP, only authorized projects as of 2018.
24	Diana Umpierre	Dong Yoon Lee is doing a beautiful job explaining. Thank you!	**Dong Yoon Lee**: Thank you for your comment.
25	Dr. Donald DeAngelis (Peer Reviewer)	Concerning seaside sparrow, you said the reservoir would improve conditions in subareas C and F. Can you clarify? Concerning the subpop A, under the Everglades transition plan there was some flexibility in how water could be routed through A and B to protect the sparrow during their breeding period. Will that be continued under this new plan?	**Dong Yoon Lee**: Subpopulations C and F are located in eastern marl prairies where reduced hydroperiod and increased frequency and intensity of drought conditions have increased invasion of exotic woody tree species, large fire frequencies, and ultimately vegetation shifts. Under Alternative C240, extended hydroperiods in this highly over-drained region would decrease the potential for large fires and invasion of exotic trees. The Cape Sable seaside sparrow (CSSS) model output also suggests an increase of hydrologic and ecological connectivity between the CSSS critical habitats in eastern marl prairies. **Walter Wilcox**: Regarding Subpopulation A and the Everglades Restoration Transition Plan operations, yes – seasonal closures of the S-12 structures are still used in CEPP operations.

Comment No.	Commenter	Question/Comment	District Response
26	Dr. Nathan Dorn (Peer Reviewer)	Going back to the hydrologic contrast for the different regions....first thank you putting this in here, it's a major improvement. If I understand correctly, for WCA-3A East and WCA-3A South the average max goes down but the average depth goes up a couple tenths due to more water, is that correct? The maximums come down but not the average?	**Dong Yoon Lee**: Correct. Seasonal maximum depth and annual hydroperiod decrease in eastern and southern WCA-3A under Alternative C240 compared to the ECB, likely due to increased water flow under the Alternative C240. However, annual average water depths increase about 0.1 to 0.2 ft in those regions.
27	Dr. Nathan Dorn (Peer Reviewer)	Shark River Slough seems to see the greatest improvement. In Shark River Slough, you can make maybe of 3.5 to 4 mos. of water there. You're not going to make much improvement for crayfish with that amount of water. The majority comes from the north and north Shark River Slough, but the northern WCA-3A both East and West will see the most improvement for crayfish. For wading birds however, the reason this isn't larger...is it because of small losses in the system?	**Dong Yoon Lee**: We agree with the reviewer that crayfish density would increase more in northern WCA-3A than in eastern Shark River Slough (SRS) because of a longer ~~and optimal~~ hydroperiod in northern WCA-3A. However, the abundance of foraging habitat for white ibis increases by a similar extent (10% to 32%) in both northern WCA-3A and eastern SRS. It is difficult to know exactly why increased water flow and likely crayfish density do not result in larger improvements in foraging habitat abundance of white ibis in northern WCA-3A than SRS. This model output is a product of a complex interaction between hydrologic variables and species-specific optimal hydrologic conditions. Therefore, improved prey abundance alone, although it is a very important factor, would not result in a linear, predictable change in foraging habitat abundance.
28	Dr. Nathan Dorn (Peer Reviewer)	So, lots and lots of small negatives over the entire landscape, including Big Cypress?	**Dong Yoon Lee**: Not just negative, but any values between -10 and +10 are included in yellow areas, which occupy most of Big Cypress and coastal Everglades areas.
29	Dr. Nathan Dorn (Peer Reviewer)	About wading bird responses then, why the orange along the L-67 A? What is causing the loss, more than 10% foraging loss? A slight increase in average depth but a decrease in max. Are these areas getting a little deeper? Your ecological evaluations are also hydrologic evaluations, why is it negative?	**Dong Yoon Lee**: A marginal increase in annual average depth likely indicates an overall decline in the accessibility to shallow water, especially for small white ibis, and in prey availability for all wading birds.
30	Dr. Nathan Dorn (Peer Reviewer)	Could we go to the alligator response? The southern WCA-3A response, where it goes negative along L67A, if you look at the left side under existing conditions, that area is marginal for alligators, and it is really deep and becomes a little worse. Why is that? Is it becoming shallower? That needs to be determined. When I look at where the orange/red pattern is, I think we need to understand what causes that. It takes away from how good this water reservation project will be for taxa.	**Dong Yoon Lee**: A long-term average of hydroperiod map presented by Walter Wilcox (which will be added in Figure 4-2) indicates that the southern boundary region of WCA-3A experiences a decrease in hydroperiod between 30 and 60 days under Alternative C240 relative to the ECB. This change likely results in a reduction of the alligator habitat suitability score in the region.

Comment No.	Commenter	Question/Comment	District Response
31	Dr. Nathan Dorn (Peer Reviewer)	As far as the alligator model is concerned it is pretty complex so it will be difficult to figure out what causes the orange areas.	**Dong Yoon Lee**: We will add the new (long-term) hydroperiod map in Figure 4-2. This new map will help explain the ecological model output.
32	Dr. Donald DeAngelis (Peer Reviewer)	For wading birds, there is a paper by (3 authors he mentioned in Restoration Ecology)... is there any connection between what they used and what is being used here?	**Dong Yoon Lee**: The paper is Beerens, Trexler, and Catano (2017). This paper simulated the wading bird foraging index under the full (CERP) and partial (scaled-back CERP) restoration relative to the ECB. They simulated the ecological model over a 36-year period, while we have a longer (41 years) simulation period.
33	Matthew Schwartz	I wasn't accurate when I said water sits in an STA - but the water cannot move through rapidly. Both for the ability to clean it and the ability to retain the vegetation that does the work. But if we look at the wet years when the massive discharges are taking place, I would be interested to hear where "available downstream storage" exists. My own experience in the area - e.g. 4 feet of water in WCA-3A - shows there's is no room for additional input of water south. And there's a struggle to get water out of the WCAs into the canal along Tamiami Trail. If the discharges to estuaries are going to continue during wet years - the district should be accurate in letting the public know how much will continue. Especially since one of the key selling points of the reservoir is its ability to significantly reduce discharges to the estuaries.	**Walter Wilcox**: You are correct that in the current system, there are significant constraints to flow south, and the STAs can experience undesirable high flow conditions. In the future, when the EAA Reservoir and CEPP are constructed, many of the downstream constraints will be reduced (increased capacity at Tamiami Trail, in the EAA canals, etc.), and the flow regimes modeled and contemplated in the EAA project operation of the STAs may be large over the course of the year but are actually reduced during extreme events because of the reservoir and conveyance improvements. All this means that the benefits to the northern estuaries are indeed expected to be realized in the future.
34	Timothy Breen	Matt…so ECB here does not include COP, correct? Thanks.	**Brenda Mills**: Correct. The Combined Operational Plan water control plan was developed after planning for the EAA Reservoir was finished.
35	Heather Tipton	Will copies of these slides be available?	**Toni Edwards**: Yes, the presentation will be posted to our water reservation webpage by the end of next week.
36	Dr. Nathan Dorn (Peer Reviewer)	The NSM suggested that you need something different to maintain ridge and slough systems and tree islands?	**Walter Wilcox**: The NSM identifies a variety of characteristics for the ridge and slough landscape, including depth regimes, sheetflow timing, distribution, magnitude, and extended hydroperiods. These hydrologic characteristics are consistent with many of the indicators for maintaining or avoiding impacts to tree islands, such as avoiding prolonged tree island inundation. Where landscapes have been drastically altered, care is needed to transition over time from the current over-drained landscape to a fully restored ridge and slough landscape to avoid impacts to tree islands as water depths are increased.

Comment No.	Commenter	Question/Comment	District Response
37	Dr. Nathan Dorn (Peer Reviewer)	Was there no way to move water through the northern part of WCA-3B to Shark River Slough?	**Walter Wilcox**: This option was explored as one of the alternatives in the original CEPP study, but the Blue Shanty Flow-way option was a better performing option and helped overcome the large seepage gradient east of WCA-3B.
38	Dr. Nathan Dorn (Peer Reviewer)	Is there a target for marl prairies beyond the seaside sparrow?	**Fred Sklar**: The target for the marl prairie model is solely for the CSSS. However, it does not have a numeric target for the sparrow. It is a habitat suitability index. It uses the hydrologic requirements for the CSSS nesting plus the hydrologic requirements for the growth of Muhly grass to predict the ability of the hydrologic cell to support CSSS.
39	Thomas Van Lent	If my previous question was answered, I think I missed it. So, let me repeat it in a different way. The ecological results were predicted on the cumulative flows and operations for the entire Central and Southern Florida Project (C&SF) including CEPP and the EAA reservoir. However, the reservation apparently is only for outflows for the EAA reservoir. If the simulations were done with only this water, the outcomes would presumably be different. How is the reservation made that will protect the ecological responses shown here, which is for much larger amounts than just the outflows from three EAA reservoir structures?	**Jennifer Brown**: The goal of this reservation is not to protect all the water driving the ecological responses, but rather to protect the water sent through this specific project feature for the benefit of fish and wildlife (i.e., the EAA reservoir outflows structures). Other state rulemaking already protects the other elements of the water budget through restricted allocation rules.
40	Diana Umpierre	Just checking if I understand, is the water reservation being proposed 370K ac-ft on average annual?	**Don Medellin**: The scope of this reservation includes the water discharged from the S-624, S-625, and S-626 structures from the EAA Reservoir. The annual average water year discharge from these three structures is predicted to be 825,000 ac-ft. This is the water needed for the protection of fish and wildlife.
41	Matthew Schwartz	Other question I had has to do with the reservations of water - someone said that existing water use won't be impacted. So, for example, a city like Pembroke Pines in Broward has a consumptive water use permit of about 16 million gpd. If we're in a low water period, the districts' Basis of Review document allows the district to allocate a CERP project for the public water supply. Will that be happening with water in the reservoir during the low water periods which are a regular part of South Florida's climate.	**Don Medellin**: Consistent with the statute, the modeling associated with this project takes into account existing legal users (all use classes) through a wide variety of climate conditions (both wet and dry) during the period of record. Slide #6 from my first presentation indicates that water reservations do not "drought-proof" the natural system. In accordance with the District's water shortage plan, the District's Governing Board can implement water shortage cutbacks during a declared drought. Existing legal users would be required to reduce their uses depending on the severity of the drought and the phase of water restriction (Phases 1 to 4). Some CERP projects are designed to provide water to the natural system as well as to reasonable-beneficial uses. When such CERP projects are constructed and have been determined

Comment No.	Commenter	Question/Comment	District Response
			operational by the Governing Board, water may be available to meet reasonable-beneficial uses.
42	Diana Umpierre	On my end, I was just thinking of the hydro and water quality (WQ) modeling data, but there's value to also see the eco models. Also, I wasn't sure if there were any new runs since the draft Environmental Impact Statement (EIS) was posted on FTP back in March 2018. Thanks. (P.S. The link to modeling results is no longer valid...goes to an old ftp site.) httsp://www.sfwmd.gov/our-work/cerp-project-planning/eaa-reservoir.	**Walter Wilcox**: Okay, we will get it uploaded again. The FTP site is not permanent, but the hydrologic and water quality data have ~~also~~ been uploaded to the Statewide Model Management System available on the SFWMD site.
43	Jim Vaughan	How is the STA cleaning the water with the volume that is coming in?	**Walter Wilcox**: The project STAs are constructed wetlands and are sized and operated to meet a long-term flow-weighted mean average of 13 ppb phosphorus. Checks are made with the Dynamic Model for Stormwater Treatment Areas (DMSTA) to ensure proper sizing across a wide range of hydrologic conditions, including wet years when large volumes of inflow are treated.
44	Diana Umpierre	Follow up question to my DEM question, is the latest DEM from USGS being used for the EDN DEM updated in 2011? See below https://sofia.usgs.gov/eden/models/groundelevmod.php.	**Walter Wilcox**: I believe that this is correct for the ecological models. It would be best to verify with the Joint Ecosystem Modeling group (www.jem.gov).
45	Nyla Pipes	With so many people upset about the releases to the Northern Everglades, many believe that the EAA Reservoir is going to stop those releases. Can you please clarify how much relief will be gotten from the estuaries from the EAA Reservoir ALONE without all the other authorized projects?	**Walter Wilcox**: No one project will fully address the problem of Lake Okeechobee releases to the northern Everglades estuaries. A combination of many projects (e.g., Indian River Lagoon South, the C-43 Reservoir, the EAA Reservoir/CEPP, LOWRP) will be needed to significantly improve conditions, and even those actions will not stop all releases. Using information from the CEPP Post Authorization Change Report (PACR), the CERP goal is to reduce Lake Okeechobee high-discharge months by 80% relative to current conditions. Already authorized projects (e.g., Indian River Lagoon South, C-43 Reservoir, original CEPP) could achieve a 39% reduction. With the addition of the EAA Reservoir, this is improved to an overall 55% reduction. Other projects like LOWRP can continue progress toward the CERP goal.
46	Timothy Breen	Will water from the reservoir be used to maintain canals in the EAA and will that water be used for water supply? If so, how much of the water?	**Don Medellin**: Yes, as described in the PACR, the S-628 structure may periodically provide discharges into the inflow/outflow canal to help stabilize water levels in the North New River and Miami canals. This water is available to existing legal users.
47	Diana Umpierre	Re-phrasing my follow up question (had bad grammar). Is the latest DEMs used in models using the latest from USGS	**Walter Wilcox**: The Everglades Depth Estimation Network (EDEN) digital elevation model is what is largely used in the ecological models.

Comment No.	Commenter	Question/Comment	District Response
		EDN DEM updated in 2011? Per the link below? https://sofia.usgs.gov/eden/models/groundelevmod.php	The hydrologic models used the SFWMD digital elevation models informed by the USGS High-Accuracy Elevation Dataset (same basis as for EDEN).
48	Jim Vaughan	How much is this going to cost? And why can't we spend a fraction of that and clean Okeechobee and get to the heart of the problem then send it south.	**Brenda Mills**: Beyond the scope of this meeting.
49	Diana Umpierre	I'm sorry I am still so confused…my apologies. I understand the tech doc says water from S-624, 625, and 626 is proposed to be reserved, but not from S-628, but that still does not say how MUCH water from those 3 structures would be reserved…can you clarify again?	**Don Medellin**: The water discharged from the S-624, S-625, and S-626 structures is 825,000 ac-ft of water on an annual average basis. This is the water that is needed for the protection of fish and wildlife downstream. Please see slides 19 and 63 in the presentation material from the peer-review session.
50	Matthew Schwartz	We now have miles of completed bridging over Tamiami Trail. This wet season is predicted to be very active. Can we expect to see lowered water levels in the WCAs this - in support of the idea that there will be room to move additional water south?	**Brenda Mills**: Each month at the Governing Board meeting, John Mitnik, Assistant Executive Manager, gives a water conditions report. This is the best forum to hear how we have responded or plan to respond to water conditions.
51	Ansley Samson	Just trying to understand better the "protection plan" for the reserved water. I understand the regional water availability rules; are there additional protection mechanisms?	**Don Medellin**: Yes, this water reservation provides an extra level of protection above the existing Restricted Allocation Area rules to ensure the water is protected for fish and wildlife.
52	Diana Umpierre	Per Table 6-4 of the draft EIS (PACR) by SFWMD, the TSP only reduces high volume to St. Lucie estuary (above 2000 cubic feet per second) (cfs) by only 7 months (basically still predicting 49 months of high volume discharges). So, I guess to follow up on another question, what else in CERP will address those?	**Walter Wilcox**: Most of those events are basin runoff events, so they are handled by the Indian River Lagoon project. The remaining lake pieces after the EAA ~~reservoir are~~Reservoir will be improved by the ~~Lake Okeechobee Watershed Project.~~ LOWRP. **Leslye Waugh**: Diana, see Section 6.3 of the PACR and Table 6-7 that shows the effectiveness of the PACR and LOWRP in achieving the CERP goal for the Northern Everglades.
53	Dr. Donald DeAngelis (Peer- Reviewer)	Tree islands - one place in the Executive Summary you say something about hydrologic improvements will restore habitats including tree islands, but you don't really say anything about tree islands in the body of the Tech Doc. Do you really mean "maintain" tree islands? You also say in central WCA-3A conditions are good. Does that reflect the situation now? Data on tree islands from 1940 to 1995 really shows a decline. If there is no creation of new tree islands proposed then is it really "maintaining" as opposed to "restoration" of tree islands?	**Fred Sklar**: Tree island protection and restoration is not part of this Technical Document because it is not directly pertinent to the discussion of fish and wildlife. None of the fish and wildlife models use tree islands to predict ecological response. Note: There is no performance measure for tree islands in CEPP, instead there is a threshold of depth and duration that is considered harmful to tree islands. In CEPP and the ~~CEPP~~ PACR, the ridge and slough performance measure was used as a surrogate for healthy and restorative tree island habitat.

Comment No.	Commenter	Question/Comment	District Response
54	Dr. Nathan Dorn (Peer Reviewer)	Staying on tree islands and Fred Sklar's response regarding adaptive management…is there uncertainty in terms of flow, the actual hydroperiods we will generate, ponding depths, etc. What are the options for adaptive management in the system?	**Fred Sklar**: No model is without uncertainty. The CEPP Adaptive Management Program has identified ~~a number of~~numerous management options associated with tree islands~~,~~ as well as sloughs and ridges that may need to be implemented if actual flows or ponding depths are neither protective nor restorative. These include incrementally increasing inflows and depths in WCA-3B to allows tree islands to acclimate to the deeper water needed for slough restoration and ~~a number of~~several construction options for plugging the Miami Canal with tree islands.
55	Dr. Nathan Dorn (Peer Reviewer)	Walter, you also explained in WCA-3B there is a lot of leakage to the east. Was that surprising and are there other places that are surprising in the system when you add 370,000 ac-ft of water?	**Walter Wilcox**: The WCA-3B dynamics were not surprising due to observations from past project efforts (including the Modified Water Deliveries project) that encountered these issues. Certainly, there are other areas of high uncertainty that will require careful monitoring as additional restoration flows enter the Greater Everglades. These include the interactions between central and western Everglades and the dynamics of overland flow between Northeast Shark River Slough (NESRS) and Taylor Slough.
56	Dr. Nathan Dorn (Peer Reviewer)	Dong Yoon in your presentation, you labeled the western Shark River Slough, getting close to the sparrow there, as "over wet". Are you saying this from a natural systems perspective or a sparrow perspective?	**Dong Yoon Lee**: When the regions in the table were coded with different colors, I labeled them from a natural systems perspective, not from a biological perspective. However, when I labeled western SRS, I mixed the two perspectives to emphasize the current hydrologic condition specifically on Subpopulation A. This point should have been explained during the presentation.
57	Dr. Nathan Dorn (Peer Reviewer)	Will this presentation be available to us while Dr. DeAngelis and I write the Final Peer Review Report?	**Don Medellin**: Yes, the presentation will be made available to you after the session.
58	Dr. Nathan Dorn (Peer Reviewer)	What is the best format for the Final Peer Review Report?	**Don Medellin**: The format and length is at the discretion of the peer-review panel as this is an independent, non-biased peer review.
59	Dr. Nathan Dorn (Peer Reviewer)	What should we expect to have from the District side before we can finalize the report? Today's presentation, Q&A from the public, and a matrix of responses to our written reviews?	**Don Medellin**: The District expects to provide the peer-review panel two deliverables: (1) a question and answer matrix that addresses each of the peer reviewers questions and comments along with responses from the public peer-review session today; and (2) a copy of the SFWMD's presentation material that addressed some of the panel's preliminary questions/comments. The SFWMD also will provide the panel a copy of all public comments (due June 12) received prior to the final report being published. All this information can be taken into account by the peer-review panel before the final peer-review report is completed.
60	Dr. Donald DeAngelis (Peer Reviewer)	How will this segment of today's session proceed?	**Don Medellin**: Keep your microphones open so we can hear the dialogue between you and Dr. Dorn, and if additional questions arise, SFWMD staff are here to answer them.

Comment No.	Commenter	Question/Comment	District Response
61	Matthew Schwartz	Tree islands are the base for terrestrial wildlife in the historic Everglades. Is it possible to restore tree islands without restoring sheetflow? Most of what we're discussing today is artificially moving water from one chamber of the system to another - via canals. Very different than sheetflow. All the science I've seen on tree islands says that the historical flow was as important as water levels now (too much or too little) - and that lack of flow has been responsible for much of the degradation of the tree islands.	**Fred Sklar**: Flow is responsible for distributing nutrients from the head to the tail of a teardrop-shaped tree island. It is thought that these nutrients help islands manage the stresses of very long hydroperiods. However, islands can do relatively well in low-flowing systems as long as depths and inundation rates are "healthy." The northern islands in WCA-3A can be restored if depths are increased, and the southern WCA-3A islands can be restored if hydroperiods are decreased. Despite these improvements, for long-term sustainability of the system, flows should increase.
62	Jim Vaughan	With Florida's hot temperature, what will keep this 23 foot deep reservoir from stratifying? Anaerobic conditions cause many negative water related issues alone.	**Fred Sklar**: The high turnover rate that was mentioned this morning and described by Walter Wilcox help to prevent stratification. In addition, the relatively shallow depth of the reservoir (even 20 ft) and high temperatures of South Florida reduce risk of stratification relative to other water bodies in other parts of the U.S. **Tom James**: Turnover can reduce the effects of stratification, especially if water levels change substantially. Wind-generated waves, due to the fetch and the summer afternoon increase in winds, will support water mixing and sediment resuspension. This is based on the dynamic ratio that is greater than 0.8 for this reservoir (see Havens, K.E., K.-R. Jin, N. Iricanin, and R.T. James. 2007. Phosphorus dynamics at multiple time scales in the pelagic zone of a large shallow lake in Florida, USA. Hydrobiologia 581:25–42). This dynamic ratio is calculated as the sqrt(area in km)/depth in meters. ~~Or~~For example, assuming the EAA Reservoir is 10,100 acres (40.5 km^2) from scenario R240 (https://www.sfwmd.gov/sites/default/files/documents/pres_2017_1221_eaa_res_public_meeting.pdf) and the 20-ft (6.1-m) depth, ~~(6.1 m),~~ ~~SQRT~~sqrt(40.9)/6.1 = 1.05. With the prevailing afternoon winds and the high dynamic ratio, the potential for stratification, even ~~for~~at high temperatures during the summer, are relatively low.

Comment No.	Commenter	Question/Comment	District Response
Q&A During the *Summary of Preliminary Peer-Review Comments* Segment of the May 29 Peer-Review Session			
63	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Ponding Depths/Hydroperiods Comments and Questions: What are the targets?	**Walter Wilcox**: Related to the targets, from a ponding depth perspective, there is a ridge and slough RECOVER performance measure, and that's where this concept of NESRS comes in. In the development of that performance measure, the RECOVER landscape scientists looked through the available NSM data and, bringing other lines of evidence about the characteristics of the pre-drainage system as understood through observation and landscapes dynamic formation processes, identified a location in NESRS, which we call Indicator Region (IR) 129 as the most representative ~~of~~ hydrologic time series of the type of conditions that would promote and sustain ridge and slough landscapes. So from a restoration perspective, because the Greater Everglades was a rather uniform, spatially homogeneous ridge and slough landscape over the WCAs as well as the ENP, the target for that particular ridge and slough performance measure is indeed the water depths that were observed in NESRS in the NSM data, but extrapolated across the entire system. So, essentially, we're looking for similar water depths as a full restoration target in southern, central, and northern WCA-3A as well as ENP. I'm not sure that comes across fully in the Technical Document. There were some questions related to that. I want to make sure that was in context of ~~essentially that~~ that target as one of the performance measures that gets combined with the others, including some of the ones I showed earlier ~~with~~: soil oxidation and sheet flow, distribution, timing, and magnitude. So, it's not a one size fits all. We're not just trying to make the water depths across the system as deep as the pre-drainage NSM data, but that is one of the considerations that goes into the composite picture of how we restore the Everglades. Those targets become kind of a shooting point, and I would say they are somewhere deeper than central WCA-3A in the current system. Maybe closer on average depth to what is in southern WCA-3A, but they don't have those extreme high peaks, as indicated by Dong Yoon's information, that are caused by the unnatural impoundment in southern WCA-3A. From the perspective of target depths, they are generally deeper than analogue locations like central WCA-3A in the current system, but they have somewhat less high depth variability to avoid inundation of tree islands and detrimental effects from excessive high water for long durations.

Comment No.	Commenter	Question/Comment	District Response
64	Dr. Nathan Dorn (Peer Reviewer)	Ponding Depths/Hydroperiods Comments and Questions: In the absence of that perspective of the NSM, I was sort of forced to think about this relative to existing analogue conditions in other parts of the system, as you said, and it looked to me like the projection is that you're going to get to the levels of the central Everglades WCA-3A, but not to southern WCA-3A. I guess what you're saying is the NSM that you were originally looking at suggested that you should be trying to make something even deeper to maintain ridge and slough systems and tree islands, is that correct?	**Walter Wilcox**: Yes, that is correct. The overall restoration target is still a little bit deeper than what the CERP program or the EAA Reservoir is able to fully achieve. So, we're almost at 100% of what CERP envisioned and we're significantly improved over the current system, but if you go by that ridge and slough target, defined by RECOVER, there is still some additional depth systemwide that would be beneficial to the landscape.
65	Dr. Nathan Dorn (Peer Reviewer)	Ponding Depths/Hydroperiods Comments and Questions: I think that covers most of my questions. I do have one last question, given you're not quite at the depth you wanted, was there no way to channel or move more water through the northern part of WCA-3B and bring it down into Northeast Shark River Slough, given that WCA-3B changes a little bit, but not at all in the north?	**Walter Wilcox**: Leslye mentioned earlier that there were a number of different plans looked at as part of the reservoir study. There also were ~~also a number of~~several different plans looked at as part of the original Central Everglades study. ~~So, there~~There were four primary alternatives that handled WCA-3B in different ways. The one that we landed on is what you see in the plan as the Blue Shanty Flow-way, which kind of compartmentalizes WCA-3B, but there were other options that attempted to send water through WCA-3B or distribute water more across the landscape ~~kind of~~ consistent with that natural flow pattern ~~that~~ I showed. The challenge comes ~~that~~ when you put water in WCA-3B in today's system. WCA-3B is significantly more degraded than other parts of the natural system, so you can't just return it to pre-drainage depths and expect to have successful outcomes. You have to go into some type of transition plan, and in addition to that, because of the manmade features, there's a pretty strong seepage gradient from west to east. So, when you put water in WCA-3B as much as the landscape indicates it should flow south into ENP, the reality is that a lot of that water is drawn to the east and toward ~~the~~ developed areas that are kept at a lower water level for flood protection ~~and people living there.~~. So, there are significant challenges with fully restoring WCA-3B, and the Central Everglades is ~~kind of~~ the first step in that transition process. The compromise ~~the team wound up with~~ was building the Blue Shanty Flow-way, restoring that portion of WCA-3B to something closer to a natural system target, and rehydrating the remainder of WCA-3B to begin the restoration process, but then setting up ~~some kind of~~a subsequent planning effort that would have to further expand on those benefits.

Comment No.	Commenter	Question/Comment	District Response
66	Dr. Donald DeAngelis (Peer Reviewer)	Ponding Depths/Hydroperiods Comments and Questions: I think that covers Ponding Depths/Hydroperiods pretty well.	Acknowledged.
67	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Future Modeling Comments and Questions: Are there plans to extend the hydrologic simulations beyond 1965-2005?	**Walter Wilcox**: The short answer is yes, but not in this process. The Interagency Modeling Center~~, as I said,~~ supports the overall CERP program~~,~~ and has been working on a data extension update ~~and we~~. We have models that now run from 1965 through 2016. They include many of the more recent years in the period of record, including some pretty substantial droughts, and the 2015 super El Niño event. That period of record will be used in upcoming planning work, including the development of the new Lake Okeechobee regulation schedule. From the EAA modeling perspective, I think that this plan has already been authorized, and there is no plan right now given limited resources to update the modeling for this project specifically. However, I would expect at some point in the future, as we continue developing restoration plans and with the additive nature of how we do it—we start with what is authorized then add another piece to the puzzle—that will facilitate at some point in the future extending these project features into the extended period of record. We'll have that information available, it just won't be done under the umbrella of the EAA Reservoir project. **Don Medellin**: Walter, when you say "authorized", you mean authorized by Congress? **Walter Wilcox**: Yes.
68	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Coastal Salinities/Mangrove Movement Comments and Questions: Are there quantitative estimates available on the possible effects on coastal salinities, which can counter mangrove inland movement? Can you use the MANTRA Model?	**Dong Yoon Lee**: So, for the first question about coastal salinities and mangrove inland encroachment, yes, in the CEPP PACR, the salinities for different locations in Florida Bay were estimated from a stage nonlinear regression and the model-predicted salinity should decrease on average by 1.5, reduce the possibility of seagrass die-off, may change the community composition in the area close to the coastal area, increase water flow, decrease land migration of the mangrove forest, and potentially slow down saltwater intrusion into the freshwater marsh. However, these data are not presented here because there are no models approved by the United States Army Corp of Engineers (USACE) to predict the effect of this on fish and wildlife in Florida Bay.
69	Dr. Donald DeAngelis (Peer Reviewer)	Coastal Salinities/Mangrove Movement Comments and Questions: I have no other questions about Coastal	Acknowledged.

Comment No.	Commenter	Question/Comment	District Response
		Salinities/Mangrove Movement. Dong Yoon's answer was a good one.	
70	Dr. Nathan Dorn (Peer Reviewer)	Cape Sable Seaside Sparrow Habitat Comments and Questions: Is there a target for marl prairies beyond the Cape Sable Seaside Sparrow or is that pretty much it? Is it a Cape Sable Seaside Sparrow target?	**Fred Sklar**: The marl prairie, of course, has ecological benefit, but the modeling is essentially done to predict suitable habitat for the CSSS. The modeling is not being done to evaluate potential habitat use, for example, for crayfish. Built into that model are some characteristics that would make it beneficial for the CSSS, including the number of dry days needed by the sparrow, but also the hydrologic requirements of the grass itself.
71	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Cape Sable Seaside Sparrow Habitat Comments and Questions: Changes in vegetation or timing of water depth during the Cape Sable Seaside Sparrow breeding season is not clear.	**Dong Yoon Lee**: Detailed water depth change can be found in the CEPP PACR, Appendix C.2.1, page 27. I can provide more information later. We will consider adding more data and figures to clarify this issue. We will also divide the current marl prairie section, as Dr. Dorn suggested, into two separate sections: one for the coastal marl prairie and one for the CSSS.
72	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Joint Ecosystem Modeling Comments and Questions: More detail needed to understand what the models are based on (habitat suitability, average yearly conditions, hydrologic structure, etc.)	**Dong Yoon Lee**: Agreed. We will add much more information, especially for wading birds. I will make sure all this information is included. **Fred Sklar**: I want everyone to realize that Dr. Lee was originally instructed to not duplicate everything that was in the CEPP PACR appendix on all the output associated with evaluating alternatives. The goal here was not to have a massive 200-page Technical Document that would give you all the detailed information. I just want him to know that, in the opinion of most people, he did an excellent job of capturing the highlights of the model output, and like he said, he will capture a bit more to satisfy the needs of the panel.
73	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Joint Ecosystem Modeling Comments and Questions: Consider using the crayfish model developed by the USGS.	**Dong Yoon Lee**: For the crayfish model, it is a very good suggestion, but this might not be possible because all the modeling for this water reservation rule should be consistent with the models that were used to get Congressional approval for CEPP and the CEPP PACR. So, it might not be possible to use another crayfish model.
74	Dr. Donald DeAngelis and Dr. Nathan Dorn (Peer Reviewers)	Difference Maps/Ecological Evaluations Comments and Questions: Synthesizing some of the ecological responses with the hydrological responses was challenging because of differences in evaluation periods. Is there a way to standardize?	**Dong Yoon Lee**: We understand the difficulty in comparing ecological outputs between the targeted species. Although inconsistent spatial and temporal domains would primarily cause this problem, the way we present the model output is consistent with the CEPP PACR. Clarifications will include narratives associated with selected rainfall years and justification for differences in the spatial or temporal domain of the model output.

Comment No.	Commenter	Question/Comment	District Response
75	Dr. Nathan Dorn (Peer Reviewer)	Difference Maps/Ecological Evaluations Comments and Questions: Actually, I think the evaluation he did here in the presentation was extremely helpful. I think the challenge just came in trying to synthesize some of the confusing responses. Obviously, those ecological models for the birds, for example, are much more complicated, but it gave me pause about exactly those spatial regions, which are not necessarily covered in detail in the hydrologic analysis, those regions where the birds declined. I think that is where a lot of the questions in my mind came up, and then a few of the evaluations jump between an average year vs. the average of the period. I spent a lot of time trying to figure out what the average year looks like, where a dry year, or if all the benefits come in dry years or if the benefits are coming in wets years, or something like that. I do think the presentation was a great improvement. I kind of agree with you, I don't know that I want all the detail of these models in another 40 pages of the Technical Document, but maybe a little bit more to try to explain where some of those spatially negative effects for the birds or other taxa might be coming from, what aspect of the hydrology that is drive that.	**Fred Sklar**: Yes, I agree, and we are going to do exactly that.
76	Dr. Nathan Dorn (Peer Reviewer)	Difference Maps/Ecological Evaluations Comments and Questions: Sometimes when there is a negative proportional effect, it is happening in an area that is already kind of bad, or the absolute effect is maybe not all that significant because the organism doesn't use the area anyway. I think the difference is a nice way to do it, but I think the change between average years, wet years, and dry years vs. the period of record made some of the responses challenging to understand.	**Dong Yoon Lee**: Yes, we will add a map presenting absolute density or index.

Comment No.	Commenter	Question/Comment	District Response
77	Dr. Nathan Dorn (Peer Reviewer)	Crayfish Suitability Model Q&A Comments and Questions: I think this has pretty much already been addressed, but I will say, seeing the hydroperiods, I think Dong Yoon showed us the hydroperiods for the eastern marl prairies, so I think we've seen that. It was close to what I was guessing it was from the map (Figure 4.2) although I think that map is going to change based on what was shown earlier as well, to an average for the period, or for a longer period. So, I think that has been evaluated. In terms of the western marl prairies, it sounds like that is primarily going to be an issue for western Everglades restoration based on what Walter Wilcox said. It would be nice to see some regions in the marl prairies because, of all those indictor regions that are in that map that has been used for evaluating the restoration, there is nothing in the marl prairies. All you can really read is down the middle of Shark River Slough, like it's a pipe, just to put it bluntly. However, there are wetlands all around in Everglades National Park that are never really evaluated. So, I think I know what roughly the eastern marl prairies where the expected benefit comes, I know what that is going to look like. So, I don't know if I'm amending my question or just suggesting for maybe the future that we have to think about that western marl prairie, but maybe not for this project.	**Walter Wilcox**: Just to give you an indication of one of the reasons why there is such a focus on going down the pipe in SRS, as you said, is because a number of the metrics defined by RECOVER are specific to the ridge and slough landscape. I think there is greater availability of graphics and data for some areas as opposed to other areas. If we're looking at information from the marl prairies, it will probably be a little different in look and feel because those IRs (e.g., IR 140) kind of flank the slough locations, but they don't typically generate the same types of graphics or metrics because you're not evaluating relative to a ridge and slough target, you're evaluating to other defined targets that are dominated by the marl prairie CSSS metrics that were discussed earlier. If we do something for the marl areas, it likely will be a little different and still have some challenges in cross-comparing.
78	Dr. Nathan Dorn (Peer Reviewer)	Crayfish Suitability Model Q&A Comments and Questions: So, Walter would you still be able to extract hydroperiod data from it?	**Walter Wilcox**: Yes, I think hydroperiods and unaltered or unnormalized ponding depths are pretty straight forward, and those come directly out of the model. The challenge comes when you look at something like the IRs with different assumptions for how you are normalizing, and then what you're reference elevation is for normalizing your depths, for example. That's where it gets a little apples to oranges, but in terms of raw hydrologic data, we can certainly show you what's happening in those areas and what to expect—it seems like you're most interested in median water levels, hydroperiod, and recession below ground characteristics—those can be summarized pretty easily.
79	Dr. Donald DeAngelis (Peer Reviewer)	Water Quality – Phosphorus Comments and Questions: I think these questions were sufficiently addressed.	Acknowledged.

Comment No.	Commenter	Question/Comment	District Response
Q&A on Peer-Review Panel Preliminary Written Reviews of the Technical Document (April 2020)			
80	Dr. Donald DeAngelis (Peer Reviewer)	What is meant by Flow transect (Figure 1-6)?	**Clay Brown** and **Walter Wilcox**: The CEPP flow transects in Figure 1-6 represent "simplified transition boundaries." Each flow transect helps water managers/planners quantify flow between compartmentalized areas and measure performance of proposed features/operational changes to the system. **Dong Yoon Lee**: The plan formulation strategy for CEPP consisted of multiple formulation phases. It started with a consideration of measures north of the Everglades in the EAA (red line) to capture, store, and deliver water south to the Everglades. The sequential formulation considered measures for redistributing water within WCA-3A (south of the red line), creating additional hydrologic connectivity between WCA-3A, WCA-3B (green line), and ENP (blue line), and effectively managing seepage along the eastern boundary of the Everglades (yellow line). More detailed information regarding the formulation, evaluation, and selection of the model is provided in the CEPP Project Implementation Report (PIR) (see CEPP_PIR_P81.pdf).
81	Dr. Donald DeAngelis (Peer Reviewer)	What is meant by Lake Okeechobee Service Area (LOSA) (Page 10)?	**Clay Brown** and **Walter Wilcox**: LOSA, on page 10, refers to permitted water users (typically agriculture or public water supply demand) that draw water from Lake Okeechobee for supplemental deliveries. The basins are geographically located near Lake Okeechobee (provided figure of LOSA showing the North Shore, Caloosahatchee, St. Lucie, and EAA basins). **Alberto Naya**: See two attachments (vol_iii_water_use.pdf and vol_iii_water_use-2.pdf), which cover the regulatory definitions for LOSA. The short definition (briefly summarized in the first attachment and expanded in the second) is that LOSA is the area served by withdrawals of surface water from Lake Okeechobee or its hydraulically connected systems. The second attachment is the LOSA Rule, which is a component of the recovery strategy for the Minimum Flow and Minimum Water Level (MFL) for Lake Okeechobee. The LOSA Rule describes the criteria required for permit applicants to demonstrate that requested allocations will not cause a net increase in the volume of surface water withdrawn from Lake Okeechobee over the base condition water use for each water use classification and potential offsets. In addition, it explains how the base condition was derived as a result of the LORS2008. Lastly, a regulatory map of LOSA is provided.

Comment No.	Commenter	Question/Comment	District Response
82	Dr. Donald DeAngelis (Peer Reviewer)	Pump station S-7 is not labelled in Figure 1-6, as far as I can see. It should be at the juncture of L5 and L6.	**Leslye Waugh**: Figure 1-6 depicts the components of CEPP. CEPP does not propose any changes to the S-7 pump station, so it is not shown as a feature on the map.
83	Dr. Donald DeAngelis (Peer Reviewer)	It is stated that "Alternative C240 achieved 97% of the CERP goal over the 36-year period of record available from RECOVER. Consistent with CEPP, Alternative C240 was modeled and analyzed over the longer 41-year period of record (1965 to 2005) to evaluate effects of the PACR. Alternative C240 provides an increase of approximately 370,000 ac-ft in average flow to the Central Everglades, exceeding the CERP goal of 300,000 ac-ft. That is a substantial difference. Are there any specifics on the changes under PACR that provided this improvement? On page 21 it is stated that "more refined modeling tools were used to evaluate Alternative C240." Does that mean that the increase in mean flow is simply a result of more accurate modeling?	**Walter Wilcox**: These are not differences due to accuracy in modeling, they are a reflection of different periods of simulation. The C240 scenario, when summarized over the simulation period from 1965 to 2000, sends just under 300~~kac~~,000 ac-ft more water per year (97% of the CERP goal) into the Greater Everglades ~~when~~ compared to the current condition. The same C240 simulation, when averaged over the 1965- to 2005 period of simulation, shows an average annual increase of 370 ~~kac~~,000 ac-ft compared to the current condition. While this average annual increase is dramatic, it is explained by the fact that the additional simulation years are generally wet conditions with frequent hurricanes, and the delta to the baselines are more significant ~~since~~because the baseline cannot convey water south (no storage or conveyance capacity) while the CEPP ~~&~~and EAA condition can convey substantial volumes.
84	Dr. Donald DeAngelis (Peer- Reviewer)	This is an accurate overview of existing conditions. However, it mentions only the effects of changes in hydrology on the current condition of the Central Everglades Watershed. It does not explicitly mention the detrimental effects that phosphorus inflow from the EAA has had in the changes that have occurred in vegetation.	**Sue Newman**: The effects of phosphorus on the Everglades are mentioned ~~further on~~later in the document. **Naiming Wang**: Any amount of additional water discharged to WCA-~~-~~3A would increase the total phosphorus load. But the long-term flow-weighted mean concentration of total phosphorus is expected to be below 13 ppb, which is comparable to natural background level. **Don Medellin**: The statutory authority granted to the SFWMD's Governing Board under Chapter 373.223(4), F.S., is limited to the protection of fish and wildlife and public health and safety.
85	Dr. Donald DeAngelis (Peer Reviewer)	Are there any future plans to extend the hydrologic simulations beyond 1965-2005? The 1965-2005 period is certainly long enough to encompass a variety of hydrologic conditions, but if there have been any long-term trends in environmental conditions, the inclusion of more recent years might be useful for forecasting.	**Clay Brown** and **Walter Wilcox**: For this project, there are no plans to extend the simulation beyond 2005 at this time. The period of simulation from 1965 to 2005 does capture extremes of the El Niño Southern Oscillation (ENSO), which is an important climate indicator. It captures the 1970-1975 droughts and the brief El Niño (wet period) in 1972. Other notable droughts captured in the period of record include: 1985, 1988, 1998-1999, and 2001. This period of record also captures significant rainfall events, including: 1969, 1983, 1994-1995, 1997 (the highest El Niño event on record), and the 2004-2005 hurricane season. For future planning efforts, including the upcoming Lake Okeechobee System

Comment No.	Commenter	Question/Comment	District Response
			Operating Manual update, the simulation period is being extended through 2016 by the Interagency Modeling Center.
86	Dr. Donald DeAngelis (Peer Reviewer)	This figure shows tremendous increase in flows into WCA-3B. Do the arrows pointing two ways represent that flow can go either way through L-29?	**Walter Wilcox**: Increased inflows to WCA-3B are expected because CEPP constructs three structures that will convey water into WCA-3B. The goal is not only re-hydrate a large portion of WCA-3B, but also to convey water through WCA-3B into northeastern ENP consistent with the historical flow path. **Raul Novoa** and **Sandeep Dabral**: Arrow direction represents the flow direction based on the annual average calculation. Structural flows can only go in one direction, as specified in the figure. For groundwater and levee seepage flows, it is possible, on a daily time step, for flows to go either direction, depending on the head difference. **Dong Yoon Lee**: We will consider revising the caption of Figure 4-11 according to the response from Raul Novoa and Sandeep Dabral.
87	Dr. Donald DeAngelis (Peer Reviewer)	Also, I have a question concerning the ponding depth and duration curves. Does "normalized" refer to division by the number of days in period of record?	**Clay Brown** and **Walter Wilcox**: In this context, a "normalized duration curve" refers to a duration curve relative to land surface elevation. The intent is to convey that the duration graphs are relative to land surface. Keep in mind that other duration graphs (e.g., Lake Okeechobee stage duration) can be relative to the vertical datum (i.e., stage). **Dong Yoon Lee**: We will add the definition of normalized duration curve on page 25 and in the Figure 4-6 caption.
88	Dr. Donald DeAngelis (Peer Reviewer)	It is stated that "[DYL: in WCA-3B,] ecologically significant increases in annual hydroperiods are not found despite the addition of 0.3 to 0.7 ft of water during ponded times." Is this related to the existing topography (there has been a loss of ridge-and-slough pattern) of WCA-3B, Blue Shanty area specifically?	**Fred Sklar**: It is not really a function of soil oxidation or ridge and slough degradation. The hydroperiod does not change very much in the Blue Shanty region because the inflows and outflows are relatively high and equal. Without Alternative C240, water levels drop to zero about 4% of the time because rainwater has no outlet. The region is compartmentalized. With Alternative C240, water levels drop to zero about 2% of the time because the inflows are high enough to prevent the region from almost ever drying out. **Dong Yoon Lee**: We will revise the paragraph to justify this conclusion.

Comment No.	Commenter	Question/Comment	District Response
89	Dr. Donald DeAngelis (Peer Reviewer)	Page 31. Northeast Shark River Slough. This states an increase in inflow from 73,000 to 794,000 ac-ft (Figure 4-15) to this area, which currently experiencing extremely dry conditions. This is significant, as NESRS has long been considered one of the key areas for Everglades restoration. There are 321,000 ac-ft from S-333, 67,000 ac-ft from S-356. Is the rest of the 794,000 ac-ft from flow from WCA-3B?	**Clay Brown** and **Walter Wilcox**: The average annual transect flows across T-18 are attributed to the features you mentioned, S-333 and S-356, and the remainder is due to several culverts and bridge flow-throughs along Tamiami Trail, in part fed by flow out of WCA-3B (the Blue Shanty Flow-way). It's more complicated than summing the flows from S-333, S-356, and culvert flows; when summed, those flows actually exceed T-18's average annual flow of 794~~k~~,000 ac-ft/year. Keep in mind the L-67 extension levee is removed in the C240 simulation; therefore, some of the flow from S-333 moves southwest, as illustrated in Figure 4-4. Additionally, in the baseline, canal flow is not counted in the transect (overland) flow summary. To a lesser degree, some is lost to evapotranspiration (ET).
90	Dr. Donald DeAngelis (Peer Reviewer)	What is meant by Segment head (Figure 4-16)?	**Clay Brown**: Figure 4-16 is a stage duration curve representing the headwater at structure S-334. The vertical axis of the graph is canal stage in feet National Geodetic Vertical Datum of 1929 (NGVD29). The term "segment" is a modeling term that refers to the discretization of a real-world canal system into modeled "segments." Output for canal segments can be reported as flow or stage; the term "head" often is used in place of stage. **Dong Yoon Lee**: We will revise the caption of Figure 4-16 (segment head → canal stage).
91	Dr. Donald DeAngelis (Peer Reviewer)	There seems to be a minor misstatement regarding Figure 4-24. It is stated that "Alternative C240 will increase the time that water levels hover between 0 and 1". Actually, according to the figure, the time that water levels are between 0 and 1 will decrease relative to ECB. Instead C240 will increase the time water levels are above the level of 0.	**Dong Yoon Lee**: Will revise the sentence: …water levels above zero by approximately 21% compared to the ECB (Figure 4-24).

Comment No.	Commenter	Question/Comment	District Response
92	Dr. Donald DeAngelis (Peer Reviewer)	It is stated that the effect of C240 on vegetation in northwestern WCA-3A is only moderately beneficial. It will reduce the amount of time of water level below 0 but could lead to increased phosphorus and cattails through oxidation of soils. So, understandably, the overall effects on vegetation are difficult to predict. But it is also stated that northeastern WCA-3A will substantially improve due to decreased amount of time water levels go below zero (Figure 4-26), as C240 will promote peat accumulation. It is argued that northeastern will not suffer from the same negative effects of phosphorus release as northwestern WCA-3A. Can this assumption be backed up further? Also, the possibility of periphyton community change is mentioned in this region. It would be useful if more information on the possibility of switches in the periphyton community and its consequences are discussed.	**Sue Newman**: This section will be rewritten to note that northwestern and northeastern WCA-3A benefits are similar with regard to increased ponding and reduced amount of time water is below 0 ft. This revision will also note that all over-drained areas subject to soil oxidation have some risk of nutrient release upon rehydration. While we do not have recent spatial sampling to document changes in soil chemistry, the areas at greatest risk for phosphorus release are likely closest to central 3ANWCA-3A in close proximity to the Miami Canal, where increases in phosphorus per unit volume have occurred (Bruland, G.L., et al. (T.Z. Osborne, K.R. Reddy, S. Grunwald, S. Newman, and W.F. DeBusk. 2007). ". Recent changes in soil total phosphorus in the Everglades: Water Conservation Area 3." Environ. Monit. Assess.. Environmental Monitoring and Assessment 129: (1-3):379-395). **Don Medellin**: The statutory authority granted to the SFWMD's Governing Board under Chapter 3763.223(4), F.S., is limited to the protection of fish and wildlife and public health and safety.

Comment No.	Commenter	Question/Comment	District Response
93	Dr. Donald DeAngelis (Peer Reviewer)	In the caption there needs to be a definition of NSM462 (I think it refers to the Natural System Model) and that the IR numbers mean indicator regions. A fuller explanation of this figure would be helpful.	**Dong Yoon Lee**: We will revise the caption and graphics of Figure 4-31. 1) Include the definition of NSM; 2) Move the purple text on the bottom of the figure into the caption. We will revise the last paragraph on page 41 to include the interpretation of the NSM462 model output. Add under NSM, simulating the hydrologic response of a pre-drained Everglades system, the duration of drydown events is 13 weeks on ~~annual~~ average annually and ranges from 10 to 16 weeks along ~~a~~the longitudinal transect of SRS. Alternative... which ~~is~~ more closely resembles a pre-drainage drought condition and is 3 weeks ... (Figure 4-31). **Clay Brown**: The figure is a comparison of three models that represents the number of weeks that are dry in NESRS from 1965 to 2005. Each of the three models and locations in NESRS are defined below. The first column in the figure represents the numbers of dry weeks for each IR in NSM462; summing the count of dry weeks for each IR results in 52 dry weeks. The sum of the number of dry weeks for IRs in the ECB (or EARECB) and Alternative C240 results in 63 and 50 dry weeks, respectively. Therefore, Alternative C240 has fewer dry weeks ~~that current (~~than EARECB~~) conditions~~; this achieves a goal of the project, which is to send more water to NESRS. In addition, Alternative C240 shows better performance than NSM462. NSM462 represents the model used for model comparison in Everglades restoration efforts. The NSM simulates the hydrologic response of a pre-drained Everglades system. The NSM does not attempt to simulate the pre-drained hydrology. Rather, more recent climatic data are used to simulate the pre-drained hydrologic response to current hydrologic input. The numerical designator "462" represents the latest version, which is 4.6.2. The EARECB represents a scenario that attempts to model assumed hydrologic conditions in 2017. Alternative C240 represents a scenario that models assumed hydrologic conditions in 2050 that includes the ~~A-2 reservoir~~EAA Reservoir (240~~k~~,000 ac-ft) and A-2 STA features. ~~In addition, this~~This scenario also includes all authorized CERP and non-CERP projects. ~~The term "~~An IR~~" represents an indictor region and consists of~~ is a collection of model cells, identified by ~~ecologist~~ecologists, that represents an ecological community of interest. This helps ecologists/managers/planners measure performance across alternatives. IRs 129, 130, 131, and 132 are ~~indicators regions~~ located in NESRS within ENP.

Comment No.	Commenter	Question/Comment	District Response
94	Dr. Donald DeAngelis (Peer Reviewer)	What is meant by NSM462 and what do the IR129, etc. numbers mean (Figure 4-31)? (I am assuming NSM is the Natural System Model, but I am not sure what 462 and the IR symbols mean.)	**Clay Brown** and **Walter Wilcox**: "NSM" is the Natural System Model and "462" represents the version of the NSM that was used; this is the typical version used for model comparison in Everglades restoration efforts. "IR" represents an indictor region, which is a collection of model cells, identified by ecologists, that represents an ecological community of interest. This helps ecologists/managers/planners measure performance across alternatives. IR129 is located in NESRS within ENP. **Dong Yoon Lee**: IRs are groups of adjacent cells within the model grid that together represent a particular region of the Everglades. The cells within an IR are intended to be homogeneous in soil type, vegetative structure, and topography and, therefore, were expected to show similar responses to hydrologic changes. Figure 4-1 shows the location of gauges, IRs, and flow transects.
95	Dr. Donald DeAngelis (Peer Reviewer)	Are any quantitative estimates available on the possible effects on coastal salinities, which can counter mangrove inland movement? (Florida Bay, salinity)	**Fred Sklar**: The added fresh water to SRS and Taylor Slough will lower the rate of saltwater intrusion along the mangroves of the southwestern coast and Florida Bay. This is expected to improve the ability of mangroves to migrate inland without significant degradation due to peat collapse. However, the SFWMD cannot quantify the rate of mangrove migration because we do not possess a landscape-scale mangrove succession model and because there is a large amount of groundwater uncertainty in these areas. **Dong Yoon Lee**: We will revise the first paragraph on page 43 to explain the potential improvement (explained by Fred Sklar) associated with increased water flow in Taylor Slough and SRS.

Comment No.	Commenter	Question/Comment	District Response
96	Dr. Donald DeAngelis (Peer Reviewer)	Northeast Shark River Slough will receive increased sheetflow, which is one of the basic goals of Everglades restoration. Increasing water flow to the wet marl prairies of ENP will substantially improve alleviate some of the problems of woody plant invasion of Cape Sable Seaside Sparrow habitat. But the picture for CSSS habitat overall is mixed. It looks from Figure 4-34 like there will be some improvement to northwestern subpopulation habitat, but reduction in habitat suitability in the southeastern areas. Can more detail be given on what the specific effects of C240 will be; changes in vegetation or timing of water depth during the CSSS breeding season. Can any tweaking of the careful timing of releases be used to decrease negative effects of high water? There is another potential issue. It appears from the pattern of increases and decreases in suitability of CSSS habitat that the areas of good habitat in the northwest and good habitat in the southeast will become separated by greater distances. This would reduce dispersal between different subpopulations, which might make each subpopulation more vulnerable to extinction.	**Mark Cook**: The concern about increased distance between the west and east subpopulations is valid given the probable limited dispersal capacity of this species. However, any loss of connectivity between east and west might be offset by the projected increased connectivity (improved habitat) among the different subpopulations east of SRS. **Walter Wilcox**: Operations for the C240 scenario were ~~already~~ informed by hydrologic targets defined in consultation with the United States Fish and Wildlife Service to identify desirable marl prairie hydroperiods and CSSS recession characteristics to maximize breeding potential. Not every year can achieve the targets due to hydrologic variability, but overall outcomes are similar to the baseline by design (despite the spatial shifts identified in the comment). Regarding Subpopulation A and the Everglades Restoration Transition Plan operations, seasonal closures of the S-12 structures are still used in CEPP operations. **Dong Yoon Lee**: We will consider expanding our discussion about the potential change in marl prairie habitat for the CSSS in this section. Replace Pearlstine (2013) with Pearlstine, L., A.L. Galbo, G. Reynolds, J.H. Parsons, T. Dean, M. Alvarado, and K. Suir. 2016. Recurrence intervals of spatially simulated hydrologic metrics for restoration of Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) habitat. Ecological Indicators 60:1,252-1,262.
97	Dr. Donald DeAngelis (Peer Reviewer)	It is stated that the comparisons ECB and C240 (Table 4-1) are bas ed on "fish and wildlife simulations" by JEM (except crayfish, whi ch was not modeled). The description should be more specific. Are these all based on habitat suitability indices. More specifics should be given; for example, are they based on average yearly conditions, or do they take into account the hydrologic structure within years? Similar models were developed for the Restudy by USGS and SF WMD. It would be useful to know if the models have also been us ed with Natural System Model output as well as ECB and C240.	**Dong Yoon Lee**: Not all models are based on suitability or habitat indices. For example, apple snail and small fish models are based on a regression analysis and provide population density. We agree with the comment and will provide a more detailed methodology, description, and citation for each model.

Comment No.	Commenter	Question/Comment	District Response
98	Dr. Donald DeAngelis (Peer Reviewer)	Small fish are a critically important food base and the increases (130% for the whole period) are impressive. It appears from Figure 4-37 that the ECB estimates are based on data from a large number of sampling sites. Within each of these sampling sites are the population density estimates based on regressions against hydroperiod used to project for C240 conditions?	**Dong Yoon Lee**: Trexler and Goss (2009) developed a logistic population growth model to predict small fish densities between the time of sampling and re-wetting of the site after the most recent drying event. High densities of small fish characterized the pre-drainage Everglades ecosystem; therefore, maximizing densities is an objective of Everglades restoration. Because prey fish dominate the prey community in both biomass and abundance, they are an important energy source for higher trophic levels, such as wading birds, alligators, and larger fish. Thus, the estimations of prey fish can be used as a general measure of trophic conditions within the Everglades. We will consider adding the absolute fish density map under the two models (instead of just presenting the difference map between the models). The following citations will be added: Trexler, J.C. and C.W. Goss. 2009. Aquatic fauna as indicators for Everglades restoration: Applying dynamic targets in assessments. Ecological Indicators 9S:S108-S119. Donalson, D., J. Trexler, D. DeAngelis, and A. Logalbo. 2010. Prey-based freshwater fish density performance measure (Greater Everglades aquatic trophic levels). DECOMP Performance Measure Documentation Sheet. United States Army Corps of Engineers, Jacksonville, FL.
99	Dr. Donald DeAngelis (Peer Reviewer)	It is stated that "the Joint Ecosystem Model Program does not have a crayfish model." However, a crayfish model (both slough and Everglades crayfish) was developed by USGS during the Restudy. It is fairly simple and could be applied if needed but it appears that the estimates in Table 4-1 are reasonable.	**Mark Cook**: We were limited to using the models from the original CEPP PIR, which did not examine crayfish responses.
100	Dr. Nathan Dorn (Peer Reviewer)	ES-1 does not include any summary about the primary expected hydrological shifts or ecological benefits to the central Everglades.	**Walter Wilcox**: Agreed. Adding text to reflect these benefits will be considered. **Don Medellin**: This summary will be added with the next revision to the Technical Document.
101	Dr. Nathan Dorn (Peer Reviewer)	The label of NESRS should be moved east into the eastern corner. The label is centered in Shark River Slough right now.	**Brenda Mills**: Figure 1-1 will be adjusted in the final Technical Document.

Comment No.	Commenter	Question/Comment	District Response
102	Dr. Nathan Dorn (Peer Reviewer)	What does it mean that the full storage water depth is 22.6 ft? How is the depth measured for this A-2 Reservoir? On page 56 you called 22.6 ft (NGVD29) the maximal storage capacity but on this page you called it normal full stage capacity? Is that the same thing? So, it will be managed typically at maximal stage with 12.6 feet of water (soil elevation appr 10 ft)?	**Brenda Mills**: Agreed. There are inconsistencies in how the depth versus elevation of water stored is described. These will be addressed in the final Technical Document. The normal full capacity is 22.6 ft deep. The reference on page 56 is an error and will be fixed in the final version.
103	Dr. Nathan Dorn (Peer Reviewer)	The definition of the South Florida Ecosystem in relation to the Everglades should be defined or else the restoration areas (in acreage) do not match up nicely. On page 6 the restoration is supposed to restore 2.4 million acres, but the Everglades only has 1.54 million acres according to Fig. 1-4. I can only guess that when you wrote the South Florida Ecosystem you were including Lake Okeechobee and perhaps the Kissimmee River and other connected wetlands.	**Brenda Mills**: Agreed. This will be clarified in the final Technical Document.
104	Dr. Nathan Dorn (Peer Reviewer)	Does some of the EAA basin runoff currently discharge to the northern estuaries (as implied in the first paragraph on the EAA)? Perhaps I'm misreading that, but the sentence should be clarified because it can be read as though the basin runoff goes east and west into the rivers.	**Brenda Mills**: Agreed. This will be clarified in the final Technical Document.
105	Dr. Nathan Dorn (Peer Reviewer)	From this document I cannot understand the engineering of the gated spillway associated with the L29 canal. It is unclear how connected the L29 will be to the Blue Shanty Flow-way. How will those features interact? Will the wetland be flowing right into and across the canal? In that case the canal will have to be managed for high enough water to allow for southerly water flow or else? This should be briefly clarified somewhere and maybe include a citation to an engineering design document or online explanation.	**Raul Novoa**: The sheetflow of water occurs from WCA-3A/3B through the Blue-Shanty Flow-way to ENP. The Blue Shanty Flow-way receives ~~flow~~water from WCA-3A through structures S-345F and S-345G. It is important to note the western portion of the L-29 levee, from S-333 to the terminus of the Blue Shanty Flow-way levee, has been removed to allow water to sheetflow through the western bridge (the elevated portion of US 41). In addition, structure S-355W (on the ~~L29~~L-29 levee) at the terminus of the Blue Shanty Flow-way levee is normally closed to allow sheetflow to move south to ENP~~,~~; however, it will discharge ~~east if~~to the eastern section of L-29 if the water level is below 7.0 ft. Lastly, structure S-356 discharges into the L-29 (east of S-355W) and sheetflows south to ENP through the eastern bridge (the elevated portion of US 41).
106	Dr. Nathan Dorn (Peer Reviewer)	In figure 1-6 the font is too small to read the features. I'd suggest you include two expanded figures to describe these regions or move the focus southward, putting Lake O at the very top of the figure.	**Brenda Mills**: Agreed. Figure 1-6 will be adjusted in the final Technical Document.

Comment No.	Commenter	Question/Comment	District Response
107	Dr. Nathan Dorn (Peer Reviewer)	The third paragraph seems out of place? What does the LOSA water have to do with the lower east coast protective levee? From the way it reads I think the LOSA water has more to do with the canal levels and section 5.1.1.	**Walter Wilcox**: Agreed. The text will be clarified.
108	Dr. Nathan Dorn (Peer Reviewer)	What does the "original" CEPP mean? Is this the second phase of CEPP or an amended CEPP? Or is this proposal the original CEPP? Same adjective (original) is used on page 21 (section 4 intro).	**Brenda Mills**: The original CEPP refers to the project described in the PIR completed in December 2014. Its Chief of Engineers report was signed on December 23, 2014, and authorized by Congress in Section 1401(4) of the Water Infrastructure Improvements for the Nation Act of 2016 (Public Law 114-322). The text will be clarified.
109	Dr. Nathan Dorn (Peer Reviewer)	Regarding bullet #7. I do not understand the meaning of "benefits of overland flow to central SRS are a continuum of the flows under Tamiami trail in the natural system" Perhaps you mean "a continuation of the flowing water" and in the "free-flowing system."? What do you mean by continuum? What do you mean by natural system?	**Brenda Mills**: Agreed. This will be clarified in the final Technical Document.
110	Dr. Nathan Dorn (Peer Reviewer)	Why should there be more levee seepage and groundwater flow with lower ponding depths under C240?	**Raul Novoa**: Based on Figure 4-13, the southern part of WCA-3B has higher ponding depths ~~in~~under Alternative C240 ~~vs~~than the ECB.
111	Dr. Nathan Dorn (Peer Reviewer)	It is unclear how much water will be used to manage canal stages for users along the New River and Miami canals. -In other words, no volumes or fractions of available A-2 reservoir water are mentioned.- As far as I can tell all of the water that comes out of the south end (S624, S625, S626 structures) is for wildlife in the Everglades. It is all one reservoir and I cannot tell how much is expected to move from those structures and how much will move out of the S628 for canal management. -Importantly, in a low water year how will those outflows be managed (i.e., how will the A2 EAA water be allocated)?	**Clay Brown**: The ~~A2 reservoir releases~~EAA Reservoir will release an average of 82~~k~~,000 ac-ft/year (long-term average 1965-2005) to the Miami and North New River canals to meet water supply demands of existing permitted users in the EAA. This amount represents only 12% of the outflows from ~~A2 reservoir~~the EAA Reservoir and still meets the CERP goal. The ~~A2 reservoir releases~~EAA Reservoir will release an average of 655~~k~~,000 ac-ft/year to STA-3/4, STA-2, and the A-1 FEB. **Don Medellin**: A total of 82,000 ac-ft of water will be discharged on ~~an~~ average ~~annual basis~~per water year from structure S-628 into the New North River and Miami canals. This was designed to improve the canal stages and ~~is~~will be available for existing legal users. The allocations associated with withdrawing water must be consistent with ~~their~~ existing permits. Slide 64 shows the area evaluated for existing legal users (red circle). Section 5 of the draft Technical Document provides additional information regarding seven existing permitted users in the EAA.

Comment No.	Commenter	Question/Comment	District Response
112	Dr. Nathan Dorn (Peer Reviewer)	Section 4.1.2. Under the explanation of avoiding adverse impacts of high water I have more to say below, but it looks to me that the S-12 structures are pumping out a lot less water and are not part of the solution for protecting WCA-3A water levels. Their mention has nothing to do with this feature of the C240 plan unless you are planning to use them in some adaptive management fashion.	**Clay Brown**: There is less water sent to the S-12 structures because water is being sent through the new structures along L-67A to the Blue Shanty Flow-way. Although there is less water sent through the S-12 structures, water levels are ~~still~~ being maintained for environmental purposes; this represents a timing shift in water availability. In addition, Section 4.1.2 shows improved water level depths in ~~WCA-3A northwest, northeast~~northwestern, northeastern, central, and ~~south~~southern WCA-3A.
113	Dr. Nathan Dorn (Peer Reviewer)	I did not understand the last sentence at the end of 4.1.1 and why the water moving into northern 3A from the L-4 spreader mechanistically produces decreased ponding depths in WCA-3B.	**Clay Brown** and **Walter Wilcox**: The last sentence of Section 4.1.1 is in reference to ~~A2 Reservoir's~~the EAA Reservoir's inflow from the Miami and North New River canals. These canals convey water from Lake Okeechobee and runoff from the EAA basin. The water is discharged into ~~northwest~~northwestern WCA-3A via the L-4 spreader canal to resemble flow patterns of the natural system. The decrease in ponding depths in northern WCA-3B results from the reduced water entering eastern WCA-3A (from WCA-2A) and the water routed ~~to~~through the Blue Shanty Flow-way to ENP as well as a flow timing shift. The timing shift refers to more water being stored for release during drier conditions. **Dong Yoon Lee**: The detailed description of changing flow pattern in WCA-3B will be added into the last paragraph on page 28.

Comment No.	Commenter	Question/Comment	District Response
114	Dr. Nathan Dorn (Peer Reviewer)	A.1. What are the targeted ponding levels? The projected ponding depths and hydroperiods for NESRS need to be clearly presented against other regions, not just against EARECB so that we know what kind of wetland landscape might be supported with the extra water. The two different sets of normalized ponding curves (IR and gage curves) provided somewhat conflicting impressions of the conditions that will be created by C240 when they are compared with central WCA-3A.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
115	Dr. Nathan Dorn (Peer Reviewer)	A.1. Continued -What are the targeted ponding levels? The projected depths for the NESRS and how they relate to depths in other sections of the intact or degraded Everglades are unclear from the analyses and gave me pause about the target (i.e., Exactly how deep are we trying to make NESRS?).	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
116	Dr. Nathan Dorn (Peer Reviewer)	A.1. Continued - What are the targeted ponding levels? Are there feasible options for adaptive management of ponding depths once the flow-way is completed and we start to experience the impacts of deeper water on the wetlands in NESRS?	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
117	Dr. Nathan Dorn (Peer Reviewer)	A.1. Continued - What are the targeted ponding levels? The two different sets of normalized ponding depth curves (gage and IR) for NESRS (IR 129 vs. gage NESRS_3) compared with other regions lead to different senses of the projected (and targeted) hydrologic conditions in NESRS. If I examine the gage projections as a guide of ponding then C240 projected conditions (Fig. 4-17) are in between the ponding depths for central WCA-3A (Fig. 4-9 EARECB) and SE WCA-3A (Fig. 4-10 EARECB), but they are notably closer to the ponded conditions in the overly deep SE WCA-3A where ridges and tree islands are being lost or have been lost (Fig. 3-4). But examining the IR projections (129 vs. 123 and 124 or Figures 4-30 vs. 4-26 and 4-27) then the ponding conditions look more similar to central WCA-3A which is well preserved ridge and slough with some remaining tree islands. Perhaps the difference between the ponding depth normalization curves is caused by the spatial averaging of the IR analyses (easterly conditions are probably shallower)? In any case, **the target depths for the NESRS and how they relate to currently intact vs. degraded ridge-slough systems is somewhat unclear from the analyses and should be presented in a way so that the reader can tell what the target is and whether the projections are giving us what we are targeting**. RECOMMENDATION: A similar comparative analysis of the ponding depths could be conducted with the normalized depth curves in NE and NW WCA-3A versus central WCA-3A and I suspect they would look favorable. The entire region was historically ridge-slough landscape and using central WCA-3A as a target at least shows how far we are returning towards ponding levels that sustained ridge and slough for the past 60 years.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
118	Dr. Nathan Dorn (Peer Reviewer)	A.2. Does this plan exacerbate the deep flooding (i.e., ponding problems) in SE WCA-3A? One apparent limitation of this plan is the continued degradation of SE WCA-3A and I became additionally concerned, after reading the entire document, that the impact of the A-2 reservoir (i.e., deep ponding depths) might actually cause an even deeper condition in parts of SE and E WCA-3A.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
119	Dr. Nathan Dorn (Peer Reviewer)	A.2. - Continued - Does this plan exacerbate the deep flooding (i.e., ponding problems) in SE WCA-3A? The lack of benefit to this SE WCA-3A was listed on page 40 with figure 4-28 and in a couple other areas, but needs to be plainly listed as a limitation that CEPP cannot reverse although it is ubiquitously listed as a degraded part of the system. Furthermore, **the full degree of the problem under C240 needs to be clarified and does not seem to be fully explored with the IRs and gages presented**.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
120	Dr. Nathan Dorn (Peer Reviewer)	A.2. - Continued - Does this plan exacerbate the deep flooding (i.e., ponding problems) in SE WCA-3A? As I looked through all of the evaluation tools it struck me that the CEPP C240 plan could be worse than the figures and document were plainly indicating. I simply could not tell for certain the degree of the problem. Figure 4-3 seems makes it look like areas that are blue (deeper) have turned green (shallower) under C240, while Fig. 4-10 (ponding depth for the WCA_3-28 gage) indicates no change and that >50% of the time the gage will be > 2 ft deep. For the same region Fig. 4-28 (IR 124) indicates that there will be no change in ponding depths of SE WCA3A – again, even though Fig. 4-3 looks like the over-deep eastern side will get shallower. Another thing somewhat misleading about Fig. 4-3 is that conditions in southeastern WCA3A (Fig. 4-10) are very deep compared with central WCA3A (Fig. 4-9) although they are all shaded in that same sweet range of 1-2 feet across all of Fig. 4-3. Later in the document when I examined the wading bird and alligator projections (Figs. 4-38 and 4-39) it appeared that that conditions in SE WCA-3A would become even deeper under C240 based on the projected decreases in alligator habitat suitability and wood stork/wading bird foraging conditions.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
121	Dr. Nathan Dorn (Peer Reviewer)	A.2. - Continued - Does this plan exacerbate the deep flooding (i.e., ponding problems) in SE WCA-3A? There are even deeper regions in eastern WCA-3A (i.e., immediately W and NW of the intersection of the Miami Canal and L67A) that were not addressed in this document, but they appear to be quite deep from the wading bird evaluation (Fig. 4-39). The water in those areas can already be well over 4 ft deep at times during the wet season. From what I see CEPP cannot do anything to address this, but might be making it deeper(?). **The depths in SE WCA-3A and east WCA-3A need to be clarified in the re-evaluation**.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.

Comment No.	Commenter	Question/Comment	District Response
122	Dr. Nathan Dorn (Peer Reviewer)	A.2. - Continued - Does this plan exacerbate the deep flooding (i.e., ponding problems) in SE WCA-3A? Along with the question of the over deep eastern portions of WCA-3A that receive no benefit (at best) I am wondering if it was logistically infeasible to add more water movement capacity to the northern portion of 3B, raising those ponding depths (in a region that experiences no benefits except in dry years) and letting more water move east from the ponded parts of eastern WCA-3A against the L67A. This was an important drawback and I failed to see why more of this water could not be moved into northern WCA-3B to manage the ponding and associated ecological damage in E-SE WCA-3A. It appears to me there was almost no ecological benefit in WCA-3B in an absolute sense and if anything it might actually be further degraded by further drying of the northern portion where the sloughs have filled in (part B.4.). If the depths in eastern WCA-3A are actually worse under C240 and moving water to 3B is a logistical impossibility then explanations of both need to be provided in a re-evaluation. Although the net effect of CEPP alternative C240 for alligators and wading birds trends positive, the improvements in northern WCA-3A and NESRS appear to be considerably offset by the degradation in SE WCA3A and the negligible responses in 3B.	**Walter Wilcox** and **Clay Brown**: Target water depth is only one performance measure used to define hydrologic improvement and is considered along with other performance measures, including flow magnitude, flow timing, sheetflow, hydroperiod extension, and other metrics. The depth targets identified by RECOVER for the ridge and slough landscape are derived in the NSM from a location in NESRS. This location was selected as representative of a target ridge and slough landscape based on the correspondence between this location's hydrologic performance and information from independent lines of evidence on ridge and slough characteristics. Once identified, this target was used as representative of the Greater Everglades overall ridge and slough landscape, spatially. In other words, the same target applies in ENP and the WCAs. Relative to current conditions, this target is similar to southern WCA-3A in terms of overall depths, but avoids the extreme, damaging high-water conditions that cause excessive ponding in today's impounded system. **Fred Sklar**: A new table will be added to highlight how different regions of the Everglades will hydrologically respond to the additional water in comparison to other locations and our water management. Clarifications will include narratives associated with IR versus gauge locations, NESRS targets, and adaptive management options. A discussion of the difference between a target and a performance measure will help identify the regions where habitats are expected to improve for fish and wildlife.
123	Dr. Nathan Dorn (Peer Reviewer)	Figure 4-1. This figure has small font and is difficult to read. Some of the gages in 4-1a are not used and some of the IR in 4-1b are not evaluated. Perhaps you could make this two figures and place them after 4-4. Figures 4-2, 4-3, 4-4 – It would be helpful to outline (with a dashed line) the central Everglades (area of primary focus here).	**Dong Yoon Lee**: We will re-create Figure 4-1 and use a full page for Figure 4-1a and Figure 4-1b. Regarding Figures 4-2, 4-3, and 4-4, we are considering replacing the average rainfall year map with a long-term (1965-2005) average output.
124	Dr. Nathan Dorn (Peer Reviewer)	I believe that I am to read the results of the hydrologic analyses (4-2, 4-3, 4-4) as the outcome of all of the component parts of CEPP included in the evaluation - meaning with all parts in place that are listed in Figure 1-6 (e.g., A2 Reservoir, backfilled Miami Canal, Blue Shanty Levee, etc.). Is that correct?	**Walter Wilcox**: Yes, the reservation is necessary to protect the water that will be used by the full CEPP project, not just individual components or implementation phases.

Comment No.	Commenter	Question/Comment	District Response
125	Dr. Nathan Dorn (Peer Reviewer)	I might have missed the definition, but can someone please explain the exact meaning of "ponding depth" (as reported in fig. 4-3)? Is it just average water depth at the site for the year (including below-ground/negative depth values)?	**Clay Brown**: The modeled ponding depth in Figure 4-3 represents the average annual ponding depth for an average rainfall year (1978) and dry rainfall year (1989). The annual average ponding depth is computed using simulated daily water levels for each model cell only when the water level is above land surface (i.e., only positive values) and computed as follows: When water level is greater than land surface elevation, then ponding depth equals water level minus land surface. Note that land surface represents an average within each model cell. The ponding depth for the year indicated is computed by accumulating the daily ponding depth for the water year and dividing by the number of days (in the year) when the ponding depth is greater than zero. **Dong Yoon Lee**: We will add a brief method of ponding depth calculation in the figure caption.
126	Dr. Nathan Dorn (Peer Reviewer)	Can someone please explain the meaning of the vector colors and arrows in Fig. 4-4? I assume vector size and color indicate something about expected volumes but I guess they could also indicate something about confidence in the direction?	**Clay Brown**: The modeled surface vectors in Figure 4-4 represent the average annual surface vectors for an average rainfall year (1978) and dry rainfall year (1989). The size and color of vectors represent the magnitude of flow within a model cell relative to all other model cells – the magnitude is not associated with any value. The colors are grouped according to magnitude (arrow size); this is to help the reader identify changes in magnitude. The direction of the arrow represents an annual average direction of flow using vector data for the corresponding year. The intent of the vector plots is to provide the reader with overall flow directionality and magnitude relative to other model cells. The reader should not attempt to compute flow (i.e., transect flows). **Dong Yoon Lee**: We will include the information provided by Clay Brown.

Comment No.	Commenter	Question/Comment	District Response
127	Dr. Nathan Dorn (Peer Reviewer)	Fig. 4-5 and Fig. 4-11 and the evaluation of the water budgets. Are the arrows for the water budget indicating the approximate or nearly exact location of structures along the canals (e.g., in particular the S345 structures and other structures on the L67). I'm asking because it is difficult to look at that discharge into 3B (Fig. 4-5) and reconcile it with the expected 3B water flow in Fig. 4-4 and the ponding depths in 4-3. Water does not generally flow SW in 3B under C240 (Fig. 4-4) and lots of water is going in (Fig. 4-5 budgeted inflows across L67) and yet ponding depths are reduced across WCA-3B in an average year (4-3). Perhaps the structures are not located in the areas where they are listed? This just needs a little explanation.	**Raul Novoa**: The arrows do not always correspond to spatial location, they are meant to illustrate movement across the water budget control volume. Just to clarify, structures S-151 and S-345D discharge to WCA-3B north of the Blue Shanty Levee. S-345F and S-345G discharge into the Blue Shanty Flow-way. Average year does not imply that it represents the annual average of the period of record. **Dong Yoon Lee**: We will revise the captions of the water budget figures according to the information from Raul Novoa.
128	Dr. Nathan Dorn (Peer Reviewer)	Figs. 4-22 and 4-32 are exactly the same figure.	**Dong Yoon Lee**: We will delete Figure 4-32.
129	Dr. Nathan Dorn (Peer Reviewer)	Section 4.2.2. Page 44. The meaning of the last sentence is unclear: "which.." (what effect?) "…can cause a transition to wet prairie and slough/open-water marsh communities." Is the wet prairie a problem? If so, why include "and" in between wet prairie and slough? Which of those two are you hoping to avoid and what causes the transition?	**Dong Yoon Lee**: Agreed. We will clarify the sentence.

Comment No.	Commenter	Question/Comment	District Response
130	Dr. Nathan Dorn (Peer Reviewer)	Section 4.3. Throughout: what is the exact meaning of using 1978 as an "average year?" Was that an average precipitation year or an average water depth for the period of record? The start of the section (perhaps on page 47) could use a brief explanation of the limitations of the ecological and modeling evaluations (for some taxa we have no models) and explanation for the choices of evaluation periods or years (e.g., wet, dry, average).	**Clay Brown**: Analyses of rainfall data in Central and South Florida using normal and log normal probability distributions were fitted to annual rainfall for the entire District area. The results of the analysis indicate the District receives a regional annual average rainfall of 53 inches, a dry annual average of 44.3 inches, and a wet annual average of 62.5 inches. Using the above statistics as a guide, representative years corresponding to annual District rainfall were selected. In addition, the annual rainfall for the antecedent year ~~should also be~~was considered. In other words, the annual rainfall preceding the "selected" year should also be consistent. In summary, 1978 was selected to represent an average rainfall year, 1989 a dry year, and 1995 a wet year. Reference Documents: Alaa, A. and W. Abtew 1999. Regional rainfall frequency analysis for Central and South Florida. Technical Publication WRE #380. South Florida Water Management District, West Palm Beach, FL. Sculley, S.P. 1986. Frequency analysis of SFWMD rainfall. Technical Publication 86-6. South Florida Water Management District, West Palm Beach, FL. **Dong Yoon Lee**: We will add a brief explanation provided by Clay Brown. Also, we will explain the differences and limitations of the ecological model.
131	Dr. Nathan Dorn (Peer Reviewer)	This summary was generally helpful as far as it goes. The legend for Table 4-1 should be adjusted if you are including crayfish in the table because they are not listed as species (e.g., *Procambarus fallax*), nor are they state threatened. WCA-3B will not experiencing increased ponding that would help crayfish production and that should be removed from the table.	**Mark Cook**: We will re-evaluate the hydrologic responses in the over-drained regions of WCA-3B to determine if it will experience increased hydroperiods and improved conditions for crayfish. **Dong Yoon Lee**: Increased hydroperiods and ponding depths in WCA-3B would help crayfish production; these hydrologic improvements will be shown better in updated Figures 4-2, 4-3, and 4-4. (Suggested new table caption: Comparison of effects on Everglades species, including federally and state-listed threatened and endangered species, within the Central Everglades ecosystem under the existing conditions baseline and Alternative C240.)

Comment No.	Commenter	Question/Comment	District Response
132	Dr. Nathan Dorn (Peer Reviewer)	B.1. Synthesizing responses. The profound challenge of synthesizing the spatially explicit hydrological changes with the ecological changes can be illustrated by considering the projected benefit to Wood Stork foraging in 3B (cited in Table 4-1, illustrated in Fig. 4-39). Storks eat fish. Fish populations are not projected to benefit from C240 in 3B except in a record dry year (Fig. 4-37b), nevertheless storks see a 30-year average improvement of foraging conditions in 3B (Fig. 4-39b). From the analyses of the ponding depths in 3B (Figs. 4-13, 4-29) it was judged that the ponding depths with C240 would provide negligible ecological benefits (page 28). Therefore, the responses are difficult to synthesize. Storks are either benefiting from better projected hydrological conditions or fish densities but obviously change much in 3B. If the benefit to storks is projected to come from fish production in record low water years I can hardly believe it would produce an average increase in habitat use over 30 years. It remains possible that storks are responding to some subtle change to the C240 hydropattern that cannot be captured in the normalized ponding curves (i.e., I realize the model includes other hydrological variables, including recession). I do not know what this means, but at any rate the projected response of the stork seems less certain in 3B. In contrast, the synthetic responses of birds, fish, and hydrologic shifts in northern WCA-3A appeared quite logical.	**Mark Cook**: The reviewer makes a good point: neither the hydrologic conditions nor the fish responses are sufficiently large enough in WCA-3B to account for the projected wood stork improvements. We will add wording in the text to this effect. **Dong Yoon Lee**: The updated map of hydroperiod (new Figure 4-2), a grand average of hydroperiod for the entire simulation period, shows increased hydroperiods in eastern WCA-3B where the wood stork model predicts a positive change (increases in the abundance of foraging habitat). We will add discussion describing a hydrologic linkage to the wood stork change. We will add two more citations: Beerens, J.M., E.G. Noonburg, and D.E. Gawlik. 2015. Linking dynamic habitat selection with wading bird foraging distributions across resource gradients. PLoS ONE 10(6):e0128182. Cook, M.I. and M. Kobza (eds.). 2009. South Florida Wading Bird Report. South Florida Water Management District West Palm Beach, FL. Revision suggestion: "The WADEM determines spatially explicit changes in high-quality foraging conditions for wading birds relative to baseline scenarios. WADEM uses a spatiotemporal species distribution model framework to evaluate the foraging responses of wading birds. Using a multi-model approach, a wading bird foraging index was produced from a spatial foraging conditions model (SFC) and a temporal foraging conditions model (TFC). The SFC predicts wading bird patch abundance over time at a fixed spatial scale (400 meters), and the TFC predicts daily abundance across space (patch quality). The resulting indices represent proxies for different components of patch dynamics: patch abundance is reflected by the SFC, and patch quality within suitable depths is reflected by the TFC. The product of these two indices is a foraging index to account for both processes." We will edit the Figure 4-39 caption using following information: Output/Metric: Foraging indices and landscape abundance Graphs: Wood Stork – percent change in mean daily foraging index (SFC × TFC) White ibis and great egret – percent change in mean daily individual abundance (TFC) (same as landscape abundance) Maps: Wood stork and white ibis – mean daily SFC values and percent difference of those means for March and April over all years. We will make a significant revision in the Technical Document.

Comment No.	Commenter	Question/Comment	District Response
133	Dr. Nathan Dorn (Peer Reviewer)	B.2. Section 4.2.3 Wet Marl Prairies. The benefits and losses to marl prairies are confusing in the document. The concept of positive and negative (benefits or losses) here is all mixed together. This section could be labeled "Cape Sable Seaside Sparrow" rather than marl prairie because the model does not really evaluate suitability of hydroperiods for marl prairie, but rather for prairies that support CSSS habitat. The evaluation started by stating there will be benefits of C240 to prairie vegetation, caused by increased hydroperiods (sentences 2-3), but then went on in most of the section to explain the marginal losses for the CSSS by making it wetter (Fig. 4-34). Is this a benefit or a loss? If you had a separate evaluation of the vegetation I would suggest you put the sparrow habitat projections in a separate section. I did not see notice a citation or hyperlink to a model in this section.	**Dong Yoon Lee**: This section will be divided into two sections: a marl prairie section and the CSSS. We are considering adding a duration curve supporting this vegetation section. Because there are no IRs in the eastern and western prairies, we would use a duration curve at ENP_G3437, representing the eastern prairies, and another curve at NP-205 (Figure 4-20), representing the western prairies (as was also used to represent CSSS Subpopulation A in the CEPP PIR). We will create a new CSSS section under the Section 4.3. We will make a significant revision in the new section explaining the marl prairie CSSS model. **Mark Cook**: The reviewer is correct, benefits to the CSSS brought about by a reduction in hydroperiod in the Subpopulation A region are not necessarily ecologically beneficial to the western marl prairies, which are currently over-drained and would benefit from increased hydroperiods.
134	Dr. Nathan Dorn (Peer Reviewer)	B.3. Section 4.3.2. Crayfish response. Fully evaluating benefits to crayfish will require additional hydrologic evaluation of the eastern marl prairies. The benefits to crayfish in northern WCA-3A (*P. fallax*) are likely, especially in NE WCA-3. Lack of benefit, even potential losses of production in western marl prairies are probably the most concerning (notes below and see B.5. – wading birds on SW coast). I previously worked on crayfish habitat suitability models for the JEM lab in 2009-2010 (Dorn 2010), but it was not ever translated to their new evaluation format. The situation for the slough crayfish (*Procambarus fallax*) is tricky because they tolerate long hydroperiods, but also grow after droughts (Dorn and Cook 2015). I would expect positive effects in northern WCA-3A (especially NE WCA-3A) based on the ponding depth curves produced for the northern WCA-3A where projected average depths are between 0.8 and 1.4 ft (assuming I am reading the curve correctly; the average should be around the 50% mark) with modest and occasional dry conditions which can be beneficial for *P. fallax* population growth. The model for Everglades crayfish (*P. alleni*) would have been a decent starting point for evaluation though the model had some weaknesses (most were caused by EDEN model inaccuracy). The importance of the response of Everglades crayfish	**Mark Cook**: The reviewer's comments are highly pertinent, and they highlight the likely limited or even negative impact of CEPP on crayfish populations, especially in the western marl prairies. We will make the suggested changes to reflect this. Unfortunately, the use of additional hydrologic and ecological (crayfish) models is not possible at this time.

Comment No.	Commenter	Question/Comment	District Response
		(*Procambarus alleni*) should not be overlooked, however because explosive population growth of Everglades crayfish was probably most responsible for the ibis irruption in 2018 in SW ENP near the coast (see point made later under B.5.; Cook and Baranski 2019). Everglades crayfish generally do not persist in sites that stay perennially flooded (Dorn and Trexler 2007; Hendrix and Loftus 2000) so that sentence in section 4.3.2 should be changed. But results from some studies in ENP (Acosta and Perry 2000, 2002) indicated their population growth will also be limited by short hydroperiods (i.e., most likely improving from 5 to 9 months flooded). I find it likely that increases in hydroperiods in the eastern marl prairies (see section B.2. on wet marl prairies – benefits or losses?) will improve Everglades crayfish production. But in order to demonstrate as much a gage or IR in the eastern rocky glades/marl prairies should be established and included in this technical report and examined to determine how much the hydroperiods have lengthened. Examining altered hydroperiods of the eastern and western marl prairies should constitute an additional pair of Indicator Regions (IR) for re-evaluation. I believe it is possible to argue that crayfish productivity will likely improve in these over-dried wetlands if the hydroperiods are sufficiently improved. Without a spatial evaluation of the hydroperiod it is hard to tell, but Fig. 4-2 only shows a shift in hydroperiod at the edge of SRS and it appears subtle. The situation in the western Everglades is different and potentially more important and an IR should be established in the western marl prairie as well because I would guess that the hydroperiod is getting shorter in that region (consistent with CSSS habitat improvements - B.2.). NP-201 declines in hydroperiod by about 12% from 85% flooded to 73% flooded (Fig. 4-19). That difference may be negligible at the gage, but it will not lead to improvement and I would expect negligible or negative effects on Everglades crayfish when considering western ENP as a whole. Beerens et al. (2017) made model predictions for crayfish (both species) in ENP based on hydroperiod matching for the two species of crayfish that could possibly be used for evaluation, but their	

Comment No.	Commenter	Question/Comment	District Response
		projections contained great deal of uncertainty that the authors acknowledged in the paper. Notably, although ibis feed heavily on crayfish when nesting (Boyle et al. 2014; Dorn et al. 2019) their model projected that ibis use would increase in ENP while they simultaneously predicted a decrease in production of crayfish. Their model predicted the opposite of what we observed in 2018 (see B.5.; Cocoves 2019, Dorn et al. 2019).	
135	Dr. Nathan Dorn (Peer Reviewer)	B.4. Section 4.3.3. Alligators. Moderate benefits for alligators appeared relatively clear. I see the benefit overall to the alligators, particularly in the north and in NESRS. I did not notice a citation or hyperlink to a model in this section. One response of the alligators in the model runs was surprising. I could not see why they should decrease in SE WCA-3A based on the run of the IR 124 which shows almost no change in ponding depths (Fig. 4-28). Looking at the map it appears the major decline of suitability for an average year with C240 happens against the L67A which suggests that the ponding depths are getting much deeper against the L67A levee (see Part A.2.). After examining the alligator output and considering about the suitability for alligators I realized IR 125 was not evaluated for ponding depth, but the alligator model output for an average year clearly shows a decrease in suitability in an average year in northern 3B (Fig. 4-38A). When the suitability map is paired with Figure 4-3 it is clear that this is because an average year in northern WCA-3B gets even drier than it currently is. Therefore, I can only conclude that the few remaining sloughs will slowly close up, even in average years (see Part A.2.).	**Dong Yoon Lee**: Updated Figure 4-2 (a long-term average hydroperiod) supports a predicted decline in alligator habitat suitability index scores in areas adjacent to the L-67 levee and southern WCA-3A. We will evaluate hydrologic changes at IR 125 (might replace Figure 4-35 [3B-29]) to explain a predicted decrease in alligator suitability index in northern WCA-3B. Also, updated Figure 4-3 will be used to indicate a predicted decrease in ponding depth, which, as the reviewer pointed out, would decrease the habitat suitability score in northern WCA-3B. Add a citation: Shinde, D., L. Pearlstine, L.A. Brandt, F.J. Mazzotti, M.W. Parry, B. Jeffery, and A. LoGalbo. 2014. Alligator Production Suitability Index Model (GATOR–PSIM v. 2.0): Ecological and Design Documentation. South Florida Natural Resources Center, Everglades National Park, Homestead, FL. Ecological Model Report. SFNRC Technical Series 2014:1.). We will make a significant revision in the Technical Document.
136	Dr. Nathan Dorn (Peer Reviewer)	B.5. Section 4.3.4. Wading birds. Some additional details of how the summaries were conducted would benefit this assessment (see below). Some clarity about the hydrologic responses in the eastern marl prairies would also help. Clear improvements to conditions seemed evident and clearly explained in northern WCA-3A; hydroperiods, fish, crayfish (probably), and wading bird foraging all seem to change and improve together in a logical fashion. This coalescence of responses should be mentioned in this section and perhaps in	**Dong Yoon Lee**: Any confusion or misunderstanding likely is driven by a lack of pertinent information about the Wading Bird Distribution Evaluation Model description. We will clarify the model output and add absolute foraging abundance maps. The southern marl prairies west of SRS are not compartmentalized because these wetlands are isolated from agricultural and human developments. ~~Contrary to~~Unlike the eastern short-hydroperiod marl prairies, the western counterparts escaped from lowered water table stressors but suffer from extended hydroperiods and dry season water level reversals drowning CSSS nests (Davie et al.

Comment No.	Commenter	Question/Comment	District Response
		the summary of the document. The net loss of landscape abundance to Wood Storks, their enigmatic responses in 3B (see B.1.), and the lack of potential benefits to wading birds in southern ENP, made the system-wide response appear marginal. [new paragraph] I cannot see the improvements or reductions in landscape abundance for either the white ibis or the wood stork given the way the foraging condition scores were presented. The results presented suggest that storks should gain foraging habitat (+162K acres), but the conclusion was that they would lose 2.1% landscape abundance? I guess that means the habitat they gain is marginal foraging habitat? The details of this evaluation and the meaning of the net change to ibis foraging habitat and landscape abundance need to be clarified. [new paragraph] For the wading birds and the snails it would be helpful to see the change in absolute terms from EARECB to C240 for at least an average year. The relative gains and losses are interesting, but may mean relatively little. [new paragraph] To that point, I find it quite strange to consider the eastern marl prairies of ENP to be a point of primary habitat gain for both storks and ibis. What makes it strange is that it appears the wading bird model projects an increased use of the eastern marl prairies by White Ibis and Wood Storks (Fig. 4-39) while the hydroperiod map presented in Fig. 4-2 indicates that hydroperiods are still 0-60 days or perhaps 60-120 days (maximum of only 4 months) and they changed marginally between scenarios. Is this just the change from constantly dry (EARECB) to being flooded for 1-3 months (C240)? Although this would be a small amount of flooding it should be probably be illustrated. Again, providing a gage or an indicator region (IR) in the eastern marl prairies would specify any subtle change occurring and help understand the benefit. Perhaps the eastern marl prairies will just provide some early dry season foraging habitat. [new paragraph] Additional Note: In late 2017 and early 2018, thanks to Hurricane Irma, the western ENP and southern BCNP experienced perhaps the wettest conditions (most flooded conditions) in the past 30 years (gages NP-205, NP-201, BCA20). The deep conditions were preceded by dry marl	2005). Deliveries of managed water during a critical nesting period is caused by regulatory water releases from the S-12A and S-12B discharge structures of WCA-3A. Although the model output shows a decline in southern Subpopulation A, we might want to test the model differently from other subpopulations due to differences in environmental conditions these subpopulation are experiencing. We will make a significant revision in the wading bird section of the Technical Document. **Mark Cook**: While areas of Subpopulation A have indeed experienced extended hydroperiods because of their proximity to the S-12 structures, the vast majority of the western marl prairies have experienced the opposite fate and are now considerably drier than they were pre-drainage. It has become evident in recent years that these wetlands are disproportionally important for wading bird foraging and are critical for supporting the coastal supercolonies, one of the major objectives of restoration, yet CEPP will provide no improvements in this respect. We need to include additional wording in the text to this effect.

Comment No.	Commenter	Question/Comment	District Response
		prairies in the previous dry season (a pre-requisite condition for good Everglades crayfish recruitment) and the deep conditions in early dry season were followed by almost perfect drying for bird foraging over the early spring. In the same dry season ENP hosted an enormous number of wading bird nests, the likes of which had not been observed in 87 years (>36,000 White Ibis nests and >1,900 Wood Stork Nests; Cook and Baranski 2019). The overwhelming majority of these nests were in the western Everglades near the coastal estuaries (Cook and Baranski 2019). The increased hydroperiods in the marl prairies were likely involved in the White Ibis response as the adults provisioned young extensively with Everglades crayfish early in the season (Cocoves 2019, Dorn et al. 2019), and as already stated in part B.3. [new paragraph] While I recognize the legal problem of managing a huge wetland ecosystem for the benefits of maintaining a variety of seaside sparrow we should also recognize that the 2018 nesting event in the southern Everglades was historically noteworthy and correlated with wet conditions in the western and southwestern Everglades and southern Big Cypress. Such flooded conditions will not become more common with the CEPP – A2 (Alt C240) management regime as presented here, which appears to dry the western Everglades slightly more than it is currently (Figs. 4-3, 4-19, 4-20). While questions remain about wading bird irruption near the coast of ENP in 2018, shunting of water further eastward to the Blue Shanty and away from the S-12 structures and the western Everglades will not improve hydroperiods or prey animal production or wading bird nesting in SW ENP.	
137	Dr. Nathan Dorn (Peer Reviewer)	The second paragraph in section 4.3.4., was more of a statement about a wish to move wading bird colonies back to the SW ENP. That goal would appear to gain almost nothing from C240. There is a small gain to fish production (Fig. 4-37) in southern SRS, but the western side of ENP will be slightly dried out for the sparrow and so I read this as no net benefit. I think the paragraph needs to be removed or simply indicate that there is little expected benefit to the SW Everglades (Fig. 4-39). Right now it does little more than list	**Dong Yoon Lee**: Agreed. Although southwestern ENP (IRs 131 and 132) see improvements in hydroperiod and water depth, ecological benefits are minor or ~~not found~~nonexistant, depending on the modeled species. We will consider deleting the sentence or revising it to illustrate negligible ecological benefits in southern coastal areas.

Comment No.	Commenter	Question/Comment	District Response
		a general interest in moving birds back to SW ENP. The projections of the models indicate nothing of the sort with most of the benefits coming up in northern WCA-3A or in NESRS.	
138	Dr. Nathan Dorn (Peer Reviewer)	This model output needs a citation (perhaps Darby et al. 2015?) and a hyperlink to the JEM model if available. It appears that hydroperiods will become improved for snails in the northern part of WCA-3A. It is not obvious how the evaluation of the difference came to be expressed in terms of square miles or acres of habitat. It seems that the evaluation of habitat gained must come from some other values (absolute densities) and not the ones shown in the figure. I cannot tell what it might mean from the evaluation of differences, but in the only region of the central Everglades that supports endangered kite nesting today (i.e., under EARECB) the average year under C240 was unchanged or slightly worse (Fig. 4-40a; southwest corner of WCA-3A). I'd guess that's a marginal response and would not take it too seriously. I cannot tell from the presented hydrologic analyses why that area should decline in predicted snail densities, but I'm also not convinced that a better analysis can be contrived given our current understanding of how this species responds to hydrologic variation. Further, a bigger unknown here for the kite is that the non-native snail (*Pomacea maculata*) response to these alterations remains unclear, but the kites have come to rely upon them as much or more than on the native snails.	**Dong Yoon Lee**: We will add a more detailed model description and citations and revise the figure caption. We also are considering presenting the model output separately for Alternative C240 and the ECB. We will add the following information: This size-structured population model simulates the response of apple snails to a range of water conditions that include timing, frequency, and duration, in addition to air temperatures (Darby et al. 2015). The numbers and size distribution of snails are simulated and can be calculated for any day of a year with input data. Adult snail population size during a given year is a product of egg production, and thus environmental conditions, from the previous year. The model was developed using EDEN and outputs begin starting in 1992. Results are shown for adult snails (>20 millimeters) during the spring (April 20), before that year's reproductive period. End of spring results are shown, as this is the population of snails of the size class consumed by the endangered Everglades snail kite. For a representative dry year (e.g., 2004), during the spring (April 20), adult apple snail population numbers increase in 454,000 acres of northern and central WCA-3A, WCA-3B, and SRS but decrease in 118,000 acres of eastern WCA-3A for Alternative C240 compared to the ECB.
Other Public Comments on Technical Document (April 2020)			
139	Siobhan Fennessy	Section 2.2 first paragraph, it is interesting that the results of this review process have been written into the document!	**Toni Edwards**: The draft Technical Document was originally written with future dates included as placeholders, including anticipated dates and outcomes for the peer review. It will be updated with the actual dates of occurrence for the steps in the water reservation development process, including the peer review, and reposted for public review as a May 2020 version.
140	Siobhan Fennessy	What is the fate of the portion of the Miami canal that will not be filled?	**Brenda Mills**: The northern portion of the Miami Canal that is not backfilled as part of CEPP will include conveyance features to move water into and through northwestern WCA-3A.

Comment No.	Commenter	Question/Comment	District Response
141	Siobhan Fennessy	On page 12: it is not clear how these 2 outcomes differ: • In northwestern WCA-3A, CEPP will improve slough vegetation depths, reducing the time that water ponding depth in the sloughs falls below zero (i.e., fewer dryouts). • In northwestern WCA-3A, CEPP will provide longer durations (hydroperiods) when the CERP target ponding depths are achieved, which improves slough vegetation suitability.	**Raul Novoa**: In northwestern WCA-3A, CEPP will improve slough vegetation by reducing the time water ponding depths in the slough fall below zero (i.e., fewer dryouts). **Walter Wilcox**: Agreed. The statements are similar, but they illustrate two different, important outcomes: overall rehydration for landscape benefit (e.g., reduced soil oxidation, fire risk) and slough water refugia (e.g., for fish populations). **Fred Sklar**: Walter is correct. Creating a hydroperiod that is conducive for the re-establishment of a ridge and slough pattern is one performance measure. Reducing the occurrences of complete drydowns is relevant to the soil oxidation and peat fire performance measure.
142	Siobhan Fennessy	A future re-evaluation of the project could be aided by addressing the comments made above. For example, ecological indicators and performance targets could be used to assess the project's contributions to both the northern estuaries and the central Everglades region. This would be valuable to assess how well the water reservation is functioning, and point to adaptive management solutions if those are warranted.	**Fred Sklar**: You make a good point. The CEPP Adaptive Management Program has a suite of performance measures that are used to assess the degree of protection and restoration produced by drivers such as water reservations. This can lead to an evaluation of management options to improve the ecological benefits.
143	Siobhan Fennessy	The size of this figure is small yet it presents very detailed data on the vegetation communities. Its small size makes it difficult to detect any differences in dominant vegetation as indicated in the legend.	**Sue Newman**: These images are available at a higher resolution, and we can post them online and provide a link. In addition, we recently obtained new aerial imagery (2019) that once classified, will provide us further insight into vegetation changes.
144	Siobhan Fennessy	In addition, from Figure 4-1b and the associated text, it is not clear what the indicator regions are used for; adding some explanation on how the indicator regions are used in the analysis would be very helpful.	**Clay Brown**: IRs are a collection of cells that represent an area ecologic interest. IRs also represent multiple performance measure graphics (PMGs) and tables. It is important to note that all PMGs are not processed at all locations. The calculation method and locations where the PMG applies are defined by RECOVER. In summary, the IR maps provide a visual reference for multiple PMGs, but not every metric is applied to every location. For example, slough metrics are not applicable to marl areas.
145	Siobhan Fennessy	Figure 4-2. This figure shows the modeled hydroperiod under average and dry years for ECB and C240. As the figure is presented, it is difficult to make out the differences between the model results from this figure; in most cases the cells have the same color in each simulation. Perhaps a third	**Clay Brown**: In Figures 4-2 and 4-3, the regions with the most differences are in the northern portion of WCA-3A and NESRS. Other differences can be seen in the Blue Shanty Flow-way and WCA-2A. An improved way of displaying the information will be considered. **Dong Yoon Lee**: We will consider replacing the yearly average with long-term average maps.

Comment No.	Commenter	Question/Comment	District Response
		panel could be to highlight the differences obtained for each cell. The same is true for Figure 4-3.	
146	Siobhan Fennessy	Please define the meaning of the color of the arrows their length.	**Clay Brown**: The modeled surface vectors in Figure 4-4 represent the average annual surface vectors for an average rainfall year (1978) and dry rainfall year (1989). The size and color of vectors represent the magnitude of flow within a model cell relative to all other model cells; the magnitude is not associated with any value. The colors are grouped according to magnitude (arrow size) to help identify changes in magnitude. Arrow direction represents an annual average direction of flow using vector data for the corresponding year. The intent of the vector plots is to provide overall flow directionality and magnitude relative to other model cells. The reader should not attempt to compute flow (i.e., transect flows). **Dong Yoon Lee**: We will edit the caption according to the information provided by Clay Brown.
147	Siobhan Fennessy	It is interesting that in the average year, conditions at the end of the flow path that runs to the southwest (SRS), appear to be nearly the same for the ECB and C240 simulation. It would be useful to comment on this in the text.	**Raul Novoa**: Figure 4-22 shows flow vector directions and is not a good indicator of ponding depths, hydroperiod, and flow volumes. Flows going across a transect at this location would be more conclusive. Please look at Transect 27 in Figure 4-22.
148	Siobhan Fennessy	This figure is difficult to read. Do the symbols within the box and whisker plots indicate a data point for the average duration (weeks) for each IR? How does the NSM462 differ from the ECB? This isn't discussed in the text. Finally, what are the RECOVER performance measures that are referenced at the bottom of the figure (in orange)– are these the targets for the distributions?	**Fred Sklar**: Not all performance measures come with discrete targets, especially habitat suitability performance measures. The performance measures indicate Alternative C240 and its associated additional 370,000 ac-ft of water will make a difference to the wildlife and fish and thus should be reserved. It also makes a significant difference to peat soil oxidation, slough restoration and landscape pattern, but these parameters are not the focus of this ~~required~~ report.
149	Siobhan Fennessy	The text of the Document indicates that this is the water budget for WCA-3A, however the legend says WCA-3B. In addition, the water budget information for WCA-3A presented is difficult to make out, particularly when searching for a particular gate or structure number. -Perhaps the structures discussed in the text could be highlighted?	**Dong Yoon Lee**: We will revise the caption.
150	Siobhan Fennessy	What methods were used to make these assessments of the effects on different federally and state listed species? Methods are not provided in the text in support of this table.	**Fred Sklar**: This table is based on a combination of the models presented in this Technical Document, model output from the CEPP PIR, an understanding of the biology and environmental requirements of each species and the best professional judgement of the federal and state ecologists working on Everglades restoration projects.

Comment No.	Commenter	Question/Comment	District Response
151	Siobhan Fennessy	The level of detail in the Technical Document is appropriate in some places and lacking in others. If the Technical Document is designed to allow an evaluation of the basis on which the predictions about the performance of the water reservation and its contributions to fish and wildlife in the Everglades, then including more information in the Document is needed. The report is strong in presenting its case and presenting the results of the models that were used in the analysis, however, without more documentation on the methods, including information about the uncertainty associated with the model predictions, it is difficult to assess the results of the analyses. That said, the RSM is, as the report says, a "robust and complex regional scale model" that has been employed for a long time in Everglades restoration planning. The Technical Document provides information on the verification tests, the USACE validation procedure, and rounds of peer review that the RSM has undergone; this gives a high degree of confidence in the hydrologic predictions. The ecological models (which provide output of the United States Geological Survey's Joint Ecosystem Model Program) have also been under development for some time to be used in restoration planning. However, without some details on the structure and performance of the models, it is difficult to evaluate the predicted ecological benefits of the water reservation project that are described in the Document. More information could be provided on, for example, the approach used to validate or verify the models, the hydrologic inputs that were used in the ecological models, and what, if any, aspects of climate change projections were taken into account? It would also be helpful to provide details on any ecological indicators in use in the project, the relevant restoration performance targets that have been established, and how well the predictions of the ecological response as a function of the new hydrological conditions match those targets. Much of the information that was used to design and evaluate the water reservation project, including the data sources, the assumptions and methods applied are not described in detail in the report. For instance, there is no description of the data sources used.	**Walter Wilcox**: Agreed. The hydrologic modeling and use of RSM is well founded. In the original CEPP PIR (Appendix G, page 104), an exercise to propagate model calibration uncertainty through the performance measures and benefit modeling was performed. This analysis illustrated that the relative selections between modeled plan features were robust, even when accounting for error in the hydrologic modeling. **Leslye Waugh**: Reference(s) to the CEPP PIR ~~&~~and PACR ~~can be added to the technical document that includes~~, which include the requested details, can be added to the Technical Document.

Comment No.	Commenter	Question/Comment	District Response
		This is understandable to some degree, it might be difficult to cover all of the work that went into the many aspects of this project in detail in a single report. This detailed information is undoubtedly in other reports, perhaps in the CEPP PIR and PACR. It may be that the level of detail isn't required or intended for this report, however, it if is meant to be a stand-alone, technical document as the question implies, then more detail will be needed to describe the data, analyses, assumptions, methods applied, and the interpretation and conclusions drawn from the analysis. If not, perhaps references to other documents would help to fill in the details.	
152	Siobhan Fennessy	There is a long history of research on water quality issues in South Florida, particularly the impacts of elevated phosphorus concentrations. The water of Lake Okeechobee is phosphorus rich, and the quality of water discharged from the lake must be improved before it can be "sent south." STAs have been created for the purpose of removing phosphorus and have been successful, and there is one planned in conjunction with the EAA Reservoir. The assumption made in the Technical Document is that the new STA (A-2) will remove phosphorus to the desired level; no contingency plans are presented about how the system will operate if P levels cannot be reduced to the low levels needed to meet water quality standards. This is a critical aspect for operations of the reservoir and the Technical Document presents no information on the anticipated capacity of the STA for phosphorus removal. The assumption is that the STAs will work, but there is not sufficient information presented to evaluate this assumption. Given the large volume of water that will move into the EAA Reservoir, and its average phosphorus concentration, has STA A-2 been sized properly so that it is large enough to handle to phosphorus leads? What level of treatment can be expected by this STA, either alone or in combination with the A-1 FEB and other, established STAs? Is it expected that the reservoir itself will remove phosphorus from the water that moves through it? Since the Reservoir is sited on former agricultural land, is there excess phosphorus in the soil that	**Sue Newman**: The CEPP Adaptive Management Plan considers management strategies such as changes in operational strategies (hydrologic pulsing, redirect flow, incremental increases in water levels), modifications to infrastructure, and vegetation management. Exactly which combination will be used will depend on Restoration Strategies performance. **Naiming Wang**: The process that led to the sizing of the EAA Reservoir and A-2 STA was presented in detail in the ~~main report of~~ CEPP PACR and reviewed by the Assistant Secretary of the Army for Civil Works in 2019. In a nutshell, the DMSTA was used (Walker and Kadlec 2005). The DMSTA was developed and calibrated to information specific to South Florida to predict phosphorus removal performance of Everglades STAs and storage reservoirs. It was calibrated to data from 35 fully functional treatment cells with viable vegetation communities of various types. As the best available tool for simulating phosphorus removal performance of existing or planned storage reservoirs and STAs, the DMSTA is configured to allow integration with the SFWMD's regional hydrologic models (SFWMD 2005, 2012) and can be configured to simulate complex regional networks of STAs and reservoirs. The DMSTA is approved by the United States Environmental Protection Agency and the United States Department of the Interior, and it is a USACE-accepted model. It was peer reviewed and certified for CEPP use. Since 2005, the DMSTA has been commonly used by state and federal agencies for STA design and evaluation, including the Restoration Strategies Regional Water Quality Plan (2012), CEPP (2013), STA-1W Expansions (2014-2018), and others. The model

Comment No.	Commenter	Question/Comment	District Response
		might complicate operations? On Pg. 47 of the Document it states that phosphorus levels will be monitored, its potential effects will be evaluated, and options in the CEPP management plan will be implemented. What are those plans? Given the potential for issues with phosphorus, these are critical questions that should be discussed in the report (see also Mitsch 2019. Ecol. Eng138:155-159).	assumptions implemented for the CEPP PACR follow those used in the Restoration Strategies Regional Water Quality Plan and CEPP, which are generally conservative. A maximum settling rate of 2.5 meters per year was assumed for the ~~A2 reservoir.~~EAA Reservoir. It is equivalent to an effective steady-state settling rate of 1.0 meter per year. The annual removal rate of total phosphorus in ~~A2 reservoir is~~the EAA Reservoir was estimated at 5%. According to data published by UF/IFAS (2012, ~~https://edis.ifas.ufl.edu/pdffiles/SS/SS50300.pdf), EAA agriculture~~https://edis.ifas.ufl.edu/pdffiles/SS/SS50300.pdf), EAA soils lead to an 28% increase in soil total phosphorus compared to uncultivated soils. Like other STA facilities built on previously farmed lands, the effects of legacy phosphorus are expected to be temporary. In fact, the A-1 FEB, which is adjacent to ~~A2 reservoir~~the EAA Reservoir, showed no net reduction of phosphorus during the first year ~~after operations. A2STA~~of operation. The A-2 STA is not sized to treat all the additional water expected by the CEPP PACR ~~project~~ alone. Proposed operation of the new A-2 STA and ~~A2 reservoir~~EAA Reservoir will efficiently integrate the new facilities with the existing ~~facilitates (~~facilities (i.e., the A-1 FEB, STA-2, and STA-3/4) and meet the WQBEL. ~~–~~As illustrated in Figure 1-7 for the timing of treated flows south into the Central Everglades under ~~C240TSP~~Alternative C240 compared to ~~existing conditions (EARECB) in Figure 1-7,~~ the ECB, the CEPP PACR ~~C240TSP~~Alternative C240 primarily ~~utilizes~~uses available STA treatment capacity that exists in the dry season ~~at both~~in STA-2 and STA-~~¾.~~-3/4. While peak -flows in wet seasons are not increased, integration with the ~~A-2~~EAA Reservoir and ~~A2STA~~A-2 STA provides additional flow attenuation and temporary storage capability, which results in improved water depth and flow conditions in STA-2, STA-3/4, and the A-1 FEB. -The treatment efficiencies are expected to improve for STA facilities downstream to ~~A2 reservoir.~~the EAA Reservoir. The estimated treatment ~~TP~~total phosphorus removal rates per unit of area for these STAs and ~~A1FEB~~the A-1 FEB are between 0.56 to 0.84- g/~~m^2~~m^2/yr -with an average 0.73 g/~~m^2~~m^2/yr. "On ~~Pg.~~page 47 of the Technical Document, it states that phosphorus levels will be monitored, its potential effects will be evaluated, and options in the CEPP management plan will be implemented. ~~What are those plans?"~~

Comment No.	Commenter	Question/Comment	District Response
			~~(Jose?).~~ **Don Medellin**: The statutory authority granted to the SFWMD's Governing Board under ~~Chapter~~Section 373.223(4), ~~Florida Statutes~~F.S., does not give the ~~District~~SFWMD authority to regulate water quality under this water reservation effort.
153	Siobhan Fennessy	In some places in the Document, it is not clear what the goals are for a particular portion of the project. For instance, on page 31 it says "Canal stages (L-29) exceed 8.5 ft NGVD29 during only approximately 5% of the simulation period within the eastern L 29 Canal segment under Alternative C240." Is there a target for how much time the stage should exceed 8.5 ft? Is this a favorable result? No indication of this is given.	**Walter Wilcox**: There is no specific target for the eastern portion of the L-29. The 8.5 ft refers to the current system Florida Department of Transportation constraint above which roadbed stability could be compromised; however, in the future, the road will be reinforced to allow stages up to 9.7 ft.
154	Siobhan Fennessy	The assumption is that the STAs will work, but there is not sufficient information presented to evaluate this assumption. Given the large volume of water that will move into the EAA Reservoir, and its average phosphorus concentration, has STA A-2 been sized properly so that it is large enough to handle to phosphorus leads? What level of treatment can be expected by this STA, either alone or in combination with the A-1 FEB and other, established STAs? Is it expected that the reservoir itself will remove phosphorus from the water that moves through it? Since the Reservoir is sited on former agricultural land, is there excess phosphorus in the soil that might complicate operations? On Pg. 47 of the Document it states that phosphorus levels will be monitored, its potential effects will be evaluated, and options in the CEPP management plan will be implemented. What are those plans? Given the potential for issues with phosphorus, these are critical questions that should be discussed in the report (see also Mitsch 2019. Ecol. Eng138:155-159).	**Sue Newman**: The CEPP Adaptive Management Plan considers management strategies such as changes in operational strategies (e.g., hydrologic pulsing, redirect flow, incremental increases in water levels), modifications to infrastructure, and vegetation management. Exactly which combination will be used will depend on Restoration Strategies performance. **Naiming Wang**: The process that led to the sizing of the EAA Reservoir and ~~additional~~A-2 STA was presented in detail in the ~~main report of~~ CEPP PACR and reviewed by the Assistant Secretary of the Army for Civil Works ~~(ASACW)~~ in 2019. In a nutshell, the DMSTA was used (Walker and Kadlec 2005). The DMSTA was developed and calibrated to information specific to South Florida to predict phosphorus removal performance of Everglades STAs and storage reservoirs. It was calibrated to data from 35 fully functional treatment cells with viable vegetation communities of various types. As the best available tool for simulating phosphorus removal performance of existing or planned storage reservoirs and STAs, the DMSTA is configured to allow integration with the SFWMD's regional hydrologic models (SFWMD 2005, 2012) and can be configured to simulate complex regional networks of STAs and reservoirs. The DMSTA is approved by the United States Environmental Protection Agency and the United States Department of the Interior, and it is a USACE-accepted model. It was peer reviewed and certified for CEPP use. Since 2005, the DMSTA has been commonly used by state

Comment No.	Commenter	Question/Comment	District Response
			and federal agencies for STA design and evaluation, including the Restoration Strategies Regional Water Quality Plan (2012), CEPP (2013), STA-1W Expansions (2014-2018), and others. The model assumptions implemented for the CEPP PACR follow those used in the Restoration Strategies Regional Water Quality Plan and CEPP, which are generally conservative. A maximum settling rate of 2.5 meters per year was assumed for the ~~A2 reservoir.~~EAA Reservoir. It is equivalent to an effective steady-state settling rate of 1.0 meter per year. The annual removal rate of total phosphorus in ~~A2 reservoir is~~the EAA Reservoir was estimated at 5%. According to data published by UF/IFAS (2012, ~~https://edis.ifas.ufl.edu/pdffiles/SS/SS50300.pdf), EAA agriculture~~https://edis.ifas.ufl.edu/pdffiles/SS/SS50300.pdf), EAA soils lead to an 28% increase in soil total phosphorus compared to uncultivated soils. Like other STA facilities built on previously farmed lands, the effects of legacy phosphorus are expected to be temporary. In fact, the A-1 FEB, which is adjacent to ~~A2 reservoir~~the EAA Reservoir, showed no net reduction of phosphorus during the first year ~~after operations. A2STA~~of operation. The A-2 STA is not sized to treat all the additional water expected by the CEPP PACR ~~project~~ alone. ~~-~~Proposed ~~operations~~operation of the new ~~A2STA~~A-2 STA and ~~A2 reservoir~~EAA Reservoir will efficiently integrate the new facilities with the existing ~~facilitates (~~facilities (i.e., the A-1 FEB, STA-2, and STA-3/4) and meet the WQBEL. As illustrated~~,~~ in Figure 1-7 for the timing of treated flows south into the Central Everglades under ~~C240TSP~~Alternative C240 compared to ~~existing conditions (EARECB) in Figure 1-7,~~ the ECB, the CEPP PACR ~~C240TSP~~Alternative C240 primarily ~~utilizes~~uses available STA treatment capacity that exists in the dry season ~~at both~~in STA-2 and STA-~~¾.~~3/4. While peak ~~-~~flows in wet seasons are not increased, integration with the ~~A-2~~EAA Reservoir and ~~A2STA~~A-2 STA provides additional flow attenuation and temporary storage capability, which results in improved water depth and flow conditions in STA-2, STA-3/4, and the A-1 FEB. ~~-~~The treatment efficiencies are expected to improve for STA facilities downstream to ~~A2 reservoir.~~the EAA Reservoir. The estimated treatment ~~TP~~total phosphorus removal rates per unit of area for these STAs and ~~A1FEB~~the A-1 FEB are between 0.56 to 0.84~~-~~ g/~~m^2~~m^2/yr ~~-~~with an average 0.73 g/~~m^2~~m^2/yr.~~"On Pg. 47 of the Document it states that phosphorus levels will be monitored, its~~

Comment No.	Commenter	Question/Comment	District Response
			~~potential effects will be evaluated, and options in the CEPP management plan will be implemented. What are those plans?" (Jose?).~~ **Don Medellin**: The statutory authority granted to the SFWMD's Governing Board under ~~Chapter~~Section 373.223(4), ~~Florida Statutes~~F.S., does not give the ~~District~~SFWMD authority to regulate water quality under this water reservation effort.
155	Siobhan Fennessy	The conclusion presented on page 28 about the Blue Shanty Flow-way is not well justified. Here it states that: "Within the Blue Shanty Flowway and the downgradient L-29 Canal, ecologically significant increases in annual hydroperiods are not found despite the addition of 0.3 to 0.7 ft of water during ponded times." Why is this the case? Is this because that part of the system typically has relatively deep water to begin with? If ponding depths are higher in the Blue Shanty flow-way (Figure 4-14), will this cause negative impacts to this part of WCA-3B, which was already considered to be impacted by excessive water depths?	**Fred Sklar**: WCA-3B has lost a great deal of its microtopography. As such, the large volumes of water, from three L-67A structures, that will be added to the Blue Shanty Flow-way have the potential to flood ridges and tree islands. The CEPP Adaptive Management Plan will facilitate the restoration of historical sloughs in this region. This is expected to increase sediment redistribution to tree islands and ridges. The hydroperiod does not change very much in the Blue Shanty region because the inflows and outflows are relatively high and equal. Without Alternative C240, ~~the~~ water levels drop to zero about 4% of the time because ~~-~~the region is compartmentalized and rainwater has no outlet. With Alternative C240~~ the~~, water levels drop to zero only 2% of the time because the inflows are high enough to keep the sloughs hydrated year round (a critical performance measure). This is expected to improve conditions for fish and wildlife, especially during the dry season.
156	Siobhan Fennessy	There is a major assumption used in a conclusion presented on page 36 of the Document about the ecological response of the system. Here the Document states that "enhanced sheetflow (approximately 340% increase; Figure 4 25) will help restore and sustain the microtopography, directionality, and spatial extent of ridges and sloughs and improve the health of tree islands in the ridge and slough landscape." Are there any data or model outputs to support this statement? What are the minimum flow rates needed to restore and sustain the ridge and slough landscape and the associated tree islands, and will this hydroperiod generate those flows? Is there a quantitative understanding of the relationship between hydroperiod and flow that can be presented to support this conclusion? Without some evidence, this assumption hasn't been supported.	**Fred Sklar**: The results in CEPP that indicate significant slough restoration are the strongest support of this sentence. However, we agree that the sentence needs to be modified and, as such, will be changed to: "According to the flow experiments in the Decomp Physical Model (see the appendix to Chapter 6 of the 2019 SFER) enhanced sheetflow (approximately 340% increase; Figure 4-25) will help restore and sustain the microtopography, directionality, and spatial extent of ridges and sloughs and may improve the health of tree islands in the ridge and slough landscape (Wetzel et al. 2005)." Wetzel, P.R., A.G. van der Valk, S. Newman, D.E. Gawlik, T. Troxler-Gann, C. Coronado-Molina, D.L Childers, and F.H. Sklar. 2005. Maintaining tree islands in the Florida Everglades: Nutrient redistribution is the key. Frontiers in Ecology and the Environment 3:370-376.
157	Siobhan Fennessy	In another example, on page 38 it states: "The introduction of phosphorus into previously unimpacted areas (i.e., central	**Sue Newman**: As currently worded, this text leads the reader to a more negative consequence than was intended. Our intent was to note that in

Comment No.	Commenter	Question/Comment	District Response
		and southern WCA-3A) might cause vegetation shifts, providing a minor adverse effect." How was it determined that this would be a minor effect? The impacts that are described in the next few sentences, for example, that elevated phosphorus levels can lead to sawgrass communities being replaced by cattails, do not seem minor.	enriched areas that are ~~enriched and are then~~ rehydrated, phosphorus can be released upon rewetting, which ~~then has the potential to~~could translocate phosphorus downstream. However, the switch to cattail from sawgrass is something that occurs after extensive loading, following significant enrichment in the soils. The text will be revised to emphasize this.
158	Siobhan Fennessy	There are other conclusions reached that need some supporting evidence. For example, it states on page 36 that central and southern WCA-3A will remain largely unaffected by Alternative C240; is this a neutral result since these areas are typically flooded under ECB? Similarly, on page 44 it states that there are vegetation trends within ENP in which slough/open water marshes switch to sawgrass marshes that are adapted to shorter hydroperiods. Is there a threshold for in hydroperiod length under which there is a transition to sawgrass? If that is known, does the transition back to slough/open water happen at the same hydroperiod length? The use of predictive ecological models based on this type of information would be useful in predicting the response to changing hydrology. This may have been done as part of the ecological modeling; if so it would be beneficial to include it.	**Fred Sklar**: Supporting evidence will be added.
159	Siobhan Fennessy	Will the increase in ponding depths in WCA-3B during all ponded times under Alternative C240 compared to ECB have a negative impact on the remnant ridge and slough, and tree island habitat in WCA-3B? Here the change in ponding depth is described as a negligible difference, but given the statements in the paragraph directly proceeding this one, the impacts could be substantial, particularly for a region that has suffered degradation. Of course, the EAA Reservoir can't meet all the hydrologic targets in the south Everglades system, but a statement on how the system might respond in this location would be a useful way to evaluate the project overall. A related issue arises page 41, where it says "Resumption of sheet flow and related patterns of hydroperiod extension will help restore pre-drainage water depth patterns;" this may be true, but how is this improvement quantified?	**Fred Sklar**: The modeling under Alternative C240 constrained the hydrology in WCA-3B to prevent tree islands from getting too inundated. The Adaptive Management option that might get implemented in WCA-3B will assess an incremental increase in ponding depths over a 15- to 20-year interval to allow sloughs, ridges, and tree islands to "build" microtopography.

Comment No.	Commenter	Question/Comment	District Response
160	Siobhan Fennessy	In the discussion on the Cape Sable Seaside Sparrow (CSSS) on page 45, it states that there will be an increase in habitat are of 12,533 acres in Subpopulations A, northern AX, B, C, and F, while there will be a decrease of 13,759 acres in another area. Does this represent a net overall impact to this species? As the hydrology of the central Everglades is restored, there is expected to be shifts in suitable habitat for the CSSS, but in the short term will these potential impacts be detrimental to the CSSS populations?	**Dong Yoon Lee**: Increased water flow into SRS would increase depth and duration of this historically deep-slough ecosystem. This will ~~result in reduction in~~reduce the extent of shallow-water edge in areas adjacent to SRS. An eastern shift of suitable habitat is expected in eastern marl prairies, while a northern shift of marl prairies is expected in Subpopulation A. The increased distance between Subpopulation A and other subpopulations in eastern marl prairies is predicted; however, we know very little about the behavior and capacity of inter-habitat dispersion of the CSSS. Increased connectivity between eastern critical habitat might be beneficial to the CSSS.
161	Siobhan Fennessy	Generally speaking, the Technical Document is sound, but it lacks some needed information on, for example, the ecological models used and quantitative analysis of the capacity of the STAs and FEB A-1 to deal with the volume of water planned to be discharged from Lake Okeechobee. Information could be provided on the relevant environmental indicators and performance standards that are being used as part of the restoration program. Clearly the EAA Reservoir will have substantial ecological benefits, but the lack of key information makes it difficult to fully assess the benefits of the project.	**Fred Sklar**: The FEBs and STAs associated with CEPP were simulated as part of the ~~CEPP~~ PIR and ~~CEPP-~~PACR~~-PIR~~. The constraint associated with these water management structures is based on maintaining a flow-weighted total phosphorus concentration of 13 ppb outflow. The DMSTA was used to constrain STA inflows so as to not exceed the required outflows. All indicators used in this Technical Document are the same as the performance measures used in the CEPP and ~~CEPP~~ PACR. It might be feasible to add an appendix with more detailed modeling information.
162	Siobhan Fennessy	It would be clearer to say “lost between 39% and 65% of its organic soils depth.	**Dong Yoon Lee**: We will revise the sentence according to the comment.
163	Siobhan Fennessy	Does the vegetation and patterning in central WCA-3A serve as a reference condition to set restoration targets with the new flows?	**Fred Sklar**: Central WCA-3A serves as a reference location where the ridge-slough-tree island landscape is the most preserved. The current hydrology in this location is similar to the hydrology predicted by the NSM and, as such, is more of a comparative reference site rather than a target.
164	Siobhan Fennessy	On page 53, the numbers presented on wood storks aren’t clear. Here it says: “Wood stork foraging conditions increase by approximately 297,000 acres (464 square miles) in northern WCA-3A, NESRS, and southeastern WCA-3B; however, wood stork foraging conditions decrease by 135,000 acres (211 square miles) in southeastern WCA-3A, resulting in an overall reduction of 2.1% in landscape abundance (1975 to 2005). Given that, should the overall effect of this be an increase in abundance?	**Dong Yoon Lee**: The wood stork model produces two different indices: the abundance of foraging habitat, which is presented in the figure, and a foraging index, which is a product of abundance and quality of foraging habitat indices. The latter was used to calculate the annual average (2.1%). Despite the relatively large areal increase in the foraging index, it results in an overall reduction (2.1%) because the foraging index in a large portion of coastal ENP is not improved by increased water flow. We will make a significant revision in this section of the Technical Document.

APPENDIX C:
PUBLIC COMMENT LETTERS RECEIVED AFTER THE MAY 29 PUBLIC PEER-REVIEW SESSION

This appendix contains formal, written public comment letters received after the public Everglades Agricultural Area (EAA) Reservoir ~~Peer Review Session~~Water Reservation peer-review session held on May 29, 2020~~(~~. See **Appendix ~~C~~B** for more information on the ~~Peer Review Session).~~peer-review session. All written comments were reviewed by South Florida Water Management District (SFWMD~~,~~) staff and, where appropriate, ~~they were~~ addressed in subsequent drafts of the technical document.



FLORIDA FARM BUREAU FEDERATION

THE VOICE OF AGRICULTURE

June 25, 2020

VIA E-MAIL ONLY: tedwards@sfwmd.gov and dmedelli@sfwmd.gov

Don Medellin
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

and

Toni Edwards
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: Florida Farm Bureau Federation's General Comments on the South Florida Water Management District's Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation

Dear Mr. Medellin and Ms. Edwards:

The Florida Farm Bureau Federation (FFBF), represents 137,000 stakeholders throughout the state of Florida many of whom reside in south Florida and are directly affected by issues related to management of Lake Okeechobee, the Comprehensive Everglades Restoration Plan (CERP) and its respective components. The FFBF's comments are specifically directed to the South Florida Water Management District's (SFWMD) draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation (Technical Document).

The subject Technical Document presents complex hydrologic and ecologic analysis that does not lend itself to quick review. With that said an extension of the given comment period would be greatly appreciated. In addition explanations of these issues in the Technical Document appear general in

P.O. Box 147030, Gainesville, Florida, 32614 - 7030 • 352.378.1321 • www.FloridaFarmBureau.org

nature and do not provide analysis applicable to any particular situation. Likewise, initial findings and assumptions concerning managing the hydrologic and ecologic components of the project need further explanation on how they comply with Florida law. These are just a few examples why given the many unanswered questions surfacing from this document perhaps an extension of time is warranted. This would allow stakeholders an opportunity to get a better understanding of what's being presented as well as further review of the comments made by the technical review panel.

The Florida Farm Bureau Federation remains committed to Everglades Restoration and ensuring CERP projects, including the A-2 STA and the EAA Reservoir Project, are based on technically sound science and implemented in manner that adheres to all legal mandates while holding true to all CERP goals and objectives. We look forward to continue working with you as you move forward with this project.

Sincerely,

Signature Redacted

Gary Ritter
Assistant Director, Government & Community Affairs
Florida Farm Bureau Federation

P.O. Box 147030, Gainesville, Florida, 32614 - 7030 • 352.378.1321 • www.FloridaFarmBureau.org

LAKE WORTH DRAINAGE DISTRICT

13081 MILITARY TRAIL
DELRAY BEACH, FLORIDA 33484-1105

Board of Supervisors
James M. Alderman
Stephen Bedner
Jeffrey P. Phipps, Sr.
Harry Raucher
John I. Whitworth III
Executive Director
Tommy B. Strowd, P.E.
Attorney
Mark A. Perry, P.A.

June 25, 2020

Via Email: tedwards@sfwmd.gov

Toni Edwards
Senior Scientist, Applied Sciences Bureau
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Dear Ms. Edwards:

Subject: Lake Worth Drainage District Comments on the May 2020 Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation

Thank you for the opportunity to review and provide comments on the May 2020 Draft Report "Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation." We recognize that the Draft Report provides the basis for South Florida Water Management District's (SFWMD) upcoming reservation rule development, and we look forward to participating in that process.

The Lake Worth Drainage District (LWDD) has long been a supporter of the Comprehensive Everglades Restoration Plan (CERP), including the construction of a reservoir south of Lake Okeechobee. In 2000, Congress intended for the project to reduce estuary discharges, provide water for the environment and water supply for municipal and agricultural uses. The Post Authorization Change Report (PARC) recognized these objectives through the proposal for additional dynamic reservoir storage in the Central and Southern Florida Project (C&SF Project).

As you are aware, the operation of Lake Okeechobee is integral to the function of the C&SF Project. Its operation affects numerous stakeholders across south Florida, including a broad range of both environmental and economic interests. While it must be managed to address critical ecological functions within the Lake itself, it also relies upon dynamic storage to meet flood control, water supply and environmental needs within the C&SF Project. The relationship between Lake Okeechobee and the EAA A-2 Reservoir is undeniable, and as a result, operations of both the structures surrounding the Lake and the A-2 Reservoir must be integrated to meet the water resource objectives established in CERP. However, there is very little information in the Draft Report regarding the EAA A-2 Reservoir projects operations, particularly as it relates to the function and operation of Lake Okeechobee.

Phone: (561) 498-5363 • Fax: (561) 495-9694 • www.lwdd.net

Therefore, it is not possible to make detailed technical comments at this time. Given that the current operating schedule (LORS 08) is not expected to be replaced until at least 2022 (LOSOM) and the EAA A-2 Reservoir is not expected to be constructed until at least 2027, adopting a prospective water reservation now may be premature.

LWDD remains committed to Everglades Restoration and we look forward to working with SFWMD and the U.S. Army Corps of Engineers to ensure that it is successfully implemented in a fashion that adheres to the legal mandates, objectives and processes established by Congress and the State of Florida. Thank you for the opportunity to provide these comments.

Sincerely,

Signature Redacted

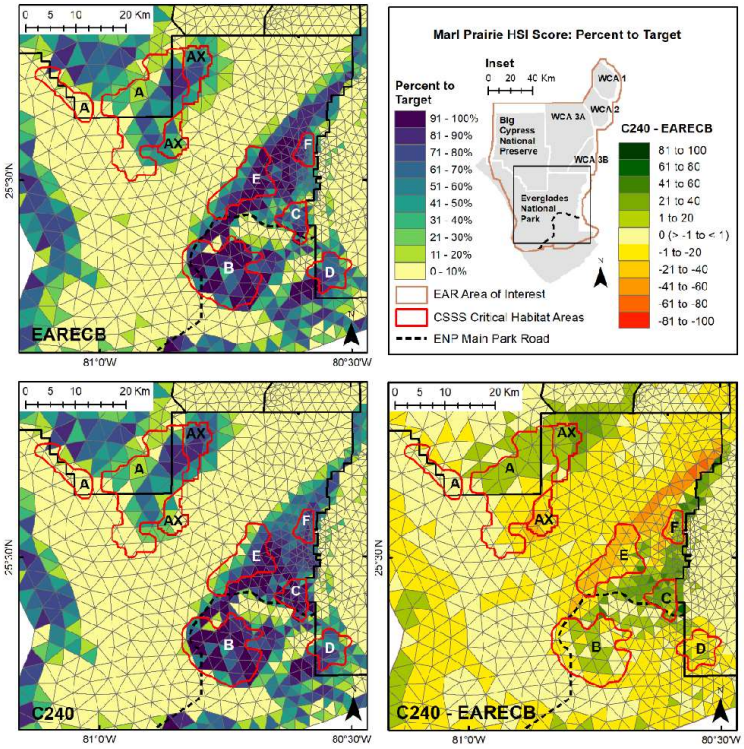
Tommy B. Strowd, P.E.
Executive Director / District Engineer
LAKE WORTH DRAINAGE DISTRICT

c: LWDD Board of Supervisors
Jeremy McBryan, P.E., Palm Beach County

USGS Joint Ecosystem Modeling (JEM) comments on EAA Reservoir WR Tech Doc

25 June 2020

- Marl Prairie
  - Figure 4-34. On page v and page 44: Caption should read, "the differences in percent to target between the ECB and Alternative", not percent differences between
  - There is an updated version of Figure 4-34, see below



- American alligator
  - Page 51: "A habitat suitability index developed by RECOVER for the American alligator" should read, **"A habitat suitability index developed for the American alligator, and used for RECOVER, can predict..."** and the model citation as follows should be included, Shinde et al. 2014: Shinde, D., L. Pearlstine, L.A. Brandt, F.J. Mazzotti, M.W. Parry, B. Jeffery, and A. LoGalbo. 2014. Alligator Production Suitability Index Model (GATOR–PSIM v. 2.0): Ecological and Design Documentation. South Florida Natural Resources Center, Everglades National Park, Homestead, Florida, USA. Ecological Model Report. SFNRC Technical Series 2014:1.

- Apple Snail
  - **Section 4.3.5 Apple Snail**, page 55: This sentence: "Apple snail habitat conditions increase by approximately 454,000 acres (710 square miles) in northern and central WCA-3A, WCA-3B, and SRS but decrease by 118,000 acres (184 square miles) in eastern WCA-3A during dry years (e.g., 2004) for Alternative C240 compared to the ECB (Figure 4-40b)." should read, **"The number of acres where adult apple snail population numbers are predicted to increase under C240 compared to ECB in a dry year includes approximately 454,000 acres (710 square miles) in northern..."**
  - Additionally, there is no description of the apple snail model, which is called EverSnail, it can be described briefly as: The apple snail model, EverSnail, quantifies the dynamics of the Apple Snail (*Pomacea paludosa*) population as a function of hydrology and temperature (i.e., habitat conditions). Adult snail population size during a given year is a product of egg production, and thus environmental conditions, from the previous year (Darby et al. 2015).
    - This is the reference for Darby et al. 2015: Darby, P.C., D.L. DeAngelis, S.S. Romañach, K. Suir, and J. Bridevaux. 2015. Modeling apple snail population dynamics on the Everglades landscape. Landscape Ecology 30(8): 1497–1510.
  - Also, was density calculated by your team to lead to this sentence?: "Overall, the apple snail population density increases 41% during the simulation period (1995 to 2005)..." If not then, we suggest to revise to **"Overall, the adult apple snail population numbers increase by 41%..."** to be more explicit.

WEST PALM BEACH
Public Utilities

Toni Edwards
Senior Scientist
Applied Sciences Bureau/Coastal Ecosystems Section
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Dear Mr. Edwards,

The City of West Palm Beach is providing the following comments in response to the T*echnical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation (dated May 2020)* and related peer review presentation materials.

The City is the largest municipality in Palm Beach County with more than 110,000 residents. The City also operates a public water supply system that provides clean, safe, and cost-effective potable water to approximately 150,000 residents of the City, the Town of Palm Beach, and the Town of South Palm Beach. The City is dedicated to ensuring that its water supply will be protected from environmental harm. Additionally, the City is committed to protecting environmentally sensitive features including Grassy Waters Preserve and the Loxahatchee River Watershed. The City also utilizes a portion of its permitted water supply to maintain water stages in Grassy Waters Preserve to protect the unique remnant of the Everglades from environmental harm. Grassy Waters Preserve is an ecologically critical wetland habitat for various threatened and endangered species including the endangered Everglades Snail Kite. Additionally, the City is also the principle source of water supply during the dry season to maintain Minimum Flows and Levels (MFL's) to the Northwest Fork of the Loxahatchee River, a federally designated Wild and Scenic River.

The City of West Palm Beach supports the concept of an Everglades Agricultural Area (EAA) A-2 Reservoir project and other state and federal efforts to restore the ecosystems throughout the Central and Southern Florida (C&SF) project's water management system. West Palm Beach like many South Florida governments relies on the C&SF system for public water supply, to protect its citizens from flooding, to protect critical ecosystems and to guard against salt-water intrusion.

The City however is unable to meaningfully comment on the T*echnical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation (dated May 2020)* and related peer review presentation materials. The City's position is that there is insufficient information on the record for the

401 CLEMATIS STREET
P.O. BOX 3366
WEST PALM BEACH, FL 33401
561.822.2200

City to comment at this time. An Operating Plan for the EAA A-2 Reservoir project will first need to be developed in order to demonstrate protection of the City of West Palm Beach existing water rights. It is premature to move forward with a water reservation for the (EAA) A-2 Reservoir project prior to determination of the impact of the reservation on water supply for the City of West Palm Beach and the critical environmental features such as Grassy Waters Preserve and Loxahatchee River.

Thank you for your consideration, and please do not hesitate to contact me by phone (561-822-2284) or email (pkalkat@wpb.org) if you have any questions.

Sincerely

Signature Redacted

Poonam K Kalkat
Director of Public Utilities
401 Clematis Street
West Palm Beach
FL 33401

June 25, 2020

June 26, 2020

Toni Edwards
Senior Scientist
Applied Sciences Bureau/Coastal Ecosystems Section
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

THE EVERGLADES FOUNDATION

Co-Founders
George Barley†
Paul Tudor Jones II

Board of Directors
Mary L. Barley
Diana Barrett, Ph.D.
Karen H. Bechtel
Christopher H. Buckley, Jr., Esq.
Jimmy Buffett
Barbara Whitney Carr
Robert Coletti
Thomas N. Davidson, Sr.
Carlos M. de la Cruz, Jr.
Nancy J. De Lisi
Joseph Z. Duke III
Maurice R. Ferré, M.D.
Marshall Field V
Ellin Goetz
Rex Hamilton
John A. Hilton, Jr.
Paul Tudor Jones II
John P. Keller
James A. Kushlan, Ph.D.
David Lawrence, Jr.
Garrison duP. Lickle
Nancy Marshall
Kimberly Mendelson
Hon. Jon L. Mills, Esq.
Jack Nicklaus
William J. Nutt
Robert L. Parks, Esq.
William Riley
Michael W. Sole
Mac Stone
Beau Wrigley

Dear Ms. Edwards:

This letter offers comment on the draft *Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation*, dated May, 2020. In summary, the technical document does an excellent job laying the foundation for a determination that the water provided by the Everglades Agricultural Area Reservoir protects fish and wildlife. What needs further elaboration, in our opinion, is the quantity of water to be reserved, and protecting the upstream contributions to that water.

Section 4 of the draft document does an excellent job of laying the factual predicate for reservations. Section 4.1 documents the hydrologic changes expected from the Central Everglades Planning Project, which includes the Everglades Agricultural Area Reservoir. Section 4.2 documents the expected change to habitats resulting from the hydrologic changes. Section 4.3 documents the expected effects of changes to hydrology and habitat on fish and wildlife. Each section uses the most up-to-date tools and metrics, offering the requisite evidence from the scientific literature. The document builds the argument both logically and methodically that the water provided by the Central Everglades Project is protective of fish and wildlife. While it is certainly possible to augment the information and elaborate on the linkages, Section 4 of the draft document concisely offers the essential facts and analyses that would form the basis for a reservation, as discussed in Section 2.

Section 5 is of particular importance, since it specifies the quantify of water to be reserved. Figure 5.2 is the distribution of annual flows from the reservoir, and is important because that is the water upon which the benefits described in Sections 3 and 4 are derived. Yet the document is not explicit on whether Figure 5.2 is quantity of water for the proposed reservation.

Also, Section 5.3.1, entitled "Upstream Watershed Evaluations" appears incomplete. For example, Slide 30 of the May 29, 2020 presentation to the Peer

18001 Old Cutler Road Suite 625 Palmetto Bay FL 33157
email: info@evergladesfoundation.org tel: 305-251-0001 fax: 305-251-0039 website: evergladesfoundation.org

Review committee shows a Lake Okeechobee stage duration curve that would indicate that Lake Okeechobee is a significant source of water for the reservoir. It is unclear if that water is also protected. This is in contrast to the Kissimmee River Reservations process, where the SFWMD specifically recognized that flows in the Kissimmee River depended on upstream watershed contributions and made reservations for the upstream lakes as well as the river.

In summary, the technical document does an excellent job laying the foundation for a determination that the water provided by the Everglades Agricultural Area Reservoir protects fish and wildlife. What needs further elaboration, in our opinion, is the quantity of water to be reserved, and protecting the upstream contributions of that water.

Sincerely,

Signature Redacted

Thomas Van Lent, Ph.D.
Senior Scientist
The Everglades Foundation

Cc: Shannon Estenoz
Melodie Naja, Ph.D.

County Administration
P.O. Box 1989
West Palm Beach, FL 33402-1989
(561) 355-2030
FAX: (561) 355-3982
www.pbcgov.com

Palm Beach County Board of County Commissioners

Dave Kerner, Mayor

Robert S. Weinroth, Vice Mayor

Hal R. Valeche

Gregg K. Weiss

Mary Lou Berger

Melissa McKinlay

Mack Bernard

County Administrator

Verdenia C. Baker

"An Equal Opportunity Affirmative Action Employer"

Official Electronic Letterhead

June 26, 2020

Via Email: tedwards@sfwmd.gov

Toni Edwards
Senior Scientist, Applied Sciences Bureau
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Dear Ms. Edwards,

Subject: **Palm Beach County Comments on the May 2020 Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation**

Thank you for the opportunity to comment on the subject document related to an important Comprehensive Everglades Restoration Plan (CERP) project. Palm Beach County (County) supports the proposed Everglades Agricultural Area (EAA) A-2 Reservoir project and other state and federal efforts to restore ecosystems throughout the Central and Southern Florida (C&SF) project's water management system. The County, like many South Florida governments, relies on the C&SF system to protect its citizens from flooding and to protect public water supply from depletion and salt water intrusion.

As communicated previously, the original June 12, 2020 deadline for comments on the subject document and related peer review materials was too short to ensure adequate public engagement and enable meaningful input from stakeholders and affected parties and appeared inconsistent with previous South Florida Water Management District (SFWMD) water reservation public review timelines. The County appreciates SFWMD extending the deadline to June 26, 2020.

Additional time was needed to understand the nuances of the proposed water reservation, the complexities of the regional modeling and assumptions, how modeling information was translated during development of the Technical Document, how the water reservation will affect and/or will be affected by the ongoing Lake Okeechobee System Operating Manual (LOSOM) effort, and the potential implications to water supply reliability and existing permitted water users.

Unfortunately, the lack of sufficient information provided in the subject Draft Technical Document makes it difficult for the County to provide extensive comments at this time. Below are questions or concerns based on the information provided.

1. The regional modeling used to prepare the Draft Technical Document to support the EAA A-2 Reservoir water reservation assumed the 2008 Lake Okeechobee Regulation Schedule (LORS2008). As such, the results of the technical analysis are integral to and dependent on Lake Okeechobee operations consistent with LORS2008. Yet LORS2008 is expected to be superseded by a new operating schedule (i.e. LOSOM) by 2022 and the EAA A-2 Reservoir is not expected to be constructed until 2027 at the earliest. These facts introduce additional questions on the appropriateness and validity of the technical analysis and leads to the belief that the proposed water reservation may be premature.
2. The relationship between the technical analysis, the subsequent water reservation rule and LOSOM is not clear. Please explain how LOSOM will affect the information in the Draft Technical Document, the subsequent water reservation rule and the timeline for rule development?
3. Due to the lack of an operational plan for the EAA A-2 Reservoir that aligns with the information provided in the Draft Technical Document, it is not clear if and how the multi-purpose operations of the EAA A-2 Reservoir, as envisioned in CERP, will occur.
4. Due to the lack of an operational plan for the EAA A-2 Reservoir, there is a large amount of uncertainty regarding project operations that could result in undocumented effects to the environment and water supply reliability.
5. Per the Draft Technical Document, releases from the EAA A-2 Reservoir via Structure S-628 to the Miami and North New River Canals may occur periodically and are not reserved for fish and wildlife. If actual EAA A-2 Reservoir operations result in little to no releases from S-628, what assurances do existing and future permitted users have that their water supply reliability will not be impacted?
6. It is not clear if and how the EAA A-2 Reservoir reduces the likelihood of water shortage conditions in South Florida that have resulted from implementation of LORS2008, which was intended to be temporary and was implemented to reduce Herbert Hoover Dike failure risk, or if and how the EAA A-2 Reservoir increases the likelihood of meeting water supply requirements for existing permitted users. How does SFWMD intend to meet their legal obligation to protect existing legal users and provide for other water related needs now and in the future?

The County will continue to monitor the EAA A-2 Reservoir water reservation rule development process and looks forward to receiving additional information to assist in increasing the understanding of the technical basis for the water reservation.

Sincerely,

Signature Redacted

Jeremy McBryan, PE, CFM
County Water Resources Manager

cc: Patrick Rutter, Assistant County Administrator

GUNSTER
FLORIDA'S LAW FIRM FOR BUSINESS

Writer's Direct Dial Number: (561) 650-0555
Writer's E-Mail Address: eross@gunster.com

June 26, 2020

VIA E-MAIL ONLY: DMEDELLI@SFWMD.GOV AND TEDWARDS@SFWMD.GOV

Mr. Don Medellin
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

and

Ms. Toni Edwards
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: United States Sugar Corporation's Comments on the South Florida Water Management District's Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation

Dear Mr. Medellin and Ms. Edwards:

This firm represents United States Sugar Corporation ("USSC"), an interested stakeholder in the Comprehensive Everglades Restoration Plan ("CERP") and all of CERP's incremental components, as well as the interrelated management of Lake Okeechobee ("Lake"). The Everglades Agricultural Area Reservoir Project ("EAA Reservoir Project") is of key import to USSC since its operation will directly influence USSC farmlands and water supply sources. As with all CERP projects, USSC supports the EAA Reservoir Project's implementation and submits these comments on the South Florida Water Management District's ("SFWMD") draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation. ("Technical Document")

Stakeholders were notified by e-mail from SFWMD staff on the afternoon of May 28, 2020 that the subject, draft Technical Document was available for review, with comments due by June 26, 2020. USSC has reviewed both the draft Technical Document and the Peer Review Panelists' comments and recognizes SFWMD will be making responsive edits. Thus, USSC's comments are more general in nature, and we look forward to further engaging in SFWMD's rule development process. Consistent with USSC's prior comment letters, concerns focus on *operation* of this new CERP project which will become an interconnected feature of the Central and Southern Florida Flood Control Project (C&SF Project). SFWMD's draft Technical Document provides scant information regarding the EAA Reservoir Project's operations, yet defined operations are critical to identifying water to be reserved for protection of fish and wildlife and meeting other applicable legal mandates.

The reservoir south of Lake Okeechobee is a part of the plan passed by Congress in 2000 intended to reduce estuarine discharges, supply water to the environment, and increase water supply for municipal, industrial and agricultural users. This intent was carried forward in the EAA Reservoir Project's Post Authorization Change Report through use of dynamic reservoir storage. The EAA Reservoir Project operations, which will be integrated with lake operations, must yield successful and cost-efficient implementation in light of all applicable state and federal laws and related commitments. Fulfilling these mandates is not evident in the draft Technical Document or related EAA Reservoir Project documents. Please consider USSC's comment letter on the Corps' Final Environmental Impact Statement for the Central and Southern Florida, Everglades Agricultural Area Reservoir Project and related permit application attached hereto as Attachment A for your convenient review. We note that the issues raised in this and other USSC's prior comment letters regarding the EAA Reservoir Project remain largely unanswered.

To understand the overall context of this rule development process and EAA Reservoir Project timing, we request the District post a copy on the EAA Reservoir Project's webpage of: (1) the U.S. Army Corps of Engineers' (Corps) Record of Decision for the EAA Reservoir Project, (2) the SFWMD and Corps' Project Cooperation Agreement addressing the A-2 STA portion of the EAA Reservoir Project and (3) the Corps' Section 1308 Report required by WRDA 2018. We also ask SFWMD to provide an update at the upcoming rule development workshops regarding both the status of the Corps' New Start position on the EAA Reservoir Project and SFWMD negotiations with the Corps regarding the partnership agreement for the EAA Reservoir component.

USSC remains committed to ensuring CERP projects, including the A-2 STA and the EAA Reservoir Project, are successfully implemented in a manner that adheres to legal mandates, are technically sound and serve all CERP goals and objectives.

Sincerely,

Signature Redacted

Elizabeth D. Ross
Gunster Law Firm
Attorneys for the United States Sugar Corporation

EDR/er

Enclosure: Attachment A - United States Sugar Corporation's Comment Letter to the U.S. Army Corps of Engineers – Final Environmental Impact Statement for the Central and Southern Florida, Everglades Agricultural Area, Southern Stormwater Treatment Area Permit Application, File No. SAJ-2018-03427(SP-KDS), dated February 24, 2020

Attachment A

United States Sugar Corporation's Comment Letter to the U.S. Army Corps of Engineers – Final Environmental Impact Statement for the Central and Southern Florida, Everglades Agricultural Area, Southern Stormwater Treatment Area Permit Application, File No. SAJ-2018-03427(SP-KDS), dated February 24, 2020

GUNSTER
FLORIDA'S LAW FIRM FOR BUSINESS

Writer's Direct Dial Number: (954) 712-1478
Writer's E-Mail Address: lphillips@gunster.com

February 24, 2020

VIA E-MAIL ONLY:
EAARESERVOIR@USACE.ARMY.MIL
KRISTA.D.SABIN@USACE.ARMY.MIL

Department of the Army
c/o Mr. Andrew LoSchiavo
U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Boulevard
Jacksonville, Florida 32207-8175

and

Department of the Army
c/o Ms. Krista Sabin
U.S. Army Corps of Engineers
Palm Beach Gardens Permit Section
4400 PGA Boulevard, Suite 500
Palm Beach Gardens, Florida 33410

RE: United States Sugar Corporation's Comments on the Corps' Final Environmental Impact Statement for the Central and Southern Florida, Everglades Agricultural Area; and Comments on the Everglades Agricultural Area Southern Stormwater Treatment Area Permit Application, Corps File No.: SAJ-2018-03427(SP-KDS)

Dear Mr. LoSchiavo and Ms. Sabin:

This firm represents United States Sugar Corporation ("USSC"), an interested stakeholder in issues related to the management of Lake Okeechobee ("Lake"), including the Comprehensive Everglades Restoration Plan ("CERP") and all of its incremental components. On January 24, 2020 and on January 28, 2020, the U.S. Army Corps of Engineers ("Corps") published separate notices seeking comments from the public regarding the above two above-referenced matters, the Final Environmental Impact Statement ("EIS") for the Everglades Agricultural Area ("EAA") Reservoir Project, and the permit application for the A-2 STA, collectively referred in this comment letter as the EAA Reservoir Project. On behalf of USSC, please include this letter in the EAA Reservoir Project's and the A-2 STA permit application's respective administrative records. USSC requests the Corps consider the following issues as it finalizes its decisions on the EAA Reservoir Project.

To be clear: USSC supports the EAA Reservoir Project, along with the other components and projects of CERP. The EAA Reservoir Project proposes new CERP infrastructure, authorized by the Water Resources Development Act of 2018. The comments in this letter are related only to the *operation* of the new infrastructure for the EAA Reservoir Project. Any representation by others that USSC does not support this project because of the submission of a comment letter is inaccurate, or worse, purposefully misleading.

As a landowner and farmer in the EAA, USSC has had a long-standing involvement in CERP and has a substantial interest in the proposed EAA Reservoir Project. USSC pays an agricultural privilege tax (a tax unique to the EAA) that support Everglades restoration. EAA farmers have invested more than $400 million in restoring and preserving the Everglades and implement the most successful and well documented EAA Best Management Practices program, reducing phosphorus loads in stormwater runoff by a long-term average of 56 percent since the program began in 1996. USSC shares the concerns of other stakeholders, including the availability of water supply (which for farmers means irrigation water for their crops) and the success of water quality improvements in the system.

USSC Supports the EAA Reservoir Project, Along with Every Other Component of CERP and Has Consistently Expressed Support for CERP, the Central Everglades Planning Project ("CEPP"), and the EAA Reservoir Project

After close to a decade of analysis and consensus building, Congress enacted the Water Resources Development Act of 2000 ("WRDA 2000"), authorizing CERP, the framework for all environmental restoration changes to the Central and Southern Florida Flood Control Project ("C&SF Project"). USSC was part of this historic achievement in 2000 and has consistently supported CERP and the construction of a reservoir south of Lake Okeechobee, which is a part of the plan passed by Congress in 2000. As evidence that USSC has always been committed to the completion of CERP projects, including the EAA Reservoir Project, below are a few examples of USSC's public expression of support for these projects:

> • "USSC supports the proposed CERP project as described and approved in the Central Everglades Planning Project ("CEPP") Post-Authorization Change Report ("PACR")."
> Source: Letter from USSC to U.S. Army Corps of Engineers, October 7, 2019
>
> • "U.S. Sugar will continue to support the EAA Reservoir project, the Florida Legislature, the South Florida Water Management District and the U.S. Army Corps of Engineers as they move forward to build and operate the projects that will store, clean and

convey more water south of Lake Okeechobee to reduce discharges, protect our coastal estuaries and the Florida Everglades"
Source: USSC Press Release, November 29, 2018

- "Senate Bill 10 has been greatly improved, takes essentially no privately owned farmland, and even removes the threat of eminent domain. The House deserves credit for quickly passing legislation that can provide some protection for our water resources while also protecting our farming communities and vital food production."
Source: USSC Statement, May 17, 2017 following the passage of Senate Bill 10

- "We have and continue to support the Comprehensive Everglades Restoration Plan (CERP), Restoration Strategies, the Modified Water Deliveries projects, and the South Florida Water Management District's priority projects."
Source: USSC Statement, June 9, 2016

- "The House vote was welcomed by members of the broad coalition that united behind the bill – environmentalists, the region's powerful sugar industry, federal regulators and politicians of both parties. 'We are proud to be part of this historic partnership,' U.S. Sugar President Robert A. Dolson said in a prepared statement."
Source: USSC Statement in Palm Beach Post, October 20, 2000

The Corps Is Required to Conduct a Savings Clause Analysis[1] Per the Mandates in WRDA 2000; The Savings Clause Analysis Included in the EAA Reservoir Project EIS Is Flawed

CERP was authorized by WRDA 2000 as the framework to change the C&SF Project into a system that meets Congress' "overarching objectives" of restoring the Everglades ecosystem while providing for South Florida's other water-related needs, including water supply and flood protection.[2] CERP authorizes the Corps to modify operations of the existing C&SF Project and add new infrastructure to accomplish CERP's overarching objectives.[3] Congress included legal assurances in WRDA 2000 to protect water supply and extensive procedures apply to insure CERP implementation adheres to these assurances.[4] On a parallel basis, Florida adopted laws to provide

[1] The federal Savings Clause is codified at Section 601(h)(5) of the Water Resources Development Act of 2000, Pub. L. No., 106-541, §601, 114 Stat. 2690 (Dec. 11, 2000). The Florida Savings Clause is codified at Section 373.1501(5)(d), Florida Statutes. The federal and State Savings Clauses are referred to collectively as the "Savings Clause" in this letter, unless otherwise more specifically limited by the terms 'State' or 'federal'.
[2] WRDA 2000, P.L. 106-541, § 601(b)(1)(A).
[3] *Id.*
[4] WRDA 2000, § 601(h) and S. Rept. No. 106-362 (2000) and S. Rept. No. 106-363 (2000).

water users the same assurances - that Florida's water use permitting program, implemented by the South Florida Water Management District ("SFWMD") - would be protected while the State worked with the Corps to implement CERP.[5] These laws were, and remain today, the cornerstone of insuring CERP can be implemented successfully.

It is undisputed that the EAA Reservoir Project is a CERP Project. In order to finalize the EAA Reservoir Project, CERP laws require the Corps and SFWMD to perform a Savings Clause analysis to insure that water users' rights (i.e., issued water use permits) are not interfered with, as the two agencies work to achieve ecological restoration and provide new sources of water for Florida's future needs.

The federal Savings Clause requirement in WRDA 2000 states:

> Until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act is available to replace the water to be lost as a result of implementation of the Plan, the **Secretary and the non-Federal sponsor shall not eliminate or transfer existing legal sources of water, including those for … an agricultural or urban water supply.**
>
> WRDA 2000, § 601(h)(5)(A)(1) (emphasis added).

This requirement is further explained in the Corps' CERP Programmatic Regulations, where the Corps and the local sponsor, the SFWMD, were required to identify the pre-CERP baseline - the hydrologic conditions that existed in 2000 - in order to properly undertake the Savings Clause analysis. The baseline is defined as follows:

> . . . **the hydrologic conditions in the South Florida ecosystem on the date of enactment of WRDA 2000**, as modeled by using a multi-year period based on assumptions such as land use population, water demand, water quality, and assumed operations of the Central and Southern Florida Project.
>
> 33 C.F.R. § 385.35(a) (emphasis added).

Florida adopted a State Savings Clause that requires the SFWMD, as local sponsor on CERP projects, to protect water users. It states:

[5] Section 373.1501 and Chapter 373, Florida Statutes. The Corps solicited comments on the EAA Reservoir Project, we raise both WRDA 2000 and State law because the National Environmental Policy Act ("NEPA") requires analysis of whether state law will be violated by a project. *See, e.g.*, 40 C.F.R. § 1508.27(b)(10). In this letter, the Savings Clause analysis is the surrogate for protecting state water rights and is considered the minimum that must be done to demonstrate the federal government is not interfering with the State's water rights program.

> (5) **In its role as local sponsor for the project, the district shall** comply with its responsibilities under this chapter and implement project components through appropriate provisions of this chapter. In the development of project components, the district shall:
>
> . . .
>
> (d) Consistent with this chapter, the purposes for the restudy provided in the Water Resources Development Act of 1996, and other applicable federal law, **provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users**, that existing levels of service for flood protection will not be diminished outside the geographic area of the project component, and that water management practices will continue to adapt to meet the needs of the restored natural environment.
>
> Section 373.1501(5)(d), F.S. (emphasis added).

The EAA Reservoir Project EIS, however, does not protect water users. It does not use the proper baseline as defined in the Corps' regulations and it does not analyze the proposed operations under the Savings Clause. Annex B in the EAA Reservoir Project EIS mentions the Savings Clause but falls short of providing the necessary analysis for water supply performance in place in 2000. The language in Annex B implies that neither the State nor the Corps will operate the EAA Reservoir Project in manner to meet the water supply performance that existed in 2000.[6] Rather than using the 2000 baseline, as mandated by Congress in WRDA 2000, the Corps has unilaterally revised the baseline to 2008, and the State appears to be quietly consenting. Specifically, the EAA Reservoir Project EIS proposes to take water that existed in Year 2000 away from existing legal users, with no written assurances on the replacement source. This is contrary to the above cited laws and inconsistent with the objectives and goals of the EAA Reservoir Project.

Nowhere has Congress or Florida's Legislature authorized this change in baseline (from 2000 to 2008). Neither federal nor state law (WRDA 2000 or Chapter 373, Florida Statues) allows for water to be taken from permitted users' allocations and transferred to the environment, without having a replacement for that water. The Corps cannot avoid application of the 2000 water supply baseline by hiding behind the fiction that the Lake Okeechobee Regulation Schedule is an "intervening non-CERP activity." The Lake Okeechobee Regulation Schedule was always

[6] Annex B at B-67 states, "Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee would be stored in the A-2 Reservoir when the TSP is implemented. This cannot occur until after the LORS is modified which would allow full utilization of the A-2 Reservoir."

contemplated to be a part of CERP. The Corps' recent rationale, that the Lake Okeechobee Regulation Schedule is only subject to CERP protections when storage north and south of the Lake is built, ignores the clear intent of the Savings Clause. The need to provide assurance to water users that their water supply performance in 2000 would not be impacted is the reason the Savings Clause was put into WRDA in the first place. Moreover, the EAA Reservoir Project was specifically designed in CERP to provide supplemental irrigation to Lake Okeechobee Service Area farms. To claim otherwise betrays the many businesses and public utilities who supported the ecological and water supply goals in WRDA 2000, supported the promise embodied in the Plan, and supported the Savings Clause that directed its implementation.

Because the EAA Reservoir Project is a CERP Project, WRDA 2000 is the only law that authorizes the Corps to achieve the ecological restoration goals described in the EAA Reservoir Project EIS. Likewise, the law that allows the State to participate in CERP projects as a local sponsor, requires the State to undertake a Savings Clause analysis. § 373.1501, F.S. The term "intervening non-CERP activity" is a creation of the Corps, which does not exist in any law or rule (it appears only in a draft guidance memorandum which does not have the force of law). These new interpretations of the CERP laws and its unilateral insertion of a new baseline appears aimed solely at allowing the Corps to avoid meeting the Year 2000 pre-CERP baseline for water supply.

CERP's goals and objectives are multi-faceted and include *both* ecological restoration and water supply protection. The Corps is not at liberty to pursue CERP's ecological goals at the expense of CERP's water supply protections. This proposed action is not within the spirit of CERP, and appears to undermine public trust for the entire plan. We can do better.

Project Purpose Is Not Achieved in the EAA Reservoir Project EIS

The EAA Reservoir Project EIS's project purpose is to improve water supply for users as well as improve deliveries for the natural system.[7] Yet, the EAA Reservoir Project EIS's analyses concludes that it is not providing such water for users,[8] and therefore, the proposed project does not meet the project's purpose. Project operations are integrated with the Lake Okeechobee Regulation Schedule and occur in two phases. First, the Corps' schedule requires the A-2 STA, ". . . be constructed and operational prior to completion of the A2 Reservoir."[9] Later, the A-2 STA will receive water from Lake Okeechobee in conjunction with the EAA Reservoir, "if"[10] and when built.

[7] EAA Reservoir Project EIS at p. 1-4. The CEPP PIR likewise states the Project Purpose and Need included "increasing water supply for municipal, industrial and agricultural users." See CEPP PIR at pp. 1-2–1-3.
[8] Annex B of the EAA Reservoir Project EIS at p. 7-9 states: "Based on the analysis, the level of service for the LOSA **water supply has not improved**, nor has it been degraded by the project. Therefore, no water was quantified for other water related needs in the LOSA. However, by virtue of additional water being stored in the A-2 Reservoir, additional water may reach water users located in LOSA." (emphasis added)
[9] EAA Reservoir Project EIS at p. 3-19.
[10] EAA Reservoir Project EIS at p. 1-4.

The EAA Reservoir Project was intended to reduce estuarine discharges, supply water to the environment, and increase water supply for municipal, industrial and agricultural users. These purposes will not be met with the project as proposed in the EIS. The EAA Reservoir Project EIS is flawed because it relies on LORS 2008 to provide water for the EAA Reservoir Project, but never recognizes that water lost under LORS 2008 must be restored for Florida's water use permittees and for maintenance of the Lake's minimum level under state law.[11] Even though CERP and Florida's water laws require these water rights be restored, the Corps does not express operational constraints that are applicable now or under any new Lake schedule. While general parameters are stated, there is no enforceable operational plan defining the recovery of water rights. The EAA Reservoir Project EIS states its first priority is to deliver water to the environment. It includes vague and non-committal language[12] (*e.g.* "may" or "when excess capacity is available is available beyond restoration flows") to describe the potential water supply for human use.[13] Meanwhile, Lake deliveries to the EAA Reservoir Project appear unrestrained, further risking the limited Lake supply source remaining available for permitted use, and contrary to the project purpose.

The Corps and the SFWMD must undertake the proper Savings Clause analysis using the correct baseline established in Year 2000 and revise the analysis that is currently included in the EAA Reservoir Project EIS. Coupled with this revision, and because of the sequencing of the A-2 STA, the Corps must include clear operational conditions in the A-2 STA permit to provide assurances to water users their water supply will be protected.

The A-2 STA Permit Must Include Operational Conditions to Protect Water Supply

The Corps' effort to define A-2 STA operation as a "stand-alone" CERP facility, without the Reservoir, is an important step. We recommend that as a next step, the A-2 STA Section 404 permit include enforceable operational conditions.[14] The EAA Reservoir Project EIS describes volumes of water directed from Lake Okeechobee to the A-2 STA during an Initial Operating Period as being capped by plant growth needs and correlated with historic agricultural water use.[15] The EAA Reservoir Project EIS explained the A-2 STA's interim operating period is limited to only vegetation establishment, not water treatment, and excluded water treatment from the A-2

[11] EAA Reservoir Project EIS at pp. 3-10, 3-11; Annex B at pp. B-40, B-41, 1-7, 1-9, 2-18, and 2-19; and Annex C at p. C-25.
[12] EAA Reservoir Project EIS at pp. ES-5; 5-15; Annex B at pp. B-21; B-66.
[13] EAA Reservoir Project EIS at pp. ES-5; 5-15. Figure 3-3 of the draft Project Operating Manual depicts allocation of water for the environment and EAA, but this depiction does not lend itself to real-time operations enforceability.
[14] USSC previously commented on SFWMD's pending 404 permit application (SAJ-2018-03427(SP-KDS)); this EAA Reservoir Project EIS is part of the Corps' application review. We incorporate by reference USSC's comment letter dated October 7, 2019 and appreciate the opportunity to comment on A-2 STA operations in both the CERP planning and Corps 404 permit application contexts.
[15] EAA Reservoir Project EIS at p. 3-19.

STA's purpose and need.[16] The following suggestions can help strengthen this language and create permit conditions to provide certainty to users that their water rights will be not violated.

While "interim operating period" is referenced in the EAA Reservoir Project EIS, consider building on this by defining the interim operating protocols and duration. This section also notes ". . . the A2 STA will be operated in accordance with the SFWMD Operations Plan that will be included as a condition of the regulatory permit."[17] This is encouraging, but the SFWMD's interim A-2 Operations Plan was not provided to the public for review and comment.[18] Without this critical document for review, we are unable to assess the impact of these interim operations on our interests. It is also unclear if the Corps can issue the Section 404 permit without such a plan. Please provide a copy of the SFWMD's A-2 Operations Plan for the public's review and comment.

Likewise, information provided in the Annex C Draft Project Operating Manual casts uncertainty by stating, "At this time, interim operations during construction cannot be determined. Later, when is [sic] time to develop interim operations during construction, consideration needs to be given to implementation of an initial growing period with minimal water depths (0.5 ft) before construction is complete, to help establish vegetation. This period will start as soon as levees facing the A-2 side are complete."[19] Adding to this uncertainty, the Corps did not model the A-2 STA as a "stand-alone" facility or as a facility operating in conjunction with the connected A-1 FEB. Without the SFWMD's Operations Plan provided to the public, coupled with the Corps' own statements regarding the operational uncertainty of the A-2 STA, we are left with no meaningful assurances regarding how the State intends to operate the A-2 STA and how it intends to comply with the Savings Clause.

Therefore, including permit conditions that dictate that the operations of the stand-alone A-2 STA cannot violate the pre-CERP hydrologic baseline in place in Year 2000 would fill this gap. Permit conditions that assure that the interim operations do not violate existing legal users water rights are appropriate, even necessary under the law. The SFWMD, as permittee to the A-2 STA permit and the agency charged with issuing and protecting water use permits, should implement these conditions.

Conclusion

For the reasons stated above, we look forward to the Corps revising its analysis in the EAA Reservoir Project EIS and including the permitting conditions discussed above in the A-2 STA permit. USSC incorporates by reference and adopts the comments of aligned farmers and water

[16] EAA Reservoir Project EIS at p. 3-19.
[17] EAA Reservoir Project EIS at p. 3-19.
[18] The EAA Reservoir Project EIS documents posted on the Corps' website (https://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branch/Environmental-Documents/) included 24 documents with different dates, including 2018 dates and in some instances referring back to the 2014 CEPP Final PIR / EIS.
[19] EAA Reservoir Project EIS Annex C at p. C-37.

users regarding on the EAA Reservoir Project. USSC remains committed to ensuring that CERP projects, including the EAA Reservoir Project, are implemented successfully, on time, and in manner that will achieve all the goals and objectives of CERP that we all worked together to accomplish.

Sincerely,

Signature Redacted

Luna E. Phillips
Gunster Law Firm
Attorneys for the United States Sugar Corporation

cc: Colonel Andrew Kelly, U.S. Army Corps of Engineers
Lieutenant Colonel Todd F. Polk, U.S. Army Corps of Engineers
Mr. Gib Owen, U.S. Army Corps of Engineers
Mr. Drew Bartlett, SFWMD Executive Director
Mr. Chauncey Goss, SFWMD Governing Board Chairman
Mr. Noah Valenstein, FDEP Secretary
Client

CARLTON FIELDS

ATTORNEYS AT LAW

Miami Tower
100 S.E. Second Street | Suite 4200
Miami, Florida 33131-2113
P.O. Box 019101 | Miami, Florida 33101-9101
305.530.0050 | fax 305.530.0055
www.carltonfields.com

Atlanta
Florham Park
Hartford
Los Angeles
Miami
New York
Orlando
Tallahassee
Tampa
Washington, D.C.
West Palm Beach

June 26, 2020

Neal McAliley
Shareholder
(305) 530-4039 Direct Dial
nmcaliley@carltonfields.com

Ms. Toni Edwards
Senior Scientist
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida
tedwards@sfwmd.gov

Re: EAA A-2 Reservoir Water Reservation Draft Technical Document

Dear Ms. Edwards:

I am writing on behalf of Florida Crystals Corporation and its affiliates (including Okeelanta Corporation and New Hope Sugar Company) to provide comments on the South Florida Water Management District's ("SFWMD") draft "Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area A-2 Reservoir Water Reservation" dated May 2020 (the "Draft Technical Document").

The SFWMD is proposing to reserve water from the EAA A-2 Reservoir so that it can only be used for environmental purposes. The Draft Technical Document summarizes this proposal as follows: "[a]ll surface water released from the EAA A-2 Reservoir through the S-624, S-625 and S-626 structures and directed to the Lower East Coast Everglades waterbodies will be reserved for the protection of fish and wildlife in the Central Everglades through adoption of a prospective Water Reservation rule." Draft Technical Document, at ES-1. The SFWMD proposes to reserve this water pursuant to Section 373.223(4), Florida Statutes.

Florida Crystals supports the Comprehensive Everglades Restoration Plan, of which the EAA A-2 Reservoir is one component. The Comprehensive Plan is the framework for all modifications and operational changes to the Central and Southern Florida Project that are intended to achieve environmental benefits. The plan is designed to increase the amount of water provided by the project, by saving water that otherwise would be discharged to tide, so that it can be used beneficially. By addressing environmental needs with this "new water" (80% was identified for the environment and 20% for other project users), the Comprehensive Plan is able to protect existing legal users who rely on water already provided by the project. To provide assurances that most of the "new water" will be devoted to environmental purposes, the plan allows for water reservations such as that proposed by SFWMD for the EAA A-2 Reservoir.

The Draft Technical Document does not provide information needed to support a water reservation for the EAA A-2 Reservoir. First, the Draft Technical Document does not identify

any specific amount of water that would be reserved for environmental use. The proposed reservation would reserve water discharged from the reservoir through certain water control structures, but would not reserve any specific quantity of water. The amount discharged through different structures will depend on how the reservoir is operated. To our knowledge, no operational plan has been developed or approved. Without such an operational plan, it is unknown exactly what water the SFWMD is proposing to reserve.

Both Florida and federal law require reservation of a specific quantity of water. Section 373.223(4), Florida Statutes, provides that "[t]he governing board ... may reserve from use by permit applicants, water in such location and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety." The Water Resources Development Act of 2000 ("WRDA 2000") similarly requires the SFWMD and U.S. Army Corps of Engineers ("Corps") to "identify the amount of water to be reserved or allocated for the natural system" in connection with projects under the Comprehensive Everglades Restoration Plan. WRDA 2000, § 601(h)(4)(a)(iii)(V). The Draft Technical Document does not identify any "amount" or "quantity" of water that would be reserved from consumptive use. The Draft Technical Document needs to be revised to include this information which is required for a water reservation.

Second, the Draft Technical Document does not identify whether the water being reserved is "new water" made available as a result of the A-2 Reservoir project, or whether the reservation would include water that currently is relied upon by existing legal users. The Savings Clause in WRDA 2000, § 601(h)(5)(A), provides that the SFWMD and Corps may not eliminate an existing legal source of water supply until a sufficient replacement source is available. Since the proposed reservation rule would make unavailable for consumptive use certain water discharged from the A-2 Reservoir, the SFWMD must make certain that it will not be reserving water that is currently being used. The Draft Technical Document indicates that at least some of the water in the A-2 Reservoir will come from EAA runoff, and that the remainder will come from Lake Okeechobee. Existing legal water users like Florida Crystals rely on water from both sources. The Draft Technical Document does not show that the water reservation would reserve only "new water," and we recommend that it be revised to address this issue.

Thank you for considering our comments. Florida Crystals looks forward to continuing to work with the SFWMD and Corps on this important project. For your convenience, we also attached a copy of our comments to the Corps on its permit for the EAA A-2 Reservoir Stormwater Treatment Area, in hopes that it will provide further input as how this project can be best implemented consistent with the Comprehensive Everglades Restoration Plan.

Sincerely,

Signature Redacted

Neal McAliley

cc: Matthew Coglianese
Attachment

122829111.1

Florida Crystals Corporation
One North Clematis Street
Suite 200
West Palm Beach, FL 33401

Matthew P. Coglianese
Environmental Counsel
P: 561-570-3075
F: 561-366-5180

Please reply by US Mail to:
Post Office Box 3435
West Palm Beach, Florida 33402

February 24, 2020

U.S. Army Corps of Engineers
Jacksonville District
Attention: Mr. Andrew LoSchiavo
701 San Marco Boulevard
Jacksonville, Florida 32207-8175
EAAReservoir@usace.army.mil

U.S. Army Corps of Engineers
Jacksonville District, Palm Beach Gardens Permit Section
Attention: Ms. Krista Sabin
4400 PGA Boulevard, Suite 500
Palm Beach Gardens, Florida 33410
krista.d.sabin@usace.army.mil

Re: Comments on the Final Environmental Impact Statement, Central Everglades Planning Project, Everglades Agricultural Area Reservoir, and Proposed Permit No. SAJ-2018-03427 (SP-KDS) for EAA A-2 Stormwater Treatment Area

Dear Mr. Thompson and Ms. Sabin:

Please accept the following comments on the U.S. Army Corps of Engineers ("Corps") Final Environmental Impact Statement for Central and Southern Florida, Everglades Agricultural Area ("EAA"), Florida, dated January 2020 ("Final EIS") and on the Corps' proposed initial Clean Water Act Section 404 permit for the EAA Reservoir Project, which would authorize construction of the Stormwater Treatment Area ("STA") component of the Project. These comments are submitted on behalf of Florida Crystals Corporation and its affiliates, including Okeelanta Corporation and New Hope Sugar Company, which are existing legal water users affected by the EAA Reservoir Project.

Florida Crystals Supports the Comprehensive Everglades Restoration Plan and the EAA Reservoir Project

Florida Crystals has been a strong supporter of the Comprehensive Everglades Restoration Plan ("CERP"). CERP is an ambitious and balanced plan to modernize the Central and Southern Florida Project ("C&SF Project") to achieve environmental benefits while providing for and protecting the other water-related needs of the region. When Congress approved CERP in the Water Resources Development Act ("WRDA") of 2000, it directed that CERP serve as the framework for all modifications and operational changes to the C&SF Project that are needed to restore, preserve, and protect the South Florida ecosystem. Hence, Florida Crystals' guidepost in evaluating the EAA Reservoir Project, and other proposed modifications to the C&SF Project, is that such proposals should be consistent with CERP, as approved by Congress in WRDA 2000.

Florida Crystals supports the EAA Reservoir Project. For years, Florida Crystals has stated, and the record reflects, its support for construction of a CERP reservoir in the EAA. In 2019, Florida Crystals voluntarily gave up valuable leases on land to be used for the EAA Reservoir Project – on an expedited basis and pursuant to a construction schedule set forth by the South Florida Water Management District ("SFWMD"), and Florida Department of Environmental Protection – to facilitate construction of the project.

The comments herein relate to a fundamental and critical issue that has been discussed numerous times with all parties involved, including the Corps, and has yet to be resolved. That is, assurance by the Corps that the EAA Reservoir Project will be operated properly – consistent with how the project was modeled and originally designed -- and that the Corps properly considers and evaluates compliance with the law and requirements applicable to preserving water supply needs of stakeholders such as Florida Crystals.

Our comments should not be interpreted as an intent to delay or otherwise interfere with the agreed-to construction schedule, as our release of the lands for the project is not rescindable and we have already made arrangements not to farm the lands needed for the construction. Rather, our comments are directed at how the project will be operated once it is built.

The Corps Must Implement the EAA Reservoir Project in a Manner that Addresses Water Supply Needs

CERP includes an EAA reservoir to improve water deliveries to the Everglades and to reduce EAA farmers' reliance on Lake Okeechobee for water supply. The original CERP design called for approximately half of the water stored in the EAA reservoir to be used to meet agricultural irrigation demands. *See* Comprehensive Review Study, Central and Southern Florida Project, Final Integrated Feasibility Report and Programmatic Environmental Impact Statement, at 9-9 (April 1999). The reason the reservoir was intended to provide agricultural water supply was to reduce the reliance of EAA farmers on Lake Okeechobee, which, in turn, would allow the Corps to modify its management of the lake to improve ecological conditions in the lake and in the Northern Estuaries.

We are pleased that the Final EIS indicates that the current design of the EAA Reservoir Project will improve water supply for the EAA. *See, e.g.,* Final EIS, at 4-34. However, it is written in a way that suggests that the Corps and SFWMD may not actually operate the EAA Reservoir Project to achieve the water supply benefits that are a fundamental and critical purpose of the reservoir. The Final EIS and underlying documents recount hydrological modeling for the proposed reservoir showing that it will provide improved water supply compared to current conditions. *See, e.g., id.* Such modeling had to make assumptions as to how the reservoir will be operated under different conditions in order to estimate the water supply effects. But nowhere in the Final EIS does the Corps identify what operational assumptions were used in that hydrological modeling. And, although this might be buried in some technical document, a simple description is important because one of the purposes of preparing environmental impact statements is to disclose proposed agency actions in non-technical language so that the public at large can understand the issues. Preserving the water supply of our company and other long-time water users is a critical consideration that must be adequately addressed in the final EIS.

More concerning is the language in the Final EIS suggesting that the agencies may decide not to operate the reservoir to meet water supply needs. The Final EIS states, "Water Supply – Additional water supply may be available for agricultural/municipal water supply with the CEPP New Water Modification, but the purpose of the reservoir is environmental restoration and water supply for the environment receives first priority." Final EIS, at ES-5. This statement conflicts with the original CERP plan that designed the EAA reservoir to meet water supply needs so that the Corps could have more flexibility in its management of Lake Okeechobee. That language also could be read to suggest that the Corps will not operate the reservoir consistent with the hydrological modeling that shows it will improve agricultural water supply.

Therefore, to have a valid project, the Corps must address these errors. We ask that the Corps do two things in its Record of Decision. First, the Corps should indicate exactly how the agencies assume the EAA Reservoir Project will be operated for purposes of its hydrological modeling of its water supply effects. This would allow the stakeholders to know in the future whether the agencies are operating the reservoir as designed, and whether the modeling assumptions remain valid. Second, the Corps should explicitly commit to manage the EAA Reservoir Project consistently with the operational assumptions it used to demonstrate that the project will improve agricultural water supply.

The water supply benefits of this project all depend on how it is operated, and committing to manage the project as modeled will provide assurance to stakeholders that the projected water supply benefits are not illusory. If the Corps does not want to make such a commitment, then it must explain how its hydrological modeling is a valid description of the water supply effects of the project.

The Corps Must Demonstrate that it Has Complied with the WRDA 2000 Savings Clause

Critically, we also believe that the Final EIS and related documents do not demonstrate compliance with the Savings Clause of WRDA 2000. The Savings Clause

provides that "[u]ntil a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act [December 11, 2000] is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and non-Federal sponsor shall not eliminate or transfer existing legal sources of water, including those for ... an agricultural or urban water supply." WRDA 2000, § 601(h)(5)(A)(1). While we appreciate the fact that the Final EIS and attached documents address whether the EAA Reservoir Project meets the Savings Clause, there are several gaps in that analysis that must be corrected.

Stand-Alone Operation of the Stormwater Treatment Area. There does not appear to be an adequate analysis of the water supply effects of the EAA Reservoir Project during the first phase of construction and operation.

The EAA Reservoir Project has two primary components: a reservoir and a STA. FEIS, at 1-3. 3-5 to 3-7. The reservoir will store water currently in Lake Okeechobee, to supply either the downstream Water Conservation Areas or urban/agricultural users. The STA will remove phosphorus from the water, because elevated phosphorus concentrations limit the ability to deliver water to the Water Conservation Areas.

These two components appear to be on very different timelines. The Final EIS indicates that the "SFWMD proposes to construct and operate the STA area component of the project prior to execution of a Project Partnership Agreement for the Federal project." Final EIS, at 1-3. The reservoir component cannot be built before execution of a Project Partnership Agreement (also known as a Project Cooperation Agreement), and even after that agreement is executed, it may take years to actually build the reservoir due to funding limitations. This means that the STA component will likely be operational for a substantial period of time before the reservoir component is operational. If there is no reservoir, then any Lake Okeechobee water treated in the STA component will not be stored but instead discharged to the Water Conservation Areas.

This split timeline for the two project components critically affects the Savings Clause analysis. That is, the Corps and SFWMD have evaluated compliance with the Savings Clause based on modeling operation of the reservoir and STA components together. The agencies determined that the combined project will increase agricultural and urban water supply over current levels because the reservoir component will store water. The Final EIS did not analyze Savings Clause compliance if only the STA component is built.

It is apparent that if there is no place to store additional water, then the STA component could simply increase the amount of water delivered from Lake Okeechobee to the Water Conservation Areas, effectively eliminating an existing source of water supply for long-time legal users before replacing that supply with a functional reservoir component. To correct this gap, the Corps should conduct a Savings Clause analysis of only the STA component of the project before finalizing approval of the STA component, consistent with WRDA 2000 and the CERP Programmatic Regulations, 33 CFR §§ 385.26(a)(3)(x), 385.36(a).

A related concern is that the SFWMD proposes to build and operate the STA component before execution of the Project Cooperation Agreement. Final EIS, at 1-3. The Project Cooperation Agreement is the document that actually requires that there be no violation of the Savings Clause. 33 CFR § 385.27(d). If the STA component is going to be operated before execution of the Project Cooperation Agreement, then there will be no assurances that the Savings Clause compliance will be a requirement during the interim period.

We recommend that the Corps address this issue by including a condition in the Clean Water Act permit for the STA component requiring compliance with the Savings Clause, tracking the language in WRDA 2000. Specifically, the condition should provide that until the reservoir component is operational so that it can replace water taken from current sources of water supply for urban and agricultural users (i.e., from Lake Okeechobee), the STA component shall not be operated to eliminate the existing legal sources of water that were available on the date of enactment of WRDA 2000 (December 11, 2000). This would be a practical and efficient way to ensure compliance with the Savings Clause in the STA's operation.

Analysis Using the Wrong Baseline. Further, the Savings Clause analysis incorporated into the Final EIS should be revised to use the correct baseline. As quoted above, WRDA 2000 provides that the Corps and SFWMD cannot eliminate or transfer an existing legal source of water supply available at the time WRDA 2000 was enacted in December 2000. The CERP Programmatic Regulations require the Corps and SFWMD to identify the pre-CERP baseline, i.e., conditions that existed at the time WRDA 2000 was enacted. 33 CFR § 385.35(a). The pre-CERP baseline is defined in the regulations as "the hydrologic conditions in the South Florida ecosystem on the date of enactment of WRDA 2000, as modeled by using a multi-year period of record based on assumptions such as land use, population, water demand, water quality, and assumed operations of the Central and Southern Florida Project." *Id.* § 385.4. The regulations provide that "[t]he Corps of Engineers and the non-Federal Sponsor shall determine if implementation of the project will cause an elimination or transfer of existing legal sources of water by comparing the availability of water with the recommended project with the pre-CERP baseline." *Id.* § 385.36(a).

In 2005, the Corps and SFWMD identified the pre-CERP baseline. Most relevant for the EAA Reservoir Project, which will take water currently stored in Lake Okeechobee, the pre-CERP baseline document indicates that the baseline operations for Lake Okeechobee would be the "Lake Okeechobee Regulation Schedule WSE according to WSE decision trees." Pre-CERP Baseline, at 14.

The Savings Clause analysis appended to the Final EIS does not compare the water supply performance of the EAA Reservoir Project using the pre-CERP baseline. Final EIS, Annex B-9 to B-10. Instead, it used a different baseline that assumed much lower water supply performance than was delivered under the WSE schedule. This violates the CERP Programmatic Regulations.

The Final EIS and accompanying documents ignored the requirements in the Programmatic Regulations based on a 2007 draft guidance memorandum. Final EIS, Annex B-10. We believe that this is improper, for several reasons.

First, a guidance document does not override legal requirements in a regulation. The CERP Programmatic Regulations are rules: They create legal rights and obligations that must be followed by the Corps. A guidance document by definition does not have force of law. The Corps stated when it promulgated the CERP Programmatic Regulations that the guidance memoranda were only to "provide internal guidance to the agencies." Final Rule, Programmatic Regulations for the Comprehensive Everglades Restoration Plan, 68 Fed. Reg. 64200, 64203 (Nov. 12, 2003). The Corps cannot change the legal obligations in a regulation by issuing a guidance document.

Second, the guidance memorandum referenced in the Final EIS is only a draft. It was prepared in 2007 – thirteen years ago – and was never finalized. Since the memorandum was never actually issued, the Corps cannot use it as the basis for its analysis. The CERP Programmatic Regulations provide that "[u]ntil guidance is issued, issues involving existing legal sources of water should be resolved on a case-by-case basis considering all factors that can be identified as relevant to decisions under the savings clause." 33 CFR § 385.36(c). The Final EIS, and attached annex, simply treat the old draft memorandum as final, when it is not, and fails to consider all of the factors relative to the water supply issue on a case-by-case basis.

Third, the discussion of the Savings Clause in the old draft memorandum is simply wrong. That guidance would exempt a whole series of actions from the requirements of WRDA 2000 by calling them "intervening non-CERP activities." Nowhere in WRDA 2000 or the Programmatic Regulations is there any reference to such a term. The concept is also inconsistent with the basic logic of the Programmatic Regulations, which provides that the effects of new projects should be compared to the pre-CERP baseline. Comparing the effects of a project to some other baseline is inconsistent with the regulations.

WRDA 2000 requires that the Corps follow the principles set forth in that statute for all modifications or operational changes to the C&SF Project intended to achieve environmental objectives, and it would be contrary to, and undermine CERP for the Corps to pick and choose which activities are subject to Congress' requirements. In particular, we disagree that changes to water regulation schedules for Lake Okeechobee somehow can be exempted from compliance with the Savings Clause, when the Lake is the hydrological center of the C&SF Project and drives water supply issues for nearly all components of CERP.

For all of these reasons, the Corps should correct its analysis under the Savings Clause which we believe it is required to do, and which can be done in a timely manner. We are optimistic that the EAA Reservoir Project can achieve its goals once completed and, hence, continue to support it, and believe that it can increase available urban and agricultural water supply if it is operated consistent with CERP and WRDA 2000.

Conclusion

We stress that our comments here are intended to ensure that the agencies properly analyze the Savings Clause issues, and that they operate the project as planned and modeled. Hence, we incorporate by reference and adopt the comments of aligned farmers and water users regarding the EAA Reservoir Project. We fully support the project, which is why Florida Crystals last year gave up its leases and facilitated the transition of lands on which the project will be built.

Sincerely,

Signature Redacted

Matthew P. Coglianese
Environmental Counsel
Florida Crystals Corporation

APPENDIX D: SUMMARY OF PUBLIC COMMENTS, QUESTIONS, AND DISTRICT RESPONSES ON DRAFT WATER RESERVATION RULE

This appendix provides a summary of comments and questions received from the public during and after the public Everglades Agricultural Area (EAA) Reservoir Rule Development Workshop #1 ~~held on~~ (July 14, 2020~~ (agenda attached).~~) and Workshop #2 (August 6, 2020). The agendas for these workshops are included below. Responses given by the South Florida Water Management District (SFWMD) to the comments and questions received at and following the ~~July 14 Workshop #1 are~~ workshops also are provided~~ here~~.

The primary objective of the workshops was to receive and respond to comments and questions from the public on any aspect of the water reservation rule development, including draft rule language and the ~~June, 2020 version of the~~ draft *Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation*. The technical document contains ~~all of~~ the science, data, methodologies, analyses, and~~ the~~ scientific and technical assumptions employed in each analysis upon which the water reservation is based. All verbal and written comments, questions, and ~~District~~SFWMD responses given during and after ~~Workshop #1~~the workshops were reviewed by SFWMD~~,~~ staff and, where appropriate,~~ they were~~ addressed in subsequent drafts of the technical document.

AGENDA
EAA Reservoir Water Reservation
Rule Development Workshop #1

July 14, 2020 – 10:00 AM
Web Based Workshop

1. Welcome and Introduction
2. Water Reservation and Rulemaking Processes
3. EAA Reservoir Project Background and Purpose
4. Description of Hydrologic Benefits
5. Description of Benefits to Fish and Wildlife
6. Summary of Peer Review and Public Comments Received
7. Public Comment Period
8. Draft Rule Language
9. Public Comment Period
10. Next Steps
11. Adjourn

This workshop is open to the public. In response to COVID-19, the session will only be held via the Zoom application. Pre-registration is required at https://zoom.us/webinar/register/WN_Y9fAqf4HScqeEoJtHGO5hg. The draft Technical Document and water reservations rules are available at https://www.sfwmd.gov/our-work/water-reservations on the ***EAA Reservoir*** tab. **COMMENTS ARE REQUESTED TO BE SUBMITTED BY July 28, 2020** to Toni Edwards at tedwards@sfwmd.gov. Phone: (800) 432-2045, ext. 6387 or (561) 682-6387.

AGENDA
EAA Reservoir Water Reservation
Rule Development Workshop #2
August 6, 2020 – 10:00 AM
Web Based Workshop

1. Welcome
2. Water Reservation Authority and Processes
3. Technical Document Comments & Revisions
4. Draft Rule Comments & Revisions
5. Public Comment Period
6. Next Steps
7. Adjourn

This workshop is open to the public. In response to COVID-19, the session will only be held via the Zoom application. Pre-registration is required at https://zoom.us/webinar/register/WN_cXAcMuenREiHHN2xSWwx_w. The most recent draft of the Technical Document and water reservation rules will be available one week before the workshop at https://www.sfwmd.gov/our-work/water-reservations on the ***EAA Reservoir*** tab. **COMMENTS ARE REQUESTED TO BE SUBMITTED BY August 27, 2020** to Toni Edwards at tedwards@sfwmd.gov. Phone: (800) 432-2045, ext. 6387 or (561) 682-6387. Please note, this agenda is draft and might be adjusted prior to the workshop.

Comment No.	Commenter	Question/Comment	District Response
Q&A During Public Comment Periods at the July 14 Rule Development Workshop #1, and Following the Workshop			
1	Diana Umpierre	I thought the final alternative was Alternative 3 (a revised USACE alternative from SFWMD C240A alternative). Can you clarify?	**John Mitnik**: Page ES-3 of the May 2020 Final Environmental Impact Statement (FEIS) gives a brief description of the differences. They consist of minor design refinements to Alternative C240 to reduce seepage.~~-~~ Additional details of the design refinements can be found within the body of the FEIS. A link to the FEIS is provided under Related Links/Planning and Authorization for the EAA Reservoir under the EAA Reservoir tab on the water reservations webpage at https://www.sfwmd.gov/our-work/water-reservations.
2	Diana Umpierre	Could you explain again the relationship between the EAASR project (incl the operation assumptions in the final USACE EIS) and the current LOSOM project going thru planning now?	**Leslye Waugh**: The current Lake Okeechobee System Operation Manual (LOSOM) Project process is expected to be complete in 2022 when the Herbert Hoover Dike rehabilitation is completed. LOSOM is being formulated for 2025, so it will include projects that will be completed in the next 5 years (e.g., C-43 and C-44). The EAA Reservoir is not expected to be completed until 2028, so the Lake Okeechobee schedule that accounts for the EAA Reservoir will be developed after the current LOSOM effort.
3	Diana Umpierre	Maybe it's a silly question, but could you clarify what species are included in the rule definition of "wildlife"? Does it mean both plant and animal species? Is it only for those animal and plant species that are threatened and/or serve as "indicators"?	**Dong Yoon Lee**: We have included ecological models for a list of indicator species such as wood stork, white ibis, alligator, apple snail, small fish, and Cape Sable seaside sparrow via marl prairie. We used our best ~~judgement~~judgment to determine crayfish distribution and abundance because no model exists. Small fish and apple snails are a major energy source for wading birds and alligators, whereas the higher trophic levels integrate the productivity of multiple trophic levels and design the landscape (referred to as architecture species).
4	Matthew Schwartz	I noticed that in the pre and post project simulations, that water flows were not expected to change much during the wet season - most changes were expected during the dry season. Referring to the graph with the blue and red lines (graph with curves). How does the EAA Reservoir decrease discharges to the estuaries if the flow south doesn't change during the wet season?	**Leslye Waugh**: With added storage in the EAA, ~~it~~the reservoir captures flow that otherwise would have been discharged to estuaries during the wet season and releases it during the dry season~~ that otherwise would have been discharged to estuaries.~~. Discharging south instead of east and west.
5	Matthew Schwartz	And when the reservoir is full - no capture correct?	**Leslye Waugh**: In short, yes. The EAA Reservoir does not just fill once and remain static. It's a very dynamic process of constant filling and emptying.
6	Scott Lindars	Does the recreation management plan intend to include waterfowl hunting opportunities?	**Don Medellin**: There are a number of recreational opportunities that are well suited for environmental purposes, bike riding, horseback riding, nature study, wildlife viewing~~ as well as a number of other activities~~, kayaking, fishing, and hunting. A detailed response with listed recreational activities is located in the FAQ document on the water reservation webpage.

Comment No.	Commenter	Question/Comment	District Response
7	Matthew Schwartz	Was the EAA Reservoir ever compared in any document to other alternatives that used more land?	**Leslye Waugh**: As described in the Post Authorization Change Report (PACR), the District analyzed alternatives that included a 360,000 ac-ft reservoir. However, this alternative would have taken portions of ~~A1~~ the A-1 Flow Equalization Basin (FEB), which is presently a part of the District's Restoration Strategies Program. ~~The~~Alternative C240A ~~alternative~~ was identified as the most cost-effective at 240,000 ac-ft, while maintaining the A-1 FEB, which serves an important water quality function, and provided the most benefits.
8	Matthew Schwartz	I meant not included in the footprint of the projects - additional sugar lands outside the current project footprint.	**Leslye Waugh**: Senate Bill 10 prohibited the use of eminent domain. Lands could only be acquired from willing sellers and there were no willing sellers adjacent to the project footprint in the analysis (A-2 lands and the A-2 expansion lands). The District's analysis conformed to the legislation. The PACR and FEIS contain information on the yellowbook alternative. Alternative C240A was selected as the most cost-effective plan.
9	Matthew Schwartz	Got it - so we went only with the limitations of the bill, and there was no in-depth science on what could have been achieved with more land?	**Leslye Waugh**: PACR process using law passed by Senate Bill 10. Essentially, we are given a "sandbox" to work in. ~~The~~Alternative C240A ~~alternative~~ was the most cost-effective alternative.
10	Diana Umpierre	Just a comment, NOT a question: SB10 did NOT limit what could have been analyzed.	**Don Medellin**: Acknowledged.
11	Diana Umpierre	Could you include the PowerPoint presentation on the SFWMD website? Thank you Don. ;)	**Don Medellin**: The PowerPoint presentation will be available as a PDF document 2-3 working days after the workshop. Find it under the EAA tab on the water reservations webpage at https://www.sfwmd.gov/our-work/water-reservations.
12	Matthew Schwartz	Can you post a link to the draft rule?	**Don Medellin**: It's on our water reservations webpage, but I will provide a link in the next steps of the agenda.
13	Diana Umpierre	Quick question, just to clarify, the rule does not protect the amount of water itself, but from where the water is released from, correct?	**Don Medellin**: The way the rule is currently crafted, water would be released from the reservoir and discharged from structures S-624, S-625, and S-626. All three of these discharge structures deliver ~~the~~ water that is being reserved ~~and delivered~~ to the Central Everglades for the protection of fish and wildlife. That is the water that is reserved under the draft rule criteria.
14	Matthew Schwartz	Was it in the packet of documents for this meeting?	**Don Medellin**: Not sure I completely understand what you mean by "packet of documents", but notifications were sent out that included the Zoom registration details and link to the water reservations website. This link provides information to a number of documents, such as the workshop agenda, draft rule language, technical document, final peer-review report, etc. I will provide the link to our water reservations webpage further down in the presentation for easy access to that information.
15	Diana Umpierre	The rule was on the website.	**Don Medellin**: Yes, that is correct.
16	Jeremy McBryan	FYI - July 28 is a Tuesday (not Friday)	**Don Medellin**: The deadline for public comments is Tuesday, July 28.

Comment No.	Commenter	Question/Comment	District Response
17	Diana Umpierre	Thanks Don and rest of staff for the detailed info and all the Q&A docs.	**Don Medellin**: Acknowledged.
18	Matthew Schwartz	Based on the modeling for the EAA Reservoir that the district has conducted, is it the district's position that the new reservoir is not expected to change the amount of treated water going south during the wet season?	**Leslye Waugh**: Everglades restoration targets still require high wet season flows consistent with natural system behavior. While wet season flows may be similar on average, the reservoir and downstream infrastructure will still provide improvements relative to today's system: 1) Shorter term (daily, weekly or sub-monthly) peaks can still be attenuated; and 2) downstream conveyance (L-67s and Tamiami Trail) is enhanced, so this wet season flow will not necessarily cause high water conditions in the water conservation areas (WCAs).
19	Matthew Schwartz	I do have some follow-up with regard to the canal projects and conveyance out of the WCAs through the Miami Canal and the L67s. But feel that I still don't have the answer to the very narrow question I asked. Would like to work on that first. This is the graph that was presented at the last two workshops (graph on slide 23 of Workshop #1 presentation). It shows flows of treated water into the Central Everglades. The modeling shows no additional treated water moving into the Central Everglades from July through October - the height of the wet season. During drier times, there are greater flows. But I would like to know how SFWMD interprets this graph - i.e. the reason treated water flows don't increase during the wettest time of the year.	**Leslye Waugh**: While the question may be narrow, there's a lot of detail behind the data. The figure in the presentation shows the mean monthly flows over 36 years. Yes, the average in the wet season seems similar, but there is significant interannual variability among the years over the period of record. The key takeaway from the figure in the presentation was the additional flow provided by the project, especially in the dry season, provides hydrologic and ecological benefits to the Everglades. Here is some more detail behind the performance: 1) Performance is driven by natural system targets (defined by RECOVER and the project team) with consideration of constraints (canal capacity, high water stages, etc.). 2) On average, the graph shows the seasonal trends, but there is significant interannual (year-to-year variability). 3) In a difference calculation where positive values show months with more flow than current and negative numbers show months with less flow than current: a) "Wet" years like the late 1960s, late 1990s, and 2005 tend to send more wet season flow than current conditions (which help to improve Lake Okeechobee and both northern and southern estuaries); b) "Dry" years like the 1970s and 2001 tend to send less wet season flow and conserve the water for delivery in the dry season to avoid Everglades marsh drydown; and c. Because the trends are unique each year (driven by the targets and constraints in response to rainfall), the average performance shows "little" difference in the wet season, but in reality, a more detailed review of the data provides more insight.

Comment No.	Commenter	Question/Comment	District Response
20	Matthew Schwartz	Leslye - I'm afraid I'm just not getting it. Even with the year to year variability, the modeling clearly shows increased dry season flows with the reservoir in place than without it. And believe the reason for that was explained during the science meeting. But the same modeling, taking into consideration the year to year variability, shows no difference in the flow of treated water south during the wet season. And that's also clear. My question is not about the net benefits of building the reservoir and the other associated projects. This particular question is, taking into account the year to year variability, the modeling shows no additional flows south during the three wettest months of the wet season - July to October. Why is that the case? Have a feeling that had I asked the reverse, i.e. why do the flows of treated water increase during the dry season, the question would have been answered already. The predictions of the model, in general, and averaged out over many years - more flows of treated water south during the dry season with the reservoir but no appreciable change in flows during the major part of the wet season - must have been considered by the SFWMD. And a reason for the difference in outcomes must have been considered as well.	**Leslye Waugh**: Acknowledged.
21	Matthew Schwartz	Putting aside the question of wet season flows, and with regard to the same graph we've been discussing, why does the district's modeling predict an increase in flows of treated water during the dry season? What factors does the district attribute those increased flows to?	**Leslye Waugh**: The increase in dry season flows is from the water stored in the reservoir that is carried over and released during the dry season.

Comment No.	Commenter	Question/Comment	District Response
Q&A During Public Comment Periods at the August 6 Rule Development Workshop #2, and Following the Workshop			
22	Tom MacVicar	The water budget for the reservoir from the PACR model shows an average of 82 kaf released to the Miami and New River canals from the reservoir. This agrees with the number cited in the draft rule. However the model only shows 448 kaf going from the reservoir to the Everglades, for a total outflow of 530 kaf, not the 825 kaf stated in the rule. Can you please explain these numbers? Thank you.	**Leslye Waugh**: Based on the Alternative C240 model simulation for the PACR, the volume probability curves found in the technical document to support the water reservation, draft rule, and presentations given at the peer-review session and rule development workshops estimate the EAA Reservoir could discharge approximately 82,000 ac-ft during an average water year from the structure to the north back to the North New River and Miami canals and 825,000 ac-ft on average annually out of the other three structures to the adjacent storage and treatment facilities and south to the Everglades. I'm not sure where the 448,000 ac-ft and 530,000 ac-ft is coming from, but I will ask Walter Wilcox or Clay Brown from our modeling group to follow up with you on this question. **Walter Wilcox**: To answer your questions, I have attached the spreadsheet that calculates the flow exceedance curve in the EAA Reservoir Water Reservation technical document. As we have discussed in the past, the Regional Simulation Model (RSM) and Dynamic Model for Stormwater Treatment Areas (DMSTA) are used in parallel to fully represent the hydrologic and water quality performance of the reservoir. The spreadsheet has a README tab that explains the structure crosswalk and how the RSM Basins (RSM-BN) and DMSTA data are used to derive the EAA Reservoir outflows to the Everglades for water reservation purposes, which are higher than what is directly simulated in the RSM-BN.
23	Tim Breen	How and why was it determined that water released from S-628 to the Miami and New River Canals would not be reserved? Thanks.	**Jennifer Brown**: The water reservation is consistent with the analysis conducted in the PACR and authorized by Congress. The reservoir is a multi-use reservoir meeting natural system and other water-related needs. The PACR demonstrated that operating the EAA Reservoir consistently with how the Comprehensive Everglades Restoration Plan (CERP) envisioned Component G would capture more water that would otherwise be discharged to the northern estuaries and enable more water to be sent south to the Central Everglades. For more information, see the PACR posted on the District's website at https://www.sfwmd.gov/our-work/cerp-project-planning/eaa-reservoir.
24	Chris Johns	Could you please explain the relationship between the ~800 k ac-ft this rule would reserve and the ~370 k ac-ft identified in the PACR?	**Leslye Waugh**: The 825,000 ac-ft of water estimated to be discharged from the reservoir to adjacent storage and treatment facilities and sent south to the Everglades is existing and new water captured by the reservoir. The 370,000 ac-ft of additional water provided by the Central Everglades Planning Project (CEPP) as measured at the "red line", which is the boundary between the EAA and WCAs is the new water above the existing or baseline condition provided by the project to the Everglades.

Comment No.	Commenter	Question/Comment	District Response
25	Gary Ritter	It was stated today that the 825K was existing water and new water. The new water part confused me because it was also stated 370K was new water. So is there new water above the 370K that would either go through the reservoir then south or just run south and not go through the reservoir?	**Leslye Waugh**: The reservoir will capture EAA basin runoff and water sent south from Lake Okeechobee. This includes existing and new water that can be captured by the additional storage and treatment of CEPP. The 825,000 ac-ft during an average annual water year is the amount of water that will be leaving the reservoir through the three structures to the adjacent storage and treatment facilities and then south to the Everglades. The 370,000 ac-ft average annually is the additional water above the existing condition at the "red line" (boundary between EAA and WCAs) due to the additional storage and treatment provided by CEPP.
26	Tommy Strowd (LWDD)	We are reviewing the work in the development of the Water Reservation Rule for the EAA Reservoir, and I'm hoping it's possible to obtain the calculation method used to derive the 825,000 ac-ft of water from the C240 modeling performed by SFWMD for the EAA Reservoir Section 203 Report?	**Walter Wilcox**: Attached is a spreadsheet that calculates the flow exceedance curve in the EAA Reservoir Water Reservation technical document. As we have discussed in the past, the RSM and DMSTA are used in parallel to fully represent the hydrologic and water quality performance of the reservoir. The spreadsheet has a README tab that explains the structure crosswalk and how the RSM-BN and DMSTA data are used to derive the EAA Reservoir outflows to the Everglades for water reservations purposes, which are higher than what is directly simulated in the RSM-BN. README tab: The RSMBN and DMSTA model are used together to help simulate the anticipated hydrologic and water quality performance of the EAA Reservoir (C240). While the RSMBN model has the ability to simulate daily hydrology, operations and routing, DMSTA is used to analyze longer term (i.e., annual) water quality outcomes. RSMBN leverages DMSTA flow targets to help inform its simulation of the STAs and while this approach ensures high correspondence between the two models at Lake Okeechobee and the "red line" inflow boundary to the WCAs, routing internal to the EAA associated with the STAs, A1FEB and EAA (A2) Reservoir may have differences. To most accurately quantify the water released from the reservoir to the downstream Everglades that provide the project's environmental benefits and needs to be reserved, a combination of RSMBN and DMSTA data represents the most accurate quantification. From a purely RSMBN perspective, the following crosswalk identifies the closest relationship between modeled outputs and EAA reservoir structures: A2RES to A1FEB: S624 = a2res2a1feb; A2RES to downstream STAs: S625 = a2res2umiami_S + a2res2Nnrhills_S; A2RES to A2STA: S626 = A2RES_to_ERSTA; A2RES to EAA water supply: S628 = RES2miami + RES2NnrHillsBasin. RSMBN as applied for the EAA reservoir project will meet environmental flows (e.g. STA inflow targets) directly from available sources (e.g. EAA runoff) without ensuring a priority routing of source water through the upstream reservoir and FEB as DMSTA assumes. While this does not affect the regional water budget for the Lake or the Everglades, it can result in reduced

Comment No.	Commenter	Question/Comment	District Response
			utilization of the EAA reservoir in RSMBN. To help account for this modeling limitation, a post-processing exercise was performed to account for what RSMBN simulates as direct inflow into the STAs but DMSTA would have routed through the reservoir / FEB complex. The driving factor for this routing in DMSTA is the "A1 Demand from A2" term. This spreadsheet performs the necessary calculations to ensure that on an annual basis the volumes of water likely to pass through the EAA reservoir to the downstream Everglades (informed by both RSMBN and DMSTA) are quantified for the purposes of protecting these environmental releases through the EAA Reservoir water reservation. Prior to post-processing, the RSMBN identified ~471 kac-ft of average annual outflow from the EAA reservoir to the Everglades and after post-processing informed by DMSTA, this number increases to ~834 kac-ft on average annual basis. This volume represents a combination of EAA runoff and Lake Okeechobee discharges and is also a mix of existing and "new" water that is delivered by the A2 reservoir facility to meet the needs of the Everglades.
27	Kyle Grandusky	I'm reviewing the latest draft of the EAA Reservoir Water Reservation Technical Support Document and I'm looking for more information on the calculation methods used to derive the 825,000 acre feet of water from the C240 modeling simulation performed by the District for the CEPP PACR / Section 203 Report. Feel free to give me a call if it's easier to discuss what I'm looking for, or if my request should be directed to someone else.	**Walter Wilcox**: To answer your question, I have attached the spreadsheet that calculates the flow exceedance curve in the EAA Reservoir Water Reservation technical document. For the EAA project, the RSM and DMSTA are used in parallel to fully represent the hydrologic and water quality performance of the reservoir. The spreadsheet has a README tab that explains the structure crosswalk and how the RSM-BN and DMSTA data are used to derive the EAA Reservoir outflows to the Everglades for water reservations purposes, which are higher than what is directly simulated in the RSM-BN hydrologic model. It is important to note that this spreadsheet is intended to identify the most complete representation of reservoir outflows (as informed by all modeling efforts) and that 1) it utilizes the same modeling data used in the PACR and released in 2018, and 2) it in no way changes that project benefits (Lake Okeechobee or red line flows). I know that it can be confusing with multiple numbers in the dialogue (e.g., this calculation is consistent with, but different from the "370,000 ac-ft additional flow" calculation), so please take a look and let us know if you have any follow-up questions.

APPENDIX E:
PUBLIC COMMENT LETTERS RECEIVED AFTER RULE DEVELOPMENT WORKSHOP #1 AND WORKSHOP #2

This appendix contains formal, written public comment letters received after the public Everglades Agricultural Area (EAA) Reservoir Water Reservation Rule Development Workshop #1 (July 14) and Workshop #2 (August 6). All written comments were reviewed by South Florida Water Management District (SFWMD) staff and, where appropriate, addressed in subsequent drafts of the technical document.



South Florida Wildlands Association
P.O. Box 30211
Fort Lauderdale, FL 33303

Toni Edwards
Senior Scientist
Coastal Ecosystems Section
South Florida Water Management District

SENT VIA ELECTRONIC MAIL TO tedwards@sfwmd.gov

Dear Toni:

South Florida Wildlands Association (SFWA) appreciates the opportunity to submit these comments on Water Reservations for the EAA Reservoir. SFWA recently attended the Rule Development for Water Reservations Workshop on July 14th, 2020 as well as the Public Peer Review Session on May 29th, 2020. We also attended several meetings of the C-43 WBSR Water Quality Feasibility Study (the most recent one on July 16th, 2020 – and very relevant to the sister EAA Reservoir project), public workshops on the EAA Reservoir held by the Army Corps of Engineers, and various scoping meetings and public workshops held at SFWMD District Headquarters in the fall of 2017.

As we do not have complete information on various aspects of the EAA Reservoir and its functioning as of this date, and time is short to make this deadline, the following comments will be in the form of notes, observations, and questions.

First of all, SFWMD has stated that the project was never evaluated as part of broad "range of reasonable alternatives." That is the usual requirement for a review under the National Environmental Policy Act (NEPA) where "a proposed major federal action is determined to significantly affect the quality of the human environment." The 10,500-acre EAA Reservoir certainly fits that bill. A list of requirements under the NEPA can be found at this website:

https://www.epa.gov/nepa/national-environmental-policy-act-review-process

"Alternatives: Consideration of a reasonable range of alternatives that can accomplish the purpose and need of the proposed action."

When the question about alternatives was asked at the July 14th meeting, SFWMD stated that it simply accepted the parameters of the SB10 bill which created the reservoir and then worked to design something that would fit within the "sandbox" that was provided for in the bill. Or something to that effect. It was clearly stated that no more land was going to be available nor would any land be acquired by the process of eminent domain regardless of the comparative value of a differently designed project.

However, given the far-reaching impacts this project will have on the future of the Everglades and our region, we strongly believe a range of alternatives should have been compared to the current design of the EAA Reservoir in the Draft EIS and other documents prepared for this project. Those alternatives would have been compared on the basis of meeting the stated goals of the reservoir and the various impacts deemed likely to occur. Even in the SFWMD's press release where the district announced that an independent review of the proposed reservoir found it to be "technically sound" – there is no mention of how the plan stacks up against other reasonable alternatives in terms of effectiveness, impacts and other factors.

https://www.sfwmd.gov/news/nr_2018_0315_eaa_res_independent_review

We believe there are alternatives which could do a far better job cleaning large quantities of water and moving sufficient water south to meet the hydrological needs of the remaining natural ecosystem. And that should have been considered and analyzed. Among those alternatives would have been a reservoir/STA system with a much larger STA – e.g. the C-44 project for the Southern Indian River Lagoon is summarized by the Army Corps of Engineers in this way:

"The C-44 project includes the construction of a 3,400-acre reservoir, a pump station with a capacity to pump 1,100 cubic feet per second (cfs) of water, and 6,300 acres of STAs."

The size of the C-44's STA is roughly the same as the one that will be added to the 10,500-acre, 23-foot deep EAA Reservoir. Yet in proportion to the size of the reservoir, the C-44's STA is much, much larger. We believe the EAA Reservoir's 6,500-acre STA will be woefully inadequate to handle the demand for clean fresh water that is currently missing from the rest of the Everglades and from Florida Bay – and could have produced much more clean water had it been designed with a significantly larger size. It seems that only politics played a role in deciding the outcome between the two systems – and the decision was not based on science. We also believe that shunting water during the dry season to other existing STAs in the vicinity as envisioned will not make up for this shortfall.

We should add here that Florida Bay is experiencing hypersaline conditions and every visit to Everglades National Park reveals that the march of red mangroves from the shoreline of Florida Bay north into the sawgrass marshes of the park is expanding year by year. Both of those conditions are explained by the park receiving only a small fraction of the water it received under historic pre-drainage conditions. And that lack of fresh water is an open invitation for saltwater to move inland through the porous limestone which underlies the park – as well as the rest of the Florida peninsula. With sea level rise increasing, South Florida's future water supply in the porous limestone of the Biscayne Aquifer is in a precarious

situation. It is absolutely at risk from the same saltwater intrusion now impacting the park so visibly. Much more freshwater in the underground system throughout the Everglades would help immensely.

Another alternative that clearly should have been given thorough analysis alongside the reservoir is the "shallow flowway" concept that is embraced by "Plan 6." In spite of being rejected for further consideration at an early stage of this process, that project had enormous benefits which the current reservoir/STA combination does not. Among them is restoration of enormous swaths of wetlands and habitat in the northern part of the system south of Lake Okeechobee. Equally important, the flowway does not have the capacity problems the current configuration has. In wet years, there would be no limit to how much water could flow south – and that could truly address the problem of massive wet season discharges to the St. Lucie and Caloosahatchee Estuaries. Combined with increased flow throughout the system (e.g. the bridging over Tamiami Trail), Plan 6 also has enormous potential for bringing back the high flows of fresh water that will be needed to bring ecological recovery to Florida Bay and the sawgrass marshes of the Everglades. It could also help with restoration of the tree islands (hammocks) which are necessary to wildlife in the traditional Everglades and which have largely been lost as a result of drainage and artificial water management. That impact from a loss of flow in the system was also noted and discussed in the Peer Review Workshop.

And if the reason other reasonable alternatives were not examined was the removal of the option to use "eminent domain" for land acquisition according to the language of SB10, that simply makes no sense. The entire concept of eminent domain is for governments to acquire private land for an important public use. The lack of use of that tool in this case appears to be no more than a quirk of the final SB10 legislation and could still be easily rectified by a new or amended bill. See:

"Eminent domain refers to the power of the government to take private property and convert it into public use. The Fifth Amendment provides that the government may only exercise this power if they provide just compensation to the property owners."

https://www.law.cornell.edu/wex/eminent_domain

Private sugar lands in the project footprint should not be the determining factor in not coming up with a reasonable range of alternatives and their analysis. And should not be the determining factor in the final outcome. We note that NEPA allows for the write-up of the "environmentally preferred alternative" alongside the agency's "preferred alternative." There is no requirement under NEPA that they be one in the same. But even that process, normally done for any EIS prepared in our region, and designed to create full transparency in the decision-making process so that the public fully understands a project and its anticipated benefits and impacts, was not done in this case.

Aside from configurations which were not examined, here are some other flaws and shortcomings we believe are part of the design of the EAA Reservoir. First of all, the height of this reservoir for this natural and agricultural area – 37-feet tall – is gigantic. The DEIS identifies this as only an "aesthetic" problem – an impaired view of the landscape looking south from the Lake Okeechobee dike. The document also points out the design of the reservoir will not allow its use by birds or other wildlife. And as a regular hiker and bird and animal watcher in the Holeyland and Rotenberger Wildlife Management

Areas adjacent to the reservoir, it's difficult to imagine how looking out on a landscape permanently altered by this enormous and dominating artificial structure will impact my use and enjoyment of the current area. Believe that will apply to other users as well. See the relevant section of the DEIS:

"The EAA Storage Reservoir levee heights (37.1 feet) would result in a long-term adverse effect, as the view from Lake Okeechobee would be blocked. In comparison to the No Action Alternative of a FEB, wading birds and other wildlife will likely not use the area to forage and roost as a reservoir, thereby decreasing the aesthetic value of the area."

But there is a far more serious impact of constructing two 37-foot walls directly in the floodplain of the original flow path of the Everglades. It will end once and for all the dream of a truly restored Everglades – the gentle but massive flow of clean fresh water from Lake Okeechobee to Florida Bay. And what we once called the "River of Grass" will be permanently relegated to history books.

For years, a major vision of Everglades restoration was the reconnection of the natural hydrological flow between Lake Okeechobee and Florida Bay. We imagine the public still believes that is what Everglades Restoration is supposed to be about. In reality, the impediments to restoring a more natural flow path are not that great – a flowway could use spreader canals and openings of the type the district and the Army Corps designed for the Picayune Strand Restoration Project. Openings and spillways along the Miami and New River canals south of Lake Okeechobee could bring water into a central flowway (lands currently occupied by sugar farmers south of Lake Okeechobee) – and then brought to STAs or even the Everglades itself. Even the subsidence of the EAA is not an insurmountable engineering problem – the basin would fill with water (as well as natural, long-hydroperiod wetlands) and could then be pumped into a spreader canal at the southern end of the project to move to the Water Conservation Areas or expanded STAs. Acquiring more land north of Lake Okeechobee for additional wetlands restoration would greatly complement the flowway project by increasing water quality of water flowing south out of the lake and into the Miami and New River canals. See this website and graphics explaining the benefits of the Plan 6 Flowway over other solutions from the Rivers Coalition:

https://riverscoalition.org/the-solution/

We should also point out that it has been simply agonizing to know that the price tag of this reservoir is roughly the same as the price tag of the original 187,000-acre U.S. Sugar lands buyout negotiated by former Governor Crist in 2008 – and which would have provided much of the land for that central flowway. And parts of the 187,000 acres of U.S. Sugar lands outside the flowway could have been used to swap out sugar lands in the flowway. Rock mines and other infrastructure in the flowway could have been purchased from a willing seller or via eminent domain. See article referencing the original U.S. Sugar purchase here:

https://www.nytimes.com/2008/06/25/us/25everglades.html

However, both the district and the Army Corps had little appetite for that negotiated buyout. In conversations with both agencies, we were told that "we have no projects earmarked for that land." And by projects they clarified that to mean projects such as reservoirs and STAs – not restored wetlands.

The Army Corps went a step further and said the Central and Southern Florida Flood Control Project mandated "productive" use of that land. "We don't take productive agricultural land and turn it into wetlands." (Personal communication with the ACOE, Stuart, Florida, 2013). Again – something that can be easily changed in legislation if it is indeed the case that EAA land cannot currently be converted to restored wetlands. The construction of the flowway would have been a wonderful use for that land – and a very cost-effective solution for a restored Everglades ecosystem. Even at this date, with the EAA Reservoir awaiting new funding authorization by congress, that solution is still possible.

Other problems. The EAA Reservoir is supposed to get its water from Lake Okeechobee. Currently, and during almost every warm, wet season of late, the lake is subject to massive algae blooms. One is currently in progress. See description below from the Florida DEP:

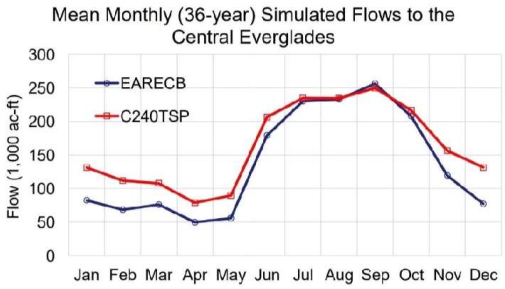
"Satellite imagery for Lake Okeechobee and the Caloosahatchee and St. Lucie estuaries and rivers has been unavailable for the past week due to overcast conditions. The most recent image available for Lake Okeechobee and the St. Lucie River and Estuary is for 7/14 which showed approximately 85% coverage of low to high algal bloom potential on the lake and no bloom activity on the visible portions of the St. Lucie River or estuary. "

https://floridadep.gov/AlgalBloomWeeklyUpdate

At the July 16th workshop to discuss water quality in the C-43 Reservoir, it was discussed that water quality leaving the reservoir had to be "the same or better" than water entering it from the Caloosahatchee. When asked what factors could make it worse (simply as a result of entering a reservoir) – algae blooms were noted by district staff. In the current configuration for the EAA Reservoir, we are going to be pouring nutrient-rich water already loaded with blue-green algae from Lake Okeechobee approximately 20 miles south into the EAA Reservoir. There is a very high likelihood that the existing blooms, already present in the water, will "blow up" once that water reaches and sits in this massive stagnant reservoir during the warm and wet season. How the STAs that will be used in conjunction with the EAA Reservoir will be impacted by this massive and expected influx of algae (once water starts flowing into them again during the dry season) has not been addressed. It is an extremely important question for the future of this project.

Although we raised this several times in the C-43 workshops, we still find it surprising that the SFWMD is only now addressing the question of how to clean up water leaving the C-43 Reservoir – now that the entire project has been designed and the project is actually under construction. Hard to believe it was not thought about at the same time that the volume of flows was considered. How the Everglades STAs will handle the massive algae blooms coming their way from the EAA Reservoir should be addressed now – or the district and the Army Corps should switch to a better solution that won't have the problem of the current configuration of the EAA Reservoir.

In the district's own modeling for the EAA reservoir and STA, they produced the graph below:



Timing of treated flows south into the Central Everglades with CEPP (C240TSP) compared to existing conditions (EARECB).

There is clearly an increase in freshwater flows during the dry season – but during the wet season, there appears to be no difference in treated water flows south with or without the reservoir. The district explained that as a function of seasonal variability in rainfall – changes in rainfall from one year to the next canceling each other out to produce no net increase during the wettest months from mid-July to mid-October. But with those same year to year changes in rainfall, dry season flows increase. The district explained that result this way – "The increase in dry season flows is from the water stored in the reservoir that is carried over and released during the dry season."

The conclusion we draw is that there is no increased capacity in the STAs to move treated water south during the wet season – and therefore water cannot be cleaned and sent south at that time. And that was also brought up in the 2017 workshops when the function of the existing 57,000 acres of STA in the EAA was discussed. The district acknowledged that the existing STAs are currently only cleaning EAA basin water and sending it south. The STAs clean little to no water from the lake during the wet season when discharges to the estuaries are taking place. That was also acknowledged during one of the 2017 reservoir workshops where it was noted that "you can't push water through water." During the dry season, there will no doubt be unused capacity in the STAs to move water from the EAA Reservoir to the STAs and to move additional water south. But that will not be the case during the wet season.

So, the plan is to hold the water in the reservoir during the wet season – where algae concentrations and deoxygenation (from bacteria feeding on the dead algae) are expected to increase. And then release that water to adjacent STAs during the dry season when there is capacity for additional water. As stated above, we believe that will have a very small impact on the wet season discharges to the estuaries during the seasons and years that the major discharges actually take place. And that has consistently been one of the big selling points of this reservoir. If the discharges to the STAs during the dry season from the EAA Reservoir area are loaded with toxic algae, that can also have a major negative impact on the treatment marshes or STAs and their effectiveness in sending clean, treated water south.

In addition, just as with water sitting in South Florida's numerous limestone mines, there is a very strong likelihood that water stored in the EAA Reservoir and picking up minerals from the walls and floor of the

reservoir will have an altered pH – making it more alkaline than the natural, slightly acidic, water of the Everglades. The impact of that situation – raised alkalinity - is discussed in this document from the U.S. EPA:

"The water in the interior marsh of the Refuge is soft, slightly acidic, and strongly influenced by rainfall. The limestone (calcium carbonate) substrate underlying the Refuge is overlain by several feet of peat so surface water is not in contact with the limestone. In contrast, the rest of the Everglades marsh has hard water with a neutral pH. In the shorter hydroperiod portions of the Park there is little soil, so surface water is subject to greater influence by the limestone substrate. Conductivity of water is closely related to its hardness, because calcium, the major contributor to hardness in the Everglades, also aids in conductance. Conductivity is of ecological interest in that it is a determinant of periphyton community composition in the Everglades. Periphyton communities in the Refuge are dominated by desmid and diatom species, while the extensive periphyton mats (Figures 1 and 56) in hard water portions of the Everglades are dominated by calcium-precipitating cyanobacteria with a high calcium carbonate content.

See page 34: https://www.epa.gov/sites/production/files/2014-03/documents/epa904r07001.pdf

Related to the above point about the reservoir and discharges to the estuaries, we have requested from the Army Corps and recently from the SFWMD data on yearly discharges from Lake Okeechobee to the St. Lucie and Caloosahatchee Rivers. Looking at volumes of discharges to the estuaries in comparison to expected discharges from the EAA Reservoir to the STAs will obviously be of value here for the public to easily understand an important aspect of this project. And how it will cut down on the flow of nutrient-rich water into the estuaries. To date, we have not received anything.

We also expressed our disappointment to the district that, at the recent water reservation workshop, no data was actually presented as to how water in the EAA Reservoir was to be divided between the public water supply, water for EAA growers, and the needs of the Everglades ecosystem,. The Army Corps DEIS specifically notes that a major purpose of the EAA Reservoir is "increasing water supply for municipal, industrial and agricultural users to a greater extent than would be accomplished in the authorized Central Everglades Planning Project."

See: https://www.saj.usace.army.mil/SFWMDEAAReservoir/

But in reality, we still have no idea how those different uses and users will be prioritized. Especially during dry seasons – and even more especially during droughts when all users will want to draw from this new source of water. During the wet season, there is adequate water for growers and the municipal wellfields are, in normal rain years, easily replenished. But this reservoir has received public support from sugar growers who are clearly expecting to tap this additional source of water when needed. Similarly, the SFWMD's "Basis of Review" document gives the SFWMD governing board the authority to use CERP projects for the public supply. See below:

"6. Consistent with Subsection 3.2.1.E.5 above, the applicant may obtain an allocation for additional water from the Waterbodies over the applicant's base condition water use, as identified below:
"a. Certified project water - Water certified by the Governing Board as available for consumptive use through operation of a water resource development project, as provided in Section 3.2.1.E.5.a;"

See page 60: https://www.sfwmd.gov/sites/default/files/documents/wu_applicants_handbook.pdf

It was not explained how the above rule dovetails with water reservations for the Everglades – or even the details of what those reservations for the EAA Reservoir are expected to be.

Given what we have presented above, we believe that the EAA Reservoir may in fact deliver most of its benefits to EAA agricultural growers as well as expanding the public water supply available to the lower east coast developers (while helping to remove a major impediment to further development in Southeast Florida – a lack of fresh water). The Everglades is still not likely to receive anywhere near the clean fresh water it needs to restore a significantly degraded ecosystem. And that system will, once again, be short-changed in a public process which favors agricultural and development interests over wildlife and the natural environment.

Sincerely,

Matthew Schwartz
Executive Director
South Florida Wildlands Association
matthew@southfloridawild.org

CC Don Medellin

H.E.R.O.

HERITAGE AND ENVIRONMENT RESOURCES OFFICE

July 28, 2020

Toni Edwards
Senior Scientist
Coastal Ecosystems Section
South Florida Water Management District
P.O. Box 24680
West Palm Beach, FL 33406
Submitted electronically to: tedwards@sfwmd.gov

RE: Seminole Tribe of Florida's Comments on EAA Reservoir Technical Document and Draft Water Reservation Rule

Dear Ms. Edwards:

The Seminole Tribe of Florida ("Seminole Tribe") is in receipt of the *EAA Reservoir Technical Document and Draft Water Reservation Rule.* We have provided below a brief list of potential issues and outstanding questions regarding our identified concerns associated with the Draft EAA Reservoir Water Reservation Rule and Technical Document.

The main issue regarding the EAA Reservoir Draft Water Reservation Rule and Technical Document is that it is still not clear as to whether or not there is potential affects to the Seminole Tribe's water supply. Generally, this reservation could affect the Seminole Tribe's access to water in a couple ways. For example, it could set aside such a large quantity of water that it shrinks the water supply pie creating greater competition among the water users. Also, if the EAA Reservoir receives an inordinate amount of water from Lake Okeechobee, it could affect Lake Okeechobee's ability to supply water because, once in the EAA Reservoir, water may have greater restrictions for use for water supply than when it is in Lake

ERMD
SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
A PLACE TO LEARN. A PLACE TO REMEMBER.
TRIBAL HISTORIC PRESERVATION OFFICE

Sr. Director and Tribal Historic Preservation Officer, Dr. Paul N. Backhouse | Tribal Historic Preservation Office Director Ms. Anne Mullins | Director of the Ah-Tah-Thi-Ki Museum Ms. Kate Macuen | Director of the Environmental Resources Management Department Mr. Kevin Cunniff

"THE LAND I WAS UPON I LOVED; MY BODY IS MADE OF ITS SANDS. COACOOCHEE."

H.E.R.O.

HERITAGE AND ENVIRONMENT RESOURCES OFFICE

Okeechobee. There may be other ways, too, but we need details to understand exactly what they would be.

Other specific comments/questions on how this Draft Rule and Technical Document will have on the Tribe's water and resources include:

1. How much water will this Draft Rule actually reserve on an average annual basis? The EAA Reservoir is supposed to make 370,000 ac-ft available for the natural environment on an average annual basis, yet the Draft Rule sets aside "all surface water released, via operation, from the EAA Reservoir that is directed to the Lower East Coast Everglades Water Bodies through Structures S-624, S-625, and S-626." The Draft Rule goes on to say, "a modified Lake Okeechobee schedule indicates the EAA Reservoir could convey 825,000 acre-feet of surface water on an average annual basis." But it is not clear whether that number is a quantification of the amount that will be reserved.
2. Will there be any limit to how much water gets reserved? And if so, what will it be? As worded, the Draft Rule reserves all water that leaves three of the structures, but no operation manual for the Reservoir exists, and there is nothing preventing a future operation manual from limiting the amount of water sent through those structures, so theoretically, there is no limit to how much water this Rule actually preserves.
3. The rule, as written, is not clear as to at what point the water becomes protected, does the water only become protected once it passes through one of those structures and is directed to the Everglades or at some point before that point?
4. If it is protected before that point, how will the District identify protected water that will be sent through one of the structures later on from water that will not be sent through?
5. What effect, if any, will this Water Reservation Rule have on Water Rights Compact Work Plan Approvals?
6. The Technical Document may not have considered impacts the EAA Reservoir may cause to water deliveries to Big Cypress Reservation. The maps included in the Technical Document that

ERMD

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
A PLACE TO LEARN. A PLACE TO REMEMBER.

TRIBAL HISTORIC PRESERVATION OFFICE

Sr. Director and Tribal Historic Preservation Officer, Dr. Paul N. Backhouse | Tribal Historic Preservation Office Director Ms. Anne Mullins | Director of the Ah-Tah-Thi-Ki Museum Ms. Kate Macuen | Director of the Environmental Resources Management Department Mr. Kevin Cunniff

"THE LAND I WAS UPON I LOVED; MY BODY IS MADE OF ITS SANDS. COACOOCHEE."

H.E.R.O.

HERITAGE AND ENVIRONMENT RESOURCES OFFICE

show the area that was analyzed for water supply impacts currently do not include Big Cypress Reservation. Clarification is needed, since water deliveries to Big Cypress Reservation are sometimes made through the same canals that the EAA Reservoir will affect.

7. Will there be any limit to how much water is sent to the EAA Reservoir from Lake Okeechobee during the dry season? The EAA Reservoir is supposed to receive runoff from the EAA and regulatory releases from Lake Okeechobee that would have otherwise gone to the northern estuaries. Yet the Post-Authorization Change Report (PACR) states that water may also be sent from the Lake Okeechobee to the EAA Reservoir even under water supply conditions. The water that enters the EAA Reservoir will be reserved first for the natural environment, and will only be made available for other purposes under limited conditions. So once water is sent to the EAA Reservoir, it would be reasonable to assume it is effectively lost for water supply purposes. When considered in combination with the USACE use of "operational flexibility" to lower the Lake in the dry season and the additional pressure that is being put on the USACE to send as much water south from the Lake this represents a legitimate concern for the integrity of the Tribe's Lake Okeechobee water supply without some limits on the amount of water that is set aside for the environment once in the EAA Reservoir.
8. Will another Savings Clause analysis be performed once Lake Okeechobee regulation schedule is revised? It is not clear how the Savings Clause analysis the District performed for this project could affirmatively tell us anything when it was based on the LORS 08 regulation schedule. By the time the EAA Reservoir gets built and becomes operational, the Lake will be operating under LOSOM, and the District says the USACE will revise the Lake schedule to accommodate the Reservoir.
9. How will the EAA Reservoir improve water supply performance? The FEIS for the EAA Reservoir states that the overall project purpose includes "increasing water supply for municipal, industrial, and agricultural users." The Technical Document, however, makes no mention of this purpose, and only performs analysis that purports to show that existing legal users will not be harmed by the EAA Reservoir. This causes concern that the project will not increase water

ERMD

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM
A PLACE TO LEARN. A PLACE TO REMEMBER.

TRIBAL HISTORIC PRESERVATION OFFICE

Sr. Director and Tribal Historic Preservation Officer, Dr. Paul N. Backhouse | Tribal Historic Preservation Office Director Ms. Anne Mullins | Director of the Ah-Tah-Thi-Ki Museum Ms. Kate Macuen | Director of the Environmental Resources Management Department Mr. Kevin Cunniff

"THE LAND I WAS UPON I LOVED; MY BODY IS MADE OF ITS SANDS. COACOOCHEE."

H.E.R.O.

HERITAGE AND ENVIRONMENT RESOURCES OFFICE

supply performance. Please explain how the EAA Reservoir will increase water supply performance?

10. Please note: Cultural Resources notification protocols should be followed under Florida Statute 872 for any inadvertent discoveries and coordinated with the SHPO and THPO. Additionally, potential impacts to tree islands from proposed fluctuating water levels within the project area should be evaluated to reduce impacts cultural resources.

The Seminole Tribe appreciates the hard work and commitment the South Florida Water Management District has applied to this technical document and rulemaking effort. The Seminole Tribe of Florida remains committed to continuing to engage in the rulemaking process, and reserves the right to revise our comments after a more thorough technical review and as more information becomes available. Thank you for your consideration of these comments. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Signature Redacted

Paul Backhouse, PhD, RPA, Snr. Director, Heritage and Environment Resources Office and THPO
Seminole Tribe of Florida

ERMD

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI
MUSEUM
A PLACE TO LEARN. A PLACE TO REMEMBER.

TRIBAL HISTORIC PRESERVATION OFFICE

Sr. Director and Tribal Historic Preservation Officer, Dr. Paul N. Backhouse | Tribal Historic Preservation Office Director Ms. Anne Mullins | Director of the Ah-Tah-Thi-Ki Museum Ms. Kate Macuen | Director of the Environmental Resources Management Department Mr. Kevin Cunniff

"THE LAND I WAS UPON I LOVED; MY BODY IS MADE OF ITS SANDS. COACOOCHEE."

LLW LEWIS LONGMAN WALKER

Attorneys at Law
llw-law.com

Reply To: West Palm Beach

August 25, 2020

Ms. Toni Edwards
Senior Scientist, Coastal Ecosystems Section
South Florida Water Management District
tedwards@sfwmd.gov

Re: **Seminole Tribe of Florida's Public Comments on the Revised Draft EAA Reservoir Water Reservation Rule**

Dear Ms. Edwards:

On behalf of the Seminole Tribe of Florida (Seminole Tribe). The Seminole Tribe is a federally recognized tribe pursuant to Section 16 of the Indian Reorganization Act of 1934, as amended. The Seminole Tribe's access to water is secured by the Water Rights Compact Among the Seminole Tribe of Florida, the State of Florida and the South Florida Water Management District (Water Rights Compact), which has been codified in both federal and Florida law. Seminole Indian Land Claims Act of 1987, Pub. L. No. 100-228 (1987); Ch. 87-292, Laws of Fla. (H.B. No. 1472). The Seminole Tribe's Brighton, Big Cypress, and Hollywood Reservations, as well as the Coconut Creek Trust Lands, all rely on the Central and Southern Florida Project for Flood Control and Other Purposes (C&SF Project) either directly or indirectly for water supply and flood protection. In addition, a great portion of the Seminole Tribe's history and culture is directly tied to the Everglades and the greater south Florida region. The Draft Water Reservation Rule (Draft Rule) for the Everglades Agricultural Area (EAA) Reservoir Project would reserve from allocation for consumptive uses substantial amounts of water from the C&SF System, which will impact water supply planning as well as day-to-day operational decisions that are critical to the Seminole Tribe's water resources. In addition, the water is being reserved to benefit the Everglades system, which potentially impacts the Seminole Tribe's historic and cultural resources. The Draft Rule does not apply to the Seminole Tribe under the Water Rights Compact unless the Seminole Tribe were to specifically incorporate it into the Criteria Manual. However, given that the Tribe's water supply depends upon the availability of the shared

JACKSONVILLE
245 Riverside Ave., Suite 510
Jacksonville, Florida 32202
T: 904.353.6410
F: 904.353.7619

ST. PETERSBURG
100 Second Ave., South
Suite 501-S
St. Petersburg, Florida 33701
T: 727.245.0820
F: 727.290.4057

TALLAHASSEE
315 South Calhoun St., Suite 830
Tallahassee, Florida 32301
T: 850.222.5702
F: 850.224.9242

TAMPA
301 West Platt St.
Suite 364
Tampa, Florida 33606
T: 813.775.2331

WEST PALM BEACH
515 North Flagler Dr., Suite 1500
West Palm Beach, Florida 33401
T: 561.640.0820
F: 561.640.8202

See Things Differently®

resource in the regional system, any action by the South Florida Water Management District (SFWMD) which would diminish the available supply would substantially affect the Seminole Tribe. Thus, the Draft Rule substantially affects the Seminole Tribe's interests

The Seminole Tribe appreciates the importance of how the EAA Reservoir Project factors in toward achieving the greater goal of Everglades restoration, and it understands the urgency that the SFWMD and many stakeholders feel in wanting to get the project built and operational. However, in its haste to complete this rulemaking, SFWMD cannot lose sight of its responsibilities to all water users who currently rely on the regional system, especially the Seminole Tribe, with whom SFWMD shares a unique relationship and responsibility. Given the number of assumptions SFWMD must necessarily make at this stage of Comprehensive Everglades Restoration Program (CERP) implementation and changing Lake Okeechobee regulation schedules, the Seminole Tribe urges SFWMD to proceed cautiously and conservatively when reserving water in such a complex system so far in advance of the time in which the water will become available for the natural system. At this time, it would be more prudent to reserve only what is minimally required to secure a project partnership agreement (PPA) with the U.S. Army Corps of Engineers (USACE). As explained in greater detail below, the Draft Rule takes an overly aggressive approach that subjects the Seminole Tribe's water rights to greater uncertainty, poses a greater risk of man-made drought, and potentially impacts its ability to develop its Brighton and Big Cypress Reservations. Furthermore, it significantly reduces the flexibility that the USACE and SFWMD have to manage and allocate water resources during the dry season. Thus, it is the Seminole Tribe's position that SFWMD amend the Draft Rule to cap the amount of water reserved at this time to only the amount necessary to secure the PPA, equal to 370,000 average-annual acre-feet.

Please accept these comments on behalf of the Seminole Tribe on the SFWMD Draft Rule for the EAA Reservoir.

1. **The EAA Reservoir is a CERP project and SFWMD should limit the Water Reservation to the amount of additional water that the project will make available to the environment as identified in the EAA Reservoir Final Environmental Impact statement and Project Implementation Report, equal to 370,000 annual-average acre-feet of water.**

The SFWMD initiated this rule development to enable it to enter into a PPA with the USACE to begin construction on the EAA A-2 Reservoir, which is part of CERP. Prior to entering into such an agreement, Florida law requires SFWMD to allocate or reserve the additional water supply that the EAA Reservoir project is expected to make available to the natural system as identified in the EAA Reservoir Final Environmental Impact Statement and Project Implementation Report (FEIS/PIR). According to the EAA Reservoir FEIS/PIR, the original Central Everglades Planning Project (CEPP), authorized in 2014, would provide an additional 210,000 acre-feet of water on

an average annual basis to the Everglades. The EAA Reservoir Project, which modified CEPP by adding to it the EAA A-2 Reservoir and stormwater treatment area, would direct an additional 160,000 acre-feet to the Everglades, for a total amount of additional water of 370,000 acre-feet on an average-annual basis. Thus, 370,000 acre-feet is the amount of water the SFWMD must reserve in order to enter into a PPA with the USACE to begin construction on the EAA Reservoir. The Draft Rule proposed by SFWMD, however, does not reserve a specific amount of water, it simply reserves all water flowing through three structures, the S-624, S-625, and S-626 structures. The Draft Rule places no upper bound on the amount of water that can flow through these structures, but it instead states that SFWMD modeling indicates that 825,000 average-annual acre-feet of water, over twice what is required to secure the project partnership agreement, could be conveyed through these structures and therefore reserved. The Draft Rule contains no standards or parameters to guide or restrain agency actions in operating the EAA Reservoir.

The lack of constraining or guiding parameters in the Draft Rule is problematic because the EAA Reservoir does not yet have an Operating Manual, nor will it have one for several years. SFWMD modeling that derived the 825,000 acre-feet figure was based on the Draft Operating Manual included in the EAA Reservoir FEIS/PIR and the 2008 Lake Okeechobee Regulation Schedule (LORS 08). Yet, by the time the EAA Reservoir becomes operational there will be a new Lake operating schedule in place and, as the EAA Reservoir FEIS/PIR and Draft Operating Manual acknowledge, the Draft Operating Manual for the EAA Reservoir will likely have changed over the course of the P&E phase of project implementation. Thus, SFWMD cannot reliably say that its modeling accurately represents the operating and environmental conditions that will be in place once the EAA Reservoir becomes operational. Thus, there is no rational relation to the Draft Rule and the amount of water needed to secure the PPA with the USACE, i.e., the additional water the EAA Reservoir FEIS/PIR states it will make available for the environment. To the extent that it would reserve 825,000 average-annual acre-feet of water for the natural system, it amounts to an enlargement, modification, or contravention of the CERP implementing laws and regulation upon which SFWMD derives its part of its authority for this rule development.

The lack of constraints in the Draft Rule is even more concerning when it is considered in the context of the current trend in the operation of Lake Okeechobee to send more water south during the dry season. In the proposed Planned Deviation to the 2008 Lake Okeechobee Regulation Schedule (LORS 08) (Planned Deviation), the USACE is attempting to justify lowering Lake Okeechobee and sending substantially more water south than LORS 08 currently allows in an attempt to address a water quality issue that has existed for decades. This proposed singular operational strategy concerns the Seminole Tribe because its Brighton and Big Cypress Reservations rely heavily on Lake Okeechobee for water deliveries, which are most needed during the dry season precisely when water is most scarce. The Planned Deviation threatens the water supplies of Brighton and Big Cypress Reservations because it would authorize the USACE

to discharge more water from the Lake when it is most needed by the Seminole Tribe. The USACE is also receiving pressure to incorporate this additional flexibility into the Lake Okeechobee System Operating Manual (LOSOM), which is currently under development. As currently proposed, the unconstrained Draft Rule would effectively remove the vast majority of the water sent south from the water supply pie, threatening the reliability of the Seminole Tribe's water supply and, consequently, its sovereignty.

Given these uncertainties, SFWMD should not take such an aggressive approach to this water reservation. SFWMD should amend the Draft Rule's language to place an upper annual limit of 370,000 acre-feet of water on the water reservation. This amount is what the law requires and authorizes the SFWMD to reserve in order to enter into the PPA with the USACE and proceed with construction of the EAA Reservoir. If later SFWMD determines that it needs to reserve more water due to changed conditions, it has the authority to review and amend the reservation every five years.

The Seminole Tribe offers the following proposed alternative language for subsection 40E-10.061(3)(a) of the Draft Rule, which substantially achieves the SFWMD's regulatory objective without overcommitting south Florida's limited water resources at this time:

(a) All surface water released, via operation, from the EAA Reservoir that is directed to the Lower East Coast Everglades Waterbodies through Structures S-624, S-625, and S-626 (see Figure 3-6) up to 370,000 acre-feet, annually, is reserved from allocation.

2. **It is uncertain how SFWMD will distinguish water released through the EAA Reservoir that is reserved from allocation and water it mixes with downstream that is not reserved**.

The EAA Reservoir is not the last stop for reserved water discharged from the S-624, S-625, and S-626 structures before it enters the Everglades. It must first flow through numerous other structures along the way where it will mix with other water that is not reserved and upon which numerous stakeholders, including the Seminole Tribe's Big Cypress Reservation, its Hollywood Reservation, and the Coconut Creek Trust Lands, rely for their water supply. It is not clear how SFWMD plans to track or apportion this mixed water. This information becomes especially important during droughts when C&SF Project does not contain enough water to meet all the needs of the system and SFWMD must make operational decisions that determine who gets the limited available water.

Absent clear guidelines or standards for the operation of the EAA Reservoir, especially during dry periods, there exists the potential for severe, unaccounted-for impacts to the Seminole Tribe's water supply for the areas mentioned above. These uncertainties only underscore the

importance of taking a more conservative approach to this water reservation. While the Everglades may be able to receive an additional 825,000 acre-feet of water annually once CEPP and the EAA Reservoir are fully operational, the C&SF System will not have the ability to reliably send that water to the Everglades system for years to come, yet the potential impacts to water supply caused by the Draft Rule will occur immediately. Thus, constraining the amount of the reservation now is more prudent and provides greater flexibility in the system to accommodate uncertainty in operations, while still substantially accomplishing SFWMD's objectives.

3. **SFWMD analysis on potential impacts to water supply caused by the Draft Rule is not reliable or sufficient.**

The analysis included in the Technical Document for the Draft EAA Water Reservation Rule only analyzes potential impacts caused to existing legal users who withdraw surface water from the Miami and North New River Canals. Even the upstream analysis appears to have been limited to a smaller sub-basin of the Lake Okeechobee Service Area (LOSA) consisting of the area immediately south of Lake Okeechobee between the Miami and North New River Canals. The analysis relies almost completely on the fact that the current LOSA Restricted Allocation Area rules restrict new allocations or increases to conclude that the Draft Rule will not impact existing legal users. These LOSA Restricted Allocation Area rules do not apply to the Seminole Tribe and its water uses. The SFWMD's reliance on a restricted allocation rule to effectively cap water supply demand indefinitely and then, evidently, reserve all additional water in the system in the Draft Rule could cripple the Seminole Tribe's development potential for Brighton and Big Cypress Reservations unless other water reservations are secured for these Tribal Reservation lands. This comes at a time when the Seminole Tribe is working with SFWMD to amend its work plan to account for future growth potential on the Reservations and the attendant increases in surface water supply needs. This is yet another reason why SFWMD should not rush to reserve more water than is necessary so far in advance of the system's actual ability to deliver it. At the very least, SFWMD must provide better documentation as to how it plans to preserve the Seminole Tribe's water rights, which include both the Seminole Tribe's present and future surface water demands. If SFWMD does not, the consequences for Brighton and Big Cypress Reservations could be significant.

Moreover, the EAA Reservoir will not exist and operate in isolation and the potential effects this water reservation will have will not only be localized to the entities that rely on the Miami and North New River Canals for surface water deliveries. Its presence will affect operations in other parts of the C&SF Project system, most notably Lake Okeechobee. Potential secondary water supply effects are of particular concern to Brighton Reservation, because once water is sent south from Lake Okeechobee, it is no longer available to the Reservation to meet its water supply needs. The pressure on the USACE and SFWMD to send as much water south as possible from Lake Okeechobee, even when the Lake is in water supply operations during the dry season, combined with the existence of the EAA Reservoir creates considerable incentive to

push even more water south. The Draft Rule is an unlimited water reservation that is premised on sending as much water through the EAA Reservoir as possible, which will create an even greater draw on water from Lake Okeechobee to the south, out of the reach of Brighton Reservation. This creates additional risk to Brighton's water supply that is not accounted for in the SFWMD's analysis of the Draft Rule.

Compounding the issue, the modeling performed by SFWMD was based on LORS 08 and it does not appear to have evaluated the potential impacts to Brighton's water supply that the 2020 Planned Deviation or something similar incorporated into LOSOM could have. SFWMD must perform a complete and thorough analysis of the Draft Rule's potential impacts to all users of Lake Okeechobee water, including the Seminole Tribe, in the context of a different Lake schedule that allows the USACE to send greater amounts of water south when the Lake is in water supply operations.

The lack of clear guidelines and standards in the Draft Rule or anywhere else on how operational decisions for the EAA Reservoir will be made is especially concerning during times of drought. For example, the Draft Operating Manual for the EAA Reservoir prohibits water supply discharges when the Reservoir stage is below 8 feet. One could easily imagine a situation during a dry period where there is a large demand on the C&SF Project from the Seminole Tribe, agriculture, municipalities, and the environment and water is being pumped through the EAA Reservoir as fast as it can, so it creates a sink for more water to be sent from Lake Okeechobee to meet the needs of the Everglades. At that point, the decisions made by the USACE and SFWMD are of critical importance, because if the EAA Reservoir is below 8 feet or does not otherwise meet the requirements for water supply discharges, all the water sent into the Reservoir will be lost for supply. The harms from mismanagement of water supply can have a long lag time before being manifested, and are not easy to evaluate in the moment. These decisions need to be guided by standards that are developed with a clear picture of the operational paradigm under which they will be made to best avoid making critical mistakes in the management of our water supply. That is why it is critical to take a conservative approach when creating a water reservation so far in advance of the time when it will be utilized and with so much uncertainty in the operations of an incredibly complex system.

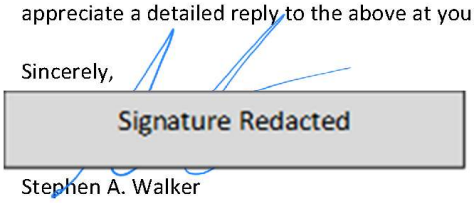
In summary, given the number of assumptions SFWMD has had to make, the uncertainties that lie ahead in the implementation of CERP, and coupled with the speed with which this rule development is proceeding, SFWMD should take a cautious, conservative approach. As expressed above, the Seminole Tribe is very concerned that this rule would substantially commit SFWMD well beyond what is justifiably necessary to enter into a PPA with the USACE for the EAA Reservoir Project. Therefore, the Seminole Tribe respectfully requests that you scale this effort back to the minimum needed to meet the PPA requirements.

01 252875-1

Ms. Toni Edwards
Senior Scientist, Coastal Ecosystems Section
South Florida Water Management District
August 25, 2020
Page 7

Thank you for the opportunity to provide these comments, the Seminole Tribe would appreciate a detailed reply to the above at your convenience.

Sincerely,



Stephen A. Walker

SAW/kss

c. Jim Shore, Esquire – Seminole Tribe of Florida

01252875-1



July 28th, 2020

VIA EMAIL
tedwards@sfwmd.gov

Toni Edwards
Senior Scientist
Applied Sciences Bureau/Coastal Ecosystems Section
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: Southeast Florida Utility Council
EAA Reservoir Reservation Rulemaking Comments

Dear Ms. Edwards,

The Southeast Florida Utility Council (SEFLUC) respectfully submits the following comments in response to the South Florida Water Management District's (SFWMD) ongoing rulemaking efforts for the adoption of water reservations for the Everglades Agricultural Area (EAA) Reservoir. SEFLUC represents potable water providers throughout South Florida serving over six million people. SEFLUC's mission is to provide a communications, networking, and support structure to allow member utilities to continue to provide superior quality water supply and wastewater management services to their customers in a cost-effective manner.

SEFLUC's members directly or indirectly rely upon water managed in the Central and Southern Florida Project (C&SF Project) to provide safe, reliable, and environmentally sustainable drinking water throughout South Florida. SEFLUC supports projects like the EAA Reservoir project and other Comprehensive Everglades Restoration Plan (CERP) projects that are intended to achieve Everglades restoration while maintaining flood control and water supply for existing legal users. In response to SFWMD's current draft rule language and draft technical documentation for the EAA Reservoir water reservation, we offer the following comments.

The draft rule would reserve "all surface water released, via operation, from the EAA Reservoir that is directed to the Lower Ease Coast Everglades Waterbodies through Structures S-624, S-625, and S 626..." It is difficult, if not impossible, for stakeholders to evaluate the practical effect of this proposed reservation. First, the reservation language itself does not provide a specific quantity of water that is reserved. Second, there is significant uncertainty, given the lack of information regarding the operation schedule for the EAA Reservoir itself. Compounding this issue is uncertainty regarding the future operation of Lake Okeechobee. As you know, Lake Okeechobee is currently operating under the LORS 2008 operating schedule. LORS 2008 itself was intended to be an interim operating schedule to facilitate necessary repairs to the Herbert Hoover Dike. The U.S. Army Corps of Engineers (Corps) is currently developing a revised Lake Okeechobee operating schedule, LOSOM, which would not take effect until 2022 or later. The new operating schedule that will result from the LOSOM development process will almost certainly

{00571498.6 }

have significant implications for the way the EAA Reservoir itself may be operated. Given these layers of unknowns, we are concerned that adopting the reservation as currently proposed could have unintended or unanticipated consequences by the time the EAA Reservoir is actually operational. We would request that SFWMD address these concerns, and additionally address how any adopted reservation will be reevaluated or revised after these unknown operational concerns are addressed.

It is also critical to address the provisions of Sections 373.1501(5)(d) and 373.223(4), Florida Statutes requiring all existing legal uses of water in the public interest be protected, and that the implementation of the EAA Reservoir reservation honors the Savings Clause of the Water Resources Development Act (WRDA) of 2000 (§ 601(h)(5)(A)), which provides that an existing legal source of water supply may not be eliminated until a sufficient replacement source is available. Though we understand that a Savings Clause analysis was previously performed by the Corps in association with the prior Post Authorization Change Report and Environmental Impact Statement prepared regarding the EAA Reservoir, given the uncertainty regarding future operation of the C&SF Project and the requirements of the Savings Clause, it is important that any analysis of potential impact to existing legal users be done in a manner which is based on the existing legal use baseline established in WRDA 2000 and consider the most up to date information regarding potential impacts on water supply. Indeed Section 373.1501(5)(d), Florida Statutes, the Florida law counterpart to the WRDA 2000 Savings Clause, specifically requires that SFWMD must "provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users..." This analysis should be based on water available to existing legal users at the time of WRDA 2000, not subsequent modifications to Lake Okeechobee operations. We would request that SFWMD address these concerns prior to adoption of any reservation.

Finally, Section 373.223(4), Florida Statutes provides that reservations are subject to period review and revision in light of changed conditions. Given the layers of uncertainties that exist and likelihood for changed conditions regarding the ultimate operation of the EAA Reservoir and the C&SF Project as a whole, we request that the reservation rule explicitly provide that SFWMD will reevaluate and readopt the reservation after revised operation schedules for Lake Okeechobee and the EAA Reservoir have been established.

Thank you for your consideration of these comments, and we look forward to working with you on this important regulatory issue.

Sincerely,

Signature Redacted

Todd Hiteshew
Chair, Southeast Florida Utility Council

{00571498.6 }

Date: August 5, 2020

To: Don Medellin, Principal Scientist, Applied Sciences Bureau, SFWMD
Toni Edwards, Senior Scientist, Coastal Ecosystems Section, SFWMD

From: Rebecca Elliott, Environmental Manger, Office of Agricultural Water Policy, FDACS

RE: Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation Rule dated June 2020 and SFWMD's Applicant's Handbook 3.11.6 EAA Reservoir Section dated June 18, 2020

The Florida Department of Agriculture and Consumer Services (FDACS) Office of Agricultural Water Policy (OAWP) appreciates the opportunity to provide technical comments on the Draft Technical Document to Support the Central Everglades Planning Project (CEPP) Everglades Agricultural Area (EAA) Reservoir Water Reservation Draft Report June 2020 and the Draft June 18 40E-10 EAA Reservoir Reservation Rule and SFWMD's Applicant's Handbook 3.11.6 EAA Reservoir section. Technical review comments are provided below.

TECHNICAL DOCUMENT TO SUPPORT THE CENTRAL EVERGLADES PLANNING PROJECT EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION Draft Report June 2020

1) Locations and Quantities of Water to be Reserved

Section 373.223(4), F.S., states: The governing board or the department, by regulation, may reserve from use by permit applicants, water in such locations and quantities, and for such seasons of the year, as in its judgment may be required for the protection of fish and wildlife or the public health and safety. Such reservations shall be subject to periodic review and revision in the light of changed conditions. However, all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest.

The information currently provided in the technical support document does not clearly identify the sources or associated volumes of water that will ultimately provide the quantities to be stored in the EAA Reservoir. Nor does it describe how the sources will be differentiated regarding quantities of "new or additional" water made available by the project versus quantities currently allocated to existing legal uses. As the EAA Reservoir water sources include Lake Okeechobee and EAA runoff, the EAA Reservoir assessment of "water to be reserved" versus "water for existing legal uses that will not be reserved" is tied to regional water management and water use permit allocations in the vicinity of the project.

FDACS recommends that the technical support document clearly describe how reserved and non-reserved water is included in both inflow and outflow EAA Reservoir operations and in the utilization of water for natural system restoration and water supply for developed areas.

The EAA Reservoir Reservation Rule is prospective and expected to be reviewed based on the Project Operating Manual operations permitted consistent with water control plans being implemented when construction is complete, with State Assurances, and with the Savings Clause. The prospective reservation should provide projected locations, quantities, seasonality, and existing legal use information consistent with the provisions of the reservation rule.

2) Operations

The EAA Reservation Rule is a prospective reservation that is subject to substantial uncertainties due to both the Lake Okeechobee System Operating Manual (LOSOM) effort that is scheduled to replace LORS08 in 2022 and the need to develop a Project Operating Manual (POM) based on the constructed reservoir that may not be consistent with the Draft POM developed in the planning process. Future operational plans are still pending and will need to be evaluated to optimally utilize the added storage capacity while maintaining compliance with State Assurances and Savings Clause requirements for water supply and flood protection performance levels. The EAA Reservoir Reservation Technical Support document states that "Interim Operations have not yet been developed and the Project Operating Manual development will occur during subsequent project phases. Development of the Project Operating Manual is an iterative process that will continue throughout the life of the project. Refinements to the operating criteria in the manual will be made as more project design details, data, operational experience, and general information are gained during project phases." The reservation documentation should avoid the perception that it is establishing an operational regime consistent with numerous SFWMD presentations that specifically state that operations are not established by a reservation.

3) Water Supply as a Project Purpose

Water supply for other water related needs is a CERP project purpose of the EAA Reservoir Project. In the CERP "Yellow Book", a portion of the projected additional water made available was identified as contributing to the water resource development goals of CERP for other water related needs. The EAA Reservoir PACR projected non-reserved water flow through Structure S-628 to the EAA via the inflow-outflow canal to the Miami Canal and the North New River Canal. While water allocations directly from the reservoir will not be permitted, the reservation does not preclude continued and additional water use allocations that meet the EAA Reservoir reservation rule criteria and all other water use permit criteria. 5.2.1 Water Not Reserved for the Protection of Fish and Wildlife states "any withdrawal of water from the Miami and North New River canals must be consistent with allocations in existing water use permits". The reservation rule identifies the water that will be reserved from consumptive use allocation but is not used to create availability rules for non-reserved water. Consider omitting the sentence above or providing the evaluation or explanation that supports the technical document finding.

4) Lake Okeechobee Regional Availability Rule (LOSA)

OAWP recommends that the discussion of LOSA Regional Water Availability (RWA) rule be clarified on pages 73 – 74 in Section 5.2 Effects of the Proposed Everglades Agricultural Area Reservoir on Existing Legal Users, and Section 5.3 Upstream Watershed Evaluation. The LOSA RWA is a regulatory component of a minimum flow and minimum level recovery strategy in response to the implementation of the interim LORS08 schedule. LOSOM or subsequent operational schedules have the potential to return the LO MFL to a prevention strategy. A return of Lake Okeechobee to an MFL prevention strategy once the Herbert Hoover Dike Rehabilitation is complete was anticipated when LORS08 was adopted as an interim schedule. OAWP recommends the LOSA RWA rule be considered as a part of the long-term planning considerations for water supply use associated with the Lake Okeechobee MFL recovery strategy and not an assumption that caps water supply use at existing conditions.

5) Upwelling of Connate Water

The potential for upwelling of connate water is described in Appendix A, Evaluation of Impacts to Water Sources for Existing Legal Consumptive Users Due to the EAA Reservoir and A-2 Stormwater Treatment Area. The canals are a surface water supply source to be protected from any detrimental water quality shifts due to the construction and operation of the CEPP EAA Reservoir, including salinity and any other connate water constituent that would negatively impact existing legal uses. Consider cut off wall design that minimizes upwelling of connate water and monitoring at locations and frequencies that will detect potential water quality problems before it is evident in the canal surface water. Mitigation to avoid harmful impacts should occur before surface water quality is compromised.

Proposed EAA Reservoir Reservation and Applicant's Handbook version July 18, 2020

40E-10.061

(3) EAA Reservoir
(d) Consider deletion of the phrase "and will be used to maintain EAA canal levels" to avoid the appearance that the reservation rule is establishing an operating regime.

3.11.6 EAA Reservoir
Applicant's Handbook – no comment

Please contact Rebecca Elliott, at 850-688-5767 or by email at Rebecca.Elliott@fdacs.gov if you would like additional information or discussion.

August 27, 2020

Toni Edwards
Senior Scientist
Coastal Ecosystems Section
(comments submitted by email)

Dear Ms. Edwards:

Thank you for the opportunity to review the draft Everglades Agricultural Area (EAA) Reservoir reservations rule dated August 05, 2020. The comments in this letter clarify and expand on the previously submitted comments dated June 26, 2020. In summary, The Everglades Foundation makes the following two recommendations:

- Because the water identified both for the EAA Reservoir reservation and the amount specifically excluded from the reservation clearly depend on identification of the inflows from Lake Okeechobee and the local basin, the reservoir inflows need to be quantified and reserved.
- The Technical supporting documentation should include operational rules that result in the reservation quantified in Figure 3-7.

The following discussion more specifically addresses these two recommendations.

One of the comments in our letter of June 26, 2020 focused the importance of the inflows to the reservoir in ensuring that the reserved water is delivered. The draft Kissimmee River water reservation proposes to reserve water not only in the Kissimmee River and floodplain, but also the Upper Chain of Lakes, the Headwaters Revitalization Lakes, and the surface and groundwater system contributing to those waterbodies. The accompanying technical document explains the rationale: "*The surface water inflows from these contributing waterbodies are integral to maintaining the hydrologic regime of the reservation waterbodies to ensure the*

18001 Old Cutler Road Suite 625 Palmetto Bay FL 33157
email: info@evergladesfoundation.org tel: 305-251-0001 fax: 305-251-0039 website: evergladesfoundation.org

protection of fish and wildlife."[1] The proposed reservation is, therefore, incomplete without recognizing and accounting for the reservoirs inflows, as those inflows are integral to maintaining the flows that were demonstrated to protect fish and wildlife in the July 28, 2020 draft technical document.

The sources of water for the EAA Reservoir of water are (a) Lake Okeechobee (b) local basin run-off, both quantified by the Regional Simulation Model-Basin (RSMBN). One can get an idea of the importance of each by looking at the direct source of inflows to the reservoir, shown in Figure 1. The average value of flow from Lake Okeechobee into the reservoir is about 250,000 acre-ft per year, a substantial fraction of the total flow into the reservoir. If one examines flows from Lake Okeechobee southward into the EAA (shown in Figure 2), there are important environmental deliveries made from the Lake, including regulatory releases from Lake Okeechobee and environmental water supply to the Everglades. In the RSMBN model, some of these flows went directly to the STAs, but in the DMSTA model, the EAA Reservoir was incorporated into the treatment train. Therefore, both types of deliveries are included in the proposed reservation, and each of these is integral to maintaining the hydrologic regime of the reservoir, thereby ensuring the protection of fish and wildlife.

The 40E-10.061(3)(d) reference to the EAA Reservoir releases through S-628 also relies on Lake Okeechobee deliveries. A simple numerical experiment whereby these agricultural water supply deliveries are turned off will show a corresponding increase in Lake deliveries for agricultural water supply (Figure 3) and a corresponding decrease in releases for environmental deliveries (Figure 4 a & b) from Lake Okeechobee. Moreover, as shown in Table 1, there is no change in deliveries from the EAA reservoir to the Everglades. This suggests that the water identified as not reserved in 40E-10.061(3)(d) also relies on Lake Okeechobee deliveries. That is, the total water from Lake Okeechobee does not change but merely shifts in allocation. Therefore, if Lake Okeechobee and local basin inflows are not accounted for in the reservation, there exists the real possibility that water currently going to the Everglades will be reduced by diversions for agricultural water supply.

The specific amounts of water from the Lake to the EAA reservoir are complicated by the fact that, in the RSMBN model the sources and purpose (e.g., flood control, environmental water supply, urban water supply, agricultural water supply, etc.) are explicitly tracked, the reservation in the proposed rule is modified by the Dynamic Model for Stormwater Treatment Areas (DMSTA). Water sent directly from the Lake to the STAs in the RSMBN model is routed differently in the DMSTA model. The proposed rule fairly and accurately accounts for the flows that DMSTA sends from the STAs to the EAA Reservoir because DMSTA includes the reservoir in the treatment train. This includes local basin run-off and Lake water, as DMSTA does not keep track of the source of the inflows. Therefore, water from Lake Okeechobee sent south directly to the STAs for the environment is included in the Figure 3-7 of the draft rule. Moreover, it also true that some, but not all, of the local basin run-off is also included in Figure 3-7.

[1] South Florida Water Management District, *Technical Documentation to Support Water Reservations for the Kissimmee River and Chain of Lakes*, Dr aft Report dated April 2020, lines 548-549.

For these reasons, the water identified both for the reservation, and the amount specifically excluded from the reservation, clearly depend on identification of the inflows from Lake Okeechobee and the local basin. The reservoir inflows need to be quantified and included.

The use of DMSTA in the quantification of the water to be reserved does introduce a complication that potentially complicates compliance. In past reservations, there is an assumption that operation of the water control features in a manner consistent with the quantification of the reservation is sufficient to assure compliance, which is entirely reasonable. However, DMSTA and the RSMBN model operate the EAA reservoir differently. Since Figure 3-7 is a hybrid calculation using results from both models, it is not clear what operations of the EAA Reservoir result in the quantities identified in the reservation. Therefore, the technical supporting documentation should include operational rules that result in the reservation quantified in Figure 3-7.

Thank you for the opportunity to comment on the EAA reservoir water reservations process. The transparency of your analyses and clarity of the documentation and presentations are noted and deeply appreciated.

Sincerely,

Signature Redacted

Thomas Van Lent, Ph.D.
The Everglades Foundation

Cc: Dr. Melodie Naja
Eric Eikenberg
Shannon Estenoz
Anna Upton

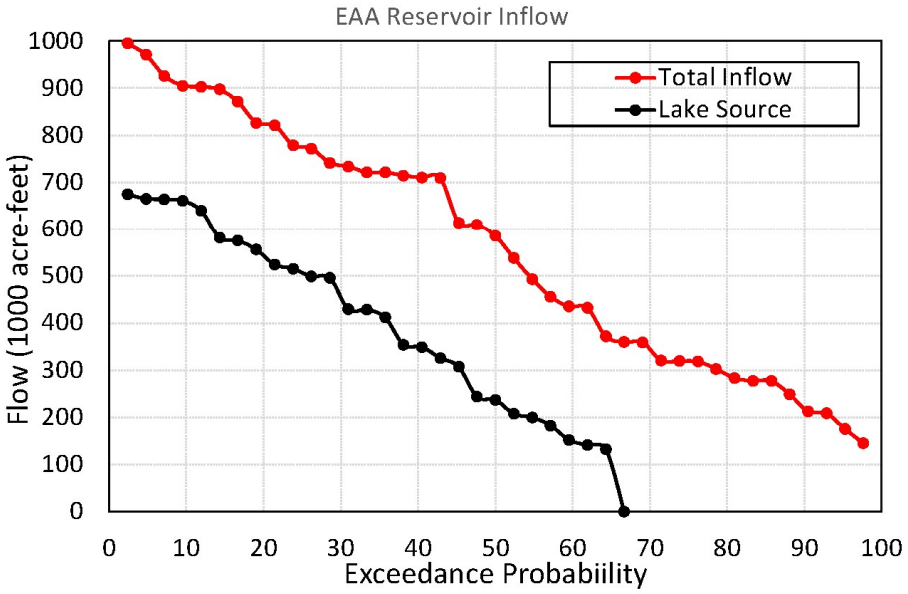


Figure 1. Annual volume probabilities for inflows to the EAA reservoir and from Lake Okeechobee.

4

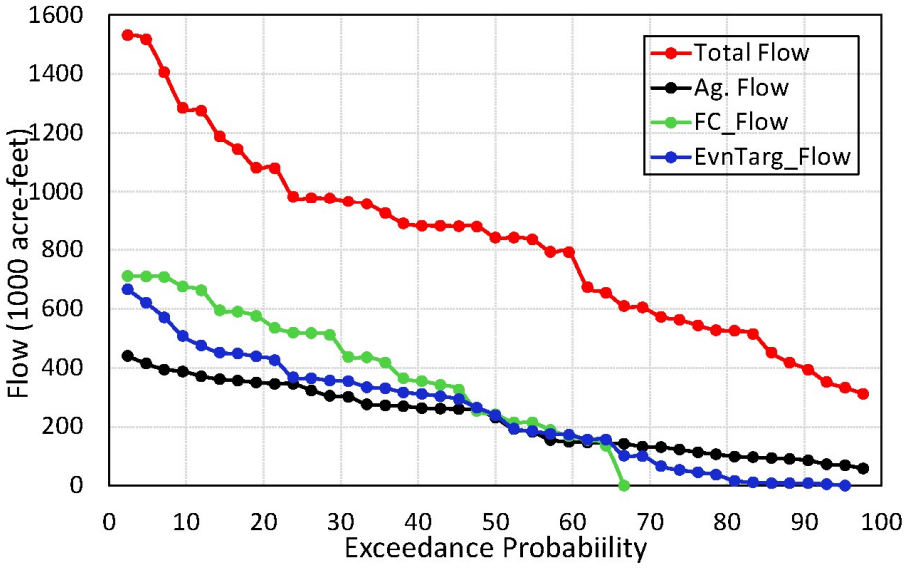


Figure 2. Annual flow volumes from Lake Okeechobee through from S-351, S-352, and S-354 by purpose.

5

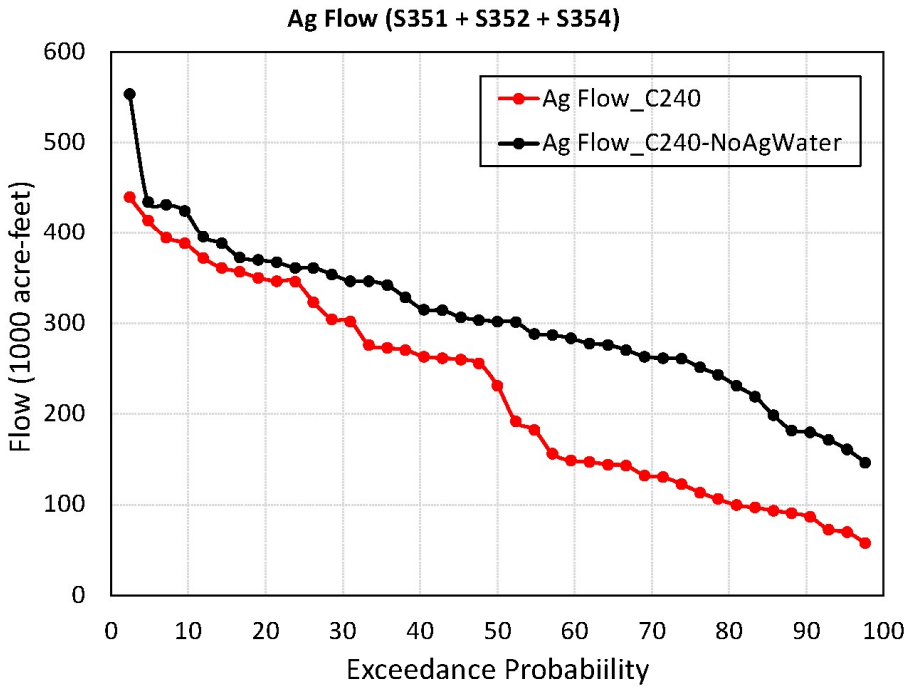


Figure 3. Lake Okeechobee deliveries through S-351+S-352+S-354 with and without S-628 agricultural water supply.

6

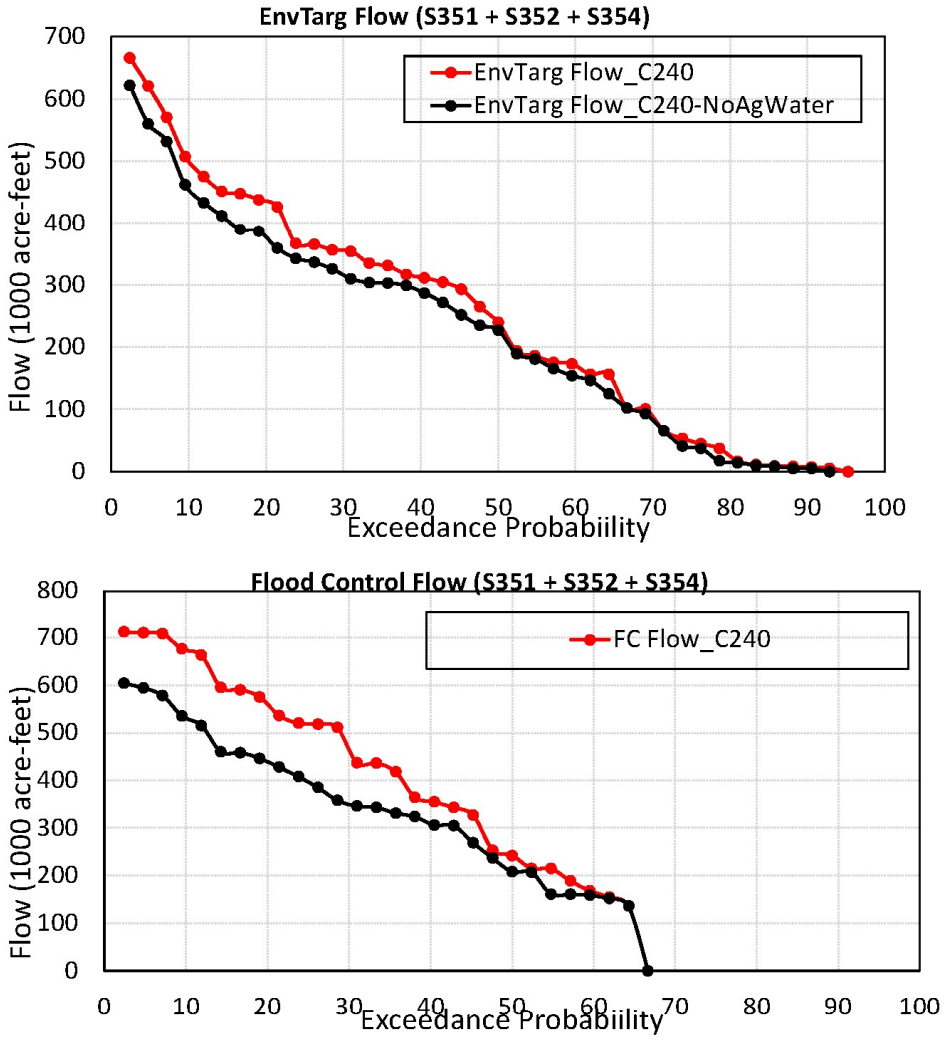


Figure 4. Annual Volumes from S351+S352+S354 to Environmental Water Supply and Lake regulatory releases to the Everglades.

7

Table 1. Average Annual Flows with and Without S-628 deliveries, in 1000 acre-ft per year

Structure	C240 with S-628 Flows	C240 without S-628 Flows
S351	303.0	312.9
S352	88.4	88.3
S354	435.3	427.7
Total	826.7	829.0
Redline Flows	1819.4	1822.5

GUNSTER
FLORIDA'S LAW FIRM FOR BUSINESS

Writer's Direct Dial: (561) 650-0555
Writer's E-Mail Address: eross@gunster.com

August 27, 2020

VIA E-MAIL ONLY: TEDWARDS@SFWMD.GOV AND DMEDELLI@SFWMD.GOV

Mr. Don Medellin
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

and

Ms. Toni Edwards
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: U.S. Sugar's Comments on the South Florida Water Management District's August 5, 2020 Draft Rule regarding the Everglades Agricultural Area Reservoir Water Reservation

Dear Mr. Medellin and Ms. Edwards:

This firm represents United States Sugar Corporation ("U.S. Sugar"), an interested stakeholder in the Comprehensive Everglades Restoration Plan ("CERP"), as well as the interrelated management of Lake Okeechobee ("Lake"). The Everglades Agricultural Area Reservoir Project ("EAA Reservoir Project") is of key import to U.S. Sugar since its operation will directly influence our client's farmlands and water supply sources. This letter adds to our prior comments; moreover, U.S. Sugar joins in with comments submitted by Florida Crystals Corporation and other water users expressing related interests.

Support for the EAA Reservoir Project and Reservation. U.S. Sugar supports the EAA Reservoir Project and its implementation, including adoption of its related water reservation rule. We submit these comments on the South Florida Water Management District's ("SFWMD") updated draft rules, dated August 5, 2020. Prior to submitting this letter, we advised members of SFWMD staff to expect these comments. With the accelerated timeframe and the uniqueness of this prospective reservation rule process, we list some of the items that we think can improve the final rule when it is ready for adoption.

Timing of Reservoir Construction and Rule Schedule. SFWMD staff has stated that the rule development schedule was geared toward enabling execution of the EAA Reservoir Project's Project Partnership Agreement in May 2021, with Corps EAA Reservoir construction beginning in the fall of 2021. However, the Corps' May 2020 EAA Reservoir Project Final Environmental Impact Statement ("EIS") indicates: "3(e) Water quality compliance – Further clarification has been made that this project will not be cost-shared until restoration strategies is complete and meeting state standards." (at 3-17) We are not sure how to reconcile the need to sign a PPA next spring with this language. Please clarify this situation.

Restoration of the MFL and water supply. SFWMD's Technical Document to support the reservation is predicated on the current Lake Okeechobee regulation schedule, LORS08, which will not be in place when the reservoir is completed. SFWMD expressed concerns about LORS08 at the time of its adoption and received Corps' assurances LORS08 would be a temporary regulation schedule, lasting 3 years, and restoration of state water rights and the lake's minimum level performance would occur as soon as possible, even as Herbert Hoover Dike (HHD) repairs were incrementally accomplished. While the Savings Clause has become a controversial topic during discussions of the LOSOM, all agencies have confirmed that it applies when CERP projects are brought on line and must be accomplished in accord with state and federal laws. The EAA reservoir clearly is covered by this which means the analysis to reserve water for fish and wildlife should underscore the prospective nature of the current analysis and anticipated update, including acknowledging the volume necessary for the Savings Clause commitment.

Completion of the HHD. The repaired HHD provides the District and Corps with the opportunity to operate the lake to recover storage, the lake MFL and water supply in the immediate future. These infrastructure additions are capable of recovering performance immediately upon LOSOM implementation in 2022, well before EAA Reservoir Project construction completion. It seems to us that SFWMD should consider how to address both the lake minimum level violation and existing legal user status in relation to Florida laws and EAA Reservoir Project commitments.

The PPA with the Corps. When the EAA Reservoir Project was authorized, FDEP's Final Order stated that: "The Corps and the District will undertake updated project assurances and savings clause analyses for the implementation phases that are selected to be included in a Project Partnership Agreement (PPA) or amendment thereto prior to entering into the PPA or PPA amendment." Since the EAA Reservoir Project is being selected for inclusion in a PPA, it appears the need for an updated analysis is upon us and an opportunity to set definitive parameters for recovered MFL and water supply performance, per Florida law, exists.

State Legal Requirements. By virtue of adopting a state reservation rule per section 373.223, F.S., certain conclusions are made, most especially that existing legal uses have been protected. Simply because this reservation rule is prospective does not eliminate the need to demonstrate satisfaction of the statutory requirement. In fact, many CERP laws and FDEP Final Orders, based on SFWMD Resolutions, for the EAA Reservoir Project as well as the overarching Central Everglades Planning Project have similar, continuing requirements. These all reflect the Legislature's stated intent – that the water management districts are responsible for assuring sustainable water supplies for all present and projected uses in amounts sufficient to avoid the adverse effects of competition, and that environmental restoration and/or MFL solutions, are to occur via new projects, not by taking water from existing water users. To expedite project implementation SFWMD should make sure the prospective reservation rule assures compliance with these legal requirements. Such a position will also minimize risk of adverse economic impacts and set operation of south Florida's water management system toward assuring sustainable water availability for people and the environment, particularly as we face sea level rise. Not only is diminishment of existing legal user water rights prohibited, but release of CERP project funding is predicated on compliance with state law. The additional time made available by the Corps' EAA Reservoir Project scheduling provides SFWMD with the time to clarify the reservation rule assurance of future water availability for the EAA Reservoir Project.

The Prospective Nature of the Proposed Rule. The EAA Reservoir Reservation rule must take special care to fully explain the prospective nature of the rule, the CERP infrastructure status and the firm commitment to fulfilling the above legal requirements. The EAA Reservoir Project is designed to store and, thereby, create "new" water for its authorized purposes which include providing water to both the environment and water users. During EAA Reservoir construction, the Corps will develop a post-LOSOM lake regulation schedule, to integrate this new infrastructure into the C&SF Project's operation.

Again, we are supportive of the EAA Reservoir Project and Reservation rule. We are confident solutions exist for the above topics such that SFWMD can accomplish rule adoption in a manner that fulfills all aspects of the CERP program.

Thank you for the opportunity to comment.

Sincerely,

Signature Redacted

Elizabeth D. Ross

cc: Client

County Administration
P.O. Box 1989
West Palm Beach, FL 33402-1989
(561) 355-2030
FAX: (561) 355-3982
www.pbcgov.com

Palm Beach County Board of County Commissioners

Dave Kerner, Mayor
Robert S. Weinroth, Vice Mayor
Hal R. Valeche
Gregg K. Weiss
Mary Lou Berger
Melissa McKinlay
Mack Bernard

County Administrator

Verdenia C. Baker

"An Equal Opportunity Affirmative Action Employer"

Official Electronic Letterhead

August 27, 2020

Via Email: tedwards@sfwmd.gov

Toni Edwards
Senior Scientist, Applied Sciences Bureau
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

Dear Ms. Edwards,

Subject: **Palm Beach County Comments on the Everglades Agricultural Area Reservoir Water Reservation**

Thank you for the opportunity to comment on the subject document related to an important Comprehensive Everglades Restoration Plan (CERP) project. Palm Beach County (County) supports the proposed Everglades Agricultural Area (EAA) Reservoir project and other state and federal efforts to restore ecosystems throughout the Central and Southern Florida (C&SF) project's water management system. The County, like many South Florida governments, relies on the C&SF system to protect its citizens from flooding and to protect public water supply from depletion and salt water intrusion.

While written South Florida Water Management District (SFWMD) responses to verbal public comments received at the July 14, 2020 rule development workshop have been provided, the July 28, 2020 version of the Technical Document to Support the Central Everglades Planning Project EAA Reservoir Water Reservation does not provide responses to written comments received on the previous draft EAA Reservoir Water Reservation Technical Document.

Below are Palm Beach County questions or concerns:

1. The regional modeling used to prepare the Draft Technical Document to support the EAA A-2 Reservoir water reservation assumed the 2008 Lake Okeechobee Regulation Schedule (LORS2008). As such, the results of the technical analysis are integral to and dependent on Lake Okeechobee operations consistent with LORS2008. Yet LORS2008 is expected to be superseded by a new operating schedule (i.e. LOSOM) by 2022 and the EAA A-2 Reservoir is not expected to be constructed until 2027 at the earliest. These facts introduce additional questions on the appropriateness and validity of the technical analysis and leads to the belief that the proposed water reservation may be premature.

2. The relationship between the technical analysis, the subsequent water reservation rule and LOSOM is not clear. Please explain how LOSOM will affect the information in the Draft Technical Document, the subsequent water reservation rule and the timeline for rule development?
3. Due to the lack of an operational plan for the EAA A-2 Reservoir that aligns with the information provided in the Draft Technical Document, it is not clear if and how the multi-purpose operations of the EAA A-2 Reservoir, as envisioned in CERP, will occur.
4. Due to the lack of an operational plan for the EAA A-2 Reservoir, there is a large amount of uncertainty regarding project operations that could result in undocumented effects to the environment and water supply reliability.
5. Per the Draft Technical Document, releases from the EAA A-2 Reservoir via Structure S-628 to the Miami and North New River Canals may occur periodically and are not reserved for fish and wildlife. If actual EAA A-2 Reservoir operations result in little to no releases from S-628, what assurances do existing and future permitted users have that their water supply reliability will not be impacted?
6. It is not clear if and how the EAA A-2 Reservoir reduces the likelihood of water shortage conditions in South Florida that have resulted from implementation of LORS2008, which was intended to be temporary and was implemented to reduce Herbert Hoover Dike failure risk, or if and how the EAA A-2 Reservoir increases the likelihood of meeting water supply requirements for existing permitted users. How does SFWMD intend to meet their legal obligation to protect existing legal users and provide for other water related needs now and in the future?

The County will continue to monitor the EAA Reservoir water reservation rule development process and looks forward to receiving additional information to assist in increasing the understanding of the technical basis for the water reservation.

Sincerely,

Signature Redacted

Jeremy McBryan, PE, CFM
County Water Resources Manager

cc: Don Medellin, South Florida Water Management District
Patrick Rutter, Assistant County Administrator
Deb Drum, Director, Environmental Resources Management, Palm Beach County

WEST PALM BEACH
Mayor's Office

Keith A. James
Mayor

August 27, 2020

VIA EMAIL
tedwards@sfwmd.gov

Toni Edwards
Senior Scientist
Applied Sciences Bureau/Coastal Ecosystems Section
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406

RE: City of West Palm Beach
EAA Reservoir Reservation Rulemaking Comments

Dear Ms. Edwards,

The City of West Palm Beach respectfully submits the following comments in response to the South Florida Water Management District's (SFWMD) ongoing rulemaking efforts for the adoption of a water reservation for the Everglades Agricultural Area (EAA) Reservoir.

The City is the largest municipality in Palm Beach County with more than 110,000 residents. The City also operates a public water supply system that provides clean, safe, and cost-effective potable water to approximately 150,000 residents of the City, the Town of Palm Beach, and the Town of South Palm Beach. The City is dedicated to ensuring that its water supply will be protected from environmental harm. Additionally, the City is committed to protecting environmentally sensitive features. The City utilizes a portion of its permitted water supply to maintain water stages in Grassy Waters Preserve to preserve this unique remnant of the Everglades. Grassy Waters Preserve is an ecologically critical wetland habitat for various threatened and endangered species including the endangered Everglades Snail Kite. The City is also the principal source of water supply during the dry season to maintain the Minimum Flows and Levels (MFL) established by SFWMD for the Northwest Fork of the Loxahatchee River, a federally designated Wild and Scenic River.

In order to ensure a safe, reliable, and environmentally sustainable water supply source remains available for the public and for the environment, the City directly relies upon surface water from the Central and Southern Florida Project (C&SF Project). Given that this water supply is so essential to the City, both from a public health and safety and environmental perspective, we must remain vigilant when there is uncertainty regarding when and in what quantity water will be made available through the regional system. The City supports projects like the EAA Reservoir Project and other Comprehensive Everglades Restoration Plan (CERP) projects that are intended to restore the Everglades and increase water supply for municipal and other water needs. It is in the context

401 CLEMATIS STREET
P.O. BOX 3366
WEST PALM BEACH, FL 33402
561.822.1400

of addressing these concerns, that we offer the following comments regarding the draft rule language and technical documentation for the EAA Reservoir water reservation.

The draft rule would reserve "all surface water released, via operation, from the EAA Reservoir that is directed to the Lower East Coast Everglades Waterbodies through Structures S-624, S-625, and S 626…" It is difficult, if not impossible, for stakeholders to evaluate the practical effect of this proposed reservation. First, the reservation language itself does not provide a specific quantity of water that is reserved. Section 373.223(4), Florida Statutes, which governs the establishment of water reservations, provides that SFWMD "may reserve from use by permit applicants, water **in such locations and quantities, and for such seasons of the year**, as in its judgment may be required **for the protection of fish and wildlife or the public health and safety**." The proposed reservation does not specify a specific quantity of water, and since it purports to reserve water from a reservoir which has not been constructed, which will capture and release unknown quantities of water, and for which an operation plan has not been established, the proposed reservation does not appear to meet this legal requirement.

The importance of this issue is highlighted by another statutory provision. Namely, Section 373.223(4) provides, "…all presently existing legal uses of water shall be protected so long as such use is not contrary to the public interest." According to this provision, a water reservation may not reserve the quantity of water required for all presently existing legal uses. However, if the water reservation does not identify the quantity of water that is being reserved from this project, it is impossible for the District to carry out its statutory obligation to protect the current existing legal users of the C&SF Project from the proposed reservation. Thus, existing legal users like the City are left in the dark as to status of their permitted allocation. This is a critical flaw that can only be solved by quantifying the reservation so that the City and other legal users will know that their water rights are protected.

There is not only significant uncertainty regarding the actual quantities and timing of water availability and operation of the EAA Reservoir, but also additional uncertainty regarding the timing and quantity of water availability throughout the C&SF, in significant part due to uncertainty regarding the future operation of Lake Okeechobee. As you know, Lake Okeechobee is currently operating under the LORS 2008 operating schedule. LORS 2008 itself was intended to be an interim operating schedule to facilitate necessary repairs to the Herbert Hoover Dike. The U.S. Army Corps of Engineers (Corps) is currently developing a revised Lake Okeechobee operating schedule, LOSOM, which would not take effect until 2022 or later. The new operating schedule that will result from the LOSOM development process will almost certainly have significant implications for the way the EAA Reservoir itself may be operated. Given these layers of unknowns, the City is concerned that adopting the reservation as currently proposed could have unintended or unanticipated consequences by the time the EAA Reservoir is constructed and operational.

There are also multiple hurdles that must be overcome for the EAA Reservoir to be funded, designed, constructed, and begin operations. It is unknown when each of these steps will occur, and at this point there is no guarantee the reservoir will be constructed, or if it will ultimately take the form in which it is currently anticipated. Given all the uncertainties involved, we request that any reservation rule language incorporate a provision requiring that the reservation rule sunset

within 5 years of adoption so that it may be reevaluated and readopted when more concrete information is available. This would provide assurance that prior to actual operation of the EAA Reservoir, a proper evaluation of its impacts and the quantity and timing of any water reservation can be performed by SFWMD and other stakeholders.

We are also concerned that the reservation as proposed does not appear to take into account the objectives of CERP and the project purpose of the EAA Reservoir. When CERP was authorized in the Water Resources Development Act (WRDA) of 2000, it was intended to both restore the Everglades ecosystem and provide for South Florida's water supply and flood protection needs. Likewise, the EAA Reservoir Project's purpose is to improve water supply for users and to improve deliveries of water for the natural system. Despite these requirements, it appears the Project as contemplated by the reservation would only reserve water for protection of fish and wildlife, without consideration of making additional water available for supply purposes as contemplated by WRDA 2000 and the authorization for the EAA Reservoir. As explained above, Section 373.223(4), Florida Statutes provides that water reservations serve a dual purpose of protection of fish and wildlife and protection of public health and safety. Given that water from the C&SF system is a critical lifeline for the people of Southeast Florida, and particularly the City, in assuring that sufficient water supplies are available for the health and safety of its citizens and customers in the region, the reservation must identify the quantity of water reserved for fish and wildlife and the quantity of water reserved for public health and safety through public supply.

The reservation analysis also does not appear to take into account potentially detrimental impacts to fish and wildlife in other areas as a result of the proposed reservation. As explained above, the City operates its water supply system in part to provide water to help meet the MFL established by SFWMD for the protection of the Northwest Fork of the Loxahatchee River and to protect Grassy Waters Preserve. Depending on the operation of the regional system and the EAA Reservoir, the proposed reservation could have unintended adverse impacts on the ability to provide protection of other critical environmental resources, like the Loxahatchee River.

It is also critical to assure that a proper Savings Clause analysis is performed in support of the reservation. Under WRDA 2000, the objective of providing for water supply is addressed in part through the Savings Clause requirement of Section 601(h)(5), which requires all existing legal users of water be protected:

> Until a new source of water supply of comparable quantity and quality as that available on the date of enactment of this Act is available to replace the water to be lost as a result of implementation of the Plan, the Secretary and the non-Federal sponsor shall not eliminate or transfer existing legal sources of water, including those for … urban water supply.

Florida law likewise requires SFWMD as the local sponsor of CERP projects to assure "that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users." § 373.1501(5)(d), Fla. Stat. Though we understand that an analysis of water supply availability was previously performed in association with the prior Post Authorization Change Report and Environmental Impact Statement prepared regarding the EAA Reservoir, given the uncertainty regarding future operation of the

C&SF Project and the requirements of the Savings Clause, it is important that any analysis of potential impact to existing legal users be done in a manner which is based on the existing legal use baseline established in WRDA 2000 and Section 373.1501(5)(d), and consider the most up to date information regarding potential impacts on water supply. However, it appears that the prior analysis was performed based on the LORS 2008 operating schedule, which will no longer be in effect by the time the EAA Reservoir would be operational, and not on the year 2000 baseline established in WRDA 2000. We would request that SFWMD conduct a proper Savings Clause analysis prior to adoption of any reservation.

In support of these comments, the City has retained GMAwater, LLC to conduct a technical review of the materials and analysis released by SFWMD concerning the proposed reservation. A technical memorandum prepared by GMAwater summarizing its evaluation is attached for your consideration.

Thank you for your consideration of these comments, and we look forward to working with you on this critical issue.

Sincerely,

Signature Redacted

Keith A. James
Mayor
City of West Palm Beach

cc: Poonam K. Kalkat, Director of Public Utilities

GMAwater
water resource and environmental consultants

Technical Memorandum

Date: August 27, 2020
By: Kyle D. Grandusky, P.E.
Subject: Technical Review of Proposed Water Reservation for EAA Reservoir

The office of GMAwater, LLC has been retained by the City of West Palm Beach to perform a limited review of the technical documents supporting the proposed water reservation rule for the EAA Reservoir. Specifically, the review focused on the hydrologic modeling and associated analyses made to estimate the average annual quantity of water that could be included in the proposed water reservation. Our review resulted in the following comments:

1. The draft rule language dated 8/5/2020 made available for review for 40E-10.061(3)(a), FAC states, *"All surface water released, via operation, from the EAA Reservoir that is directed to the Lower East Coast Everglades Waterbodies through Structures S-624, S-625, and S-626 (see Figure 3-6) is reserved from allocation. Model simulations of the EAA Reservoir, together with existing and planned infrastructure, and* ***a modified Lake Okeechobee schedule****, indicate the EAA Reservoir could convey 825,000 acre-feet of surface water on an average annual basis (see Figure 3-7)."* (bold emphasis added)

   Upon review of the TECHNICAL DOCUMENT TO SUPPORT THE CENTRAL EVERGLADES PLANNING PROJECT EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION, Draft report dated 7/28/2020, by SFWMD (TECHNICAL DOCUMENT), there is no discussion of how "a modified Lake Okeechobee schedule" has been taken into consideration in the hydrologic modeling, or otherwise in any analysis of the potential average annual volume of 825,000 acre-feet that could be released from the reservoir and included in the proposed water reservation. Clarification is needed from SFWMD as to what is meant by this. Does it refer to the future operation schedule that will result from the current/ongoing Lake Okeechobee System Operation Manual (LOSOM) planning project? Or does it refer to the underlying hydrologic modeling assumptions for Lake Okeechobee operations in the simulations for the EAA Reservoir?

   Note, the TECHNICAL DOCUMENT indicates the average annual quantity is based on the results of the Regional Simulation Model (RSM) Alternative C240 completed in 2018 for the Central Everglades Planning Project Post Authorization Change Report (CEPP PACR). The existing conditions baseline model utilizes the LORS08 operational schedule, and the future with EAA Reservoir model utilizes a modified version of LORS08 that promotes Lake Okeechobee discharges to the south.

2. It appears that no new or additional hydrologic modeling was completed for the proposed water reservation. As noted above, the 2018 CEPP PACR modeling is the basis for estimating

the potential average annual quantity of 825,000 acre-feet. The TECHNICAL DOCUMENT contains a very limited description of how the average annual volume and corresponding volume probability curve is calculated. Upon request to SFWMD staff for additional information on the probability calculations, an excel spreadsheet (file name: EAA_Reservoir_Reservation_30Apr2020.xlsx) was provided for my review. From the spreadsheet "Readme" information, it appears the RSM operational assumptions for the EAA Reservoir are configured to first send inflows to STA 2 and STA 3/4 from the Miami and North New River Canals if the STA has capacity to receive direct canal inflows, and the EAA Reservoir is effectively bypassed. Under these assumptions, the RSM predicts an average annual outflow from the EAA Reservoir of only about 471,000 acre-feet, which is well below the 825,000 acre-feet identified by the proposed reservation. SWFMD utilized a second model known as 'DMSTA' used in conjunction with the RSM to evaluate the water quality performance of the STAs. The DMSTA model assumes most of the STA inflows are first routed through the EAA Reservoir and/or A-1 FEB prior to entering the STAs. The spreadsheet attempts to reconcile the operational differences of the two models, and make an estimate of how much flow passes through the EAA Reservoir. I have the following comments on the this spreadsheet analysis:

a. This spreadsheet analysis and a thorough explanation of the underlying assumptions should be made part of the record for the proposed water reservation rule, and be included as part of the TECHNICAL DOCUMENT. A public workshop explaining the analysis should be held and an opportunity/additional time to provide comments on this analysis should be provided.
b. Daily flow time series of the RSM (Alternative C240) and the DMSTA model output data results are included in the spreadsheet for select structures as deemed important by the author of the spreadsheet. The analysis concludes a *reconciled* (my terminology) average annual EAA Reservoir Release volume of 825,000 acre-feet. The figure showing the DMSTA model configuration and average annual flows & TP loads provided on sheet 'A1 Flow DMSTA' appears to show an average annual flow from the EAA Reservoir to the STAs of 387,000 acre-feet and from the A-1 FEB to the STAs of 544,000 acre-feet. When combined, assuming all flows will first be routed through the EAA Reservoir, the total is 931,000 acre-feet. SFWMD should explain why the totals are apart by more than 100,000 acre-feet (825,000 vs. 931,000).
c. The DMSTA figure shows additional direct inflows from the Miami and North New River Canals of 88,000 and 149,000 acre-feet annually. If operated this way in actual practice, do these flows need to be part of the proposed water reservation?
d. This spreadsheet analysis appears to lack a true mass balance/ daily routing analysis of the EAA Reservoir showing that the full 825,000 acre-feet can be captured an released by reservoir on an average annual basis, and that it's not already full at certain times when this spreadsheet assumes it will take additional water from the Miami and North new River Canals. SFWMD should include a routing analysis for these assumed operations to demonstrate the estimated probability release curve is accurate/realistic.



4500 Biscayne Blvd., Suite 350
Miami, FL 33137
305-371-6399
fl.audubon.org

August 27, 2020

Toni Edwards
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

Via Email: tedwards@sfwmd.gov

Re: EAA Reservoir Water Reservation

Dear Ms. Edwards,

Audubon Florida writes in support of developing and adopting a water reservation for the Everglades Agricultural Area Reservoir for the protection of fish and wildlife in the Central Everglades, substantially in the form described in the Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation Draft Report dated July 28. 2020 (Draft Technical Document). The EAA Reservoir is a critical component of the CEPP and will increase freshwater flows to Everglades National Park and Florida Bay while reducing harmful discharges to the Caloosahatchee and St. Lucie estuaries (collectively referred to as the Northern Estuaries). The Comprehensive Everglades Restoration Plan (CERP) requires protection of water for natural systems and the reservation is a prerequisite to the South Florida Water Management District (District) entering into a Project Partnership Agreement with the U.S. Army Corps of Engineers (Corps) to ensure federal cost sharing for EAA Reservoir construction and operations. Construction of the EAA Reservoir has been identified as a high priority for Governor DeSantis and the District. Adopting the reservation in a timely manner will allow the District and the Corps to continue efforts to expedite construction of this important project so that the hydrologic benefits can be realized.

The Draft Technical Document points out that the proposed water reservation is prospective. Although the rule is anticipated to be become effective in December 2020, water from the EAA Reservoir will not be available until the reservoir is fully constructed and certified for operations by the District's Board of Governors. Moreover, the rule is subject to reviews at least every 5 years. Therefore, while we acknowledge there are uncertainties regarding the water reservation and rules that will need further development, Audubon encourages the District to adopt this reservation now with the intention to revisit and modify the reservation rules as new data become available through the reservoir pre-construction design phase and as the new Lake Okeechobee System Operating Manual is implemented.

The EAA Reservoir is being constructed to capture EAA runoff and some of the regulatory releases from Lake Okeechobee that are discharged to the Northern Estuaries. The Draft Technical Document and water reservation rules identify the reservoir as the "Reservation Waterbody" and propose to reserve from

consumptive uses all surface water released via operation from the EAA Reservoir structures S-624, S-625, and S-626. District modeling simulations estimate that the EAA Reservoir ***could*** convey up to 825,000 acre feet on an average annual basis to existing STA's, EAA S-2 STA and the A-1 FEB as a result of the reservoir filling and emptying multiple times throughout the year. The 825,000 average annual acre feet is described as 370,000 acre feet on an average annual basis made available by the reservoir in addition to existing flows to the Everglades.[1] It is not clear from the Draft Technical Document or proposed rules whether 825,000 acre feet is the actual amount of the water reservation. Differentiating between existing and increased and reserved volumes is important given that the anticipated ecological benefits are based on that amount of outflow from the designated S structures. What is also unclear is how water from Lake Okeechobee, which appears to be a significant upstream contributing waterbody to the reservoir, will be preserved to ensure sufficient inflows to the reservoir to meet the water reservation. The proposed Kissimmee River water reservation protects water in contributing waterbodies and in this case the Lake is a contributing waterbody, but no similar protection or provision for Lake water is apparent. The document should include more information on this relationship.

The Draft Technical Document further notes that an estimated 82,000 acre feet of water on an average annual basis could be discharged from the reservoir through the S-628 structure to the EAA through the Miami and/or North New River canals for supplemental irrigation which is not reserved for fish and wildlife. The District should elaborate on the decision to carve out a supply of water from the EAA Reservoir for supplemental irrigation when the Corps Savings Clause analysis of the reservoir confirmed that existing legal sources of water supply will not be transferred. The District should also provide assurances that water is not released to the EAA, even though it is not included in the reservation, if doing so would jeopardize meeting the 825,000 acre feet needed for fish and wildlife. The District would condition the discharges to the EAA on the reservoir stage exceeding 8.2 feet and the Miami and/or North New River canals being below their maintenance stages. However, the proposed rules do not contain these stipulations and we urge the District to include these important limiting conditions in the proposed rules.

While more detail is needed, we conclude the Draft Technical Document and proposed rules fulfill the legal prerequisite for the District and the Corps to enter into a Project Partnership Agreement and will allow design and construction of the EAA Reservoir to move forward as expeditiously as possible. They also provide a sound basis for protecting fish and wildlife in the Central Everglades. Audubon encourages the District to continue to identify measures to further benefit the key indicator species identified in Table 4-2 in the Draft Technical Document, especially the endangered Wood Stork and Roseate Spoonbill.

Thank you for the opportunity to comment.

Sincerely,



Doug Gaston
Northern Everglades Policy Analyst

[1] See, for example, District staff responses to public comments 3 and 5 in Appendix C to the Draft Technical Document.

CARLTON FIELDS

ATTORNEYS AT LAW

Miami Tower
100 S.E. Second Street | Suite 4200
Miami, Florida 33131-2113
P.O. Box 019101 | Miami, Florida 33101-9101
305.530.0050 | fax 305.530.0055
www.carltonfields.com

Atlanta
Florham Park
Hartford
Los Angeles
Miami
New York
Orlando
Tallahassee
Tampa
Washington, D.C.
West Palm Beach

Neal McAliley
Shareholder
(305) 530-4039 Direct Dial
nmcaliley@carltonfields.com

August 27, 2020

Ms. Toni Edwards
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, Florida 33406
tedwards@sfwmd.gov

Re: EAA Reservoir Water Reservation Rulemaking

Dear Ms. Edwards:

I am writing on behalf of Florida Crystals Corporation and its affiliates (including Okeelanta Corporation and New Hope Sugar Company) to provide comments on the South Florida Water Management District's ("SFWMD") proposed Water Reservation Rule for the EAA Reservoir. These comments supplement our previous comments, and we also join in the separate comments of U.S. Sugar Corporation and other urban and agricultural water users. Florida Crystals remains supportive of the EAA Reservoir, but there are still important questions about how it will be operated to provide environmental benefits and protect existing legal water users.

The rule proposed by the SFWMD states that it would reserve all surface water released from the EAA Reservoir through three water control structures. In our previous comments on the SFWMD's draft technical document, we pointed out that the SFWMD must identify an amount of water to be reserved. The proposed rule now states, "Model simulations of the EAA Reservoir, together with existing and planned infrastructure and a modified Lake Okeechobee schedule, indicate the EAA Reservoir could convey 825,000 acre-feet of surface water on an average annual basis." Draft Section 40E-10.061(3). We interpret this to mean that the rule would reserve 825,000 acre feet of water.

It is ambiguous which project features are the basis of the reservation. The proposed rule indicates that the reservation is for the "EAA Reservoir." Yet, the language quoted above suggests that the SFWMD is proposing to reserve water not just associated with the EAA Reservoir, but also water from other "planned infrastructure" and also a "modified Lake Okeechobee schedule." The rule does not identify the "planned infrastructure" or state how the Lake Okeechobee regulation schedule would be modified. It is unclear whether, how, and when the "planned infrastructure" and "modified Lake Okeechobee schedule" would be implemented. The U.S. Army Corps of Engineers is currently developing a revised regulation schedule for Lake Okeechobee, but it is still in the planning stages and no final schedule has been identified. We do not understand how the SFWMD can reserve water that may or may not be available

based on future projects and operational changes and which have not been fully designed, finalized or implemented. Therefore, it seems premature for the SFWMD to reserve water for such speculative future projects until their details are finalized.

The amount of water proposed to be reserved by the SFWMD in the current iteration of its draft rule bears little relationship to the planning for the EAA Reservoir. The SFWMD and Corps have indicated that the EAA Reservoir will deliver approximately 370,000 acre-feet of additional freshwater to the Everglades on an average annual basis. *See* Central and Southern Florida, Everglades Agricultural Area Reservoir and Stormwater Treatment Area, Final Environmental Impact Statement for SFWMD's Section 203 Study, at 3-25 (May 2020). Yet, the proposed rule would reserve 825,000 acre feet of water, more than double the amount of water modeled to be delivered by the EAA Reservoir. This raises several significant questions.

The proposed rule would reserve approximately 455,000 acre feet of water that currently is being provided by the Central and Southern Florida Project. The Comprehensive Everglades Restoration Plan ("CERP") was designed to improve environmental conditions by developing "new water" – essentially storing water that currently is lost to tide – and making that water available for environmental and other uses. By growing the proverbial water "pie," the SFWMD could reserve water for environmental use without fear that it might impact existing legal users. However, the proposed rule would essentially re-divide the pie by reserving half a million acre feet of water already in the system ("existing water"). This approach appears to be at odds with the concept behind CERP.

Florida law mandates that the SFWMD ensure that it is not impacting existing legal users when it makes the water reservation. Moreover, Florida's CERP – related law, section 373.1501(5)(d), Florida Statutes, provides that the SFWMD must "provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of project components so as to adversely impact existing legal users." We have seen no analysis of how this existing 455,000 acre feet of water is currently being used, or whether it is relied on by existing legal users such as urban water utilities with wellfields near the Everglades. The only analysis we have seen that addresses the protection of existing legal users was done for the 370,000 acre feet of incremental deliveries to be provided by the EAA Reservoir (the "new water"), regarding which we previously provided comments, not the 455,000 acre feet of "existing water" that also is covered by this proposed rule. An analysis of a significantly smaller quantity of water does not provide reasonable assurance that the proposed rule will protect existing legal users.

In addition, if in fact the EAA Reservoir and related projects will deliver an average of 825,000 acre feet of additional water to the Everglades, then there are major flaws in the planning for the reservoir. The Corps and SFWMD analyzed the environmental effects of the reservoir on the Everglades, Lake Okeechobee, and other water bodies based on modeling that it would deliver an additional 370,000 acre feet of water. If the SFWMD now believes that the reservoir will deliver more than twice that amount of water, then the agencies could not have accurately evaluated the environmental effect of the project. This suggests that the Corps must prepare a Supplemental Environmental Impact Statement before it moves forward, because there is either significant new information or there has been a substantial change in the project. It also suggests that any Savings Clause analysis conducted for the EAA Reservoir is invalid, because the agencies only analyzed the effects of sending an additional 370,000 acre feet to the Everglades, not 825,000 acre feet. Both federal and Florida law require the SFWMD to

demonstrate that its restoration actions will not eliminate existing legal sources of water, and no such demonstration has been conducted for this proposed rule. These are not inconsequential considerations.

Similarly, the Corps recently issued its final Environmental Impact Statement and Record of Decision for the EAA Reservoir Project. The Corps' authorization documents set several key parameters regarding construction and operation of the EAA Reservoir Project, including the project's relationship to Florida's infrastructure, which may also change to the project. It is unclear if the District plans to update its reservation rule analysis in light of the operational guidelines stated in the Record of Decision.

Another change to the understood project relates to the A-2 STA portion of the EAA Reservoir is currently under construction and expected to be operational in 2023. It would be helpful if staff could explain how SFWMD will be addressing Florida's reservation rule requirement as related to stand-alone operation of the A-2 STA.

The SFWMD needs to resolve these questions before it moves forward with the proposed rule. We support providing additional water to the Everglades consistent with the CERP, but the agency needs to do this in a transparent, straightforward and clear manner that ensures that no existing legal users will be affected.

Thank you for considering our comments. Florida Crystals looks forward to continuing to work with the SFWMD and Corps on this important project.

Sincerely,

Neal McAliley

Digitally signed by Neal McAliley
Date: 2020.08.27 20:34:18 -04'00'

Neal McAliley

APPENDIX F: EVERGLADES AGRICULTURAL AREA RESERVOIR WATER RESERVATION QUANTIFICATION DOCUMENTATION REPORT

OVERVIEW AND BASIS

The Everglades Agricultural Area (EAA) Reservoir project was an expedited planning effort undertaken as a component of the Comprehensive Everglades Restoration Plan (CERP). This project planning effort was led by the South Florida Water Management District (SFWMD) and sought to enhance the performance of the Central Everglades Planning Project (CEPP), which had been authorized by Congress. The project identified a 240,000-acre-foot (ac-ft) reservoir (EAA Reservoir) with multi-purpose operational flexibility, a 6,500-acre stormwater treatment area (STA), and conveyance improvements as part of the "C240" tentatively selected plan (EARC240 or TSP). Modeling support to the EAA Reservoir project effort was provided by a team of modelers from the Modeling Section of the SFWMD's Hydrology and Hydraulics Bureau. The CEPP Modeling Strategy document (SFWMD 2012a) describes the modeling process and tools used, the associated rationale of the selection process, and the means by which the tools could expediently support the project workflow. Given the EAA Reservoir project effort was being pursued as a change to an authorized CERP project, use of comparable modeling strategies and tools as those used in the development of the authorized CEPP plan was a guiding principle of EAA Reservoir project modeling work. The primary model support tools used in EAA Reservoir project refinement were as follows:

- Screening tool and water quality assessment:
  - Dynamic Model for Stormwater Treatment Areas (DMSTA)
- Detailed planning models:
  - Regional Simulation Model Basins (RSM-BN)
  - Regional Simulation Model Glades-LECSA (RSM-GL)

The primary modeling products of the EAA Reservoir project were evaluated based on outputs from the Regional Simulation Model (RSM; SFWMD 2005a,b). The RSM is a robust and complex regional scale model. Due to the model's scale, it often is necessary to implement abstractions of system infrastructure and operations that, 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 sometimes is 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).

As described in **Figure F-1**, the EAA Reservoir project modeling workflow strives for appropriate application of modeling tools (particularly DMSTA and RSM) for their intended use. It is neither efficient nor necessary to force intermediate modeling products to reflect a higher level of detail or consistency than is needed at that time for decision making. Along the modeling workflow, there are many opportunities for refinement. Intermediate products serve an immediate need and then are enhanced, incorporating feedback and information as the process progresses. Use of modeling results must be predicated on the intended use, and at times, information from multiple models or sources must be aggregated.

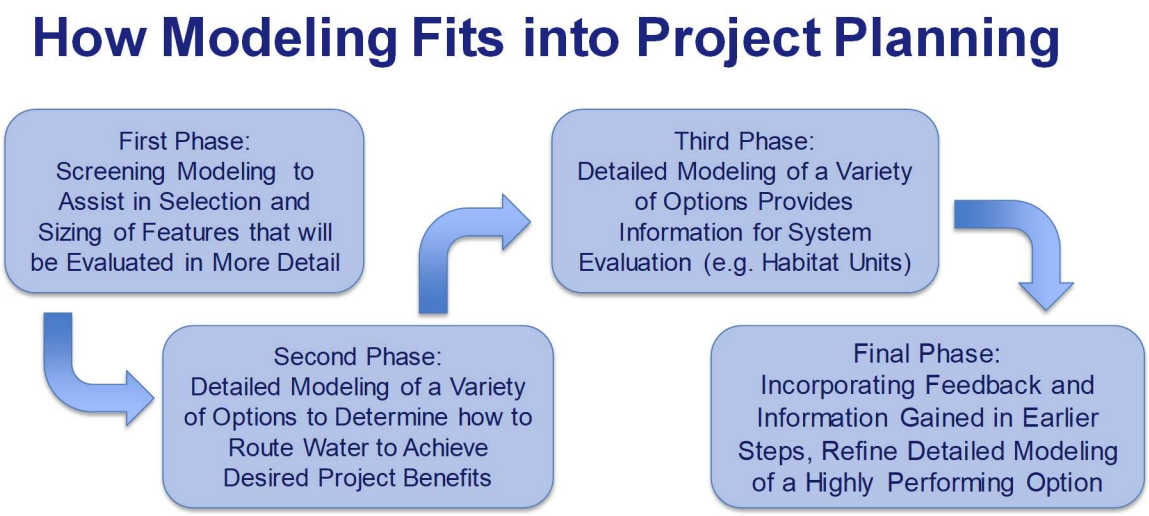


Figure F-1. Typical Everglades Agricultural Area Reservoir project modeling workflow.

The RSM-BN (SFWMD et al. 2009a,b), RSM-GL (SFWMD 2010, 2011), and DMSTA (Walker and Kadlec 2005, Wang 2012) models were reviewed through the United States Army Corps of Engineers validation process for engineering software, as part of CEPP. The RSM and DMSTA models were classified as "allowed for use" for South Florida applications in August 2012 and January 2013, respectively.

Modeling support for the EAA Reservoir project focused on working with the larger project planning team and other interested parties to formulate and test project features leading to the ultimate identification and refinement of a TSP. Modeling products were developed at the appropriate level of detail to support feature screening and detailed representation of project features and to provide information for all necessary evaluations required for plan development and documentation. The project plan formulation framework was built on work already completed as part of the CEPP planning effort, and it uses the same tools and techniques, performing initial screening followed by detailed evaluation to identify final project planning alternatives and ultimately a TSP for the effort. From a modeling deliverable perspective, the EAA Reservoir project modeling support was summarized in the following three model documentation reports:

1. EAA Reservoir Project Baseline – Reviews the various non-EAA Reservoir project model representations (e.g., current and future without project conditions) used in various aspects of project planning (SFWMD 2018a).

2. EAA Reservoir Project Final Array of Alternatives – Reviews the model-supported feature screening efforts undertaken to size the reservoir and treatment facilities, and details evaluation of three modeled "with" project" model representations examined during plan formulation (SFWMD 2018b).

3. EAA Reservoir Project TSP – Reviews the model representation of the optimized plan identified in the final steps of plan formulation and project assurance planning (SFWMD 2018c).

Additional information on the use and rationale for the definition of these scenarios is contained in the CEPP Post Authorization Change Report (PACR; SFWMD 2018d). In 2020, the SFWMD initiated rule development to protect fish and wildlife in the Central Everglades, defined as Water Conservation Area 3 and Everglades National Park, by developing a prospective water reservation for the EAA Reservoir (SFWMD 2020). This documentation report describes the data, quantification methods, and outcomes to quantify EAA Reservoir performance to support the proposed water reservation. It also compares these

outcomes to other relevant values from the PACR to help provide context and clarity on the methods and results. The following accompanying spreadsheet further documents the relevant data and calculations described in this report: "EAA_Reservoir_Reservation_wRedline_30Apr2020.xlsx."

QUANTIFICATION

To ensure consistency with other model summaries and benefit calculations used in the PACR, the RSM and DMSTA simulations identified and released in January 2018 (**Table F-1**) provided the data sets for the prospective water reservation quantification exercise.

Table F-1. Version information and model file locations used for the prospective water reservation quantification exercise using RSM Release 2.3.5R and DMSTA v2c2b.

RSM-BN ALT C240 011718	RSM_REL_2.3.5R and xml_v12774
Input: …svnroot/trunk/rsm_imp/CEPP_EAR/Models/rsmbn/alternatives/C240/input Output: projects/CEPP_EAR/FilesToFTP/PlanFormulation/Alternatives/05_17Jan2018/rsmbn_model_output/C240	
RSM-GL ALT C240 011718	RSM_REL_2.3.5 and xml_v12773
Input: …svnroot/trunk/rsm_imp/CEPP_EAR/Models/rsmgl/alternatives/C240/input Output: projects/CEPP_EAR/FilesToFTP/PlanFormulation/Alternatives/05_17Jan2018/rsmgl_model_output/C240	

For the purposes of the prospective water reservation, all water discharged by the EAA Reservoir towards the Central Everglades would be quantified as necessary for the protection of fish and wildlife (SFWMD 2020). Based on currently available engineering design details for the facility (**Figure F-2**), flows through S-624, S-625, and S-626 should be quantified.

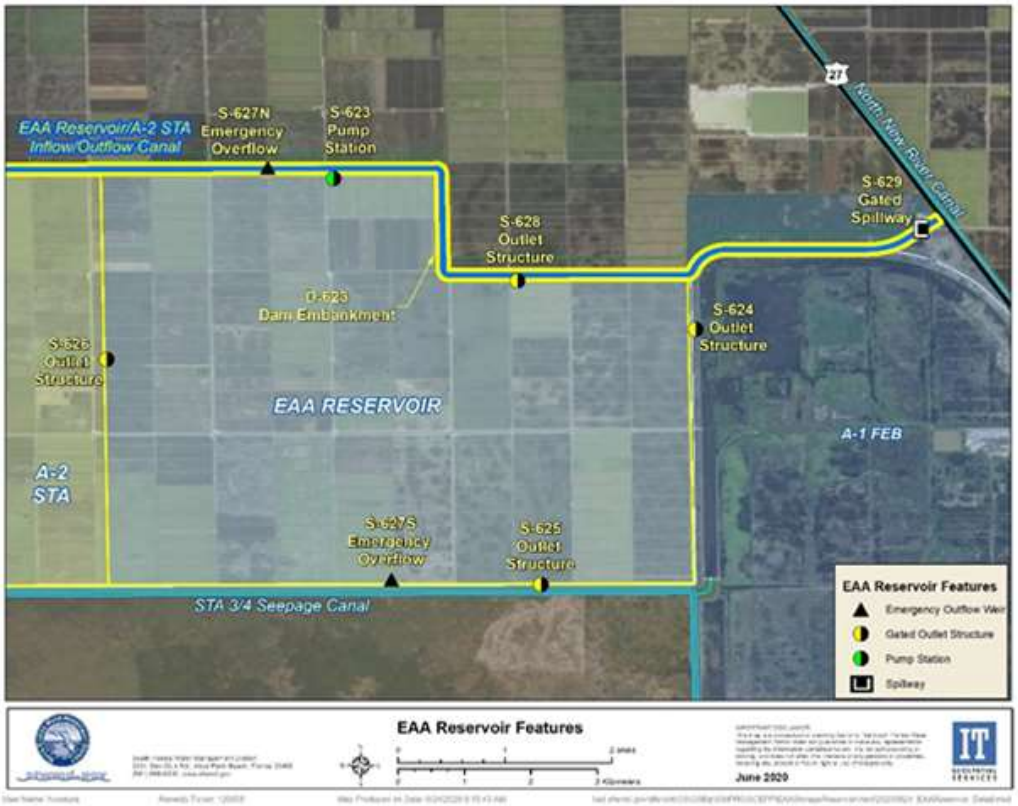


Figure F-2. Everglades Agricultural Area Reservoir design features, as of April 2020.

From the RSM-BN perspective, the following crosswalk identifies the closest relationship between modeled outputs (**Figure F-3**) and EAA Reservoir structures:

- A2RES to A1FEB: S624 = a2res2a1feb
- A2RES to downstream STAs: S625 = a2res2umiami_S + a2res2Nnrhills_S
- A2RES to A2STA: S626 = A2RES_to_ERSTA
- A2RES to EAA water supply: S628 = RES2miami + RES2NnrHillsBasin

The above relationship is not sufficient to quantify flows through the EAA Reservoir because the RSM-BN and DMSTA are used together to simulate the anticipated hydrologic and water quality performance of the reservoir. While the RSM-BN is able to simulate daily hydrology, operations, and routing, the DMSTA is used to analyze longer-term (i.e., annual) water quality outcomes (SFWMD 2012b). To quantify the water released from the EAA Reservoir to the downstream Central Everglades that provides the project's expected environmental benefits associated with the water reservation, a combination of RSM-BN and DMSTA data represents the most accurate quantification.

As shown in **Figure F-3**, the RSM-BN leverages DMSTA "environmental" flow targets to help inform its simulation of the STAs. Similarly, the DMSTA uses RSM source hydrology for a) quantification of EAA basin runoff and Lake Okeechobee releases requiring treatment, and b) simulation of agricultural demand met by the reservoir. While this iterative modeling approach ensures high correspondence between the two models at Lake Okeechobee and the "red line" inflow boundary to the water conservation areas (where project assurances are quantified as shown in **Figure F-4**), routing associated with the STAs, A-1 Flow Equalization Basin (FEB), and EAA Reservoir may have differences.

In the DMSTA model, the general priority of operation is for most EAA runoff and Lake Okeechobee discharges to be routed through the EAA Reservoir, then the A-1 FEB, and then to downstream STAs (**Figure F-5**). During real-time operations, it is possible to adjust inflow and outflow for each facility based on real-time hydrologic conditions and STA performance to maximize the efficiency of the whole system. The DMSTA model, however, simulates each facility in series, completing the simulation of one facility before moving on to the next one. The model does not provide feedback from downstream facilities that can be used to optimize flows for the upstream facilities during simulation. To help address this model limitation, and with knowledge that STA outflow concentrations directly relate to phosphorus and hydrologic loading rates, an operational protocol was developed to maximize STA performance within the DMSTA simulation.

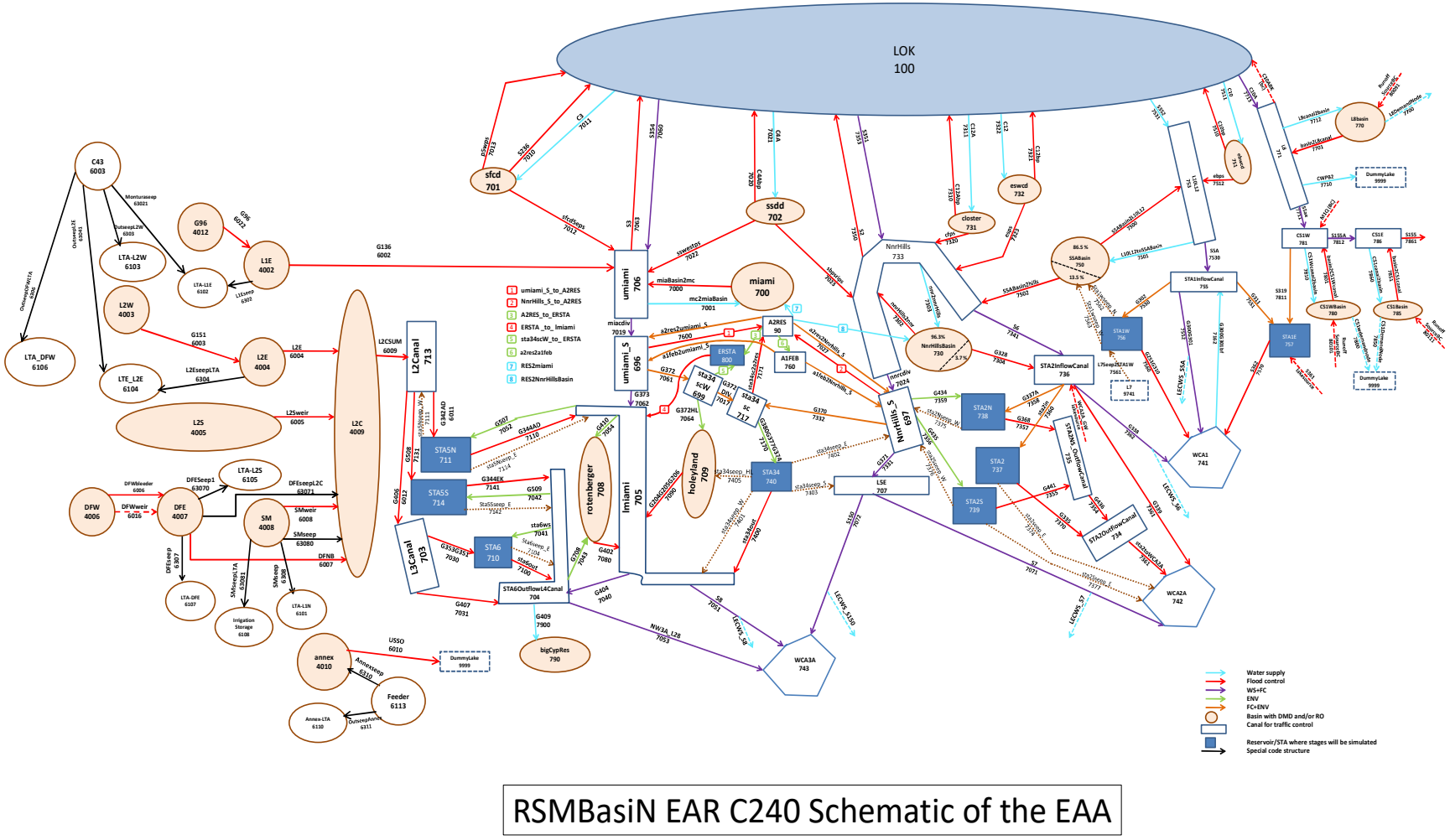


Figure F-3. Regional Simulation Model Basins routing diagram.



Figure F-4. The Central Everglades Planning Project red line located along a northern water conservation area inflow transect.

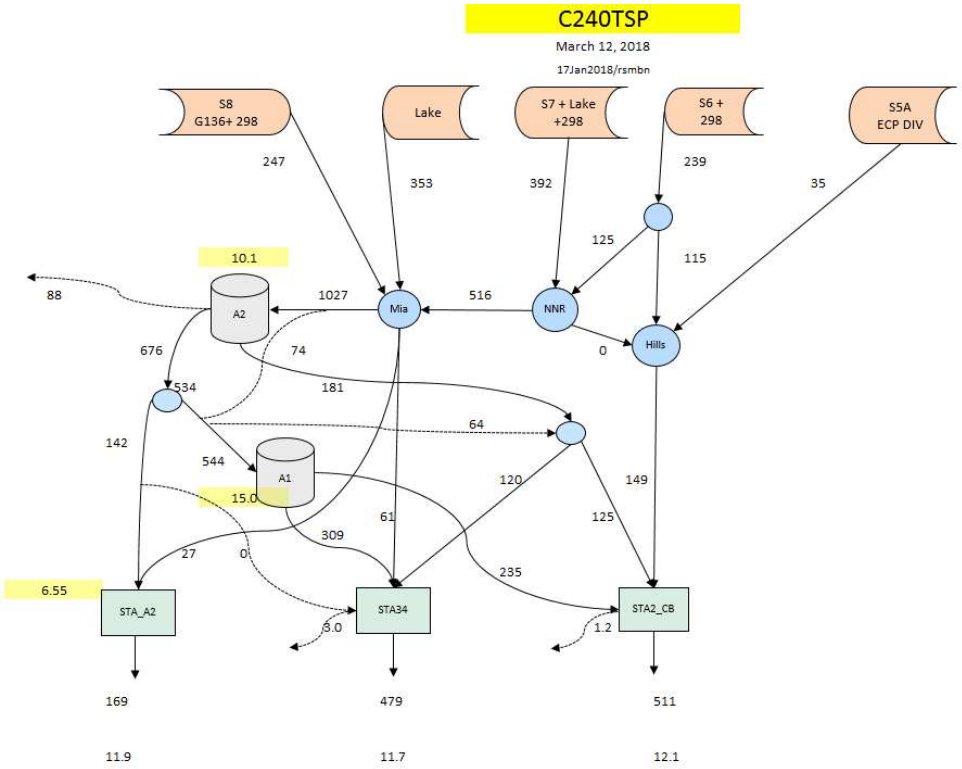


Figure F-5. Dynamic Model for Stormwater Treatment Areas network design diagram for the EARC240 Central Everglades Planning Project Post Authorization Change Report run.

The release algorithm implemented in the DMSTA model (Wang 2018) distributes and routes flows among a network of five facilities (A-2 Reservoir, A-1 FEB, STA-2, STA-3/4, and A-2 STA) to meet the downstream water quality criteria. The algorithm complies with the physical constraints of the canal network and the storage and treatment facilities, and it is adaptive to seasonal variations as well as long- and short-term antecedent conditions of upstream flows and precipitation. The algorithm also balances treatment capacity to meet water quality targets and downstream environmental needs. Specifically, the algorithm is defined as follows:

A. For the three downstream STA facilities: STA-2, STA-3/4, and A-2 STA, the maximum inflow demands were set initially at 2,700, 3,100, and 310 cubic feet per second (cfs), respectively. After adjustments (outlined below), the maximum inflow demands were 2,956, 3,363, and 326 cfs.
    I. The demands were adjusted down by 80% during dry seasons (outside of Julian days 150 to 300).
    II. The demands were adjusted based on long-term (30 days) and short-term (15 days) antecedent flows to the A-1 FEB. The demands were raised as antecedent inflows increased and were lowered as antecedent inflows decreased with seasonal weighting factors.
    III. If the demands were less than the average antecedent 30 days' precipitation deficits (evapotranspiration minus rainfall), they were increased to match the deficits.
    IV. The demand by STA-2 was reduced by the amount of inflow directly from the Hillsboro Canal.
B. The percentages of the demands from STA-2, STA-3/4, and the A-2 STA that were to be met by A-1 FEB outflows (i.e., A-1 FEB demands) were 73%, 82%, and 0%, respectively. The remaining demands were to be met by the EAA Reservoir.
C. The target releases from the EAA Reservoir were used to meet total demands, including demands directly and indirectly through the A-1 FEB from STA-2, STA-3/4, and the A-2 STA, and the agriculture demand that was predefined in the RSM-BN.
D. The target releases from the A-1 FEB were used to meet the total A-1 FEB demands from STA-2 and STA-3/4.
E. The total releases from the A-1 FEB and EAA Reservoir were further constrained by outflow structure capacity and applicable stage-dependent overland flow capacity.

As shown in the DMSTA flow routing diagram (**Figure F-5**), application of these protocols results in some flow being routed directly to downstream STAs or the A-1 FEB, but the majority of flows are routed through the EAA Reservoir. To capture this operational intent for the purposes of water reservation quantification (thereby preserving the expected water quality performance of the project), a daily time series of "demand" through the EAA Reservoir was quantified using DMSTA data (in worksheet "A1 Flow DMSTA" of the spreadsheet "EAA_Reservoir_Reservation_wRedline_30Apr2020.xlsx").

Returning to the RSM-BN, as applied for the EAA Reservoir project, it is important to note that although STA flows are directly informed by comparable DMSTA flows, the RSM code will meet these environmental flows (e.g., STA inflow targets) directly from available sources (e.g., EAA runoff) without ensuring a priority routing of source water through the upstream reservoir and FEB as DMSTA assumes. While this does not affect the regional water budget for Lake Okeechobee, the northern estuaries, or the Everglades, it can result in reduced utilization of the EAA Reservoir in the RSM-BN.

To overcome this RSM limitation, a post-processing exercise was documented in the "EAA_Reservoir_Reservation_wRedline_30Apr2020.xlsx" spreadsheet. The workbook performs the necessary calculations to ensure that, on an annual basis, the volumes of water likely to pass through the EAA Reservoir to the downstream Everglades (informed by both RSM-BN and DMSTA) are quantified for the purposes of protecting these environmental releases through the prospective EAA Reservoir Water Reservation. To account for what the RSM-BN simulates as direct inflow into the STAs but the DMSTA would have routed through the EAA Reservoir/FEB complex, a daily calculation is performed to redirect water directly entering the STAs in the RSM-BN to and through the EAA Reservoir for water reservation quantification purposes. This calculation is limited by the available water budget and the daily DMSTA "demand" term previously described. Results then are summarized using May to April water years to better reflect the seasonal carryover of water from the wet season into the dry season that is critical to realizing project benefits.

Prior to post-processing, the RSM-BN identified 471,000 ac-ft of average annual outflow (1965 to 2005 simulation period) from the EAA Reservoir to the Central Everglades. After post-processing, informed by the DMSTA model, average annual outflow increases to 834,000 ac-ft. When summarized using May to April water years, these terms are 465,000 ac-ft average annual outflow directly from the RSM-BN output and 825,000 ac-ft average annual outflow after post-processing informed by the DMSTA model. These volumes represent a combination of EAA basin runoff and Lake Okeechobee discharges as well as a mix of existing and "new" water delivered by the EAA Reservoir to meet the needs of the Central Everglades.

OUTCOMES

The outcomes of the RSM-BN and DMSTA modeling of the EARC240 scenario were used to quantify the volume of water expected to be sent through the EAA Reservoir towards the Central Everglades through the S-624, S-625, and S-626 structures considered in the prospective water reservation for the protection of fish and wildlife in the Central Everglades (Water Conservation Area 3 and Everglades National Park). Data were summarized for 40 water years (May to April) across the simulation period (1965 to 2005) and summarized in the volume probability curve shown in **Figure F-6**.

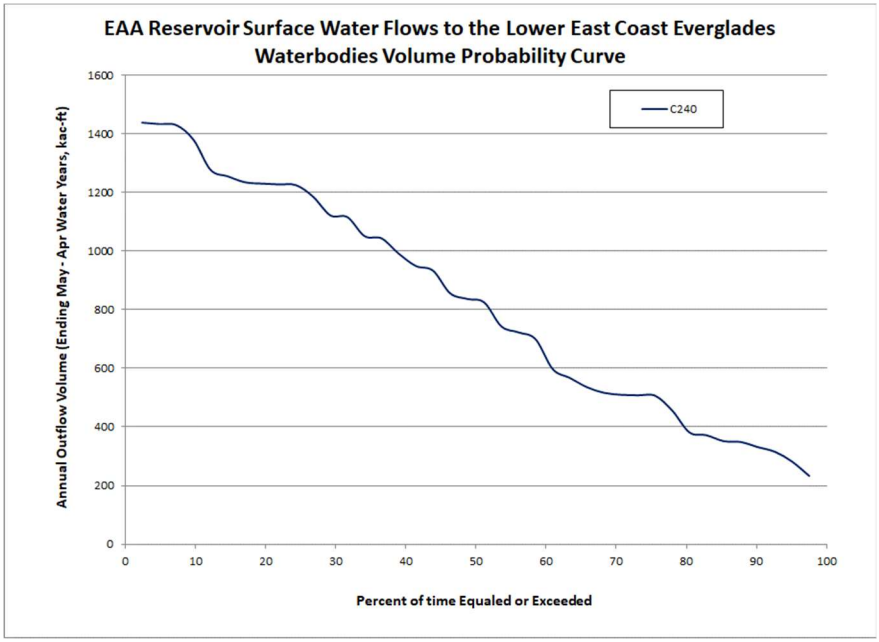


Figure F-6. Everglades Agricultural Area Reservoir outflows toward the red line (May to April water years).

The average annual volume consistent with **Figure F-6** (May to April water years) is 825,000 ac-ft and is derived from the same modeling data sets used in the PACR (SFWMD 2018d). The PACR executive summary states "the TSP would substantially increase CEPP flows to the central Everglades from an average annual flow of approximately 210,000 ac-ft to an average annual flow of approximately 370,000 ac-ft." The quantification of the 370,000 ac-ft was based on a comparison of current (EARECB) and with-reservoir (EARC240) RSM modeling simulations released in January 2018 and is the difference in outflow from the central flowpath STAs towards the Everglades (at the red line) measured across the entire 41-year simulation period from 1965 to 2005 (January to December calendar years). **Table F-2** shows how these two important quantifications are related, and in the accompanying spreadsheet, the table values link back to the common RSM-BN and DMSTA used.

Table F-2. Period of simulation flow summary for key Post Authorization Change Report outcomes.

Flow	Average Annual Period of Simulation (kac-ft, 1965-2005 Calendar Years)			Average Annual (kac-ft, 1965-2005 May to April Water Years)		
	EARECB	EARC240	Difference	EARECB	EARC240 (RSM & DMSTA)	Difference
Lake Okeechobee flood control and environmental releases toward the Everglades	60	541	481	59	531	473
EAA Reservoir agricultural releases toward the EAA	0	82	82	0	82	82
EAA Reservoir environmental releases toward the Everglades	0	834	834	0	**825**	825
Other releases toward the Everglades	760	296	-464	758	295	-463
Central flowpath flows toward the Everglades (at red line)	760	1,130	**370**	758	1,120	362

DMSTA = Dynamic Model for Stormwater Treatment Areas; EAA = Everglades Agricultural Area; EARC240 = "with-project" simulation; EARECB = existing conditions baseline simulation; kac-ft = thousand acre-feet; RSM = Regional Simulation Model.

Another way of showing the data, from the perspective of the red line as opposed to from-reservoir outflows, is in a stacked bar chart (**Figure F-7**). The data are coherent and derived from common sources, meaning whether looking at relative changes or absolute volumes at particular locations, all data are summarized from the same modeling (including RSM-GL south of the red line) used in the PACR to illustrate the project benefits and effects.

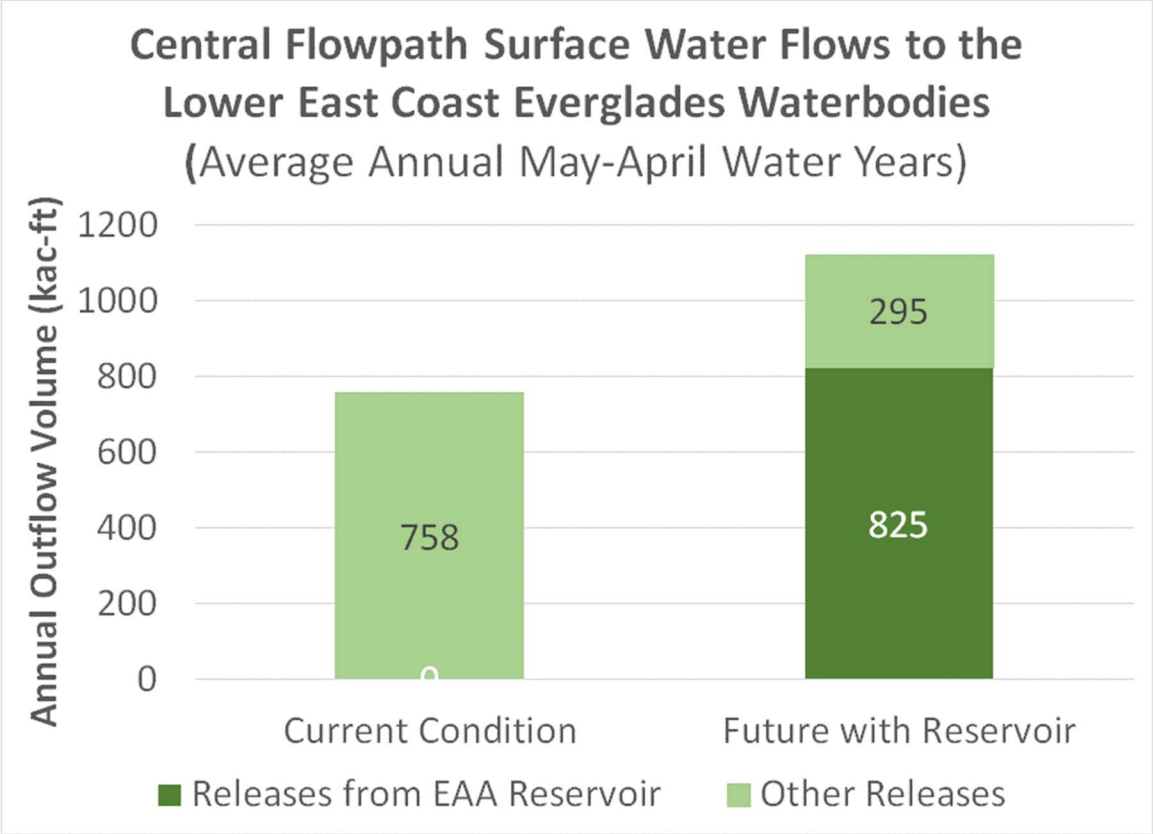


Figure F-7. Central flowpath flows toward the red line (May to April water years).

To further clarify the relationship between flows at specific facilities and those at regional points of interest, including Lake Okeechobee and the red line into the Everglades, **Figures F-8** to **F-10** are included below. While the red line is not explicit on the figures, it is concurrent with the boundary between the EAA and the water conservation areas, and the green arrows on the figures pass through the red line. **Figure F-8** shows flows from the current condition (EARECB) scenario, while **Figure F-9** shows the "future with reservoir" condition if summarized directly from the RSM-BN and **Figure F-10** shows the "future with reservoir" condition when summarized from the RSM-BN and DMSTA post-processing effort. These diagrams do not represent a complete water budget (e.g., differences due to seepage, rainfall and evapotranspiration, flow-through for urban water and environmental deliveries to water management areas, etc. are not displayed). In addition, for display purposes, the A- 1 FEB, STA-3/4, and STA-2 facilities are combined in the figures (significant flexibility exists to manage operations between these features).

As can be seen in **Figures F-9** and **F-10**, inclusion of the DMSTA post-processing does not change flows at Lake Okeechobee or out of the downstream STAs, but rather only affects the proportion of flows "internally" routed in the EAA through the EAA Reservoir. As previously described, **Figure F-10** represents the most complete quantification of EAA Reservoir flow (825,000 ac-ft considering both hydrology and water quality) and does not change the project benefits or relative increase in flow into the Everglades compared to current flows (approximately 370,000 ac-ft).

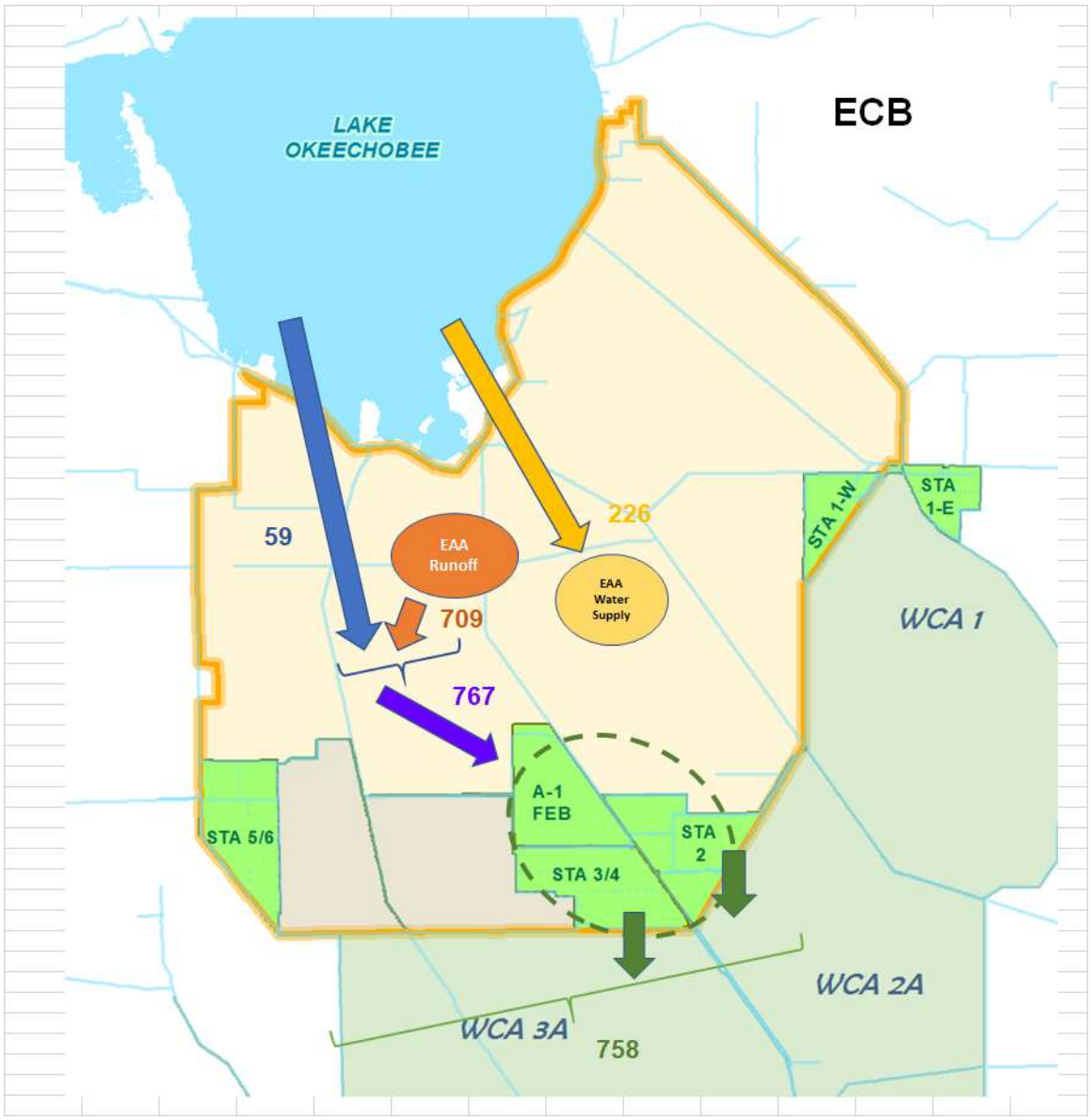


Figure F-8. Current condition (EARECB) Regional Simulation Model flow routing diagram, long-term annual average (May to April water years. (Note: All values are in thousand acre-feet.)

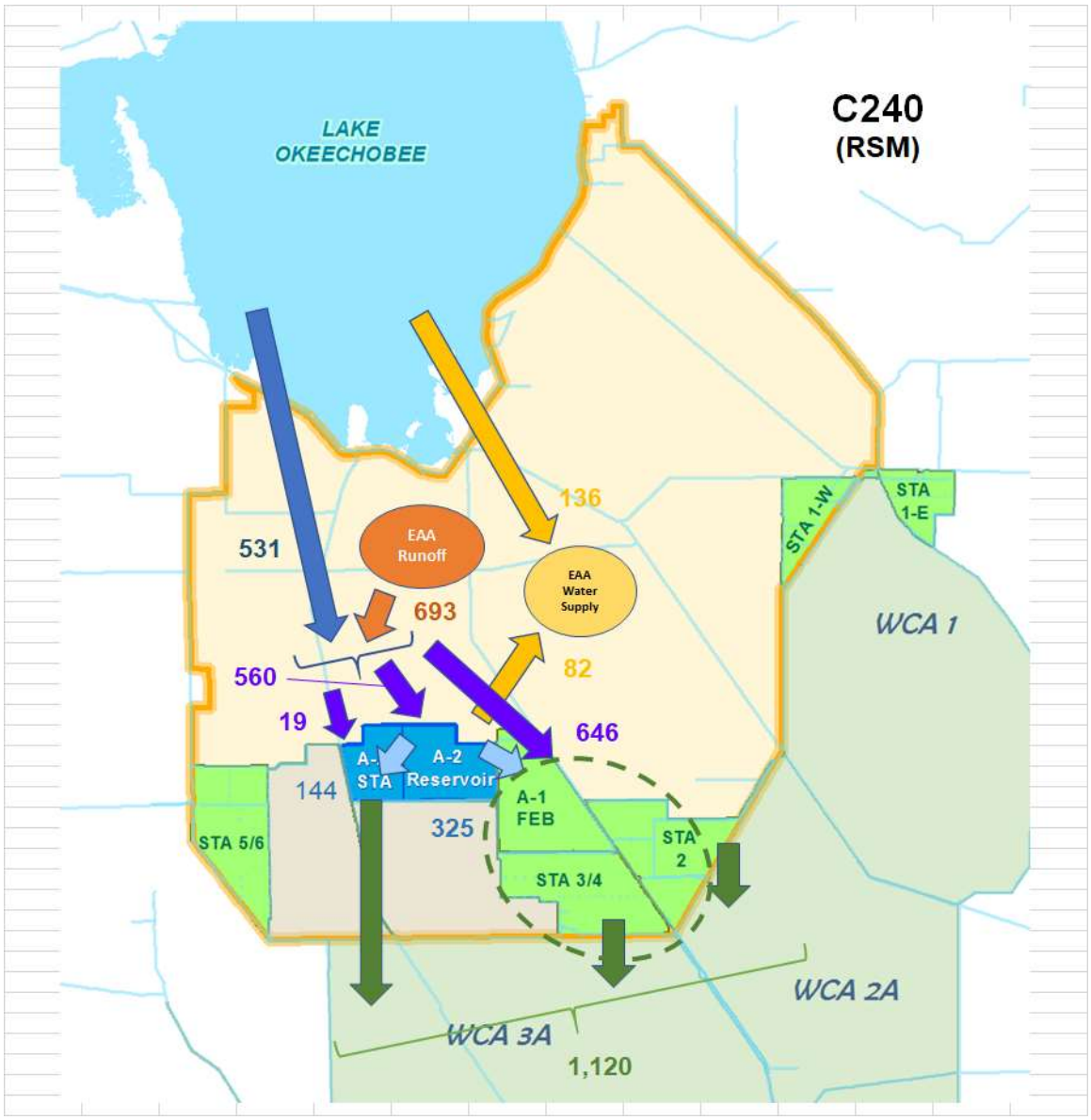


Figure F-9. Future with reservoir condition (EARC240), Regional Simulation Model flow routing diagram, long-term annual average (May to April water years. (Note: All values are in thousand acre-feet.)

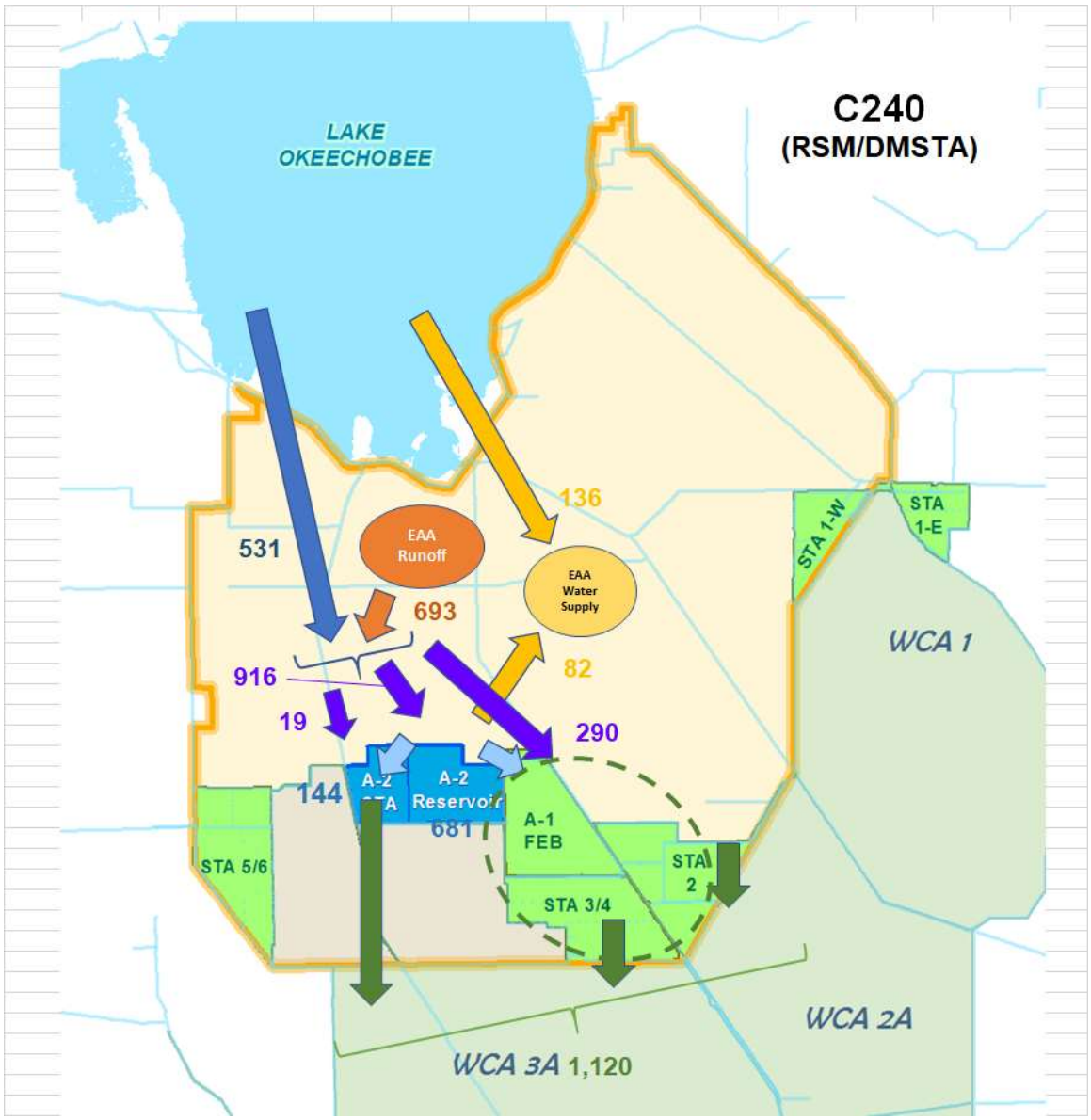


Figure F-10. Future with reservoir condition (EARC240), Regional Simulation Model & Dynamic Model for Stormwater Treatment Areas flow routing diagram, long-term annual average (May to April water years. (Note: All values are in thousand acre-feet.)

LITERATURE CITED

SFWMD. 2005a. Regional Simulation Model – Theory Manual. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2005b. Regional Simulation Model – Hydrologic Simulation Engine (HSE) User Manual. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2010. Draft Report – Calibration and Validation of the Glades and Lower East Coast Service Area Application of the Regional Simulation Model, Sept. 2010. South Florida Water Management District, West Palm Beach, FL.

SFWMD. 2011. Model Documentation Report (Draft): RSM Glades-LECSA—Alternative "H" V1.0. USACE DASR Project 12-WCA Decomp and Sheetflow Enhancement-Part 1. MSR 358 Final Array. South Florida Water Management District, West Palm Beach, FL. 57 pp.

SFWMD. 2012a. Central Everglades Planning Project: Modeling Strategy. South Florida Water Management District, West Palm Beach, FL. 32 pp.

SFWMD. 2012b. Restoration Strategies Water Quality Plan. West Palm Beach, FL 92 pp.

SFWMD. 2018a. Model Documentation Report: Everglades Agricultural Area Storage Reservoir Project (EAASR) Baseline and Screening Runs. South Florida Water Management District, West Palm Beach, FL. 72 pp.

SFWMD. 2018b. Model Documentation Report: Everglades Agricultural Area Storage Reservoir Project (EAASR) Final Array of Alternatives. South Florida Water Management District, West Palm Beach, FL. 56 pp.

SFWMD. 2018c. Model Documentation Report: Everglades Agricultural Area Storage Reservoir Project (EAASR) Tentatively Selected Plan. South Florida Water Management District, West Palm Beach, FL. 54 pp.

SFWMD. 2018d. Central Everglades Planning Project Post Authorization Change Report (PACR) Feasibility Study and Draft Environmental Impact Statement. South Florida Water Management District, West Palm Beach, FL. 333 pp.

SFWMD. 2020. Draft Technical Document to Support the Central Everglades Planning Project Everglades Agricultural Area Reservoir Water Reservation. South Florida Water Management District, West Palm Beach, FL.

SFWMD, Florida Department of Environmental Protection, and Florida Department of Agriculture and Consumer Services. 2009a. Caloosahatchee River Watershed Protection Plan, Appendices, Appendix C Northern Everglades Regional Simulation Model. 116 pp.

SFWMD, Florida Department of Environmental Protection, and Florida Department of Agriculture and Consumer Services. 2009b. St. Lucie River Watershed Protection Plan, Appendices, Appendix C Northern Everglades Regional Simulation Model. 116 pp.

Walker, W.W. and R.H. Kadlec. 2005. Dynamic Model for Stormwater Treatment Areas. Prepared for the U.S. Department of the Interior and the U.S. Army Corps of Engineers. http://wwwalker.net/dmsta/.

Wang, N. 2012. Summary of DMSTA model runs prepared for CEPP. Internal Memorandum to Walter Wilcox, dated December 12, 2012. USACE DASR Project 51—Central Everglades Planning/Analysis Phase/ Plan Formulation/ Baselines/ Final_Output_121312/ rsmbn_model_output/ dmsta_model_output/ FWO.

Wang, N. 2018. Summary of DMSTA model runs prepared for CEPP PACR. Internal Memorandum to Walter Wilcox, dated March 14, 2018. SFWMD FTP: /EAASR/PlanFormulation/Alternatives/03_30Jan2018/DMSTA/.

APPENDIX G:
EVALUATION OF IMPACTS TO WATER SOURCES FOR EXISTING LEGAL CONSUMPTIVE USERS DUE TO THE EVERGLADES AGRICULTURAL AREA RESERVOIR AND A-2 STORMWATER TREATMENT AREA

PURPOSE

This appendix briefly describes and analyzes the possible effects of operating the Everglades Agricultural Area (EAA) Reservoir and A-2 Stormwater Treatment Area (STA) on the water sources of existing legal consumptive users. **Figure G-1** is an aerial photograph of the EAA Reservoir and A-2 STA site.

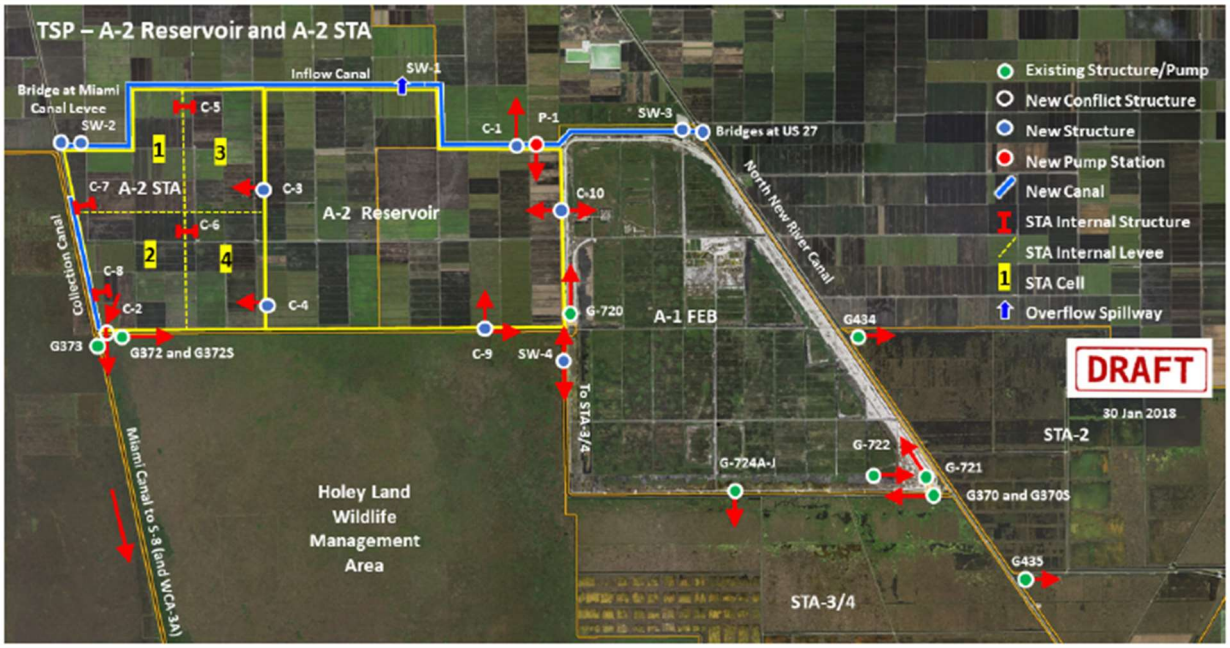


Figure G-1. Location of the Everglades Agricultural Area Reservoir and A-2 Stormwater Treatment Area.

PROJECT AREA HYDROLOGY AND HYDROGEOLOGY

The EAA Reservoir and A-2 STA are within the southern portion of the EAA. The site is bisected by the Miami Canal Basin and the North New River and Hillsboro Basin (**Figure G-2**). The North New River Canal (L-18/L-19) and Miami Canal (L-24/L-23) are located east and west of the reservoir, respectively. East of the reservoir is the A-1 Flow Equalization Basin, and west of the reservoir is the proposed EAA A-2 STA. South of the reservoir is the Holey Land Wildlife Management Area and STA-3/4. The L-21 Canal and STA-3/4 discharge canal are the nearest regional canals to the north and south, respectively.

The EAA Reservoir will be hydrogeologically connected to the surficial aquifer system (SAS), which primarily is an unconfined aquifer. However, the SAS comprises three main hydrostratigraphic units, or permeable zones, separated by partial confinement. Zone 1, the shallowest zone, is of Pleistocene age and includes the Anastasia and Fort Thompson formations. The lithology of Zone 1 consists of cemented and loosely cemented shell that can be highly permeable. Zone 2, located at intermediate depth, is of Pliocene age and includes the Pinecrest Sand member of the Tamiami formation. Zone 2 consists of shelly, highly permeable, well-cemented, gray limestone and sandstone and can be semi-confined from Zone 1. Zone 3, the deepest zone, also is of Pliocene age and includes the Ochopee Limestone member of the Tamiami formation. Zone 3 commonly includes gray, sandy lime rudstone (a carbonate grain-supported rock) and sandstone. In southwestern Palm Beach County, Zone 3 is called the gray limestone aquifer.

The EAA Reservoir and A-2 STA are in an area where groundwater is known to be saline at depth (Reese and Wacker 2009). The saline groundwater originated from seawater present during deposition

(i.e., connate water) of the Late Miocene and Pliocene Epochs (approximately 3 to 7 million years ago) or upwelling of saline water from deeper saline aquifers. Nearby monitor wells indicate the chloride ion concentrations in Zones 1 and 2 vary from 100 to 180 milligrams per liter (mg/L). However, below Zone 3 (approximately -80 feet (ft) North American Vertical Datum of 1988 [NAVD88]), the chloride ion concentration is 3,000 mg/L.

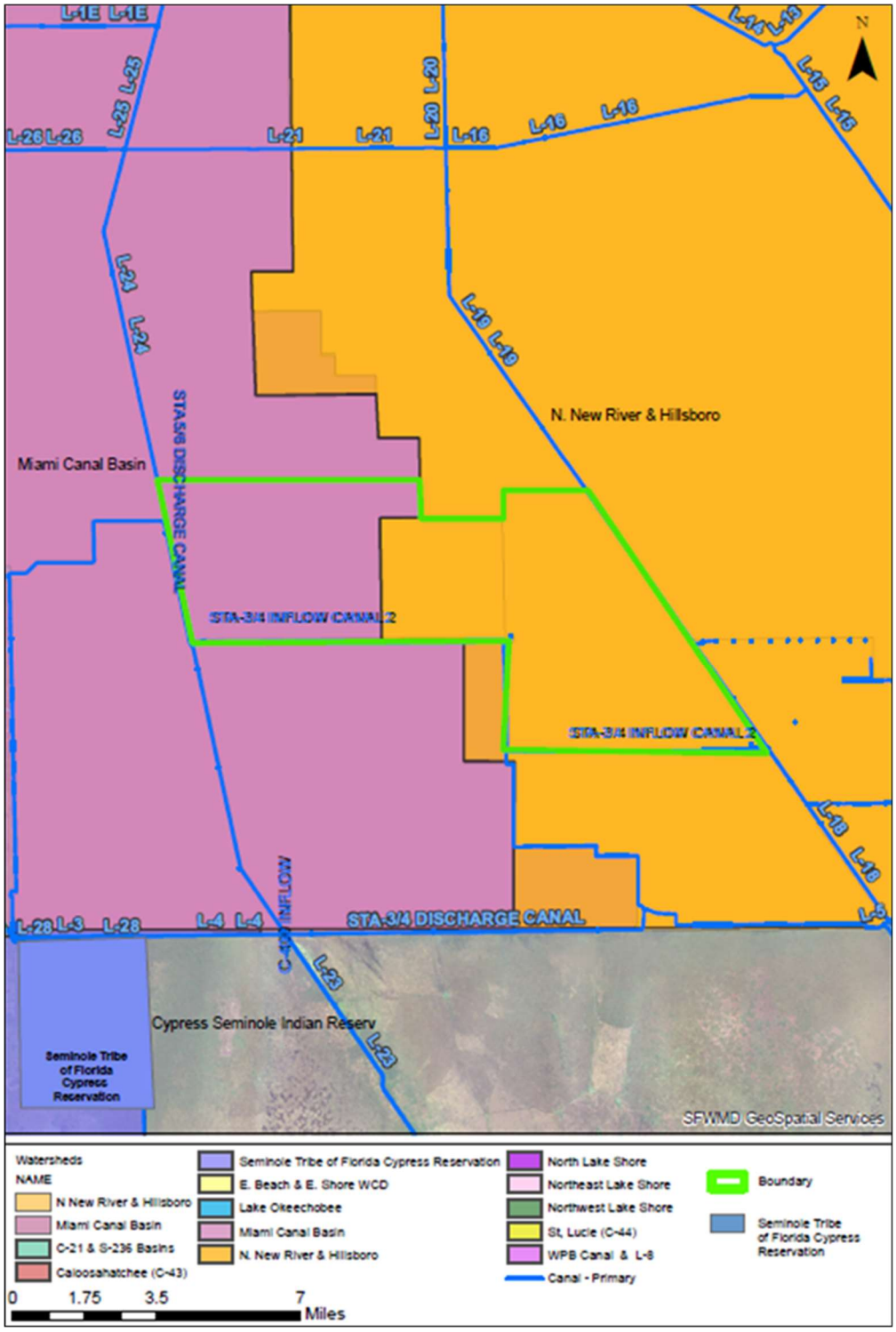


Figure G-2. Hydrology map of the Everglades Agricultural Area Reservoir.

MODELING RESULTS AND WATER SOURCES OF EXISTING LEGAL USERS

The EAA Reservoir and A-2 STA were evaluated with integrated groundwater and surface water modeling software called MIKE SHE (DHI 2019). The model was verified and calibrated using SEEP/W, which is a finite element model used for seepage analysis as a function of time. The SEEP/W model used a finer discretization and telescoped to the model domain near the cut-off wall and reservoir. In the model, Zone 1 was represented by a layer thickness ranging from 8.0 to 20.7 ft, with a hydraulic conductivity of 900 ft/day. Zones 2 and 3 were combined in the model and represented by a layer thickness ranging from 129 to 143 ft, with a hydraulic conductivity of 30 ft/day.

An impermeable 3-ft thick wall (i.e., cutoff wall) is proposed to be constructed below the embankments that surround the EAA Reservoir to a depth of -34.1 ft NAVD88 (located within the Caloosahatchee formation) and next to the northern inflow-outflow canal as an active control for seepage. The MIKE SHE and SEEP/W models were used to simulate the effects of the cutoff wall and the inflow-outflow canal on groundwater seepage. The seepage analysis quantified the amount of seepage loss from the reservoir to determine whether various proposed seepage management alternatives would effectively mitigate impact to surrounding areas and to quantify impacts, if any, to lands surrounding the reservoir and A-2 STA.

A baseline model without the EAA Reservoir and A-2 STA was compared to a second model with the reservoir and STA using conservative parameters that maximized the amount of seepage that could occur. The normal full storage elevations of 31.1 and 12.5 ft NAVD88 of the EAA Reservoir and A-2 STA, respectively, were used in a steady-state condition model. The cut-off wall was included in the model run but the inflow-outflow canal was set at an elevation equivalent to the regional canals (8.9 ft NAVD88) to represent only passive control. The difference in water elevations between the baseline model and the with-reservoir model using only passive controls demonstrates the limits of the area of influence (AOI; **Figure G-3**). The AOI is defined by the 0.25-ft mounding contour, which extends approximately 2.7 miles north of the EAA Reservoir and A-2 STA. Mounding as high as 2 ft could be expected immediately north of the reservoir. Due to the length of the model run to steady-state conditions and the full water elevations of the EAA Reservoir and A-2 STA, the parameters were chosen to represent a conservative estimate of the AOI. The existing legal users and their commensurate withdrawal facilities within the AOI are shown in **Figure G-3**, and those permittees and their water sources are listed in **Table G-1**.

The primary land use in the EAA is agriculture, and the dominant crop is sugarcane within the AOI. All existing legal users' water sources are directly or indirectly conveyed from the Miami Canal or North New River Canal, which are owned and operated by the South Florida Water Management District. Therefore, existing legal users should have no impact to the EAA Reservoir and A-2 STA. Furthermore, there are no users of groundwater from the SAS within the AOI; therefore, consumptive use of groundwater will have no impact to the reservoir and STA. Sugar Farms Co-Op and Florida Crystals Corporation have agricultural operations under Water Use Permits 50-08986-W and 50-0656-W, respectively, that encroach on the reservoir area. Both permits will need to be modified to remove the irrigated acreage contained within the EAA Reservoir and A-2 STA (17,917 acres).

Modeling that used active controls for seepage adjusted the stage elevation within the inflow-outflow canal based on: 1) the design stage of the canal (4.5 ft NAVD88), 2) the proposed capacity of the pumps (total of 600 cubic feet per second) that will move water from the canal to the reservoir, and 3) two alternative depths of the north cut-off wall (-34.1 and -65 ft NAVD88). The deeper cut-off wall reduced seepage by half, and the stage elevation range for the inflow-outflow canal can either fully intercept seepage (and cause drawdown north of the canal) by maintaining stage elevations at 4.5 ft NAVD88 or allow seepage up to the passive model by maintaining stage elevation at 8.9 ft NAVD88. The results of the active controls range

from mounding, as shown previously with no active controls (passive), to drawdowns as large as 3 ft north of the EAA Reservoir and A-2 STA (**Figure G-4**). A canal elevation between these two limits will be used to minimize drawdown and mounding north of the EAA Reservoir and A-2 STA. A model using the shallower cut-off wall and stage elevation of 6.8 ft NAVD88 for the inflow-outflow canal was presented as the optimal active control design. As shown in **Figure G-5**, minimal impacts occur north of the EAA Reservoir and A-2 STA using these parameters.

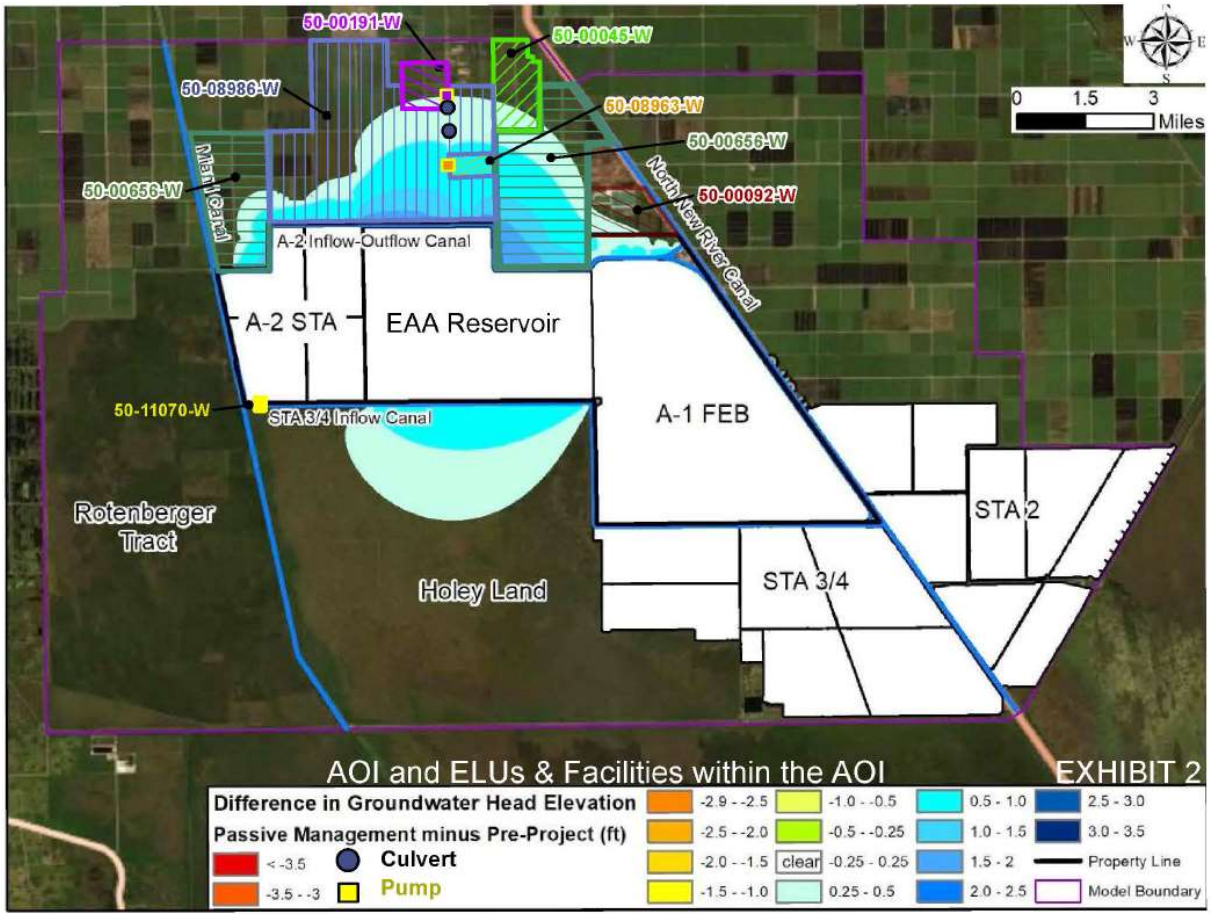


Figure G-3. Area of influence and existing legal user facilities.

Table G-1. Existing legal uses surrounding the Everglades Agricultural Area Reservoir and A-2 Stormwater Treatment Area.

Project	Water Use Permit	Application	Surface Water Source in the Area of Interest	
			L-19 Canal	L-23/L-24 Canal
Star Ranch Enterprises	50-00045-W	101012-1	X	
Star Farms Corporation	50-00191-W	101011-24	X	
Okeelanta Corporation	50-00656-W	190725-16	X	X
Halasco	50-08963-W	140513-6	X	
Sugar Farms Co-Op	50-08986-W	181001-16	X	X
ECP and Non-ECP Components	50-11070-W	160520-28		X
Star Ranch Enterprises West Farm	50-00092-W	190619-5	X	

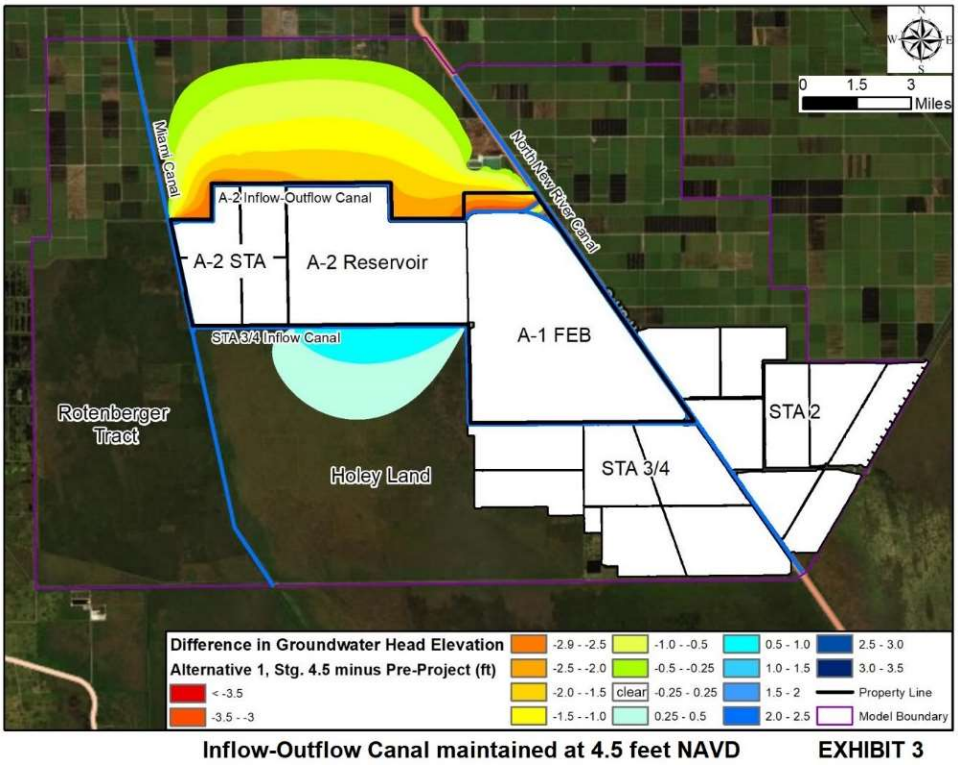


Figure G-4. Difference in water table elevations in the immediate vicinity of the project when the inflow-outflow canal stage is maintained at 4.5 feet NAVD88.

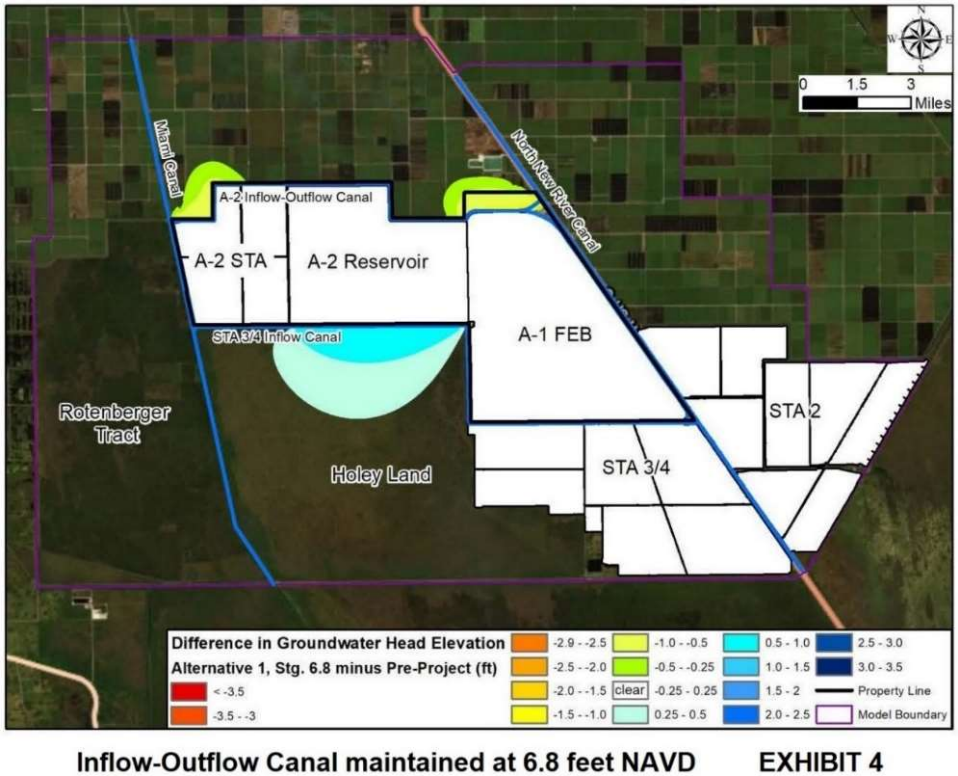


Figure G-5. Difference in water table elevations in the immediate vicinity of the project when the inflow-outflow canal stage is maintained at 6.8 feet NAVD88.

FINDINGS AND RECOMMENDATIONS

Modeling demonstrated active control of stage elevation in the inflow-outflow canal can minimize potential mounding or drawdown effects to existing legal users north of the EAA Reservoir and A-2 STA. Additionally, because there are no consumptive uses of groundwater and the use of surface water by existing legal users is from regional canals maintained by the South Florida Water Management District, the potential for harmful impacts to the EAA Reservoir and A-2 STA as a result of the continued use of surface water by existing legal users, including seepage, is considered minimal.

Impounding water with or without the use of a cut-off wall or seepage barrier results in alterations to groundwater flow, which may affect water quality. Water quality impacts due to the reservoir and cut-off wall should be addressed in light of recent data and preliminary findings of ongoing investigations performed for the Herbert Hoover Dike Major Rehabilitation Project and Water Conservation Areas 1 and 2A (United States Army Corps of Engineers 2015). The altered circulation of groundwater flow could cause upwelling of connate saline water, where present. This is exacerbated when a seepage barrier is installed. Monitoring conducted at the Herbert Hoover Dike indicated changes in salinity occurred when the seepage barrier depth was close to the saline water interface (1,000 mg/L in this study), which caused upconing of the saline water interface and fresh or brackish water above the interface to become more saline, while groundwater at depths of up to three times the depth of the seepage barrier became less saline. The cut-off wall has a proposed depth of -34.1 ft NAVD88, and the saline water interface is estimated at approximately -80 ft NAVD88. For Lake Okeechobee, which has the same hydrostratigraphic units as the EAA Reservoir, Reese and Wacker (2009) and Prinos and Valderrama (2014) demonstrated the effects of a seepage barrier reached three times the depth of the impermeable wall. The saline water interface at the reservoir site is estimated to be well within this range.

Therefore, to provide assurances that harmful mounding/drawdown and/or saline upconing is not occurring to existing legal users north of the EAA Reservoir, it is recommended that a groundwater and saline water monitoring program be implemented. Monitor wells traversing north and south and background wells to the north (beyond the AOI) should be installed and regularly sampled for groundwater elevation and chloride ion concentrations at various depths. Monitor wells close to and/or deeper than the seepage barrier can serve as sentinel wells. If saline water is being discharged from the inflow-outflow canal or if there is upwelling of saline groundwater into the canal (base flow), existing legal users downstream of the Miami Canal and North New River Canal should be protected by sampling the chloride ion concentration in the canals. Groundwater elevation and chloride ion concentration data should be evaluated for trends and used to provide feedback for operational purposes and maintenance of optimal stage elevations for the inflow-outflow canal to balance the need to protect existing legal users and environmental features and to provide flood protection during various hydrologic and seasonal conditions.

LITERATURE CITED

DHI. 2019. MIKE 11 Reference Manual. Available at: https://www.mikepoweredbydhi.com/download/mike-2019.

Prinos, S.T. and R. Valderrama. 2014. Changes in the saltwater interface corresponding to the installation of a seepage barrier near Lake Okeechobee, Florida. United States Geological Survey Open-File Report 2014-1256. 36 pp.

Reese, R.S. and M.A. Wacker. 2009. Hydrogeologic and hydraulic characterization of the surficial aquifer system, and origin of high salinity groundwater, Palm Beach County, Florida. United States Geological Survey Scientific Investigations Report 2009-5113. 83 pp.

United States Army Corp of Engineers. 2015. Herbert Hoover Dike Major Rehabilitation, Palm Beach County Florida, Environmental Assessment and Finding of No Significant Impact. United States Army Corp of Engineers, Jacksonville, FL.