ANNEX B
ANALYSES REQUIRED BY WRDA 2000 AND FLORIDA STATE LAW

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ANNEX B ANALYSES REQUIRED BY WRDA 2000 AND FLORIDA STATE LAW

B.1 LEGAL BASIS – BACKGROUND

Federal law and regulation implementing the Comprehensive Everglades Restoration Plan (CERP) require Project Implementation Reports (PIRs) to address certain assurances as part of the project being recommended for approval and implementation. This section addresses provisions of Section 601(h) of the Water Resources Development Act of 2000 (WRDA 2000), the Programmatic Regulations for the CERP (33 CFR Part 385) for Savings Clause requirements and Project-Specific Assurances.

The following sections describe the specific requirements from WRDA 2000 and the CERP Programmatic Regulations and present the methods, results, and conclusions of the analyses necessary to meet those requirements.

B.1.1 Water Resources Development Act (WRDA 2000)

Congress enacted the WRDA 2000, Section 601, Comprehensive Everglades Restoration Plan, which approved CERP "as a framework for modifications and operational changes to the Central and Southern Florida (C&SF) Project that are needed to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection." Section 601(h) of WRDA 2000, entitled, “Assurance of Project Benefits,” establishes project-specific assurances to be addressed as part of CERP implementation.

Section 601 (h) (1) of WRDA 2000 provides the following:

> *IN GENERAL - The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida Ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Plan shall be implemented to ensure the protection of water quality in, the reduction of the loss of fresh water from, the improvement of the environment of the South Florida Ecosystem and to achieve and maintain the benefits to the natural system and human environment described in the Plan, and required pursuant to this section, for as long as the project is authorized.*

In this document, **Sections B.1** and **B.1.1** discuss the Savings Clause and project assurances required by WRDA 2000 to be addressed in each PIR. **Section B.1.2** lists the Savings Clause and project assurances provisions of the CERP programmatic regulations, which provide supplemental information for implementing the WRDA 2000. **Section B.1.2.5** discusses the role of the Draft Guidance Memoranda in the analyses.

The Savings Clause analysis is listed in WRDA 2000 as a means to protect users of legal sources of water supply and to protect the levels of service for flood protection that were in place at the time of enactment. Specifically, Section 601(h)(5) of WRDA 2000, entitled “Savings Clause,” requires an analysis of each project’s effects on legal sources of water that were in existence on the date of enactment of WRDA 2000 (i.e., December 2000), effects on levels of service of flood protection in existence on the date of enactment of WRDA 2000, and effects on the Seminole Tribe of Florida Water Supply Compact with the State of Florida and South Florida Water Management District (SFWMD). Section 601(h) (5) of WRDA 2000 states the following:

(A) NO ELIMINATION OR TRANSFER. – 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 –

(i) an agricultural or urban water supply;
(ii) allocation or entitlement to the Seminole Indian Tribe of Florida under section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e);
(iii) the Miccosukee Tribe of Indians of Florida;
(iv) water supply for Everglades National Park; or
(v) water supply for fish and wildlife.

(B) MAINTENANCE OF FLOOD PROTECTION. – Implementation of the Plan shall not reduce levels of service for flood protection that are –

(i) in existence on the date of enactment of this Act; and
(ii) in accordance with applicable law.

(C) NO EFFECT ON TRIBAL COMPACT. – Nothing in this section amends, alters, prevents, or otherwise abrogates rights of the Seminole Indian Tribe of Florida under the compact among the Seminole Tribe of Florida, the State, and the South Florida Water Management District, defining the scope and use of water rights of the Seminole Tribe of Florida, as codified in section 7 of the Seminole Indian Land Claims Act of 1987 (25 U.S.C. 1772e).

The analysis of project-specific assurances is listed in WRDA 2000 as a means to assure that CERP project benefits are realized by establishing the appropriate quantity, timing, and distribution of water to be dedicated and managed for the natural system. Section 601(h) (4) of WRDA 2000, entitled "Project-Specific Assurances," contains the following requirements for PIRs:

(A) PROJECT IMPLEMENTATION REPORTS. –

(i) IN GENERAL. – The Secretary (of the Army) and the non-Federal sponsor shall develop project implementation reports in accordance with Section 10.3.1 of the Plan.
(ii) COORDINATION. – In developing a project implementation report, the Secretary and the non-Federal sponsor shall coordinate with appropriate Federal, State, tribal, and local governments.
(iii) REQUIREMENTS. – A project implementation report shall –

...(IV) identify the appropriate quantity, timing, and distribution of water dedicated and managed for the natural system;
(V) identify the amount of water to be reserved or allocated for the natural system necessary to implement under State law;

WRDA 2000 excerpts cited above are intended to provide a concise summary of the Savings Clause and Project-specific Assurances analyses required under WRDA 2000. Refer to WRDA 2000 for complete text.

B.1.2 Programmatic Regulations (33 CFR Part 385)

Section 601(h)(3) of WRDA 2000 required the Secretary of the Army, with the concurrence of the Governor and the Secretary of the Interior, to promulgate Programmatic Regulations to ensure that the goals and objectives of the CERP are achieved. See **Section 6.8, Table 6-18** of the main report for a summary of compliance with the provisions of the Programmatic Regulations. The Final Programmatic Regulations for the CERP, which were published in 33 CFR Part 385 in 2003, establish the processes and procedures to guide the U.S. Army Corps of Engineers (Corps or USACE) in the implementation of the CERP. In this document, **Section B.1.2** summarizes the requirements of the Programmatic Regulations that provide supplemental information to WRDA 2000.

B.1.2.1 Pre-CERP Baseline

Section 385.35(a) of the Programmatic Regulations requires the development of a pre-CERP baseline to aid the Corps and the SFWMD when implementing the Savings Clause to determine if existing legal sources of water will be eliminated or transferred and to demonstrate that the levels of service of flood protection in existence on the date of enactment of WRDA 2000, and in accordance with applicable law, will not be reduced by implementation of a project.

B.1.2.2 Savings Clause - Elimination or Transfer of Existing Legal Sources of Water

Section 385.36 of the Programmatic Regulations requires that PIRs include a determination of existing legal sources of water that are to be eliminated or transferred as a result of project implementation. If a project is expected to result in an elimination or transfer of an existing legal source of water, the PIR shall include an implementation plan that ensures a new source of water of comparable quantity and quality is available to replace the source that is being transferred or eliminated.

B.1.2.3 Savings Clause - Flood Protection

Section 385.37 of the Programmatic Regulations requires that PIRs include an analysis of the project's impacts on levels of service for flood protection that existed on the date of enactment of WRDA 2000 (December 2000) and are in accordance with applicable law to demonstrate that the levels of service for flood protection will not be reduced by implementation of the project. Where appropriate and consistent with restoration of the natural system, opportunities to provide additional flood protection shall be considered. The conditions that existed on the date of enactment of WRDA 2000 are included in the Pre-CERP Baseline.

B.1.2.4 Project Assurances - Identification of Water for the Natural System

Section 385.35(b) of the Programmatic Regulations requires that each PIR identify the quantity, timing, and distribution of water to be dedicated and managed for the natural system necessary to meet CERP restoration goals.

B.1.2.5 Project Assurances - Identification of Water for Other Water-Related Needs

Section 385.35(b) of the Programmatic Regulations also requires that each PIR identify the quantity, timing, and distribution of water made available for other water-related needs of the region.

B.1.2.6 Draft Guidance Memoranda

The Programmatic Regulations require the development of six guidance memoranda jointly by the Corps and SFWMD in consultation with others. The Draft Guidance Memoranda dated July 2007 provided

additional information to complete the analyses initially described in WRDA 2000; however, since the guidance memoranda exist in draft form only, the PIRs completed prior to their approval can use appropriate methods deemed reasonable at the time. The July 2007 Draft Guidance Memoranda are available for review at the following link:

http://141.232.10.32/pm/progr_regs_guidance_memoranda.aspx

Section 385.35(b)(3)(iii) of the Programmatic Regulations specifically states that "PIRs approved before... the development of the guidance memorandum may use whatever method the Corps of Engineers and the non-Federal sponsor deem is reasonable and consistent with the provisions of Section 601 of WRDA 2000." During the preliminary planning phases of the CEPP project, based on consideration of the expedited schedule, the Corps and SFWMD advocated using efficiencies learned from the processes of developing prior PIRs, including prior CERP project methodologies for the technical analyses described in Draft Guidance Memoranda 3 (Savings Clause Requirements) and Draft Guidance Memoranda 4 (Identifying Water Made Available for the Natural System and for Other Water-Related Needs). The two draft memoranda provide additional background information and describe the analyses and tools to address the Savings Clause and project assurances requirements of the Programmatic Regulations. Selected tools appropriate to the CEPP project are also appropriate for the CEPP PACR and were applied to conduct the necessary analyses. The analyses completed for the CEPP PACR, is documented in **Section B.2, Section B.3,** and **Section B.4** within this Annex, meet the intent of the draft memoranda while fulfilling the requirements of Section 601 of WRDA 2000 and the Programmatic Regulations.

Section B.2.1 of this report contains the key assumptions common to Savings Clause and project assurance analyses including an overview of the modeling tools available, the scenario assumptions, and the regional project effects resulting from achieving the CEPP PACR objectives.

Section B.2.2 of this report contains a description of the assumptions, concept, and methodologies applied for the CEPP PACR evaluation of Savings Clause requirements.

Section B.2.3 contains a description of the assumptions, concepts, and methodologies applied for the CEPP PACR evaluations to identify water made available by the project for the natural system and for other water-related needs of the region.

Section B.3 describes the results of these analyses, while **Section B.4** provides conclusions and identifies the amount of water made available by the project for the natural system to be reserved or allocated by the State of Florida and the amount of water made available for other water-related needs.

B.2 METHODS

The same hydrologic models used for plan formulation are typically applied to the Savings Clause and project assurance analyses. This ensures consistency when representing the project effects in the analyses subsequent to plan selection. The Regional Simulation Model (RSM) for Basins (RSM-BN) and the RSM Glades-LECSA (RSM-GL) hydrologic models were used to simulate and evaluate the environmental effects of the CEPP PACR array of alternatives through comparison with pre-project base conditions simulated with the same models. The RSM-BN is applied north of the L-4/L-5/L-6 (the CEPP PACR formulation Red line) for Lake Okeechobee, the Everglades Agricultural Area (EAA), and the Northern Estuaries; the RSM-GL is applied within the Water Conservation Areas (WCAs), Everglades National Park (ENP), and the Lower

East Coast Service Areas (LECSAs). The RSM models uses a 41-year period of hydrologic record (1965 through 2005) which includes sufficient climatological variability (including natural fluctuations of water) to represent the full range of hydrologic conditions experienced within the South Florida region over a long-term period. No one modeling tool or representation of model results can definitively predict with-project hydrologic conditions across the project area given the large regional scope of the project, model tools limitations and assumptions, and future uncertainties regarding the effects of other projects. However, each snapshot of model results can form the basis for applying best professional judgment to determine whether the potential effects of TSP would reduce the availability of an existing source of water or reduce the level of service for flood protection, and to quantify the water necessary to achieve the benefits of the plan.

The plan formulation process applied during CEPP PACR analyzed the environmental effects and benefits of the project alternatives through qualitative and quantitative comparisons between the future without (FWO) project condition and the future with-project condition. The FWO project condition describes what is assumed to be in place if none of the study's alternative plans are implemented. The FWO project condition for CEPP PACR assumes the construction and implementation of authorized CERP and non-CERP projects, and other Federal, State, or local projects constructed or approved under existing governmental authorities that occur in the CEPP PACR study area, as described in **Section 2.5 of the main report**. The future with-project condition describes what is expected to occur as a result of implementing each alternative plan that is being considered in the study. Based on this formulation and evaluation approach, the CEPP PACR alternatives were analyzed as the next–added increment of CERP projects to be included in a system of projects identified as likely to have been implemented after implementation of the CEPP project. The CEPP PACR tentatively selected plan (TSP; Alternative C240) was formulated, evaluated, and justified based on the ability of the TSP: (1) to contribute to the goals and purposes of the CERP Plan, and (2) to provide benefits that justify costs on a next-added basis.

B.2.1 Project Objectives and Associated Baseline Model Assumptions

Viewed from a programmatic perspective, the identification of water for the natural system associated with the CERP involves an analysis of four different aspects of ecological responses to hydrologic changes: 1) responses to the change in the quantity of water received by the natural system; 2) responses to the timing of those deliveries; 3) responses to the distribution of water delivered to the natural system; and 4) responses to the quality of the water received by the natural system. In a project specific sense, however, the relative importance of each of these aspects (quantity, timing, distribution, and quality) will vary from project to project depending upon the specific objectives established for the project.

For example, some CERP projects may focus formulation efforts on simply changing the timing (i.e., seasonality) or distribution (i.e., inflow and outflow points or internal movement) of water delivered to the natural system. Other projects may focus primarily on increasing or decreasing the amount of water delivered to the natural system depending on its needs, while still other projects may focus on improving the quality of the water delivered to the natural system to maintain desirable ecological community structure. These aspects, depending upon their applicability to specific CERP projects, are addressed during plan formulation through performance measures and evaluation criteria used to evaluate alternative plans and ultimately select a plan. Hydrologic targets for the natural system applied during plan formulation help to identify the quantity of water required to meet restoration objectives, in contrast

to water that exceeds the targets and may be harmful or otherwise not contribute to meeting the restoration targets.

The TSP achieves the project objectives by changing the timing, distribution, and volume of water conveyed, to the natural system. The large regional scale of the TSP causes large volumes of water to move between ecosystems and basins consistent with the project's objectives (**Table B-1**). The water made available for the natural system is the water required for the protection of fish and wildlife within natural systems, including water that contributes to meeting hydrologic, water quality, and ecologic targets for natural system restoration. The TSP provides for a further reduction to regulatory releases from Lake Okeechobee to the Northern Estuaries and sends more treated water south to the Greater Everglades. The Savings Clause and project assurances analyses for this TSP will focus on whether these regional-scale changes meet the requirements of WRDA 2000 and the Programmatic Regulations.

Concurrent with development of the operational refinements to the TSP (described in **Section 4.6.2 of the main report**), preparation for Savings Clause and Project Assurances analyses was initiated. The analyses of the Saving Clause and Project Assurance requirements includes considerations of three different sets of assumptions at two different points in time or conditions as depicted in **Table B-2**; 1) The Existing Condition Baseline (EARECB) and 2) the Future Without Project baseline (EARFWO) and 3) future with the project (TSP). Comparison of the TSP to these new baselines resulted in different trends as seen during plan formulation for selected areas as discussed in the results section below. The model assumption tables for all base conditions are provided in the **Hydrologic Modeling Annex (A-2)** to the Engineering Appendix (**Appendix A**).

The CEPP PACR documentation and complete sets of RSM-BN and RSM-GL hydrologic model performance measure output are posted on the SFWMD public web site for the EAA Storage Reservoir:

ftp://ftp.sfwmd.gov/pub/EAASR/

The following complete performance measure data sets are provided to facilitate additional review of the hydrologic modeling output for the baselines and the TSP:

- EARECB, EARFWO, R240, R360, C360 (comparison used for NEPA evaluation in **Section 5 of the main report**)
- EARECB, EARFWO, TSP (comparison used for the Savings Clause and Project Assurances evaluation in **Annex B**)

Table B-1. Goals and Objectives of CERP, CEPP, and CEPP PACR

CERP Objective	CEPP Objective	CEPP PACR Objective
CERP Goal: Enhance Ecological Values		
Improve habitat and functional quality	Reduce high-volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the Northern Estuaries	Further reduce high-volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the Northern Estuaries
	Restore seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades System	Further improve upon restoration of seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades System
	Improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and salt water intrusion	Further improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and salt water intrusion
Increase the total spatial extent of natural areas	No corresponding CEPP objective; consider this objective in future increments	No corresponding CEPP PACR objective
Improve native plant and animal species abundance and diversity	Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization	No corresponding CEPP PACR objective
	Restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function	Further restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function
CERP Goal: Enhance Economic Values and Social Well-Being		
Increase availability of fresh water (agricultural/municipal & industrial)	Increase availability of water supply	Increase availability of water supply
Reduce flood damages (agricultural/urban)	No corresponding CEPP objective; consider this objective in future increments	No corresponding CEPP PACR objective
Provide recreational and navigation opportunities	Provide recreational opportunities	Provide recreational opportunities
Protect cultural and archeological resources and values	Protect cultural and archeological resources and values	Protect cultural and archeological resources and values

Table B-2. Key Assumptions based on Modeling Reports from Engineering Appendix (Appendix A) and Hydrologic Modeling Annex (Appendix A, Annex A-2)

Condition	Intent	Equivalent for Central Everglades Planning Project (CEPP)	Model Scenario
Existing Conditions	Actual conditions at the time the Tentatively Selected Plan (TSP) is selected, including land use, operations, and demands. Demand can be either permitted or projected, whichever is greater.	2017 conditions with only the projects and operations approved and in effect. Includes 2008 Lake Okeechobee Regulation Schedule (LORS) and the Everglades Restoration Transition Plan (ERTP) for WCA 3A and the South Dade Conveyance System. Relative to the CEPP RSM-BN ECB scenario, the RSM-BN EARECB scenario is unchanged in the modeling domain with the exception of Lower Kissimmee River Restoration and the A-1 FEB. Permitted demands are included.	**EARECB**
Initial Operating Regime Baseline	Future conditions at the time the TSP is operational including land use, operations, and demands. Demands can be either permitted or projected, whichever is greater.	The future condition when the project will be initially operated, including other Non-CERP projects, CERP projects (with completed PIRs), and CEPP features, and associated operations. Includes LORS 2008 and ERTP. Permitted demands are included.	**EARFWO**

B.2.1.1 Volume Probability Curves and Stage Duration Curves

To identify the quantity, timing, and distribution of water for the natural system, a probabilistic approach was selected utilizing volume probability curves to depict the distribution of volumes of water that provide natural system benefits as a result of project features or to determine whether water is eliminated or transferred from natural systems. These volumes of water may include water that is available to meet natural system needs without project features and the water made available from TSP features to meet natural system needs through the entire range of historic climatologic conditions. For purposes of identifying the increase in the volume of water for the natural system, volume probability curves were produced depicting the range of the quantities of water delivered for natural system areas and coastal estuaries under all climatic conditions through the RSM period of simulation used to perform project evaluations.

The volume probability curve indicates the probability (percentage of time equaled or exceeded, on the x-axis) that a certain quantity of water (expressed as flow or volume on the y-axis) is made available as a function of historical rainfall distribution. The water quantities are aggregated for each water year within the RSM period of simulation, defined as starting in May of year 1 and continuing through April of year 2 (40 total water years in the 1965-2005 RSM period of simulation). Once computed, the values are ranked from highest to lowest. Volume probability curves quantify the water, along with its timing and distribution to the natural system.

To identify whether the project reduces the level of service of flood protection, evaluations focus on changes to water stages and their frequency within canals and at selected representative monitoring gauge locations within the LECSAs. The RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to

indicate a potential change in flood risk. Like volume probability curves, stage duration curves indicate the probability (percentage of time equaled or exceeded, on the x-axis) that a certain stage (expressed in National Geodetic Vertical Datum [NGVD] on the y-axis) is achieved as a function of historical rainfall distribution. Stages are aggregated for each day in the RSM period of simulation. Once sorted, the values are ranked from highest to lowest. A more localized analysis, with higher resolution hydrologic and/or hydraulic models, will be performed if there is an indication of significant increase in flood risk from the regional analysis.

B.2.2 Analyses for Savings Clause including Intervening non-CERP and CERP Projects

The regional changes to quantity, timing, distribution, and quality of water proposed by the project, as described in **Section B.2.1,** focus on meeting hydrologic restoration targets for the Northern Estuaries, the Greater Everglades (including WCA 2, WCA 3, and ENP), and Florida Bay. The purpose of the Savings Clause analyses is to determine whether there will be an elimination or transfer of existing legal sources of water or reduction to the level of service of flood protection as a result of the project. By comparing stage duration curves and other results from the model simulations in sequential step-wise fashion (EARECB, EARFWO, C240), the effects of the CEPP PACR conveyance improvements, A-2 Storage Reservoir, and A-2 STA project (C240 or TSP) alone can be isolated from intervening non-CERP and/or other CERP project effects (EARFWO). If no reductions to existing legal sources or levels of service for flood protection are indicated at any sequential step during the comparison, then the Savings Clause requirements are determined to have been met. If there is an elimination or transfer of an existing legal source of water, then a new source of water supply to replace the water lost as a result of implementation of the TSP will be identified.

Consistent with the approach outlined in Draft Guidance Memoranda 3, which was developed to meet the intent of WRDA 2000 and the Programmatic Regulation, the following guidance will be applied by the CEPP to address the effects of intervening non-CERP activities:

- Savings Clause analysis only applies to changes from date of enactment of WRDA 2000 that result from “Implementation of the Plan”;
- Intervening non-CERP activities are changes wholly outside of CERP – e.g., Lake Okeechobee Regulation Schedule (LORS) 2008, Modified Waters Deliveries to Everglades National Park (MWD), C-111 South Dade, IOP, ERTP, etc.;
- Savings Clause does not require CERP to make up for reductions in quantity or quality of existing legal sources or levels of service for flood protection caused by intervening non-CERP activities, but CERP cannot cause further reductions;
- Savings Clause does not prohibit CERP from reducing quantity or quality of existing legal sources or levels of service for flood protection increased by intervening non-CERP activities, but CERP cannot reduce those increases below those in place on the date of enactment of WRDA 2000.

To determine whether it is the TSP or other intervening CERP or non-CERP activities are affecting the existing legal sources or levels of service for flood protection, where effects are observed, a series of comparison can be made between the appropriate base conditions and with-project conditions. The first potential comparison is to the EARECB and represents system conditions at the start of CEPP PACR formulation. The EARECB includes effects from implementation of the ERTP for WCA 3A and the South Dade Conveyance System (SDCS), which are an intervening non-CERP activity. The original Pre-CERP

Baseline, which is not used for the CEPP PACR analyses (RSM model representations were not developed), does not include the intervening non-CERP activities and does not reflect revised circumstances under which the project has been formulated and may be implemented.

The only model-based comparison that accurately reflects only the effects of the CEPP PACR TSP is the future with the project condition (TSP) compared to the initial future without the project (EARFWO) (**Table B-3)**. The simulations for TSP and the EARFWO both include the effects of intervening CERP activities that were assumed to be implemented in the future without project condition, including: CEPP; Indian River Lagoon-South Project; Site 1 Impoundment Project; Biscayne Bay Coastal Wetlands Project; Broward County Water Preserve Areas Project; Caloosahatchee River (C-43) West Basin Storage Reservoir; and the C-111 Spreader Canal Western Project.

Table B-3. Summary of Comparisons for Savings Clause for CEPP PACR

Step	Base Condition Model Run	With-Project Model Run
1	Existing Conditions Baseline – EARECB	Alternative C240
2	Initial Operating Regime without the project – EARFWO	Alternative C240

If no reduction at any step, then requirements of Savings Clause have been met.

Because of the incremental formulation of CERP projects contemplated under the formulation process described in the Draft Guidance Memoranda, methods to assess the potential effects of intervening CERP activities were not specifically addressed in the Draft Guidance Memoranda. Since each of these CERP projects assumed for the CEPP PACR future without project condition have completed PIR documents that demonstrate Savings Clause compliance for each of these projects, effects to existing legal sources or levels of service for flood protection that are observed in comparisons between the future without project condition (EARFWO) and the Existing Condition baseline (EARECB) shall not constitute a Savings Clause violation for the TSP. Updated supplemental Savings Clause analyses, using the most current available information, may need to be completed prior to implementation of CERP projects if subsequent revisions to the programmatic Integrated Delivery Schedule (IDS) or other new information is determined by the USACE to significantly change the appropriateness of prior CERP PIR analyses.

In this analysis, the focus is to determine the potential effects of the TSP. The analysis compares the future with the project (C240) to the future baseline without the project (EARFWO). This comparison segregates the effects of the intervening CERP and non-CERP projects. In addition, the TSP is also compared to the existing baseline condition (EARECB). This additional analysis informs evaluators of the cumulative potential effects of both CEPP PACR and other intervening CERP and non-CERP projects relative to conditions experienced previously.

B.2.2.1 Savings Clause – Elimination or Transfer of Existing Legal Sources of Water

To analyze the potential elimination or transfer of existing legal sources, affected basins or users are evaluated. The basins and users that may be affected by the project are displayed in **Table B-4,** classified according to the categories identified in WRDA 2000.

Table B-4. Existing Legal Sources Evaluated for Elimination and Transfer

WRDA 2000, Section 601(h)(5)	User or Natural System Evaluated in CEPP PACR
(i) an agricultural or urban water supply;	• Lake Okeechobee Service Area (LOSA), including the Everglades Agricultural Area (EAA) • Lower East Coast Service Area 2 (LECSA-2) • Lower East Coast Service Area 3 (LECSA-3)
(ii) allocation or entitlement to the Seminole Indian Tribe of Florida under section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e);	• Brighton Reservation • Big Cypress Reservation
(iii) the Miccosukee Tribe of Indians of Florida;	• Alligator Alley Reservation (west of WCA 3A) • Tamiami Trail Reservation (south of WCA 3A) • Reservations at Tamiami Trail/Krome Avenue
(iv) water supply for Everglades National Park; or	• ENP
(v) water supply for fish and wildlife.	• Caloosahatchee Estuary • St. Lucie Estuary • WCAs 2 and 3 • Florida Bay

The primary RSM-BN and RSM-GL model results evaluated for effects to agricultural or urban water supply are the volume and/or frequency of cutbacks, which is applicable to the Lake Okeechobee Service Area (LOSA), Lower East Coast Service Areas (LECSAs), and the Seminole Tribe of Florida's Brighton and Big Cypress reservations. Additional information available to evaluate agricultural and urban water supplies includes regional groundwater differences maps, seepage volumes across the East Coast Protective Levee (ECPL), regional water supply deliveries, and canal stages near public water supply wellfields. These metrics are indicators of whether the water supply demand in the LECSAs can continue to be met by the regional system, including Lake Okeechobee, the WCAs, and the surficial aquifer system. The selected metrics provide more direct and higher resolution measures of potential water supply effects for the CEPP PACR Savings Clause assessment than would be provided through assessment of inflow volume probability curves for each user group or basin. Analyses within the LECSAs are performed for LECSA 2 and 3 only (essentially Broward and Miami-Dade Counties, respectively) since these basins are affected by the CEPP PACR. Significant changes to LECSA 1 (Palm Beach County) and the North Palm Beach Service Area are not indicated in the CEPP PACR modeling comparisons, and WCA 1 remains unchanged. For the Miccosukee Tribe of Indians of Florida, stage duration curves for gauges in WCA 3 and hydropattern maps of WCA 3 are evaluated.

For ENP, the RSM-GL water year flows into ENP at its northern boundary will be compared. For the two Northern Estuaries, the analysis focuses on whether the project eliminates or reduces deliveries to meet the low flow criteria targets for the Northern Estuaries. The high flows to the estuaries are not subject to a Savings Clause analysis because these flows are damaging to the estuaries, and one of the CEPP PACR objectives is for reduction of damaging high flows. For WCA 2 and WCA 3, the change to inflows relative to CEPP PACR objectives was evaluated. Although there is only a statistical relationship between Shark River Slough hydrology and Florida Bay salinity, and there needs to be a better understanding of the geophysical mechanisms that control salinity, statistical models indicate that additional inflows to Shark River Slough will decrease salinities in Florida Bay. The overland flows at Transect 27 for Shark River Slough

and Transect 23 (including T23A, 2T3B, and T23C) for Taylor Slough were evaluated as indicative of changes in Florida Bay. and Transect 23 (including T23A, 2T3B, and T23C) for east/central Florida Bay), were also evaluated (**Figure B-1**).

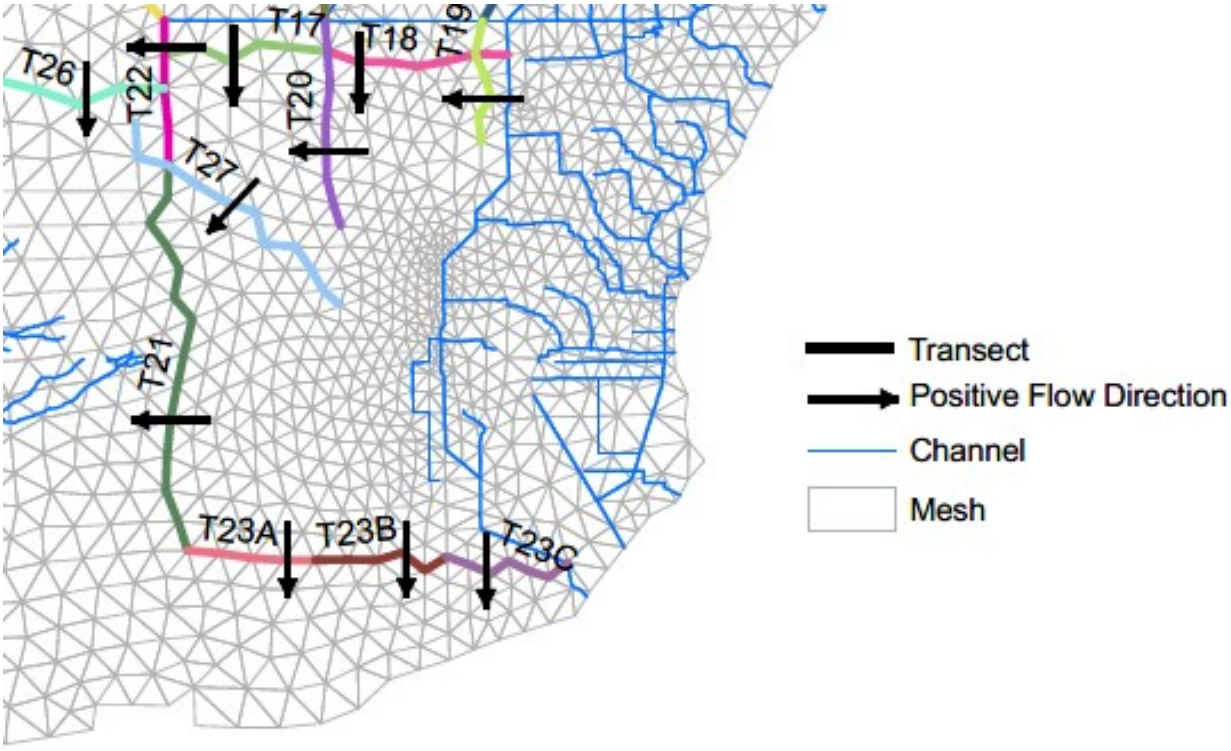

Figure B-1. Location Map for RSM-GL Transects Used for Florida Bay Analysis

B.2.2.2 Savings Clause - Flood Protection

Flood protection is evaluated by a combination of best professional judgment interpreting model results and engineering analyses. Consistent with the Draft Guidance Memoranda, the same models and results used for plan formation were applied for the CEPP PACR Savings Clause assessment. This varies from typical storm event analyses by using a long period of record simulation and focusing on the wet events included within the 1965–2005 simulation period.

As an example of an extreme wet event encompassed within the CEPP RSM-BN/RSM-GL simulation period and therefore included in the CEPP PACR evaluations, Hurricane Irene in late 1999 (13–17 October) may be specifically considered. During this historical storm event, several monitoring sites in Broward, Miami-Dade, and Palm Beach counties, including WCAs 1, 2, and 3, received the 24-hour, 48-hour, and 72-hour maximum rainfall amounts that would be expected to occur once in 100 years, with cumulative rainfall in excess of 9 inches (SFWMD Technical Publication EMA #386, May 2000). Notably, however, as documented within the CEPP PACR RSM model output hydrographs peak stages within the simulation period of record for the project area typically occur outside of this 1999 event. The occurrence of the majority of peak stages for WCAs 1, 2, and 3 during 1994–1995 and the occurrence of peak stages for Lake Okeechobee during 1969–1970 indicates that, for these specific areas, these other hydrologic combinations of storm events and wet antecedent conditions also observed within the simulation period

may correspond to a lower frequency of occurrence (return period greater than 100 years) than the 1999 event.

The four features or areas affected by the project that will be analyzed include 1) the potential risk to Herbert Hoover Dike (HHD) due to changes in the Lake Okeechobee stages, 2) the A-2 Reservoir and A-2 STA located in the EAA, 3) the effects of changed water levels in WCA 3A and WCA 3B on the Everglades Protective levees (L-31N and L-31W), L-67, L-29, and L-30, and 4) the agricultural and urban areas located east of the Everglades Protective levees L-31N and L-31W.

B.2.2.2.1 Lake Okeechobee Herbert Hoover Dike

For the HHD, risk and uncertainty associated with increased lake stages were assessed consistent with the HHD formulation assumptions established for the CEPP PACR future without condition. There are structural integrity concerns with the embankment and internal culvert structures that resulted in a Dam Safety Action Classification (DSAC) risk rating of Level 1. DSAC Level 1 represents the highest USACE dam risk of failure rating and requires remedial action. The HHD Dam Safety Modification Study (DSMS) Final EIS[1] from 2016 divided the 143-mile dike into 32 segments for analysis. The recommended plan identified in the DSMS provides cost-effective structural measures that work in unison to reduce the likelihood of a breach at HHD. The DSMS recommended plan includes construction of risk reduction measures such as cutoff walls and seepage management systems around the southern half of HHD and limited areas in the northwest sides of the dam. These USACE efforts are intended to lower the DSAC rating from Level 1. The CEPP PACR future without project condition assumes the planned remediation of HHD will lower the DSAC risk rating and are expected to be completed by 2025. These remediation measures will not resolve all issues with the HHD dam, nor will all current design criteria be met.

Prior to the 2008 LORS, Lake Okeechobee operated under the Water Supply and Environmental Regulation Schedule (WSE). The 2006-2008 LORS study was initiated because of adverse environmental impacts that WSE had on the lake ecology. Dam safety was later added as a performance criterion since lowering of the lake, as the LORS study was pursuing, is one of the basic Interim Risk Reduction Measures implemented for deficient dams until appropriate remediation is effectuated. The WSE held Lake Okeechobee stages approximately 1.0–1.5 feet higher than the 2008 LORS under wet conditions. Studies for the remediation of HHD are based on the 2008 LORS, which was used as the basis for the development of the Standard Project Flood (SPF) condition. The SPF is the design condition used for the risk assessment and remediation to address internal erosion failure modes.

B.2.2.2.2 A-2 Reservoir and A-2 STA Located in the EAA

Operational stages for the A-2 Reservoir feature were managed between 0.00 and 22.60 feet depth. The A-2 reservoir inflow pump station is shut off when the reservoir depth reaches 22.60 feet. Structural inflows to the A-2 Reservoir would be discontinued when depths exceed 22.60 feet, although additional rainfall may further increase stages. Hydraulic design of the A-2 Reservoir perimeter levee system included consideration of the stage variability for A-2 Reservoir operations. Operational stages for the A-2 STA are managed between 0.00 and 4.00 feet depth. Consistent with the evaluation approach identified in Draft Guidance Memoranda 3, the assessment for the level of service for flood protection was based on the performance of the flood control system when modeled against the period of record (1965-2005), and

[1] USACE. 2016. Environmental Impact Statement. Herbert Hoover Dike Dam Safety Modification Study, Glades, Hendry, Martin, Okeechobee and Palm Beach Counties, Florida. June.

the assessment does not further consider specific design flood targets such as the 10-year or 100-year flood event.

Detailed assessments of the TSP within the EAA were conducted. MIKE SHE / MIKE 11 model results indicate there are no adverse impacts to flood protection in the EAA. Therefore, based on plan formulation modeling, the TSP meets the Savings Clause requirements to maintain the pre-existing levels of flood protection. Additional information and model results can be found in **Appendix A, Engineering**. Additional assessments of potential effects from the TSP will be refined during the preconstruction engineering and design phase (PED). Information regarding the design considerations for flood protection is included in **Section B.3.2.2**.

B.2.2.2.3 WCA 3A and WCA 3B Water Level Changes and the East Coast Protective Levee

The USACE Final ERTP EIS and Record of Decision (ROD; signed on 19 October 2012) identified the 1960 WCA 3A 9.5 to 10.5 feet, NGVD Regulation Schedule as an interim measure water management criterion for WCA 3A Zone A. This change to Zone A, compared to the previous IOP for WCA 3A regulation, was necessary to mitigate for the observed effects, including discharge limitations of the S-12 spillways. Based upon the interim water management criteria for WCA 3A as well as the current condition of endangered species within WCA 3A, the ERTP EIS concluded that IOP is no longer a viable option for water management within WCA 3A and SDCS. The preliminary USACE Water Resources Engineering Branch (EN-W) analysis of WCA 3A high water levels, which was integrated into the ERTP EIS, also recommended further consideration of additional opportunities to reduce the duration and frequency of Water Conservation Area 3A high water events (ERTP Final EIS, Appendix A-5).

Formulation efforts for the CEPP PACR TSP attempted to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the Future Without Project (EARFWO) condition used during formulation of CEPP PACR, which includes ERTP. The ERTP constraint precluded raising of the top of the WCA 3A Regulation Schedule, while simultaneously recognizing that substantial benefits were still expected and that goals to further lower stages in WCA 3A were consistent with the constraint. The WCA 3A analysis provided in **Section 3.2** provides comparisons between the final updated future without project baseline (EARFWO) and the with-project condition (TSP); continued reliance on the WCA 3A three-gauge average stages for assessment of WCA 3A high water frequency, durations, and peak stages is consistent with the original WCA 3A design assumptions and the ERTP assessment (average of stages at the monitoring gauges of 3A-3, 3A-4, and 3A-27); increased weight would not be considered for a single gauge, such as 3A-28 (Site 65).

B.2.2.2.4 Agricultural and Urban Areas Located East of the East Coast Protective Levees

Flood protection in Miami-Dade County is of special concern due to the proximity of agricultural land uses, urban areas, and the Everglades. A complex network of canals, structures, culverts, impoundments, and pumps work in tandem to minimize seepage losses from the Everglades yet meet water supply and flood protection needs of agricultural and urban users. Selected gauges, groundwater difference maps, seepage from regional system, and other model results were evaluated collectively to determine if the level of service for flood protection was affected.

For the agricultural and urban areas located east of the East Coast Protective Levees (L-31N and L-31W), the RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to indicate a potential change in flood

risk. Using the 1983 to 1993 stage duration curve data from the RSM-GL calibration and verification, the percentage of time the stage is above the root zone can be calculated and the information can be used to give an indication that additional flood control evaluation in the vicinity of a particular RSM-GL cell(s) may be needed. Six gauges or cells were evaluated consistent with Restoration Coordination and Verification (RECOVER) performance measure (**Figure B-2**). In addition, a gauge near Tamiami Trail, G-3439, was also evaluated. It is located near the neighborhoods called Belen, Sweetwater, Serena Lakes, and Country Walk, which have experienced flood conditions historically (**Figure B-3**). The most important part of the stage duration curve for flood protection assessment is the range of higher stages. Therefore, exceedances were evaluated for wet periods. Specifically, frequency and magnitude evaluations are made at the highest 1 to 20 percentiles of the curve, and relative magnitude of difference evaluations are made at the 10 % frequency of stage duration. An alternative is of concern when the stages are noticeably higher than the 1983-1993 curve and when the higher stages occur for longer periods of time. Differences occurring deeper than 2 feet below land surface elevation are disregarded. It should be noted that usefulness of the 1983-1993 calibration data used in the official RECOVER performance measure was determined based on the South Florida Water Management Model (SFWMM). Confirmation that the RSM's calibration data bodes similar results (the RSM-GL calibration period is 1984–1995, and the verification periods are 1981–1983 and 1996–2000) or can be applied in the same manner as SFWMM has not been completed. A more appropriate comparison is the EARECB baseline in the SDCS, which include the ERTP water control plan.

The stage duration curves for the LEC canals adjacent to WCA 3B and ENP and selected monitoring gauges throughout the LEC were also assessed as part of the Savings Clause flood protection evaluation. The stage duration curves for these canals and gauges were assessed for increased stages within the upper 10th percentile, which were assumed as a representative indicator of potential increased flood protection risk.

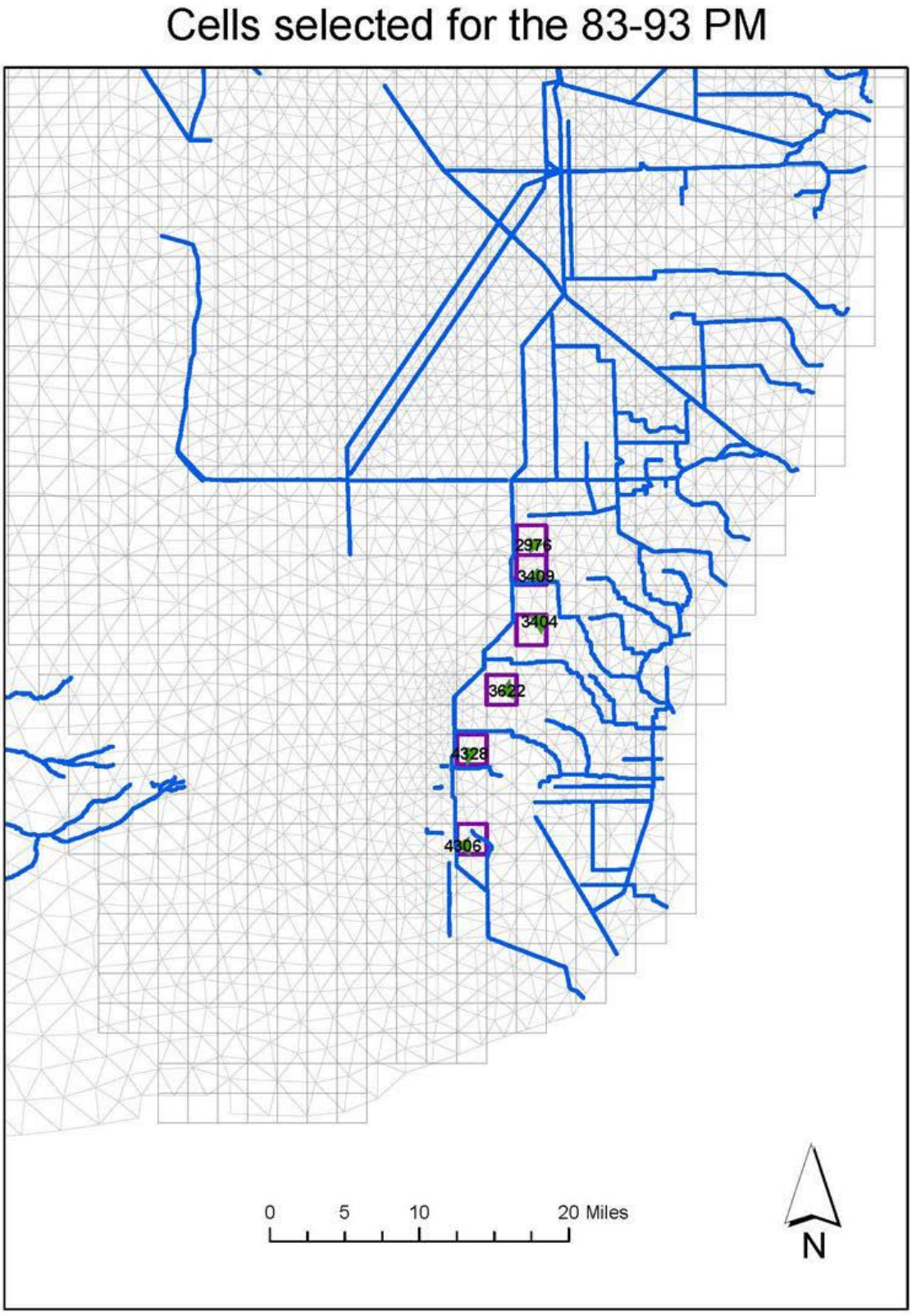

Figure B-2. Location of Cells Evaluation for Potential Effects to Agriculture in South Miami-Dade County

Figure B-3. Location of G-3439 (red dot) Relative to the Neighborhoods

B.2.3 Analyses for Project Assurances – Identifying Water Made Available by the Project for the Natural System and Other Water Related Needs

Identification of water for the natural system is based on the concept of water needed to achieve the benefits of the project and the overarching objective of restoration, preservation, and protection of the South Florida Ecosystem. The water made available for the natural system is the water required for the protection of fish and wildlife, including water that contributes to meeting hydrologic, water quality, and ecologic targets for restoration of natural systems. Hydrologic targets for the natural system applied during plan formulation help to identify water required to meet restoration objectives, in contrast to water that exceeds the targets and may be harmful or otherwise not contribute to meeting the restoration targets.

Water for project assurances is quantified where project benefits accrue, consistent with the habitat unit benefits quantified during TSP plan formulation resulting from water being made available by the project.

The ability of the TSP to provide water to meet other water-related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed. The basins where the project may potentially supply water for the natural system or other water-related needs are listed below:

- Natural System
  - Everglades
  - WCA 2 and 3
  - ENP including Florida Bay
- Other Water-Related Needs
  - LOSA including EAA
  - LECSA-2
  - LECSA-3

Identification of the water made available by the project requires analyses of the RSM-BN and RSM-GL results for the TSP. The identification of water involves both 1) existing water in the system that is available to the natural system and available for other water-related needs, and 2) water made available by the project to the natural system and for other water-related needs, as depicted in **Figure B-4**. The sum of these two categories is the total water that is expected to be available to the natural system and available for other water-related needs.

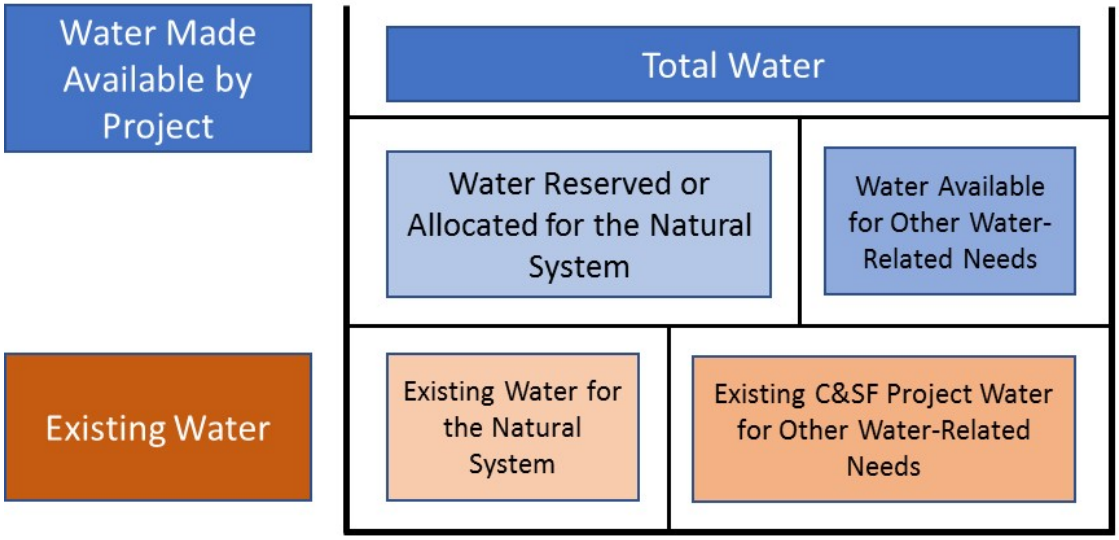

Figure B-4. Water Needed to Achieve the Benefits of the Plan

Both categories of the water can be quantified by calculating the flows in the regional system. The existing water supply in the C&SF Project system includes previously identified or reserved water associated with other CERP projects. For this analysis, CEPP; Caloosahatchee River (C-43) West Basin Reservoir, Indian River Lagoon-South C-44 Reservoir, Site 1 (Fran Reich) Reservoir, Broward County Water Preserve Areas, Biscayne Bay Coastal Wetlands (not included in the RSM-GL model), and C-111 Western Spreader Canal were included in the future without project (EARFWO). The total water available with the project is represented by the with-project condition (TSP, C240A model run). The difference between these two

conditions represents the water made available by the project (TSP (C240A) minus EARFWO) as depicted in **Table B-5.**

Table B-5. Summary of Analyses for the Identification of Water Made Available by the Project

Analysis	Water for the Natural System
Existing pre-project water for the natural system	EARFWO
Total water for the natural system with the project	TSP (C240A)
Identification of water made available by the project	Difference between TSP and EARFWO

To follow the habitat unit benefits calculated during plan formulation, three spatial locations were selected to quantify the water needed to achieve the benefits of the CEPP recommended plan: inflows to WCA 3, inflows to ENP, and overland flows towards Florida Bay. These specific locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the TSP.

- Surface water inflows into WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, flows into northeast WCA 3A via the S-150 gated culvert, and STA-5/6 outflows to northwest WCA 3A for the EARECB, EARFWO base conditions; for the TSP, the combined flows from the S-8 pump station discharges to the Miami Canal and discharges to the S-8A gated culvert (which diverts water to the L-4 Levee degrade gap) are included in addition to S-150 and STA-5/6 outflows to WCA 3A.
- Surface water inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G) and S-356.
- Overland flows towards Florida Bay are quantified for RSM-GL Transect 23 (southeast ENP) and Transect 27 (Central Shark River Slough). Although there is only a statistical relationship between Shark River Slough hydrology and Florida Bay salinity, and there needs to be a better understanding of the geophysical mechanisms that control salinity, statistical models indicate that additional inflows to Shark River Slough will decrease salinities in Florida Bay.

Quantification of water made available for the natural system is displayed using volume probability curves. The 10th, 50th, and 90th percentiles will be identified for the TSP and the EARFWO. The difference between these conditions is the water made available by the project for the natural system. Benefits projected for the Northern Estuaries are the result of reduced discharges from Lake Okeechobee, and therefore do not require additional water to be reserved for the natural system.

To evaluate whether additional water is made available by the project to meet other water related needs, specifically water supply in LOSA, the changes to the level of service were evaluated. For the LECSAs, whether additional water has been made available by the project in the regional system is quantified as the increase in demand above the pre-project public water supplies (EARFWO) in LECSA 2 and LECSA 3 that could be met without affecting the benefits accrued to the natural system. The increase in demand identified in CEPP PIR is included in the future with-project condition, the EARFWO.

B.2.4 Elimination or Transfer of Existing Legal Sources of Water

B.2.4.1 Lake Okeechobee Service Area

Consistent with the WRDA 2000 and the Programmatic Regulations, the Savings Clause analysis removes the effects of the intervening non-CERP projects and compares the with-project condition (TSP) to the without project condition (EARFWO).

The volume of demand for existing legal users not met for the LOSA during the 8 years with the largest water shortage cutbacks in the period of simulation is improved when comparing the with-project condition, TSP, to the without project condition, EARFWO. The severity, duration, and magnitude of water supply shortages for existing legal users decrease with the project. An additional 2% to 15% of the demands are met in the 8 years with the largest water supply shortages (**Figure B-5**). Over the entire period of simulation, the average annual volume water shortages decline by 6,000 ac-ft in the with-project condition compared to the without-project condition (TSP averages 23,000 ac-ft of water shortages and EARFWO 29,000 ac-ft of cutbacks for the EAA area and Other LOSA areas) (**Figure B-6**).

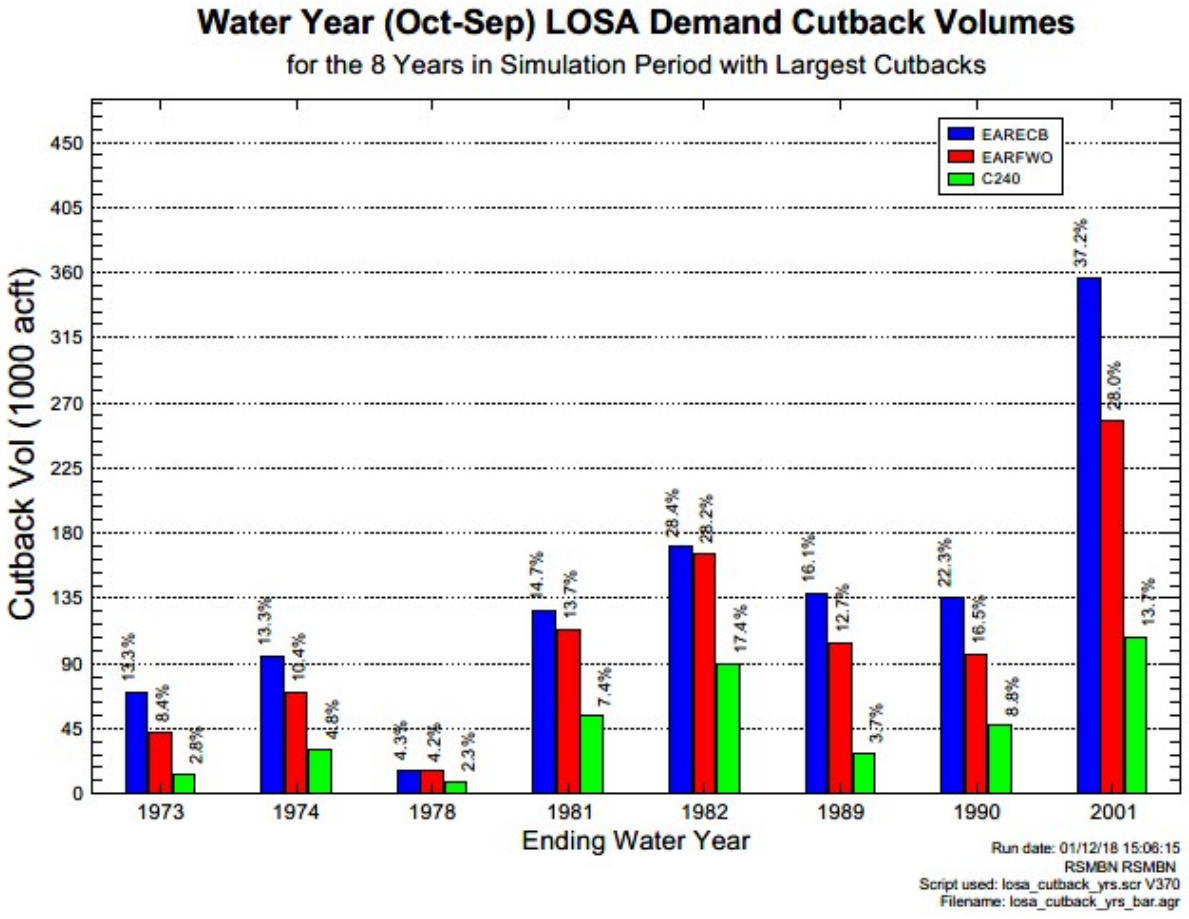

Figure B-5. LOSA Demand Cutback Volumes for the 8 Years with the Largest Cutbacks

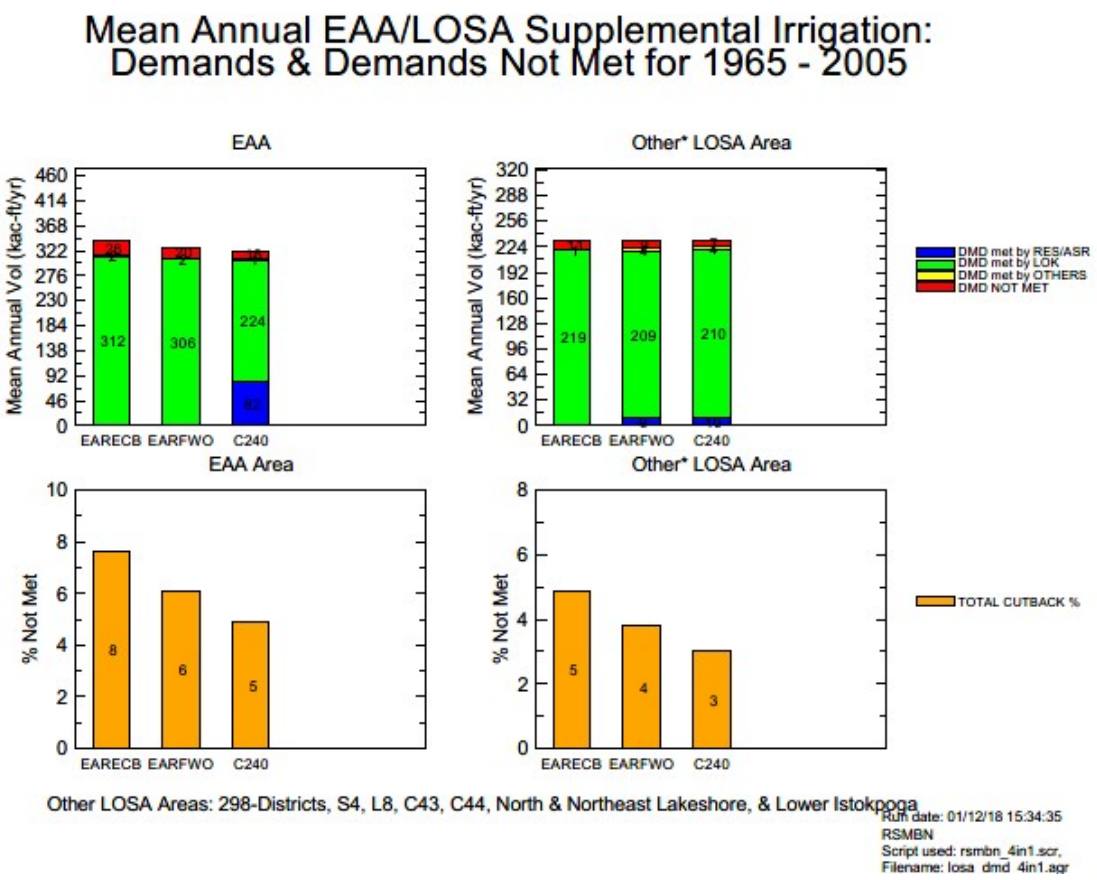

Figure B-6. Mean Annual EAA/LOSA Supplemental Irrigation: Demands & Demands Not Met for 1965–2005

An additional analysis compares the EARECB to TSP. Each of the eight years with the largest water shortage cutbacks indicate the volume of water supply cutbacks are decreased. The reduction in percentage of demands not met during water shortage is by 2% to 24% for the with-project condition (TSP) compared to the existing condition (EARECB). Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 13,000 ac-ft in the with-project condition compared to the existing baseline (TSP averages 23,000 ac-ft of cutbacks, and EARECB average is 36,000 ac-ft of cutbacks for LOSA).

Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee would be stored in the A-2 Reservoir for other water-related needs. This water for other water-related needs is contingent on a LORS update to ensure the required operational flexibility and utilization of the A-2 Reservoir. The TSP differs from the EARFWO in how it meets other water-related needs. Instead of discharging all water stored in the A-2 FEB to STA 3/4 as assumed in the future without project (EARFWO), the TSP returns water to the Miami and North New River to maintain canal levels when excess capacity is available beyond restoration flows. This added operation does not affect existing permitted allocations within the EAA. The additional water conveyed to both the Miami River and North New River canals included in the TSP improves the ability to meet existing permitted demands in the LOSA by retaining more water in the regional system and making it available to agricultural users. This operation also allows the A-2 Reservoir

to cycle more often and capture more Lake Okeechobee regulatory releases or EAA runoff that can be directed to the STAs for treatment prior to reaching the Greater Everglades.

B.2.4.2 Lower East Coast Service Area

Existing legal sources of water in the LECSA include groundwater withdrawn by public utility wellfields, private wells, irrigation wells, and surface water withdrawals for landscape, public water supply, recreation, and agricultural uses in the LECSA 2 and LECSA 3. The Seminole Tribe of Florida also withdrawals groundwater to meet water supply demands in LECSA 2. Project features and operations are designed to maintain canal and groundwater stages, manage additional seepage quantities, and maintain overall flows to the LECSAs. The water the CEPP PACR project provides to WCA 3A would meet State water quality standards as required by Section 385.53(b)(3)(i) of the Programmatic Regulations. This additional water would be conveyed south to ENP, with some portion reaching the LECSA through recharge of the surficial aquifer system.

In the LECSA, the water supply demand continues to be met by the regional system including Lake Okeechobee, the WCAs, and the surficial aquifer system. The ability to continue to meet urban and agricultural demands with CEPP PACR implementation is evaluated by assessing relative changes in the frequency of water supply cutbacks in LECSA 2 and LECSA 3. Although the RSM-GL model predictions of the absolute number of water supply cutback events and the corresponding frequency of occurrence have a high degree of uncertainty, relative comparisons between the RSM-GL base conditions and the RSM-GL with-project condition (TSP) provide a meaningful comparison to quantify potential effects of the project. Water supply cutbacks to the LECSAs can be triggered by Lake Okeechobee stages or by local groundwater levels.

In the with-project condition (TSP) and future without (EARFWO), the number of water years with lake triggered cutbacks during the period of simulation is 13 events and local groundwater triggered cutbacks is 19 events in LECSA 2. The total number of cutbacks events and the resulting frequency for LECSA 2 remains the same for the two conditions at 32 events (**Figure B-7** and **Figure B-8**), indicating no change for water supply performance within LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events in the TSP or EARFWO modeling simulations. The number and frequency of water years with cutback events is also the same for the lake triggered cutback events in the EARFWO and TSP at 13 events (**Figure B-9** and **Figure B-10**).

Comparisons to the existing condition base condition (EARECB), the TSP has one less cutback event than the existing condition base condition (33 cutback events compared to 32 events) in LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events in the EARECB. The total number of lake triggered cutback events is the same for TSP and the EARECB, at 13 events (**Figure B-11** and **Figure B-12**).

A comparison of the regional groundwater stage difference map comparing TSP and the EARFWO was used to identify where systemic groundwater reductions may occur. The April 1989 and April 2001 difference maps were selected to determine whether the project affects groundwater levels during specific dry year conditions where regional water levels are most likely to be impacted. April is typically the driest month of the year and 1989 was one of severest droughts within the period of simulation. For the comparison of the TSP and the EARFWO, the average April 1989 regional water levels were maintained and there are no differences in groundwater levels in LECSA 2 and LECSA 3 (**Figure B-13**). Although less severe than the 1989 drought across the LEC, 2000–2001 was also a significant drought period for South

Florida. For the comparison of TSP and the EARFWO, the average April 2001 regional water levels were maintained in LECSA 2 and LECSA 3 (**Figure B-14**).

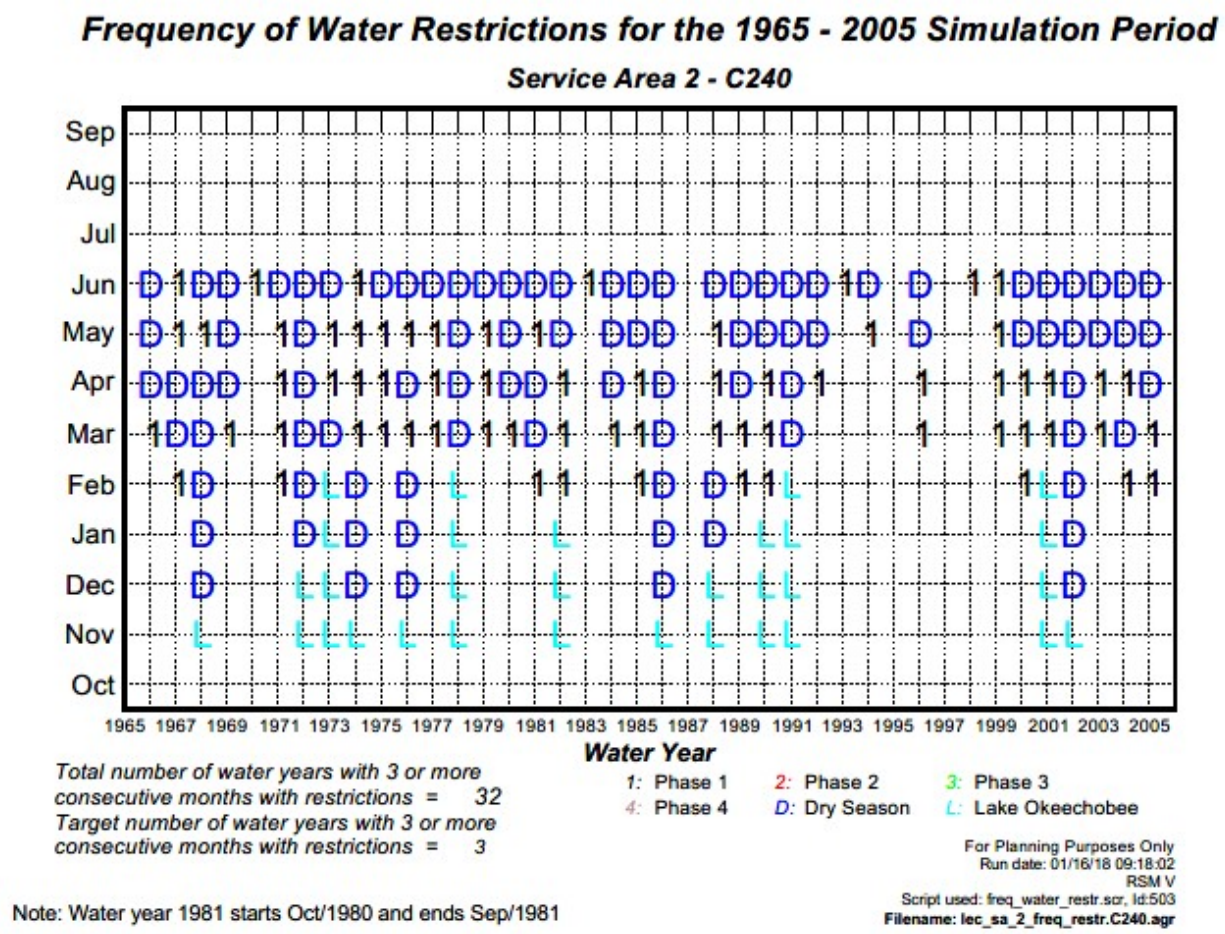

Figure B-7. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 TSP

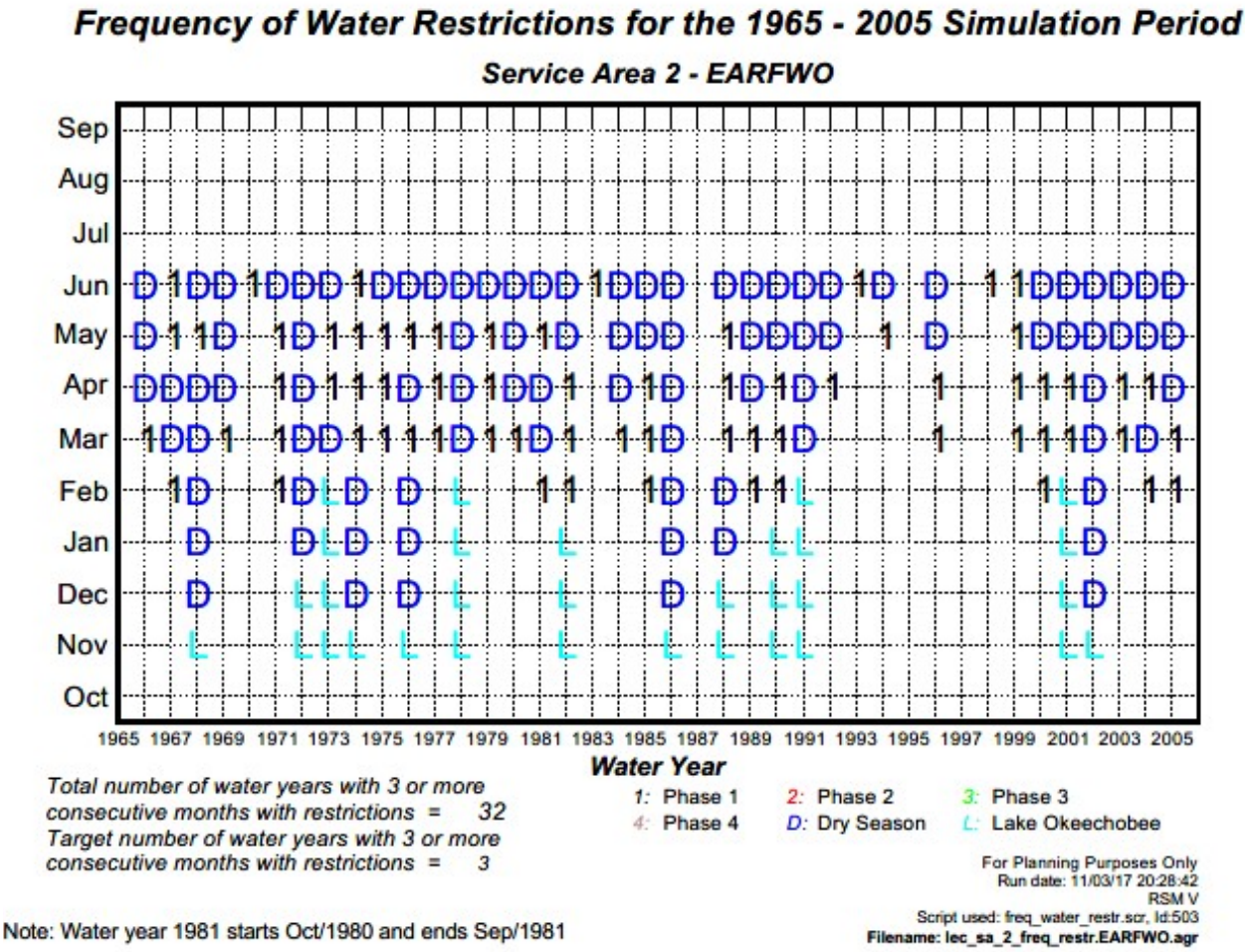

Figure B-8. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 EARFWO

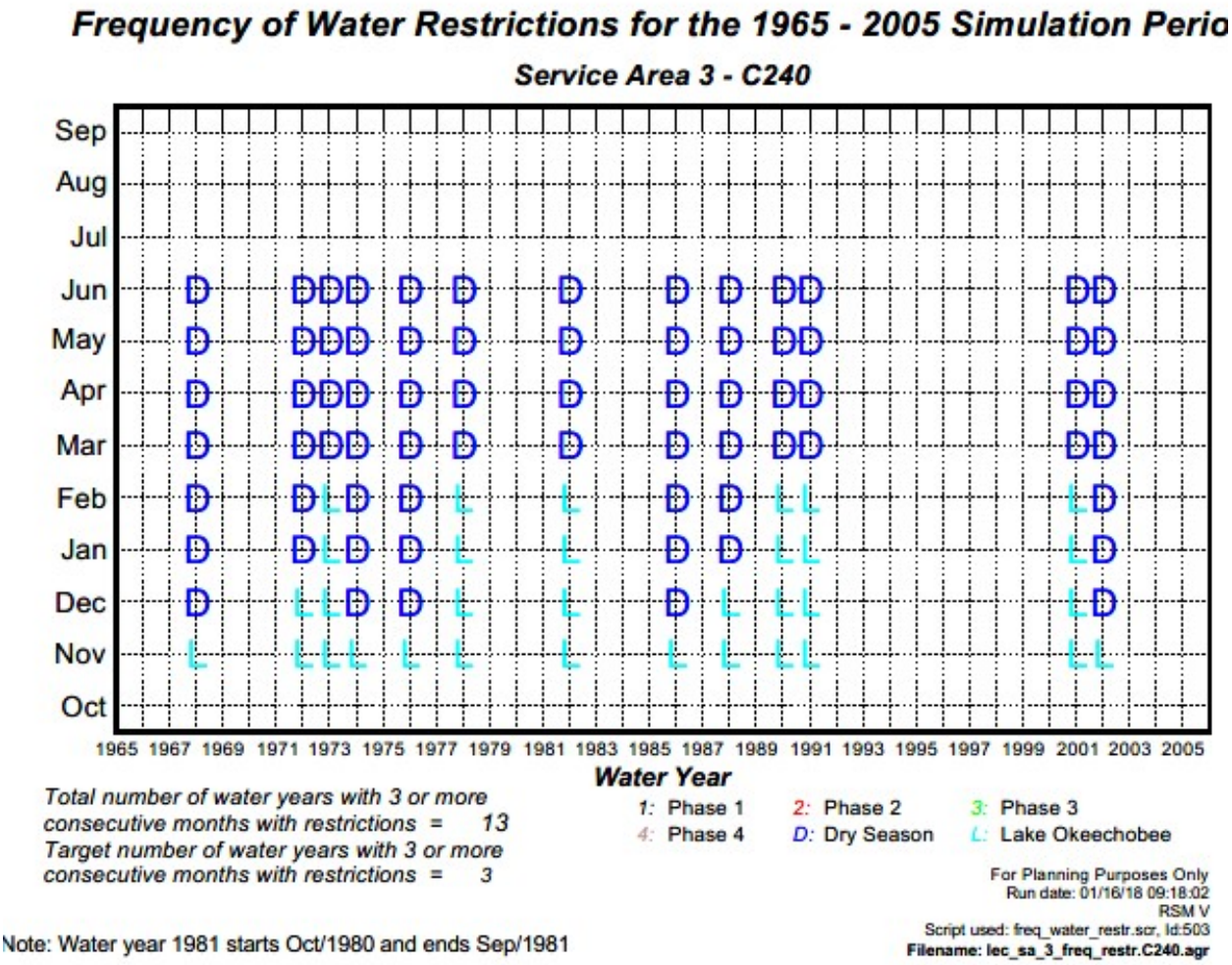

Figure B-9. Frequency of Water Restrictions for the 1965-2005 Simulation Period for the LECSA 3 TSP

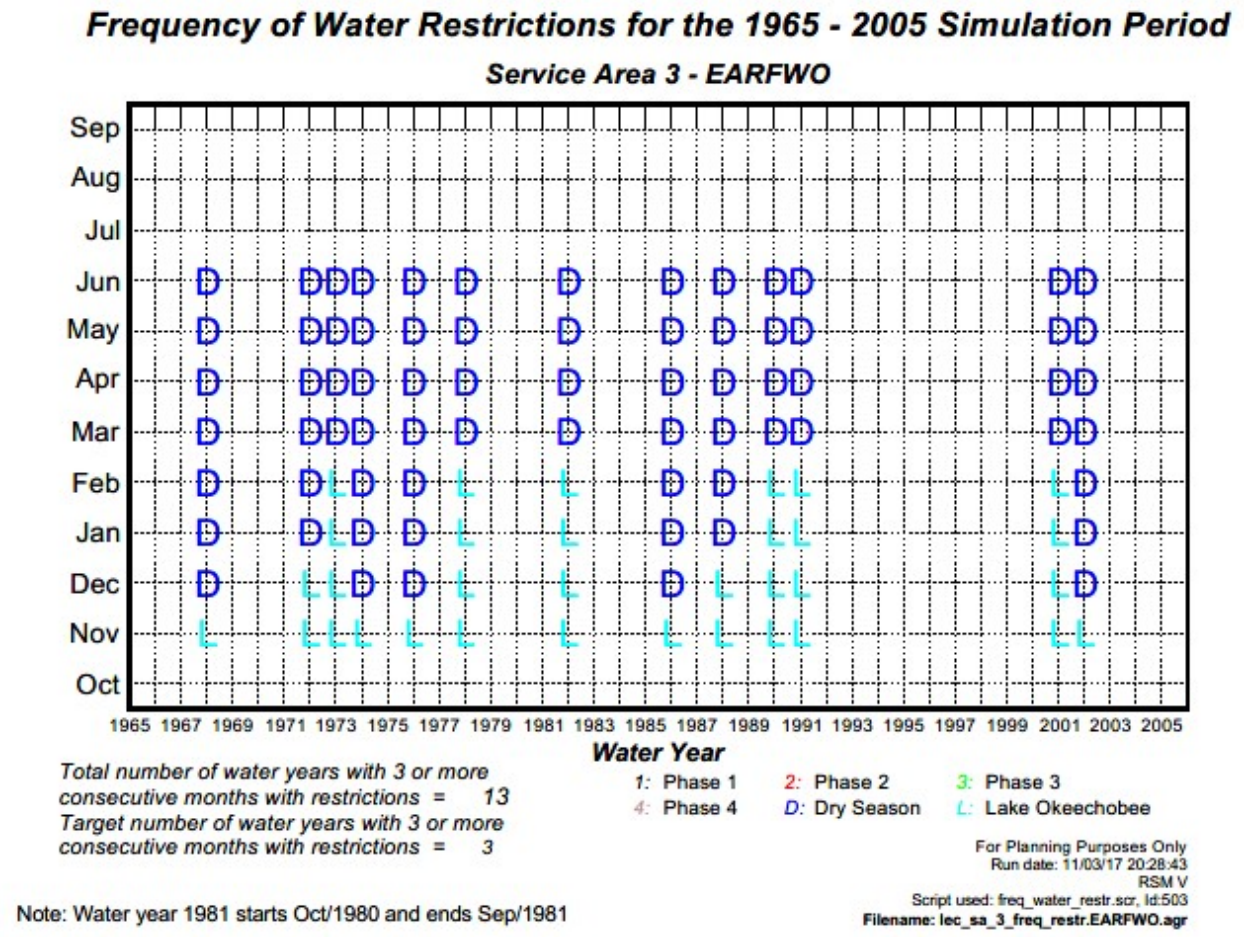

Figure B-10. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 EARFWO

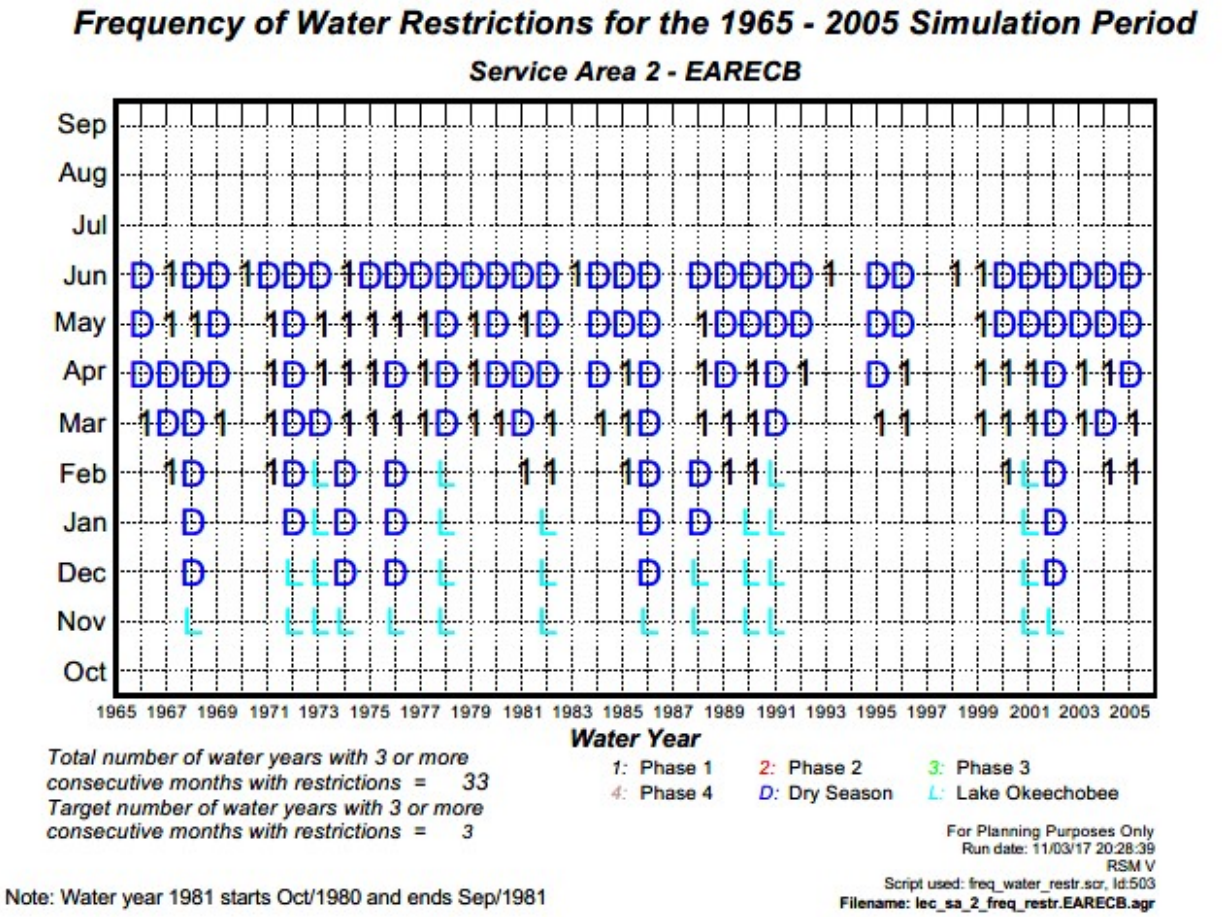

Figure B-11. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 EARECB

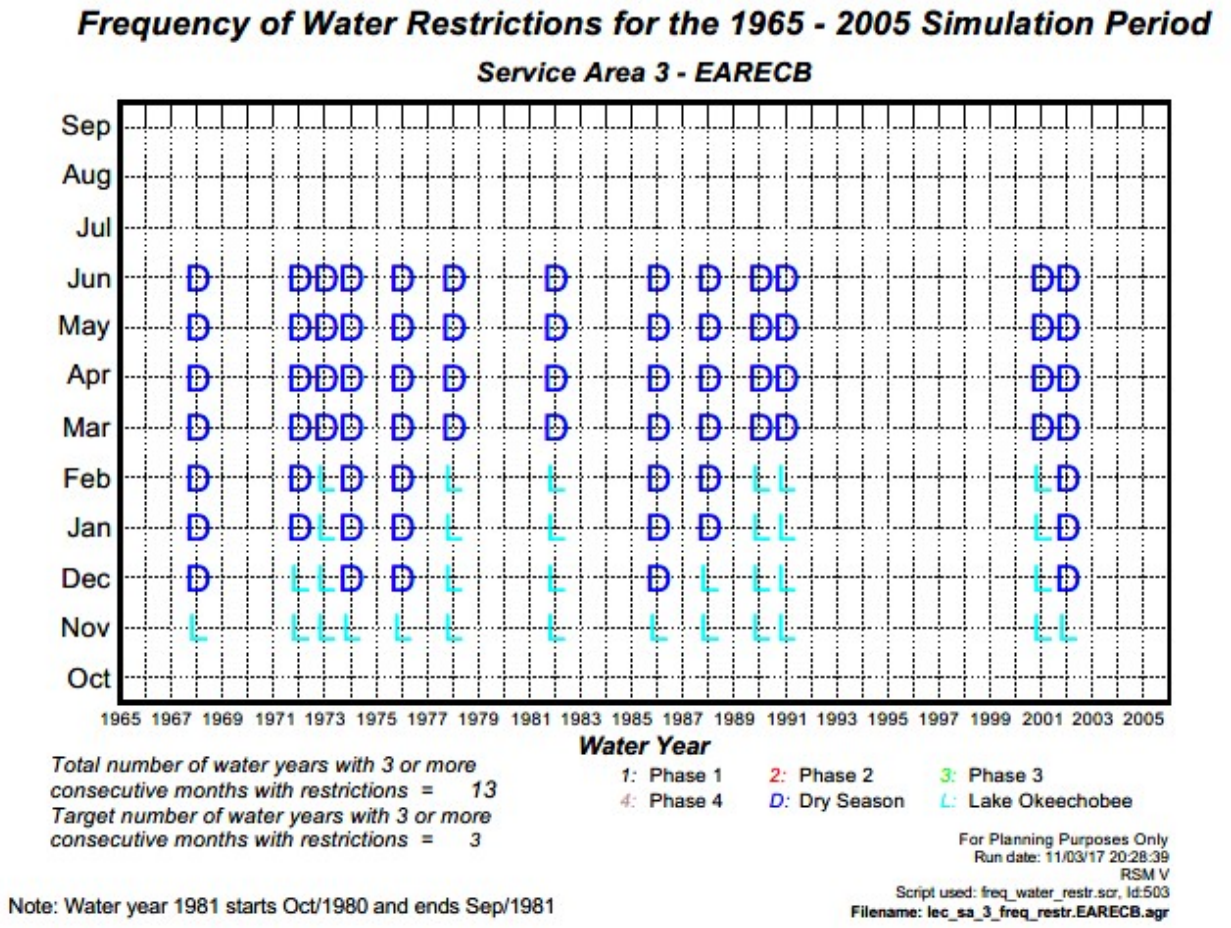

Figure B-12. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 EARECB

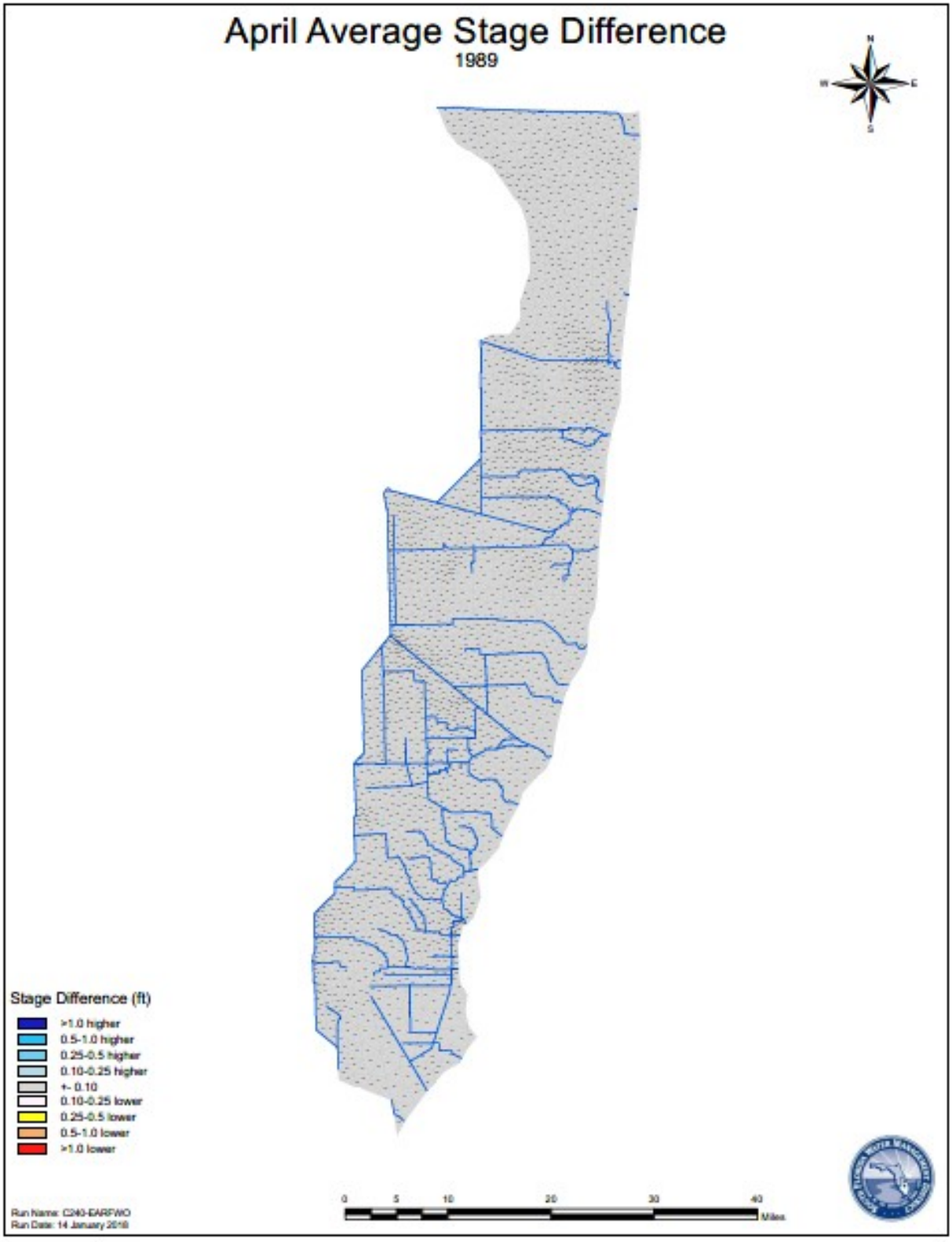

Figure B-13. April 1989 Groundwater Stage Difference Map for TSP and EARFWO

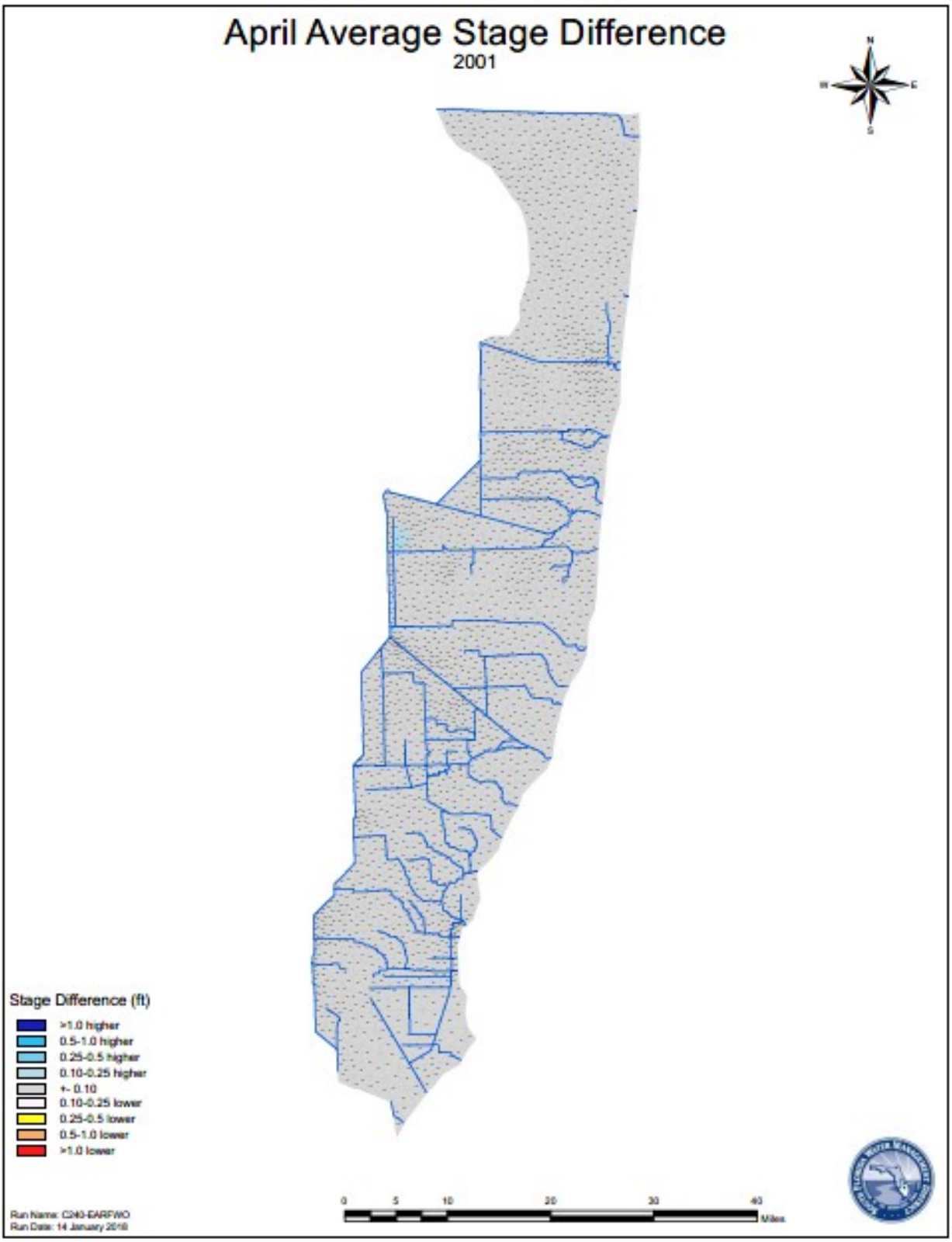

Figure B-14. April 2001 Groundwater Stage Difference Map for TSP and EARFWO

B.2.4.3 Seminole Tribe of Florida

Both the Brighton and Big Cypress Reservations depend partially on Lake Okeechobee for supplemental irrigation water supplies for agricultural and other needs. The unmet demand volume and percentage of water demand not met can be compared to assess the ability of existing legal sources to continue to meet demands. For the Brighton Reservation, the unmet demand volume and percentage of demand not able to be met are essentially the same in the with-project condition (TSP) and the without-project condition (EARFWO). In the with-project condition (TSP), the unmet demand volume and percentage of demand not able to be met are 1,000 ac-ft and 2.5%, respectively; for the without-project condition (EARFWO), the unmet demand volume and percentage of demand not able to be met are 1,000 ac-ft and 3.2%, respectively. For the Big Cypress Reservation, the unmet demand volume and percentage of demand not able to be met are essentially the same as well. In the with-project condition (TSP), the unmet demand volume and percentage of demand not met are 1,000 ac-ft and 3.2%, respectively; for the without-project condition (EARFWO), the unmet demand volume and percentage of demand not met are 1,000 ac-ft and 3.6%, respectively. Based on this comparison, water supply performance for the Seminole Tribe of Florida Brighton and Big Cypress Reservations is the same with CEPP PACR implementation.

Compared to the existing base condition, the TSP reduced the volume of demands not met for the Tribes. For the Brighton Reservation, in the EARECB the volume and percentage of demand not met are 1,000 ac-ft and 4.2%. For the Big Cypress Reservation, in the EARECB, the volume and percentage of demand not met are 1,000 ac-ft and 4.2% (**Figure B-15** and **Figure B-16**).

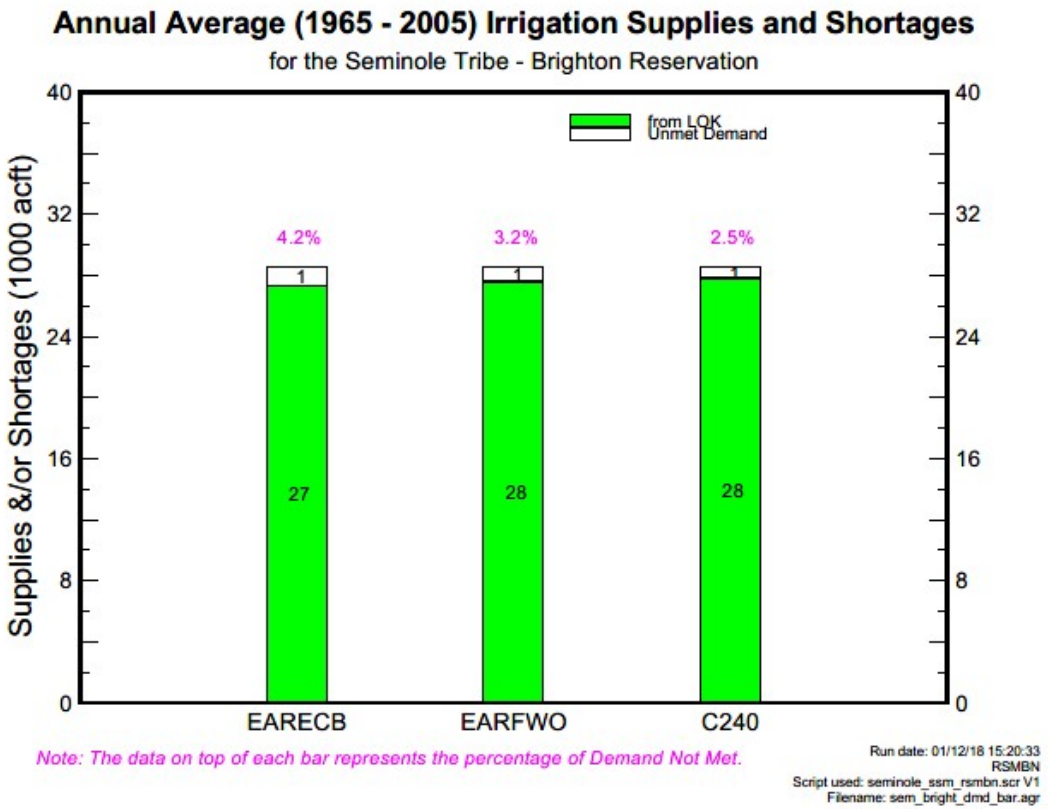

Figure B-15. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe of Florida – Brighton Reservation

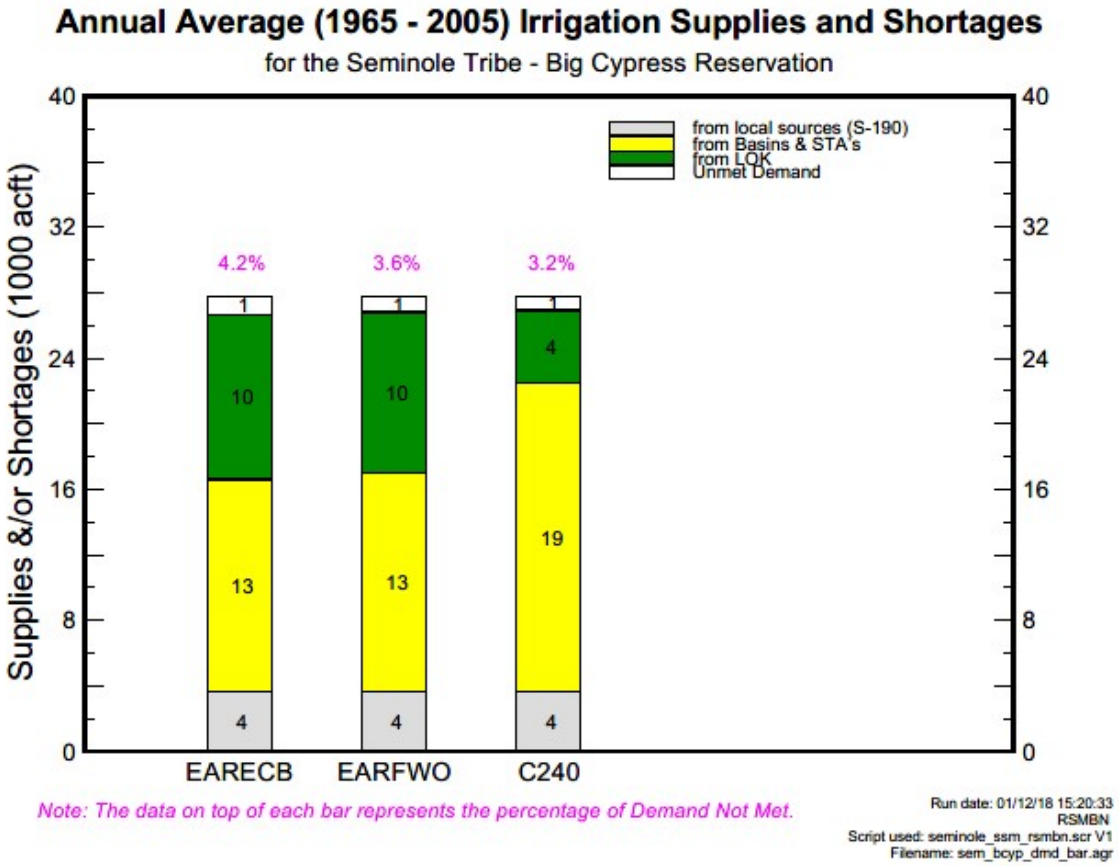

Figure B-16. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe of Florida – Big Cypress Reservation

B.2.4.4 Miccosukee Tribe of Indians of Florida

The Miccosukee Tribe of Indians of Florida has several reservation areas and resorts in the project area. The reservation areas utilize groundwater as their source of water. The resort, located in Miami-Dade County, utilizes potable water supplied by Miami-Dade Water and Sewer Department. These sources would not be reduced or negatively affected by the TSP.

B.2.4.5 Everglades National Park

For ENP, water deliveries at Tamiami Trail are displayed in **Figure B-17**. This is the average annual delivery volume probability curve for the 41-year period of simulation. Inflows to ENP are quantified for the S12s (A-D), S333, the S355s (A&B), S345 F&G, and S356. The with-project condition, TSP, deliveries exceed the without-project condition, EARFWO, for 32 of the 40 water years. Eight years exhibit drier conditions with lower volumes reaching the ENP in general. The reductions range between 1,000 and 30,000 ac-ft, which is less than 0.5% of the total volume delivered. The year 2002 had the highest reduction when comparing the TSP to the EARFWO of 103,000 ac-ft, but it equates to less than a 2% reduction in average annual flows to ENP.

Comparisons to the existing condition baselines (EARECB) indicate that the with-project condition deliveries exceed the existing condition deliveries for 37 of the 40 years evaluated. The year 1966 had the

highest reduction when the TSP is compared to the EARFWO of 97,000 ac-ft, but it equates to less than a 2% reduction in average annual flows to ENP.

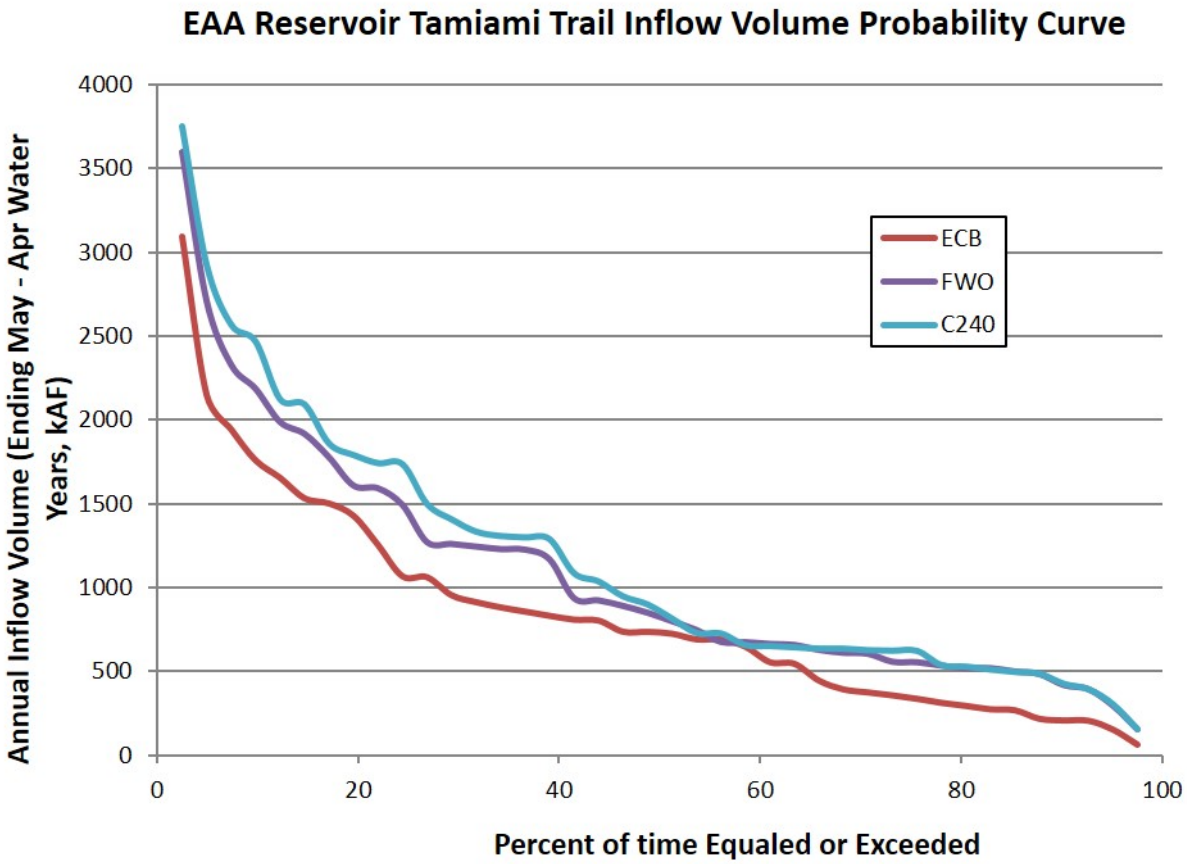

Figure B-17. TSP Tamiami Trail Inflow Volume Probability Curve

B.2.4.6 Water Supply for Fish and Wildlife

B.2.4.6.1 Caloosahatchee Estuary

The low-flow restoration criterion as defined by RECOVER for the Caloosahatchee Estuary is an average monthly flow of less than 450 cfs. In the Caloosahatchee Estuary, the number of months the low-flow criterion is not met is similar in the with-project (TSP) and without-project (EARFWO) conditions (**Figure B-18**). The estuary low-flow criterion is not met in 26 months out the 41-year period of simulation in TSP and 23 months in the EARFWO. The with-project condition does not significantly change the frequency of achieving the low-flow target.

Comparisons to the existing condition baselines show significant improvement in low-flow performance with TSP. The EARECB show 179 months when average monthly flows are less than 450 cfs, compared to 26 months in TSP. The existing condition baseline does not benefit from the inclusion of the CERP Caloosahatchee River (C-43) West Basin Reservoir, which is included in the future conditions.

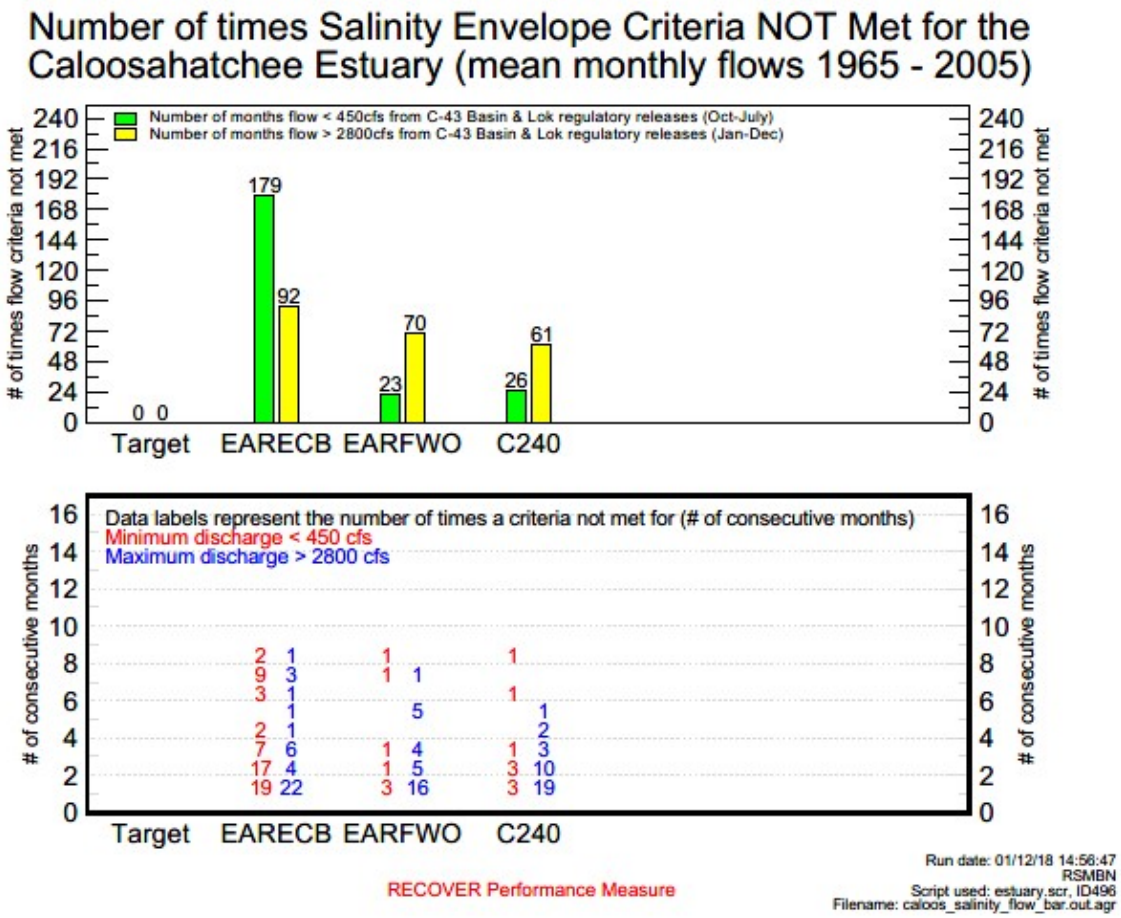

Figure B-18. Number of Times Salinity Envelope Criteria Not Met for the Caloosahatchee Estuary (mean monthly flows 1965–2005)

B.2.4.6.2 St Lucie Estuary

The low-flow restoration criterion defined by RECOVER the St. Lucie Estuary is an average monthly flow of less than 350 cfs. In the St. Lucie Estuary, the number of months the low-flow criterion is not met increases in the with-project (TSP) condition, compared to the without-project condition (EARFWO) (**Figure B-19**). The low-flow criterion is not met in 67 months out the 41-year period of simulation in TSP and 65 months in the EARFWO. The with-project condition does not significantly change the frequency of achieving the low flow target.

Comparisons to the existing condition baselines show a significant improvement in low-flow performance with TSP. The EARECB show 88 months when average monthly slows are less than 350 cfs, compared to 67 months for TSP. The existing condition baseline does not benefit from the inclusion of the Indian River Lagoon-South Project's C-44 Basin Reservoir, which is included in the future conditions.

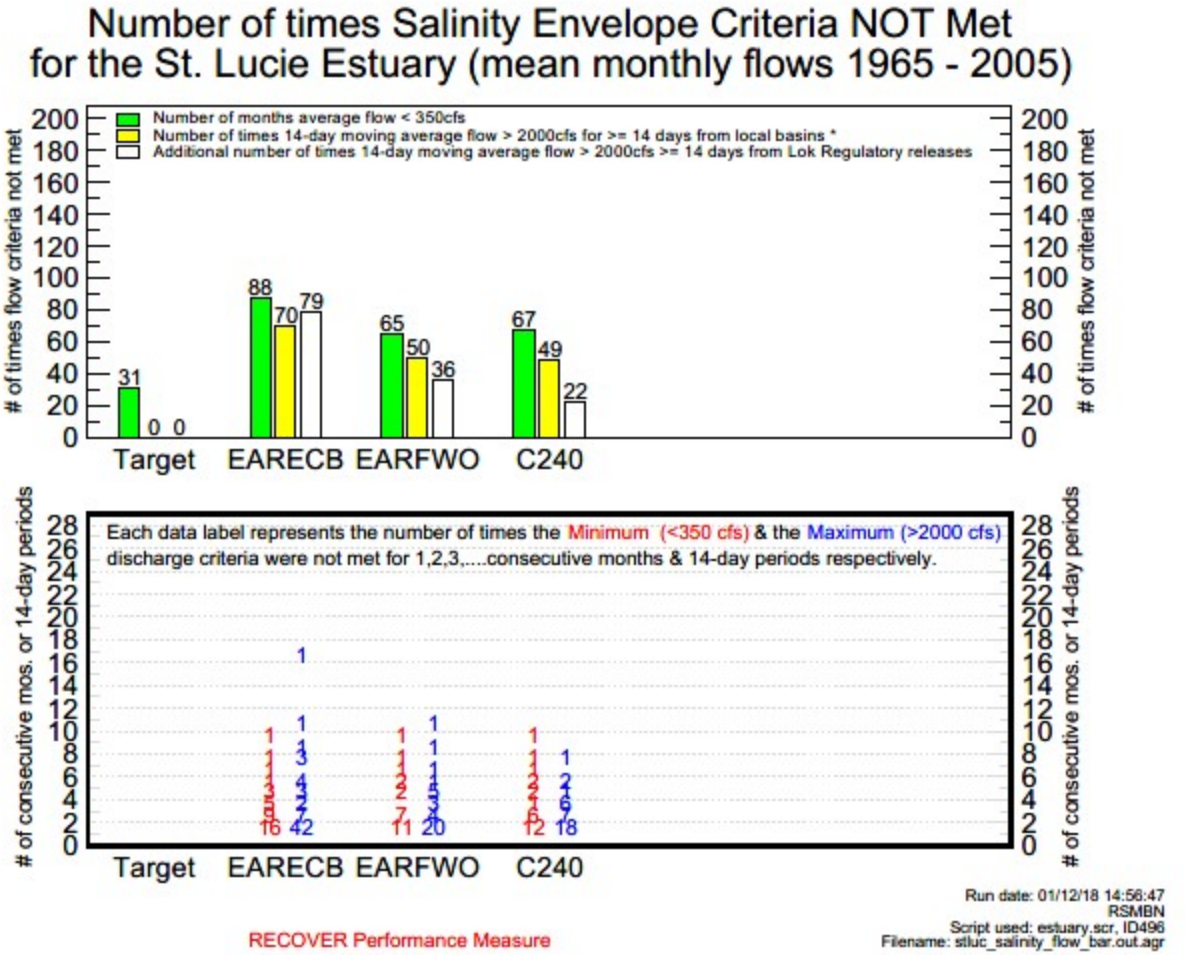

Figure B-19. Number of Times Salinity Envelope Criteria Not Met for the St. Lucie Estuary (mean monthly flows 1965–2005)

B.2.4.6.3 WCA 2A

In the with-project condition (TSP), deliveries to WCA 2A are increased compared to the without-project condition (EARFWO) for 32 individual water years and decreased in 8 of the years (**Figure B-20**). This is due to changes to how water is distributed spatially and temporarily with the A-2 Reservoir and A-2 STA. The 8 years when flows are reduced averages 22,000 ac-ft or around 7% of the total inflows. In the with-project condition (TSP), less water reaches WCA 2A than in the existing condition (EARECB). The existing condition provides more water than WCA 2A needs to sustain its wetlands, especially when considering that 90% of the tree islands in WCA 2A were previously "drowned" due to deep water stress in the 1960s. The TSP utilizes some of this excess water, in addition to the additional flows redirected south from Lake Okeechobee, to increase the hydroperiods and achieve restoration objectives in WCA 3A and ENP through the L-6 diversion operations. The following analysis compares the hydrological implications within WCA 2A for the EARECB, EARFWO, and TSP. The comparison indicated little or no difference between these conditions or an improvement with the TSP.

Comparing ponding depths for a representative wet year of 1995 (**Figure B-21**), there is no significant difference in the depth class distribution between the EARECB, and TSP. There is, however, less water ponding, on average, in the northwestern region of WCA 2A with the EARFWO. Ponding depths during a representative dry year of 1989 (**Figure B-22**) indicate small differences in the patterns. The EARECB, and TSP are similar, while EARFWO is slightly drier in the northwestern corner of WCA 2A. The hydroperiod classes do not differ significantly either (**Figure B-23**)

Surface water flow vectors between the EARECB, EARFWO, and TSP were not found to be significantly different for either representative dry (1989) or wet years (1995) (**Figure B-24 and Figure B-25**). In conclusion, although the volumes of water reaching WCA 2A vary between the TSP, EARFWO, and EARECB, all move water through to WCA 2B and WCA 3A. The with-project condition, TSP, is similar and likely not different from the EARFWO in terms of moving water through to WCA 2B and WCA 3A and preventing soil oxidation during dry years.

In addition, TSP hydrologic performance in WCA 2A is consistent with the mitigation associated with construction and operation of the Compartment B of ECP STA-2. The hydroperiod targets identified in the Florida Department of Environmental Protection permit were applied during CEPP PACR plan formulation and were maintained despite the L-6 diversion operations.

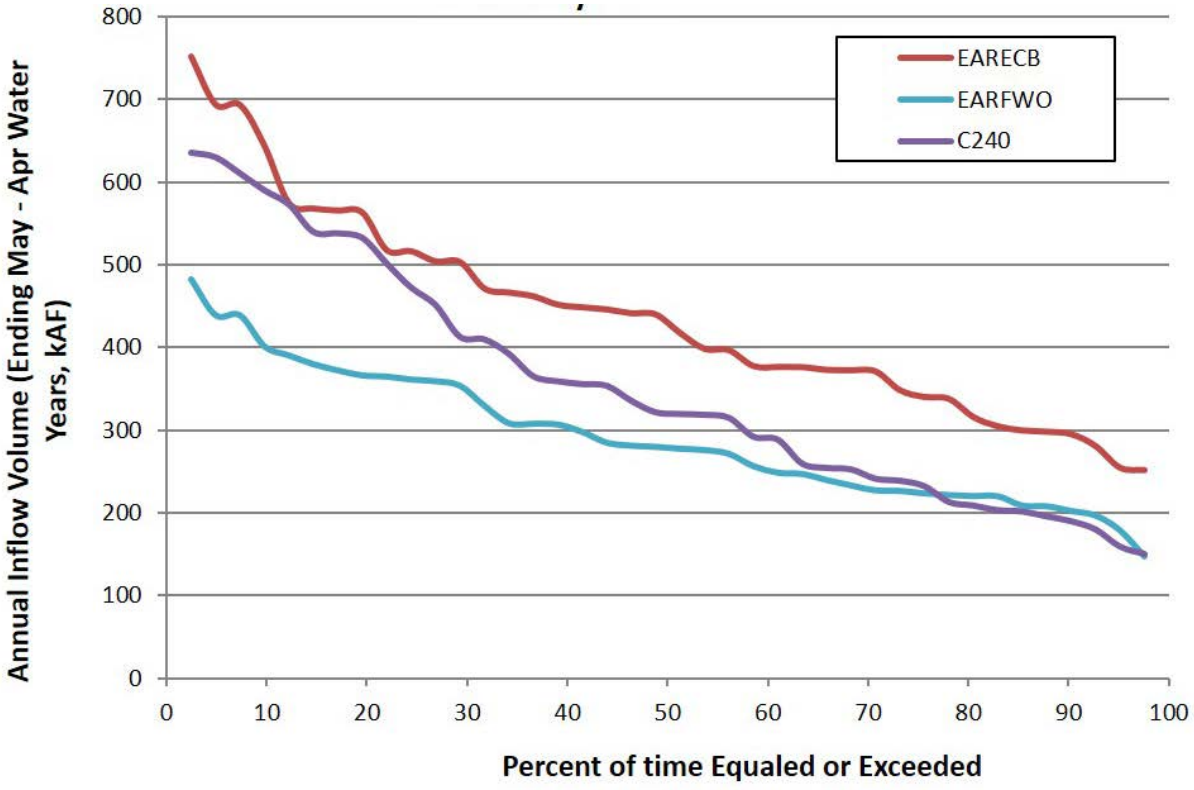

Figure B-20. WCA 2A Inflow Volume Probability Curves for Environmental Baseline Condition (EARECB), Future Without Project (EARFWO) and the CEPP PACR TSP (C240)

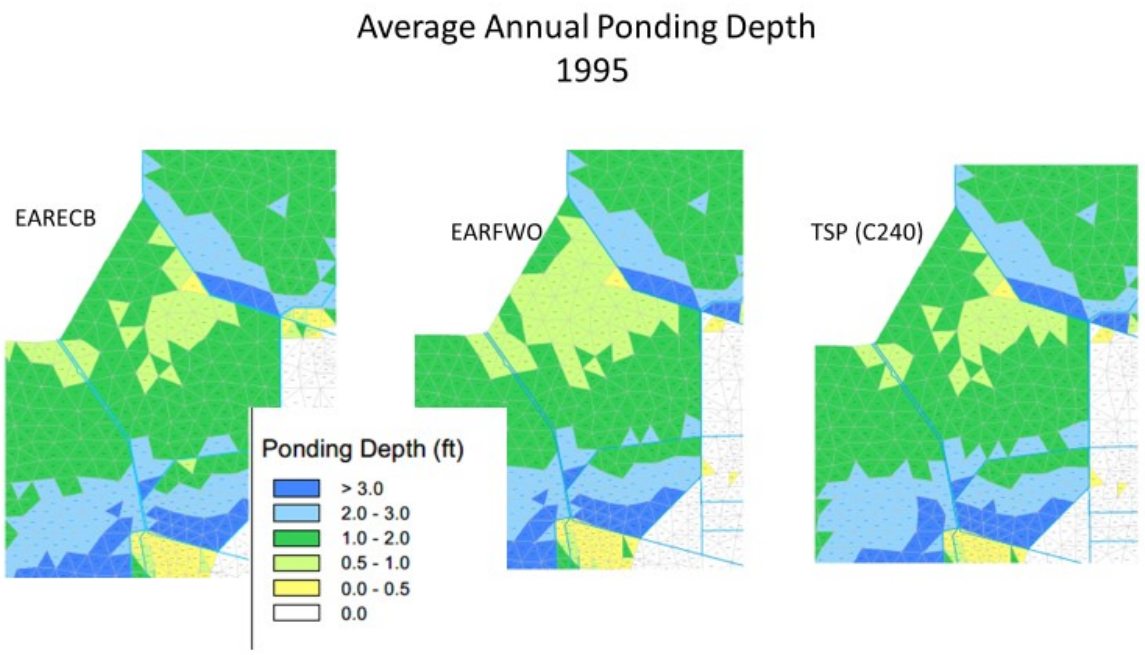

Figure B-21. Wet Year (1995) Ponding Depth Comparisons for WCA 2A for EARECB, EARFWO, and TSP

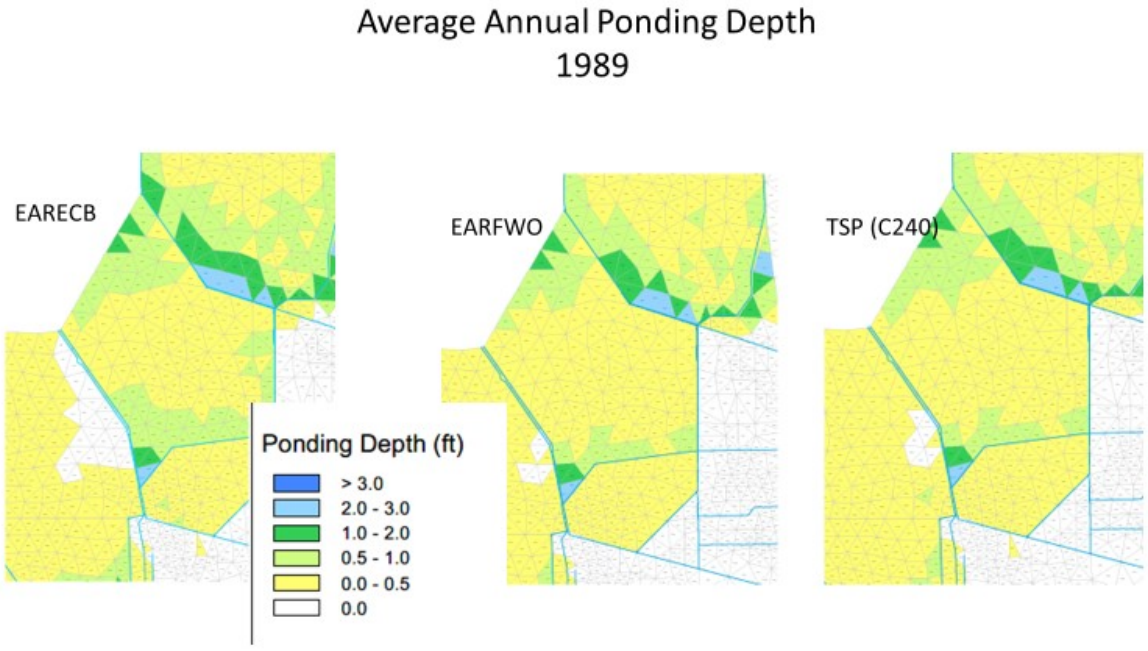

Figure B-22. Dry Year (1989) Ponding Depth Comparisons for WCA 2A for EARECB, EARFWO and TSP

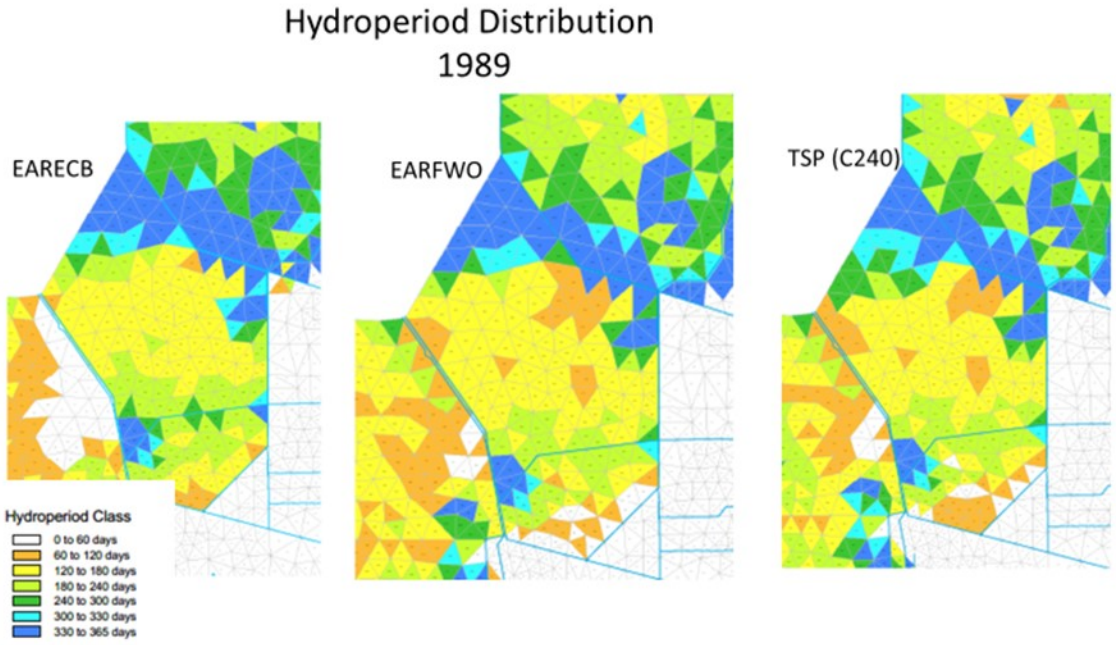

Figure B-23. Dry Year (1989) Hydroperiod Comparisons for WCA 2A for EARECB, EARFWO and TSP

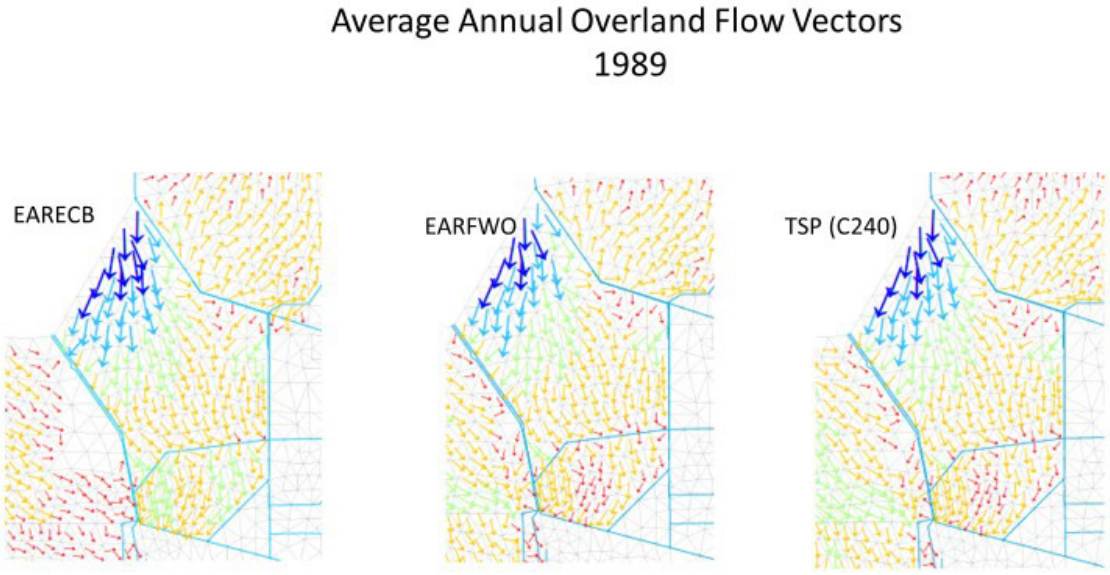

Figure B-24. Surface Water Flow Vector Comparisons for 1989 WCA 2A for EARECB, EARFWO, and TSP

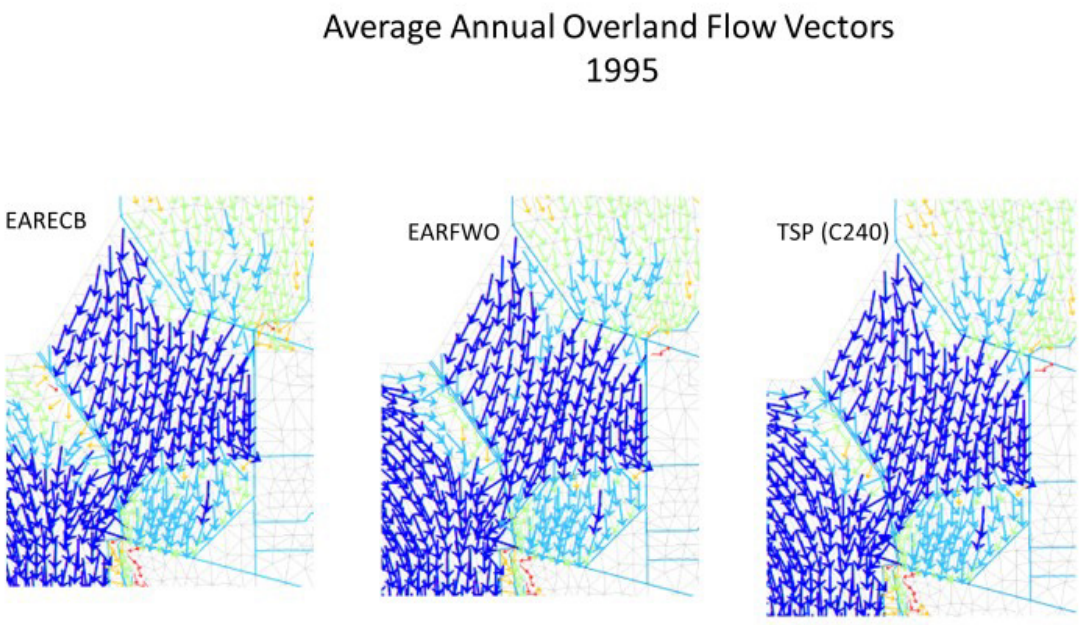

Figure B-25. Surface Water Flow Vector Comparisons for 1995 WCA 2A for EARECB, EARFWO and TSP

B.2.4.6.4 WCA 3A

For WCA 3A, water deliveries into WCA 3A are displayed in **Figure B-26**. This probability exceedance plot displays the average annual water year delivery for the 41-year period of simulation. The with-project condition (TSP) deliveries exceed the without project condition (EARFWO) for 34 of the 40 total individual water years. For the 6 years when flows decrease, the average annual volume is 30,000 ac-ft, which is less than 1% of the total inflows into WCA 3A. Compared to the existing condition (EARECB), inflows to WCA 3A increase in the future without condition (EARFWO) due to the increased utilization of STA-3/4 and the new A-2 STA.

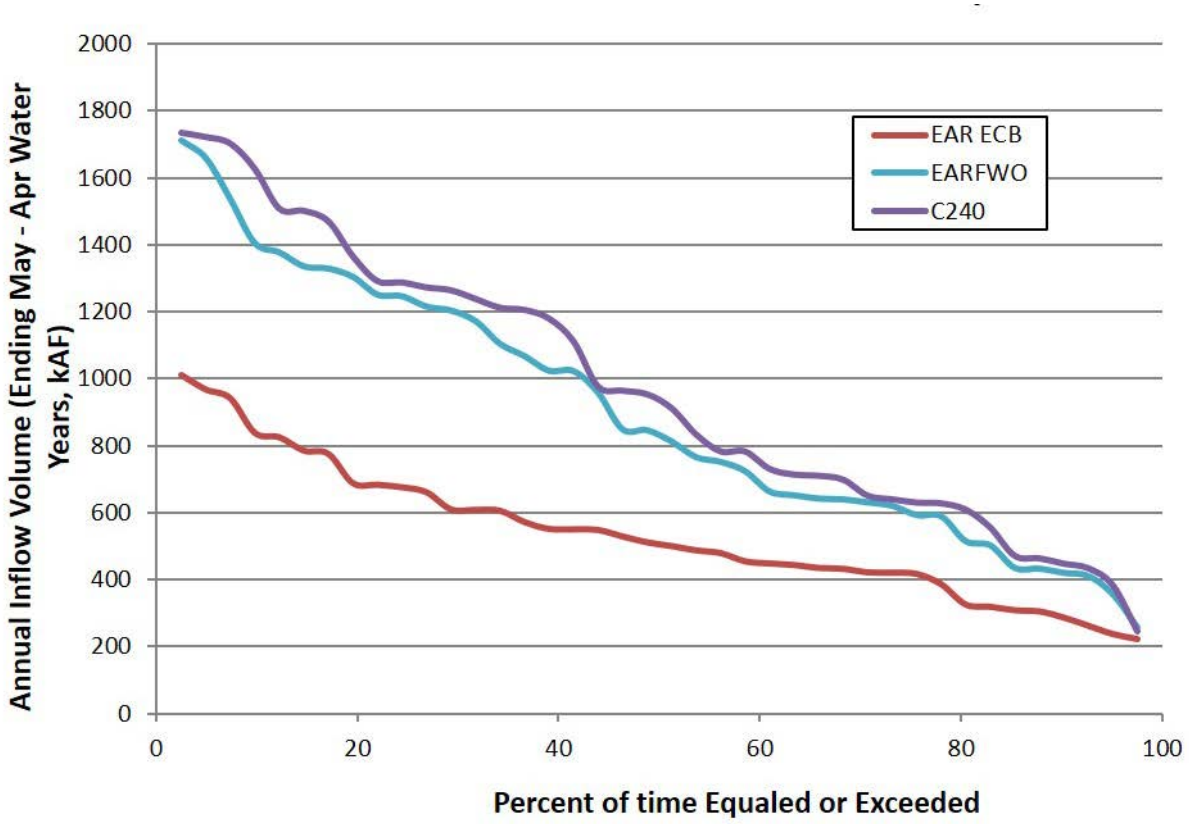

Figure B-26. WCA 3A Inflow Volume Probability Curves for Environmental Baseline Condition (EARECB), Future Without Project (EARFWO) and the CEPP PACR TSP (C240)

B.2.5 Savings Clause - Flood Protection

The four features or areas affected by the project that will be analyzed include 1) the potential risk to HHD due to changes in the lake's stages, 2) the A-2 Reservoir and A-2 STA located in the EAA, 3) the effects of changed water levels in WCAs 3A and 3B on the East Coast Protective levees L-67 and L-30, and 4) the mix of agricultural and urban areas located east of the East Coast Protective levees L-31N and L-31W. In addition, areas of interest to the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida, including Tribal reservations, are assessed in **Section 3.2.5** and **Section 3.2.6**, respectively.

B.2.5.1 Lake Okeechobee Herbert Hoover Dike

Benefits gained from sending new water south from Lake Okeechobee are derived in part from operational refinements that can take place within the existing, inherent flexibility of the 2008 LORS, and in part with refinements that are beyond the schedule's current flexibility. Modifications to 2008 LORS will be required to optimally utilize the added storage capacity of the A-2 Reservoir to send approximately 370,000 ac-ft/yr of new water available in CEPP PACR TSP south to the Everglades, while maintaining compliance with Savings Clause requirements for water supply and flood control performance levels.

The hydrologic modeling conducted for the TSP to optimize system-wide performance incorporated the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the TSP

included proposed revisions to the 2008 LORS flow chart guidance of maximum allowable discharges, which are dependent on the following criteria:

- Class limits for Lake Okeechobee inflow and climate forecasts, including tributary hydrologic conditions, seasonal climate outlook, and multi-seasonal climate outlook
- Stage level, as delineated by the Regulation Schedule management bands
- Stage trends (whether water levels are receding or ascending)

Most of the 2008 LORS refinements applied in the TSP modeling lie within the bounds of the operational limits and flexibility available in the current 2008 LORS, with the exception of the adjustments made to the class limits for the Lake Okeechobee inflow and climate forecasts. Under some hydrologic conditions, the class limit adjustments made to the Lake Okeechobee inflow and climate forecasts reduced the magnitude of allowable discharges from the Lake, thereby resulting in storage of additional water in the Lake in order to optimize system-wide performance and ensure compliance with Savings Clause requirements. However, these class limit changes represent a change in the flow chart guidance that extends beyond the inherent flexibility in the current 2008 LORS. Additional information and documentation of the TSP modeling assumptions for Lake Okeechobee operations are found in the **CEPP PACR Appendix A, Annex A-2**.

Independent of TSP implementation, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and Herbert Hoover Dike (HHD) infrastructure remediation. The USACE expects to operate under the 2008 LORS until there is a need for revisions due to the earlier of either of the following actions: (1) system-wide operating plan updates to accommodate CERP projects as described in the **CEPP PACR Section 6.1.3.2**, or (2) completion of sufficient HHD remediation and associated culvert improvements, as described in **CEPP PACR Section 2.5.2**. When HHD remediation is completed and the HHD DSAC Level 1 rating is lowered, higher maximum lake stages and increased frequency and duration of high lake stages may be possible to provide the additional storage capacity assumed with the TSP. The future LORS which may be developed in response to actions (1) and/or (2) is unknown at this time. It is anticipated that the need for modifications to the 2008 LORS will be initially triggered by non-TSP actions that are expected to occur earlier than implementation of the authorized CEPP PACR and the proposed modifications presented as the TSP. CEPP implementation in the future, with or without the modifications proposed in this CEPP PACR, may itself require even further LORS revisions to optimize system-wide performance and ensure compliance with Savings Clause requirements.

Lake Okeechobee stage duration curves for the RSM-BN model representation of the EARECB (2008 LORS; note that plot lines overlap), EARFWO (2008 LORS, plus additional CERP and non-CERP projects and prescribed assumed operational flexibility), and TSP (LORS 2008, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as **Figure B-27** (note: upper 25% of the stage duration curve is displayed). Peak stages for the CEPP PACR Savings Clause baselines and TSP are summarized as follows: 17.59 feet NGVD for the EARECB; 17.66 feet NGVD for the EARFWO; and 18.14 feet NGVD for TSP.

The USACE 2008 LORS Environmental Impact Statement (EIS) assessment recognized that minimizing the frequency of exceedance of the 17.25 feet elevation offers additional protection for public safety and the HHD, for the condition prior to completion of the current approved and planned HHD remediation

measures, and this criterion was evaluated as a LORS project performance measure. The frequency of occurrence for lake stages above 16.0 feet, 16.5 feet, 17.0 feet, and 17.25 feet are summarized in **Figure B-28**. The baselines and the TSP all show simulated stages above 17.25 feet NGVD: 11 days for the EARECB; 29 days for the EARFWO; and 60 days for TSP (note: there are 14,975 days in the RSM-BN 41-year period of simulation).

The assumed modified Lake Okeechobee operations with the project does increase the frequency, duration, and magnitude of Lake Okeechobee peak stages (compared to the EARFWO). Following completion of the HHD remediation, the degree to which higher maximum lake stages and increased frequency and duration of high lake stages would be accepted, if at all, will be contingent on the conclusions identified in the 2015 DSMR (note: this process is independent and separate from the CEPP and CEPP PACR project).

Given recognition of the DSMR uncertainty and the continued utilization of the 2008 LORS, the assessment of the Lake Okeechobee high water performance with the project indicated consistency with the HHD formulation assumptions established for the CEPP PACR future without project condition (EARFWO), which included general consideration of potential risk and uncertainty associated with increased lake stages. Lake Okeechobee high water performance requirements will likely need to be revisited following completion of the 2015 DSMR, but the CEPP PACR stage duration curve trends for increased high water conditions appear reasonable based on the current expectations for the HHD remediation.

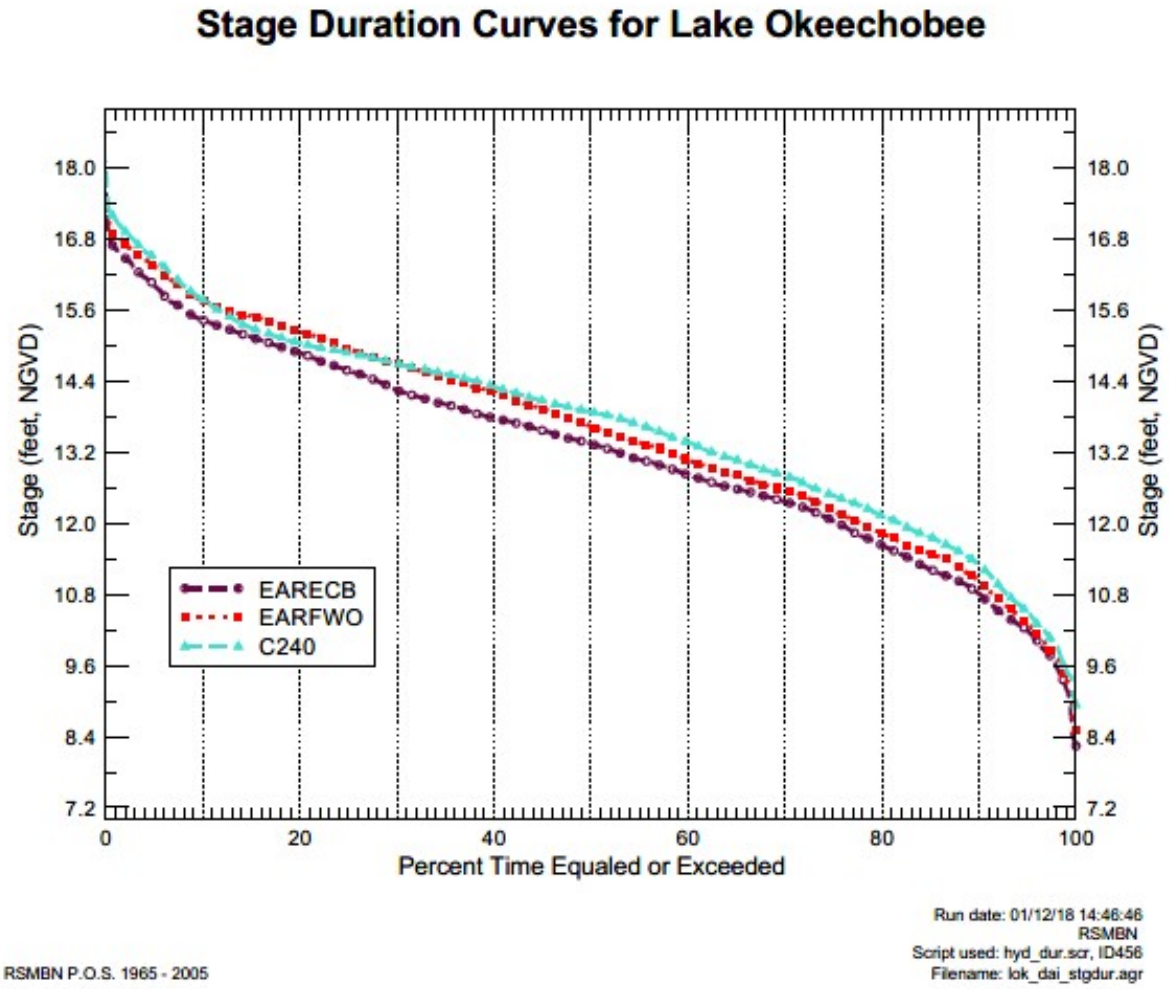

Figure B-27. Lake Okeechobee Stage Duration Curve

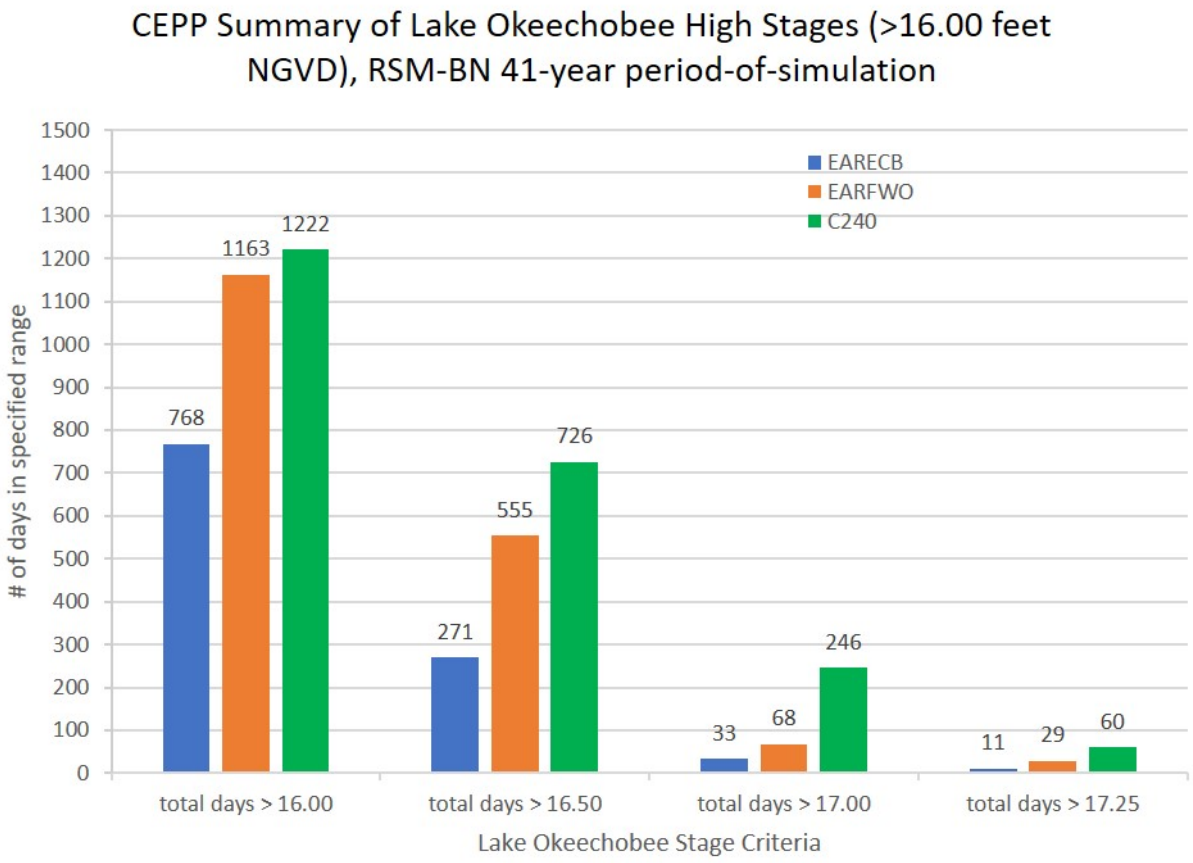

Figure B-28. Occurrence Frequency of Lake Okeechobee High Stages

B.2.5.2 A-2 Reservoir and A-2 STA located in the EAA

Stage duration curves shown in **Figure B-29** for the EARFWO (14,000-acre A-1 FEB only) and TSP. Ground surface elevation within the A-2 Reservoir was assumed at 10.00 feet NGVD for the RSM-BN modeling. Minor changes to groundwater levels are expected adjacent to the A-2 Reservoir (10,500 acres) and A-2 STA (6,500 acres), compared to the future without project condition (EARFWO) which includes the CEPP FEB on A-2. Modeling for both alternatives includes the SFWMD Restoration Strategies A-1 FEB.

The A-2 Reservoir design includes perimeter conveyance canals that surround the reservoir and will also collect seepage to limit potential impacts. The A-2 Reservoir at this time carries a high hazard potential classification (HPC) per CERP Design Criteria Memoranda (DCM) 1, which is extended to embankment design. Embankment top widths are 14 feet wide per DCM-4, with dam heights based on analysis of the DCM-2. The A-2 Reservoir embankment top elevation is established at 45.60 feet NAVD 88 (47.03 feet NGVD 29), more than three feet above the maximum surcharge pool elevation. As described in further detail in the Engineering Appendix (Appendix A), the maximum surcharge pool elevation is based on the greatest elevation resulting from the following storm routings: a. The Inflow Design Flood (IDF), which is identified as the 100-yr 24-hr storm event for the A-2 Reservoir location, per DCM-2; b. the 50 % 72-hr PMP per ER-1110-8-2(FR); and c. wind setup and wave run-up analysis on critical fetch lengths with the impoundment at full pool. A weir-type spillway will provide uncontrolled discharge from the A-2 Reservoir

during extreme events, when discharges are required to protect the embankment integrity. The spillway will include a 13.5-foot-long weir with crest elevation set at 32.60 ft NGVD. The spillway will discharge into the adjacent A-2 Inflow Canal along the northern portions of the A-1 and A-2 parcels. The weir will be located in line with the northern A-2 embankment.

Within the RSM-BN simulated period of record (1965–2005), the maximum simulated stage in the A-2 Reservoir is 33.50 feet NGVD for the EARTSP, which corresponds to an elevation of 32.60 feet NGVD when the model volume is converted to the most up-to-date reservoir footprint. Based on the assumed ground surface elevation of 10.00 feet NGVD used in the RSM-BN model, the peak depth is 22.60 feet over the period of record. The A-2 Reservoir overflow spillway SW-1 was designed with a crest elevation of 32.53 feet NGVD, based on the average assumed ground surface elevation of 9.93 feet NGVD used for the preliminary (pre-PED survey) hydraulic design, as described in Appendix A of the CEPP PACR; based on this design, the A-2 Reservoir overflow spillway would only discharge if the Reservoir depth exceeds 22.60 feet. As the A-2 Reservoir stages over the simulated period of record do not overtop the overflow spillway (simulated peak depth condition of 23.50 feet; design depth 22.60 feet). The spillway preliminary design details, including discharge location, did not warrant further analysis for the CEPP Savings Clause evaluation of the TSP. During CEPP PACR formulation, no detailed modeling was performed to determine the extent or frequency of emergency discharges under extreme event outside of the 1965–2005 period of record that was analyzed for the CEPP PACR.

A slurry cut-off wall will be constructed below the A-2 Reservoir embankment to ensure compliance with the Savings Clause and for flood protection in the EAA (**Appendix A, Annex C-1**). Due to the additional storage volume capacity provided by the A-2 Reservoir, construction and operation is expected to incidentally improve flood protection.

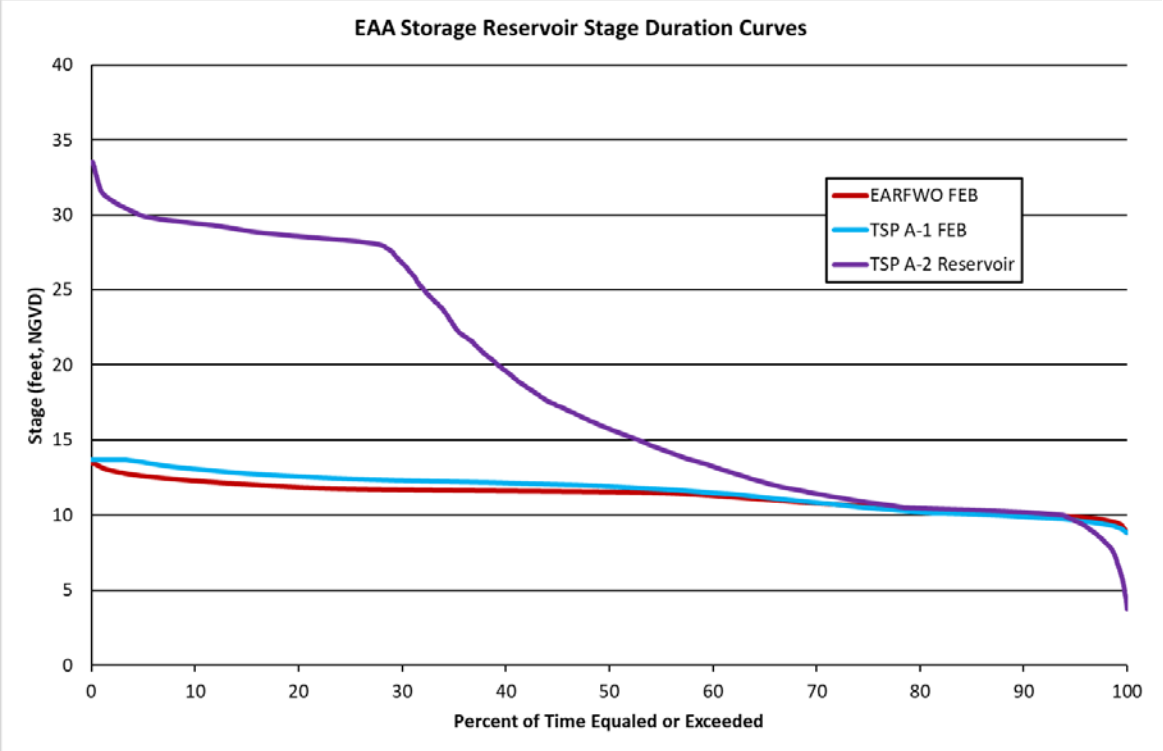

Figure B-29. EAA Storage Reservoir Stage Duration Curves

B.2.5.3 WCA 3A and WCA 3B Water Stages Relative to the East Coast Protective Levee

Compared to the EARFWO, the TSP stages are higher by approximately 0.1–0.3 feet in the upper 10% of the stage duration curve for the WCA 3A three-gauge average stage, as shown in **Figure B-30** (upper 25% of the stage duration curve); the TSP is lower than existing condition (EARECB). In order to consider potential differences during specific years, the annual duration of exceedance of the ERTP WCA 3A Zone A stage levels for the complete period of simulation (**Figure B-31**) was evaluated. The annual durations were also displayed and assessed as a frequency curve (**Figure B-32**). The total number of days above Zone A is summarized as follows for the EARFWO and TSP (with percent of total period of simulation, 14975 days, in parentheses): EARFWO – 3,321 days (22%); and TSP – 3,849 days (26%).

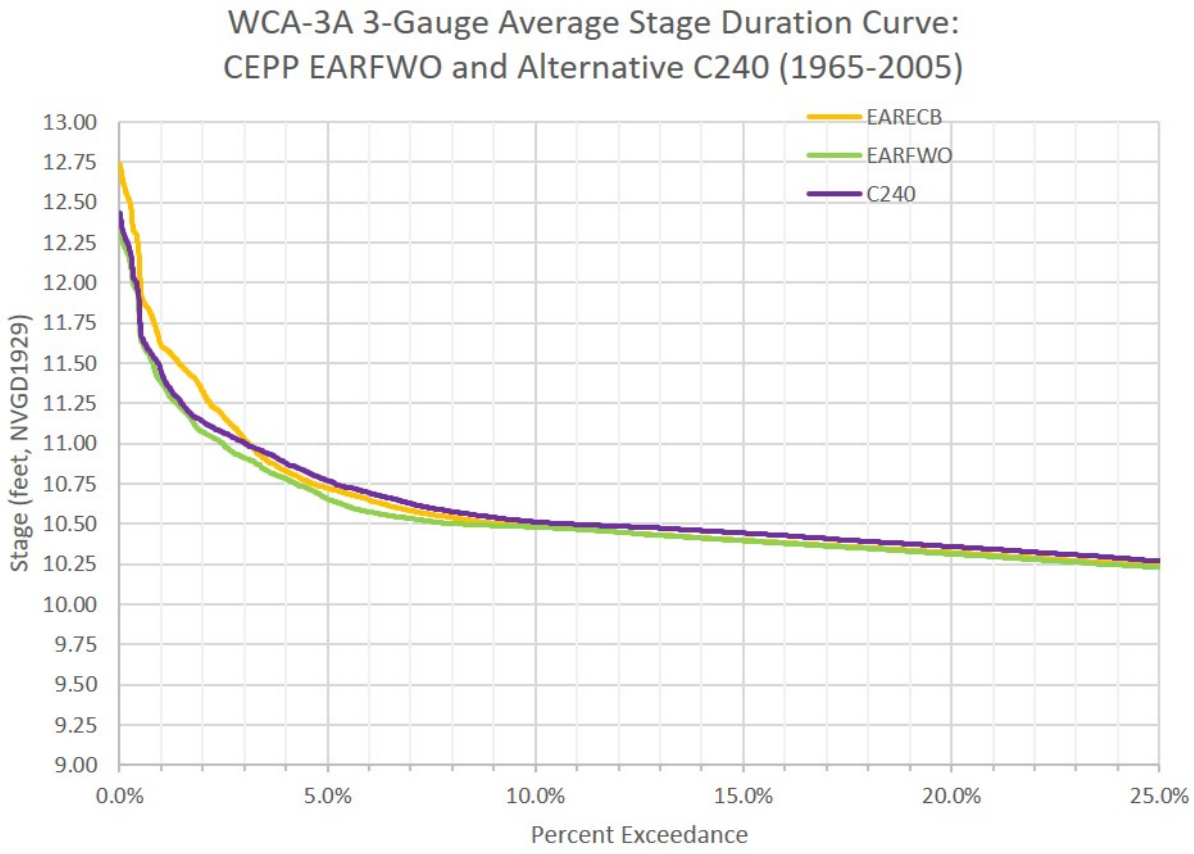

Figure B-30. WCA 3A Three-Gauge Average Stage Duration Curve

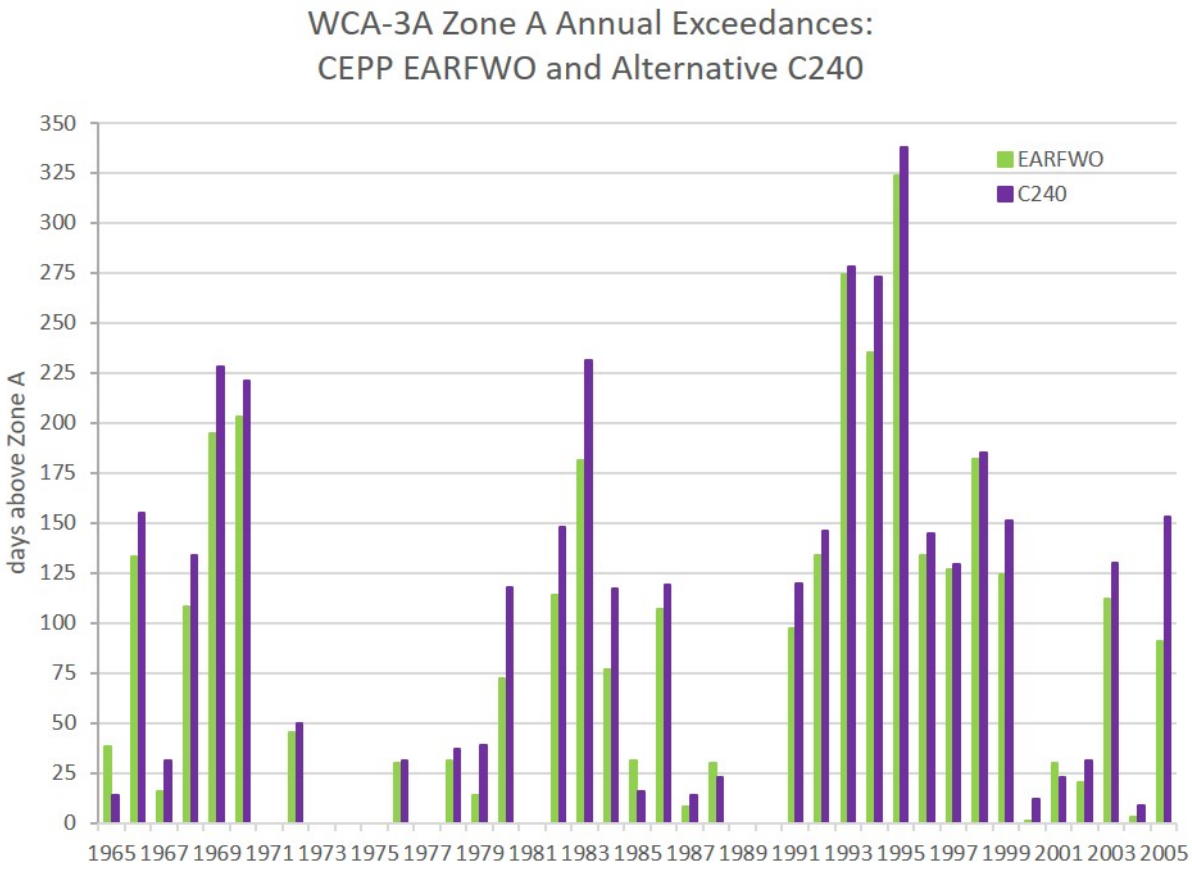

Figure B-31. WCA 3A Three-Gauge Average Annual Zone A Exceedance Summary

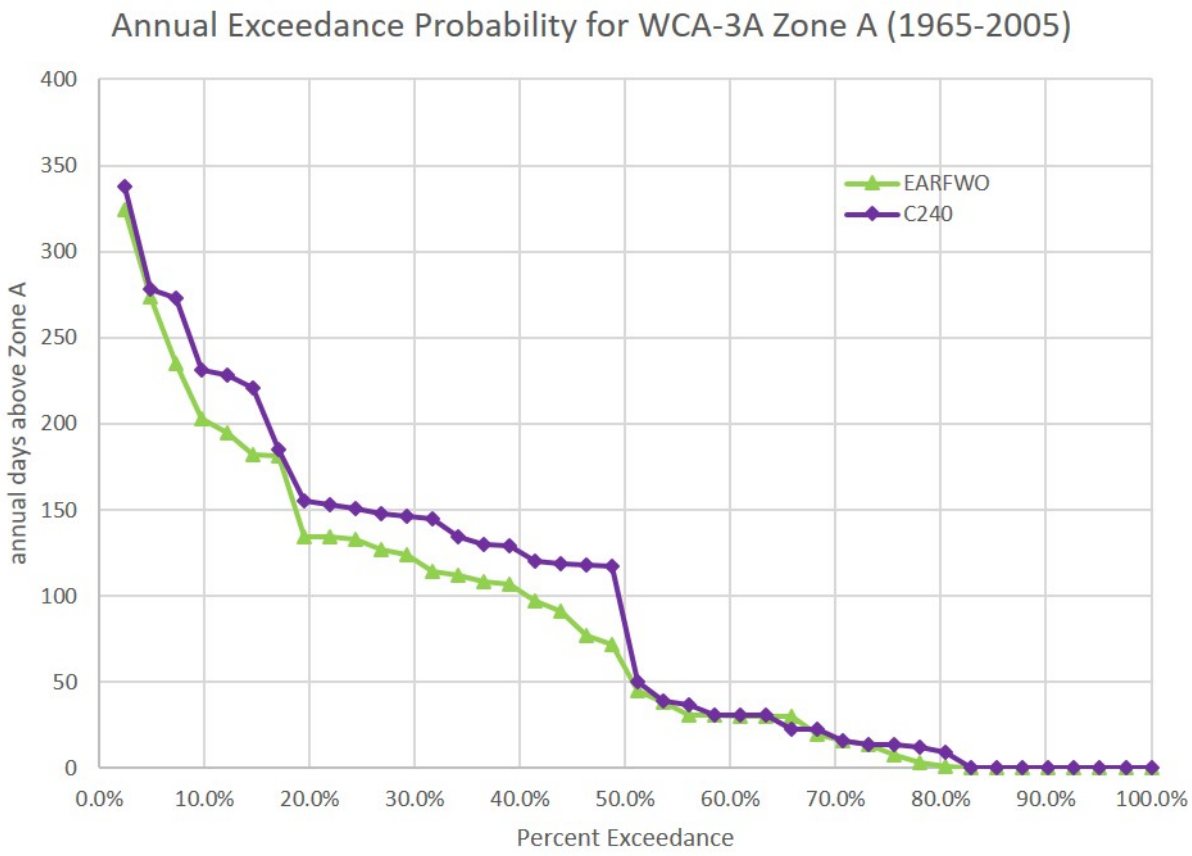

Figure B-32. WCA 3A Three-Gauge Average Probability Exceedance Curve for Annual Zone A Exceedance

The performance assessment for TSP included review of the WCA 3A stage hydrographs for individual years in which the number of days above Zone A increased by more 4% between the EARFWO and TSP.

The detailed assessment of the frequency, duration, and peak stages of high water levels within WCA 3A concluded: 1) WCA 3A peak stages are lower (relative to current conditions); 2) the frequency and durations of Zone A exceedance are increased; 3) the increased frequency and durations occur during periods of the year when WCA 3A water levels are below peak critical levels; 4) CEPP PACR infrastructure modifications (increased WCA 3A outlet capacity) and operations demonstrate that increased WCA 3A stages at the end of the dry season and start of the wet season can be effectively managed to avoid exacerbating high water conditions at the end of the wet season when Zone A levels off at 10.5 feet NGVD; and 5) CEPP PACR infrastructure and operations utilized to achieve these performance levels need to be codified in the Project Operating Manual (POM). The requirements to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the EARFWO were, therefore, successfully achieved in the TSP as in the CEPP Recommended Plan.

Concurrent with CEPP PACR TSP and modeling efforts, a review of WCA 3B high water levels compared to the WCA 3B design criteria and independent of any previous SPF stage considerations. WCA 3B is currently bounded by the L-29 Levee (Section 3) to the south, the L-67A Levee and the L-67C Levee to the

west, and the L-30 Levee to the east; the design grades for these WCA 3B perimeter levees range between 13.0 feet NGVD for the L-29 Levee (note: typical sections range from 13.5-17.5 feet NGVD, due to subsequent stockpiling of spoil material from L-29 Canal improvements, and all L-29 Section 3 Levee sections meet or exceed the design grade) to 20.0 feet NGVD for the L-30 Levee (the design grades for the L-67A and L-67C Levees are 17.5 and 12.5 feet NGVD, respectively), such that the L-29 Levee design grade represents the limiting factor for peak WCA 3B stages for CEPP PACR. Stage duration curves (upper 25%) for the EARECB, EARFWO, and TSP are provided in the CEPP PACR Engineering Appendix for the two RSM-GL monitoring gage locations within WCA 3B at Site 71 and Shark-1 (also alternatively referred to as SRS-1) that are produced with the model standard output information; corresponding RSM-GL model GSE elevations for these gauges are 6.64 and 6.61 feet NGVD, respectively. For TSP, peak stages within WCA 3B (outside of the Blue Shanty Flow-way) were 9.25 and 9.24 feet NGVD at Site 71 and Shark-1, respectively, or approximately 0.13-0.15 feet greater than the EARECB baselines (9.10-9.11 feet NGVD); however, the WCA 3B peak stages for the TSP remains approximately 3.75 feet below the L-29 Section 3 design grade of 13.0 feet NGVD. The SPF rainfall for WCA 3B is approximately 1.5 feet (17.5 inches; based on the localized 3-day, 100-year maximum rainfall event of 14 inches).

B.2.5.4 Agricultural and Urban Areas Located East of the East Coast Protective Levees

For the agricultural and urban areas located east of the East Coast Protective Levees (L-31N and L-31W), the RSM-GL has no capability to precisely measure flood control on individual parcels or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to indicate a potential change in flood risk. Using the 1983 to 1993 stage duration curve data from the RSM-GL calibration and verification, the percentage of time the stage is above the root zone can be calculated and the information can be used to give an indication that additional flood control evaluation in the vicinity of a particular RSM-GL cell(s) may be needed. Six gauges or cells were evaluated consistent with RECOVER performance measure. Of the six RSM-GL cells compared to the 1983–1993 calibration data (**Figure B-33**), the without project condition (EARFWO), and the existing condition baseline (EARECB), five of the six indicator cells (**Figure B-33**), stages in the with-project condition (TSP) are either the same or below the 1983-1993 calibration data and/or the groundwater stages are more than two feet below ground at levels and would not affect crops. The stage duration curve for indicator cell 4328 (**Figure B-33**) for the with-project condition (TSP) is the same as the future without project condition (EARFWO) during the wettest hydrologic conditions, with stages approximately 0.5 feet above the calibration values for the upper 20th percentile. As further described within Annex B of the CEPP PIR, the predicted modeled performance for both the FWO condition and TSP is likely the result of the calibrated C-111 Canal roughness coefficient likely being set too high and causing higher upstream C-111 Canal stages (and adjacent groundwater levels). The hydrologic modeling results in this specific case are not representative of the performance that is expected following CEPP PACR TSP implementation, and it is recognized that the FWO simulated stages along this reach of the C-111 Canal and adjacent agricultural areas would not be deemed acceptable to local stakeholders.

Comparison of the regional groundwater stage difference maps for the EARFWO and TSP simulation results can identify where systemically higher groundwater levels, which may adversely impact flood protection, may occur. The October 1995 map was selected to determine if the project affected groundwater levels when regional groundwater levels are most likely to rise. The month of October typically has the highest rainfall of the year and 1995 is one of years with the highest wet season rainfall in the period of simulation. The with-project condition (TSP) and the without project conditions (EARFWO)

were compared. The 1995 regional water levels are maintained or are the same for LECSA 2 and LECSA 3 (**Figure B-34)**. The average October groundwater stage difference map for the complete period of simulation (1965–2005) indicates no changes within the urbanized LECSA 2 and LECSA3 for TSP compared to the EARFWO (**Figure B-35**).

When comparing the with-project condition (TSP) to the existing condition baseline (EARECB) (**Figure B-36**), stages near the Broward County Water Preserve Area Project in LECSA 2 increase consistent with that project's purpose. Groundwater stages east of Pennsuco in LECSA 3 decrease between 0.10 and 0.25 feet. Farther south, in the vicinity of the SDCS within LECSA 3, groundwater stages increase between 0.1 and 0.5 feet when comparing TSP to the EARECB under extreme wet events. Under average conditions, there is no change when comparing the TSP to the EARECB. This is consistent with the simulated higher seepage rates along L31N and L31W (**Table B-6**).

The stage duration curves for the LEC canals adjacent to WCA 3B and ENP and selected monitoring gauges throughout the LEC were also assessed as part of the Savings Clause flood protection evaluation. The stage duration curves for these canals and gauges do not indicate significant increased stages within the upper 10 percentile, which was assumed as a representative indicator of potential increased flood protection risk. Compared to the EARECB, L-30 Canal stages (north of S-335) and the L-31N Canal stages (north of G-211) for TSP indicate a slight reduction of 0.1-0.2 feet to of the highest stages in the wettest 10% of hydrologic conditions (**Figure B-37** and **Figure B-38**). C-111 Canal stages between S-176 and S-177 indicate no significant change for the upper 10% of the stage duration curve compared to the EARFWO, with a small stage reduction of 0.1 feet observed compared to the EARECB (**Figure B-39**).

G-3439, a monitored well located along the C4 Canal, was also evaluated (**Figure B-40**). The with-project condition (TSP) performs the same as the without project condition (EARFWO). Comparison of the with-project to the existing condition baseline (EARECB) shows the water stages slightly reduced with TSP during the wettest half of the conditions.

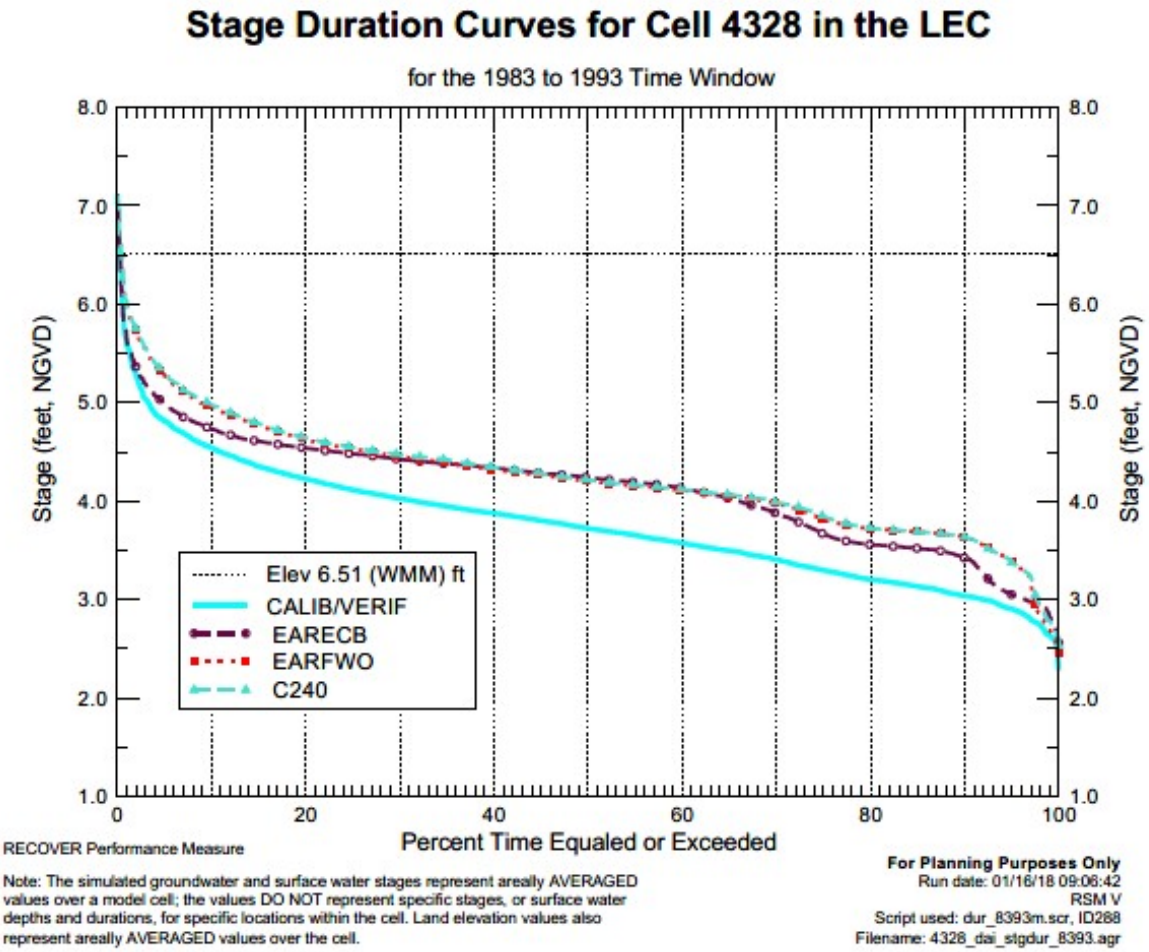

Figure B-33. Stage Duration Curves for Cell 4328 in the LECSA

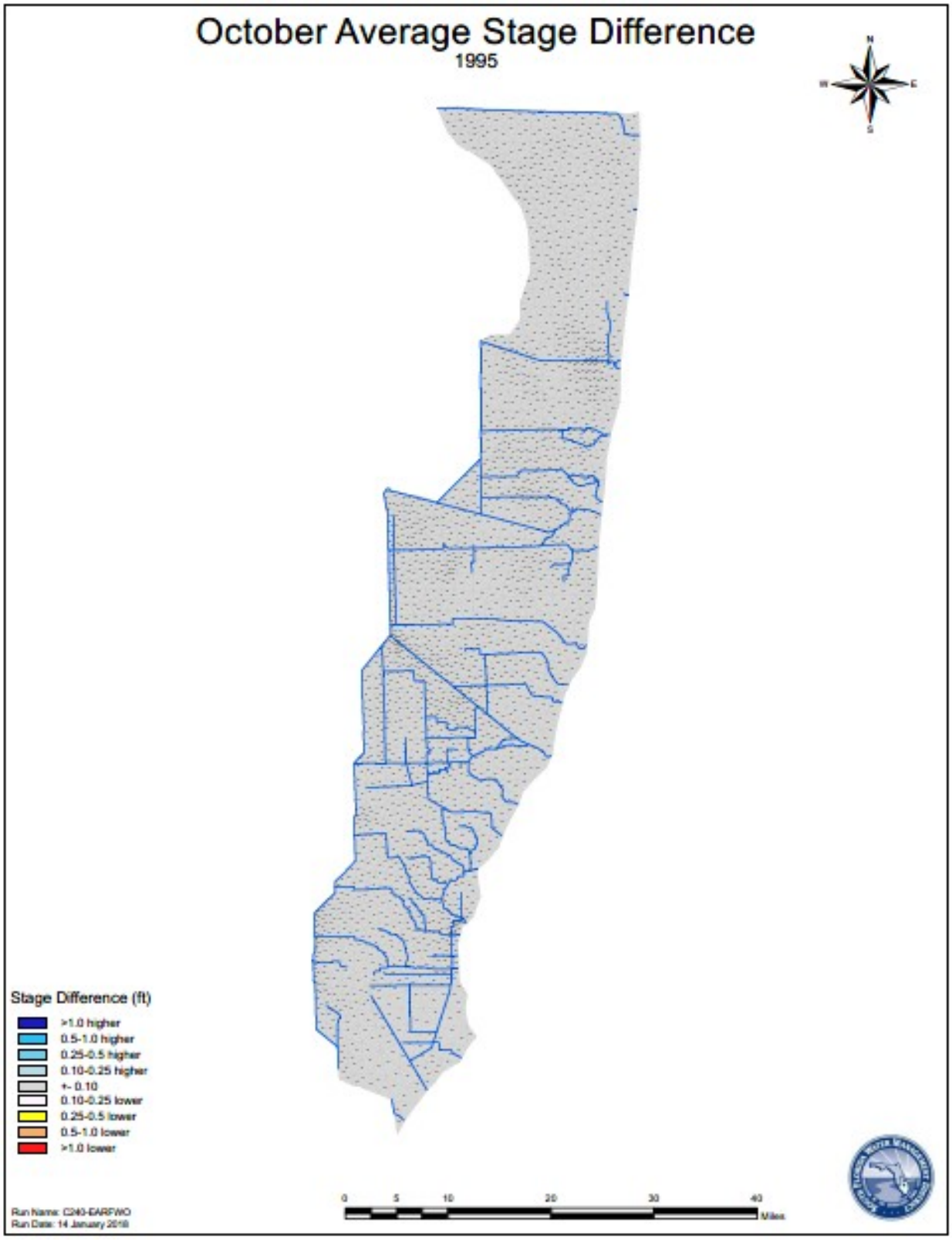

Figure B-34. October 1995 Average Stage Difference between TSP and EARFWO

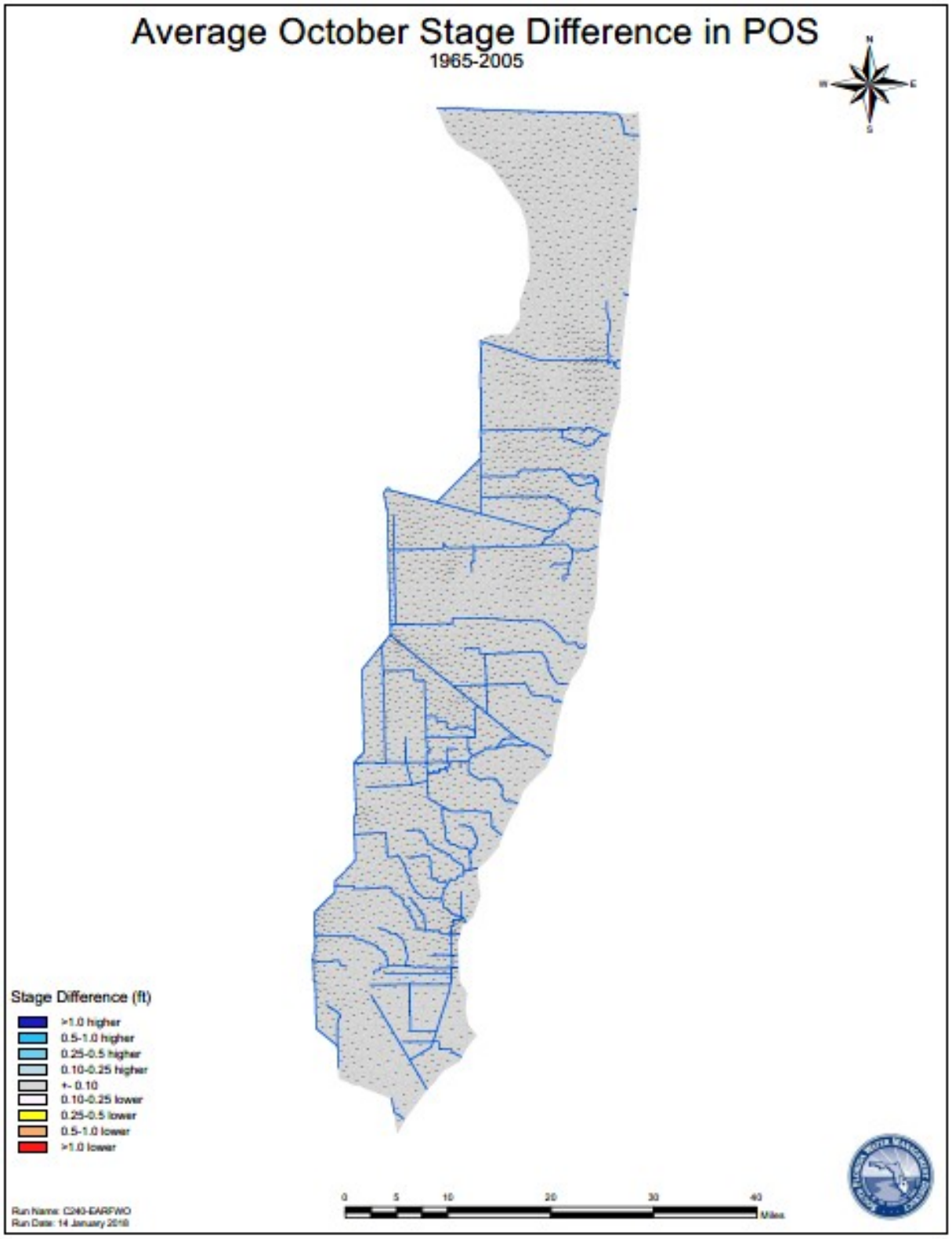

Figure B-35. Average October Stage Difference Map between TSP and EARFWO for 1965–2005

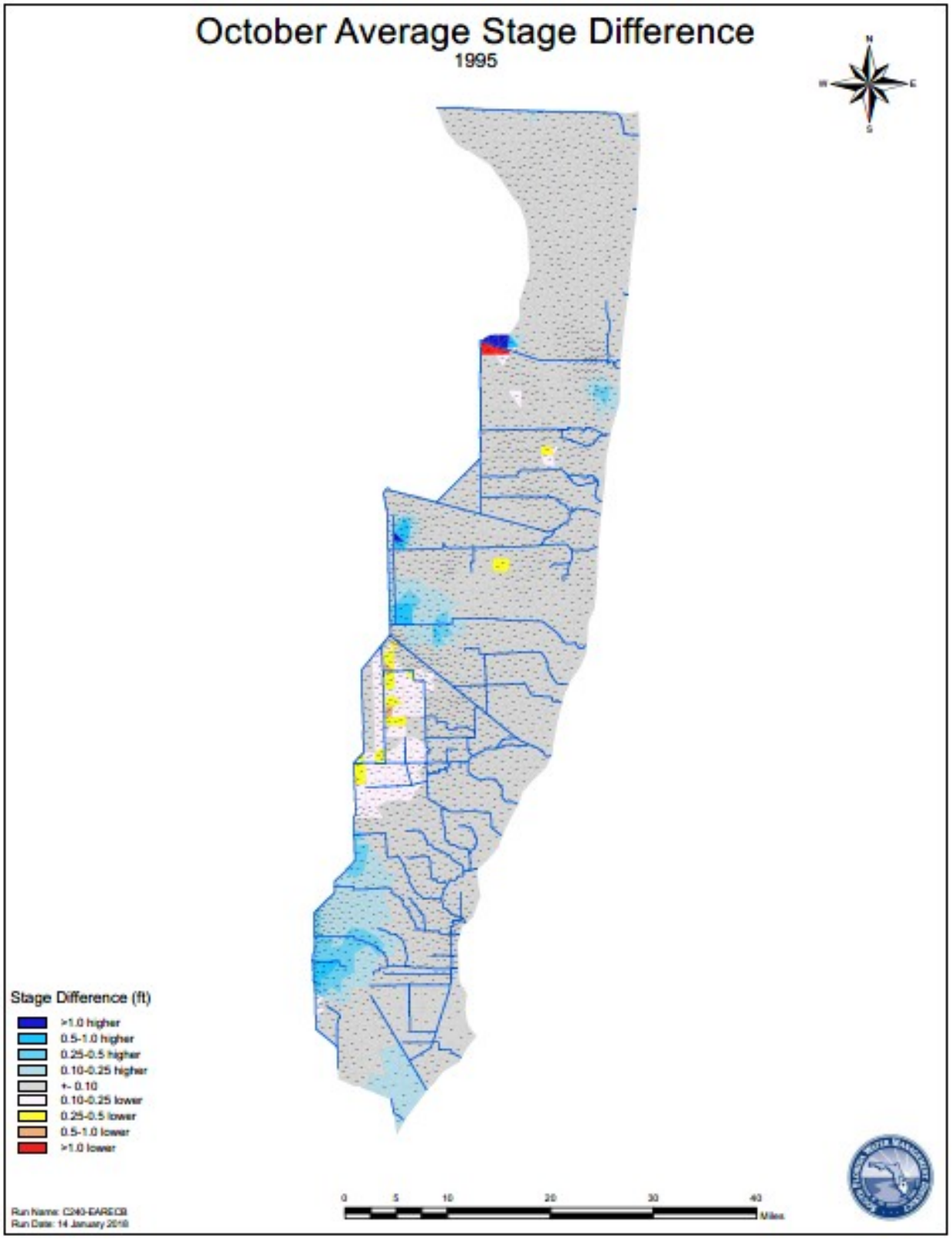

Figure B-36. October 1995 Average Stage Difference Map between TSP and EARECB

Table B-6. Groundwater Seepage under the East Coast Protective Levee to the LECSA 3, Average Annual 1,000 acre-feet

Seepage Direction	EARECB	EARFWO	TSP
L30 north of the bridge	213	201	208
L30 between S335 and the bridge	110	141	146
L30 south of S335	91	100	103
L31N north of G211	170	251	259
L31N from G211 to S331	29	28	29
L31N from S331 to S176	206	322	338
C111 from S176 to S177	106	214	220
C111 from S177 to S18C	30	47	49

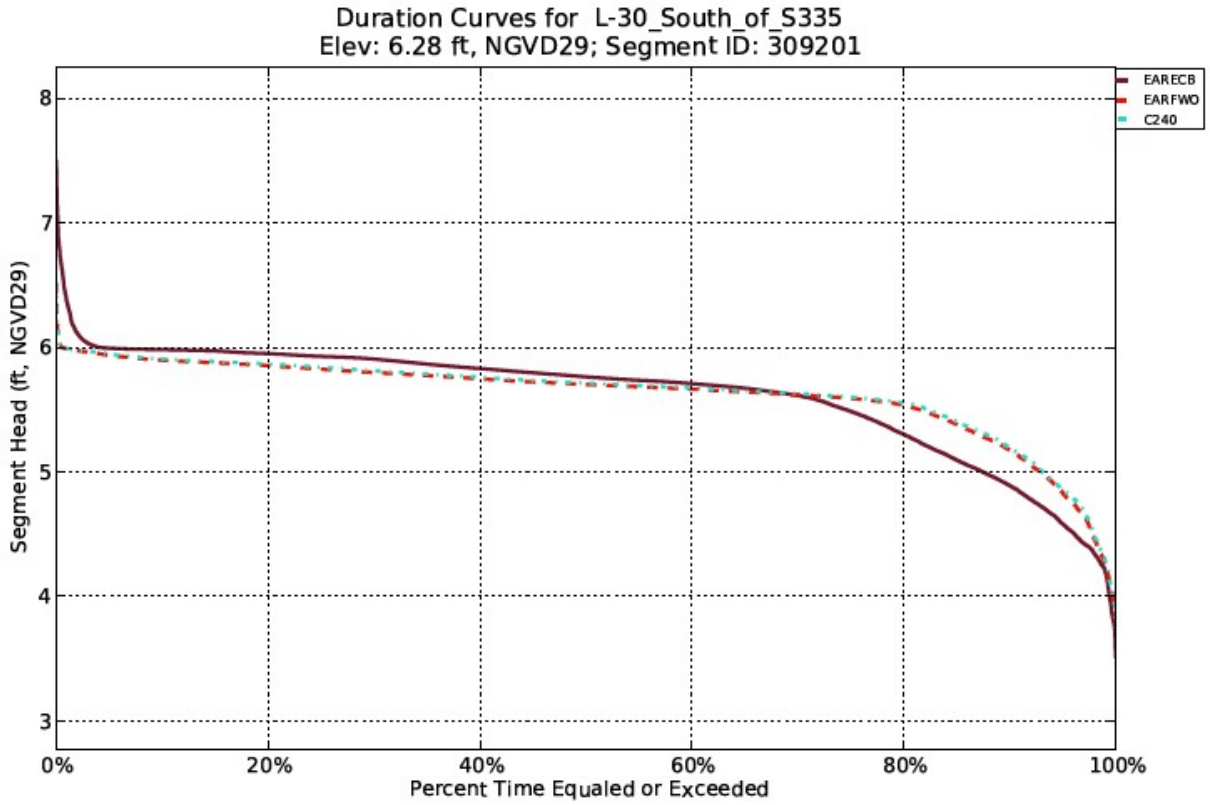

Figure B-37. Duration Curves for L-30 Canal, adjacent to WCA 3B

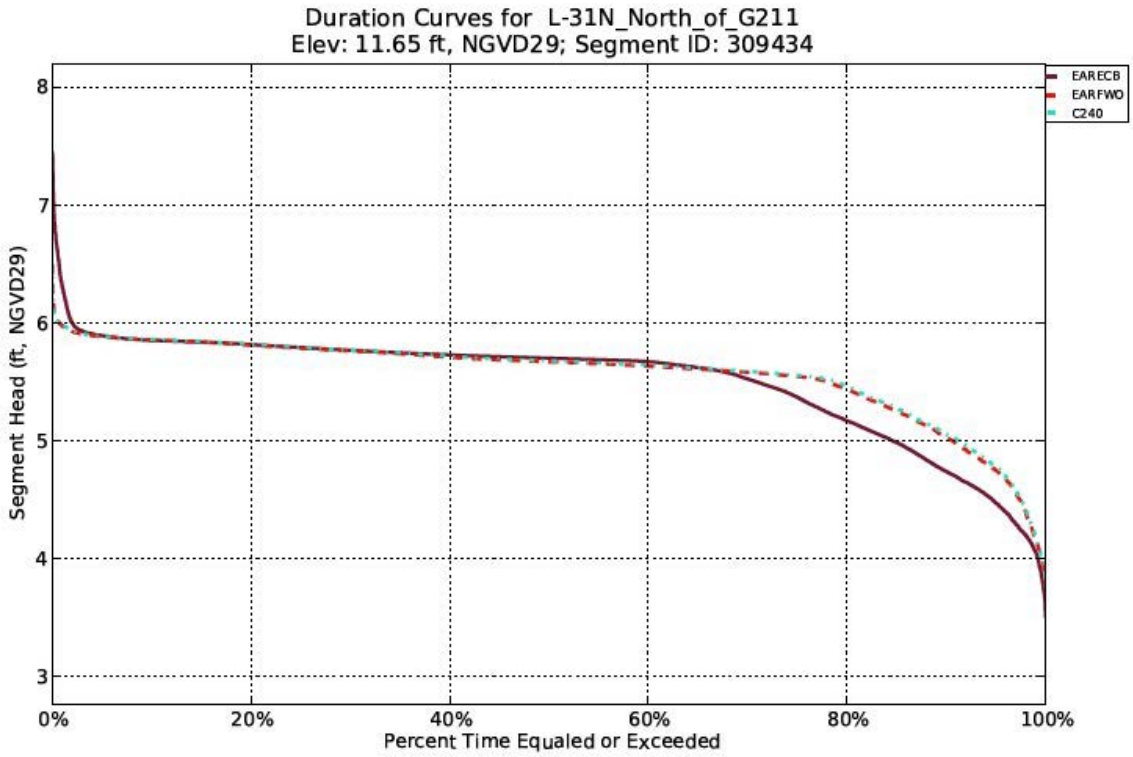

Figure B-38. Duration Curves for L-31 N Canal, Adjacent to Northern ENP

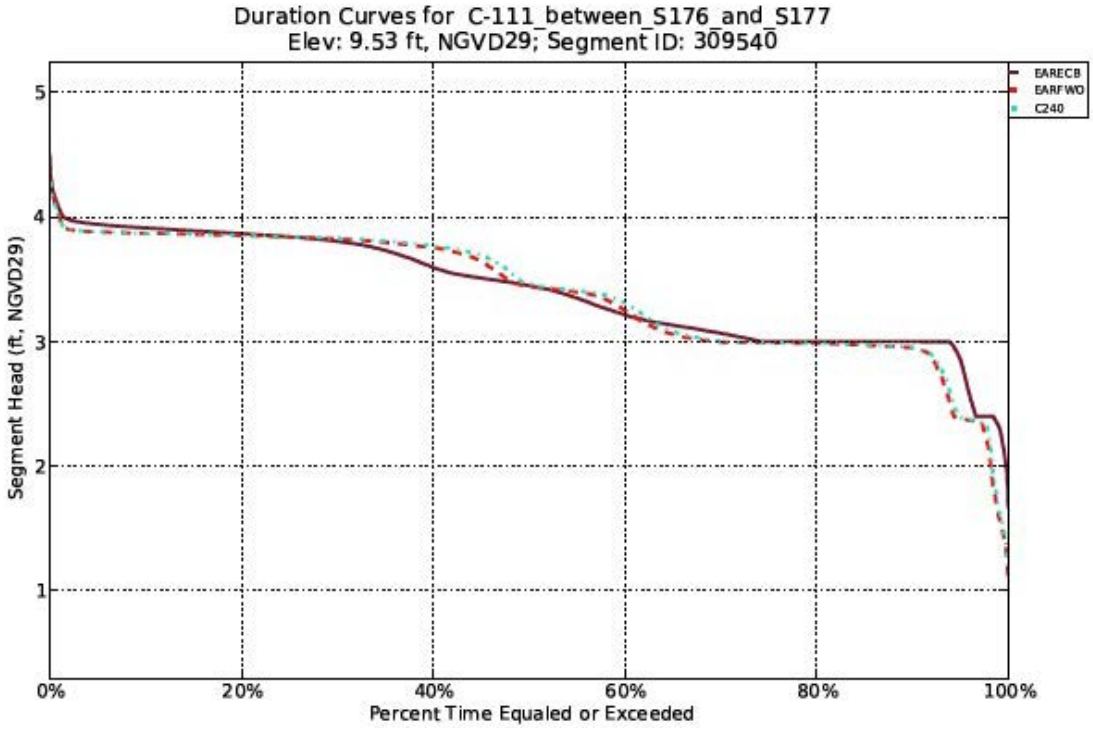

Figure B-39. Duration Curves for C-111 Canal, Adjacent to Southern ENP

Figure B-40. Stage Duration Curves for G-3439

B.2.5.5 Seminole Tribe of Florida

Water deliveries to northern WCA 3A will benefit the Tribe's hunting, fishing, trapping, and frogging rights (1987 Tribe and State of Florida Settlement Agreement) along the approximate 14,720 acres on the NW corner of the WCA 3A. Implementation of the TSP is expected to further rehydrate northern WCA 3A by redistributing treated STA discharges from the L-4 and L-5 Canals north of WCA 3A in a manner that further promotes sheetflow. Compared to the EARFWO, TSP stages near the L-28 Levee and average annual hydroperiods within the Seminole Tribe of Florida Big Cypress Reservation do not change (**Figures B-41 to B-43).**

Sheetflow and related patterns of hydroperiod extension and increased water depths would help to restore and sustain the micro-topography, directionality, and spatial extent of ridges and sloughs and improve the health of tree islands in the ridge and slough landscape. The TSP rehydrates northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires and promoting transition from upland to wetland vegetation.

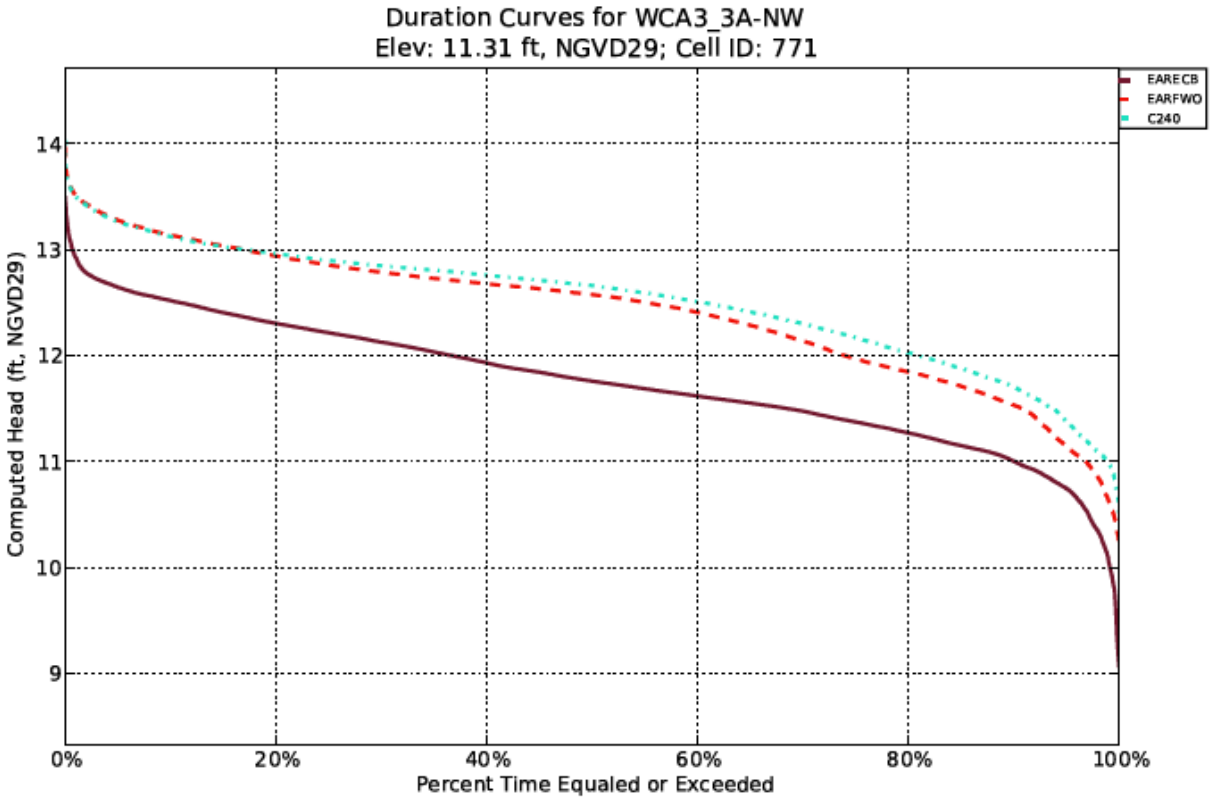

Figure B-41. Stage Duration Curves for WCA 3A-NW

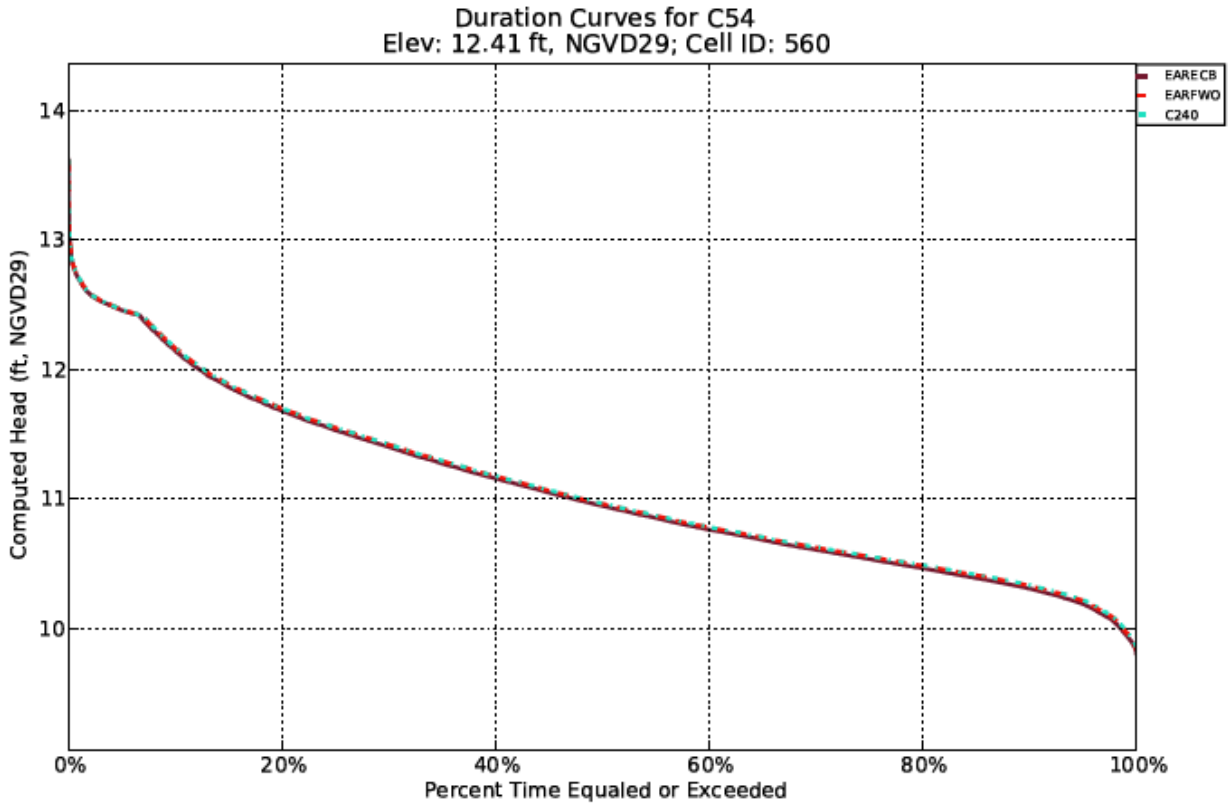

Figure B-42. Stage Duration Curves for C54

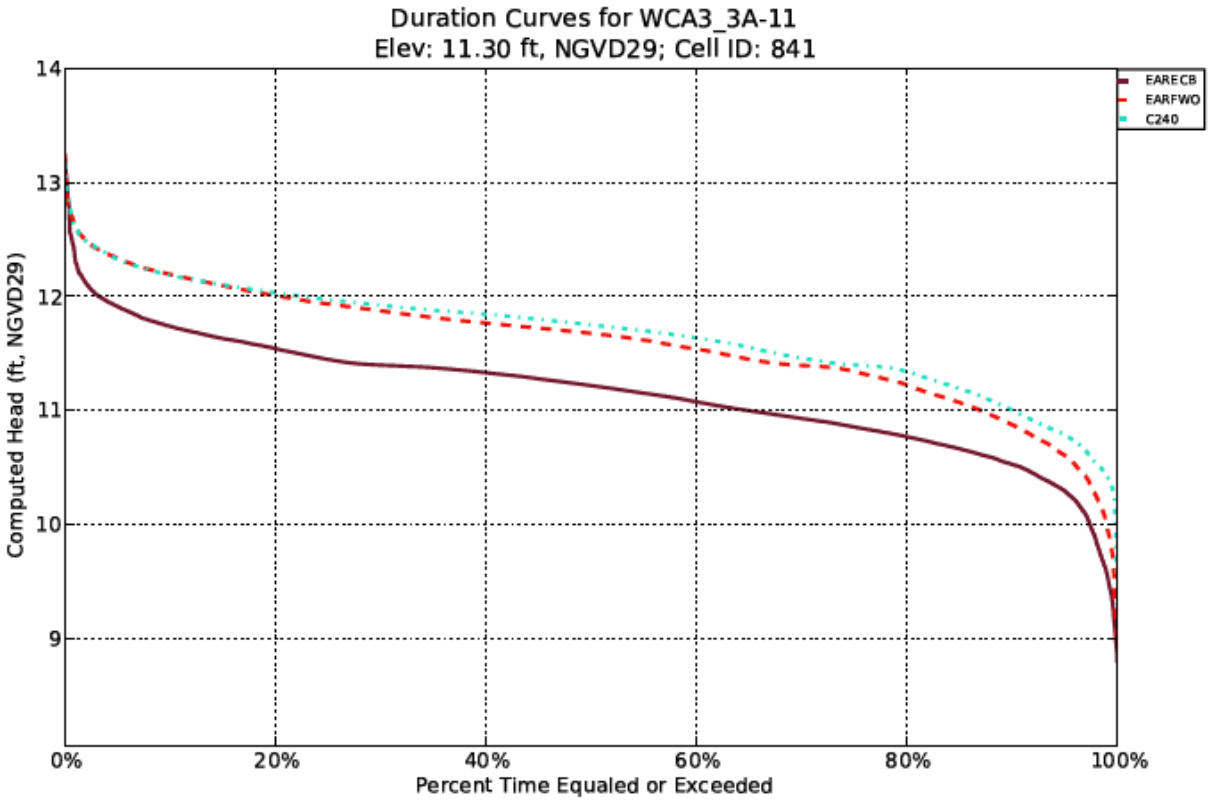

Figure B-43. Stage Duration Curves for WCA 3A-11

B.2.5.6 Miccosukee Tribe of Indians of Florida

The TSP shows improved hydroperiod and hydropatterns in northwestern WCA 3A compared to the future without the project (EARFWO). Sheetflow and related patterns of hydroperiod extension and increased water depths would significantly help to restore and sustain the micro-topography, directionality, and spatial extent of ridges and sloughs and to improve the health of tree islands in the ridge and slough landscape. The TSP would rehydrate northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires, and promoting transition from upland to wetland vegetation.

The TSP is expected to further rehydrate northern WCA 3A, improving conditions for tree islands and ridge-slough landscape patterns.

For the TSP, WCA 3B stages at Site WCA 3B-71 would slightly increase for the wetter half of the period of record, including stage increases of 0.1 feet during the upper 40% of the stage duration curve (**Figure B-44**). The peak stage within the Blue Shanty flow-way is 9.70 feet NGVD and stages exceed 8.0 feet NGVD for approximately 40% of the period of simulation, which is similar to EARFWO (**Figure B-45**).

Compared to the EARFWO, TSP stages within northwest ENP (NP-201) would slightly increase in the upper 50% of the stage duration curve and would be the same for the remaining drier 50%. Compared to the EARECB, stages decreased up to 0.3 feet under both wet and dry hydrologic conditions. To the south and west, the NP-205 monitoring gauge indicates no change under all hydrologic conditions between the EARFWO and TSP (**Figure B-46**).

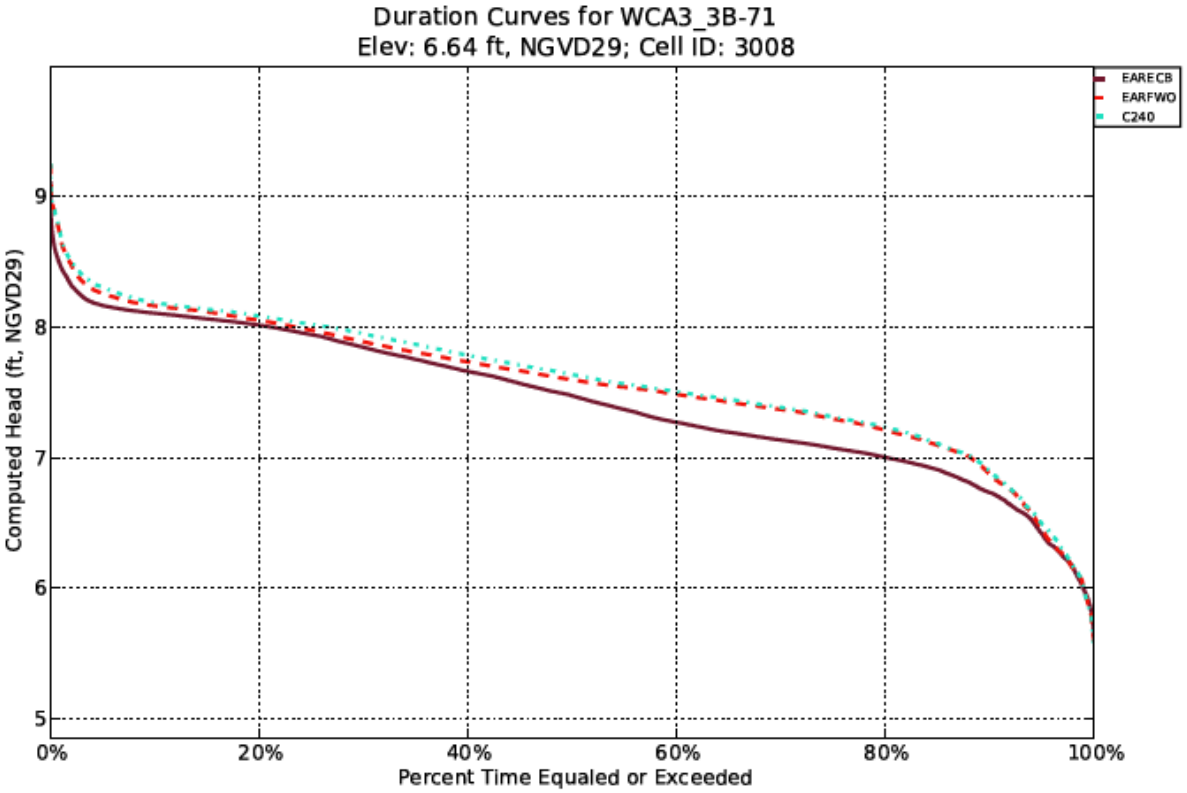

Figure B-44. Stage Duration Curves for WCA 3B-71

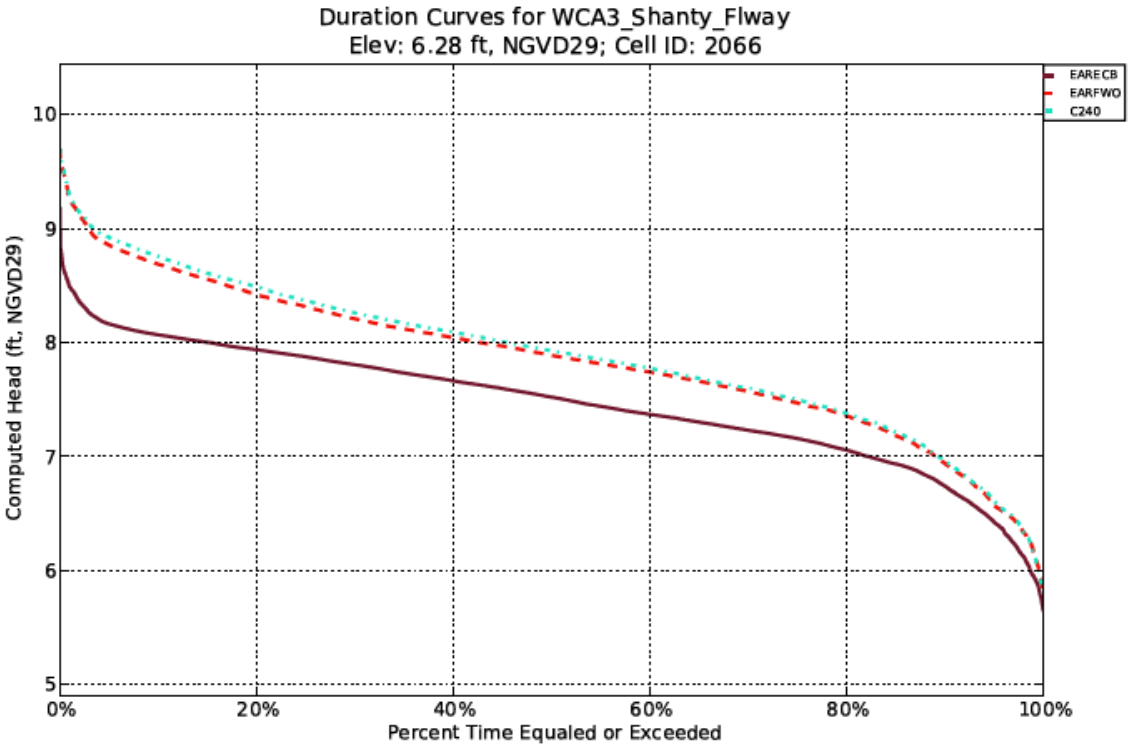

Figure B-45. Stage Duration Curves for WCA3 Shanty Flow-way

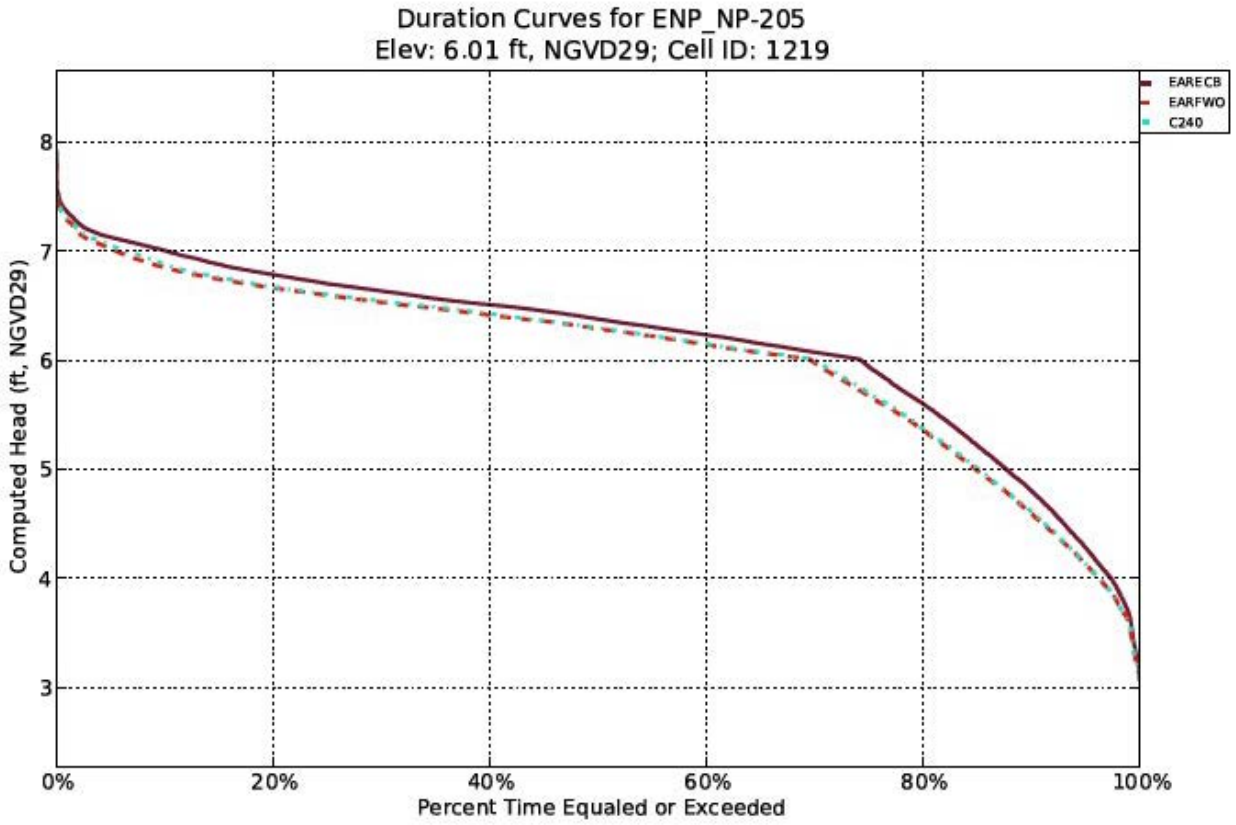

Figure B-46. Stage Duration Curves for ENP NP-205

B.2.6 Project Assurances – Identification of Water Made Available by the Project

The total water and the water made available for the natural system and other-water-related needs are quantified when all project features are constructed, and the project is expected to be operational as identified in the with-project condition, the TSP. The pre-project water expected to be available when the project is operational is represented by EARFWO. The difference between these two conditions, which is computed for each water year within the RSM period of simulation, represents the water made available by the project (TSP minus EARFWO).

B.2.6.1 Water Made Available for the Natural System

The habitat unit benefits were calculated during plan formulation at three locations: inflows to WCA 3, inflows to ENP, and overland flows towards Florida Bay, including overland flows at Shark River Slough. Although there is only a statistical relationship between Shark River Slough hydrology and Florida Bay salinity, and there needs to be a better understanding of the geophysical mechanisms that control salinity, the statistical models indicate that additional inflows to Shark River Slough will decrease salinities in Florida Bay.

These locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the TSP. Quantification of flows into WCA 3 can be found in **Figure B-47**. Quantification of flows into ENP can be found in **Figure B-48**. Quantification of overland flows towards Florida Bay can be found in **Figure B-49** and **Figure B-50**.

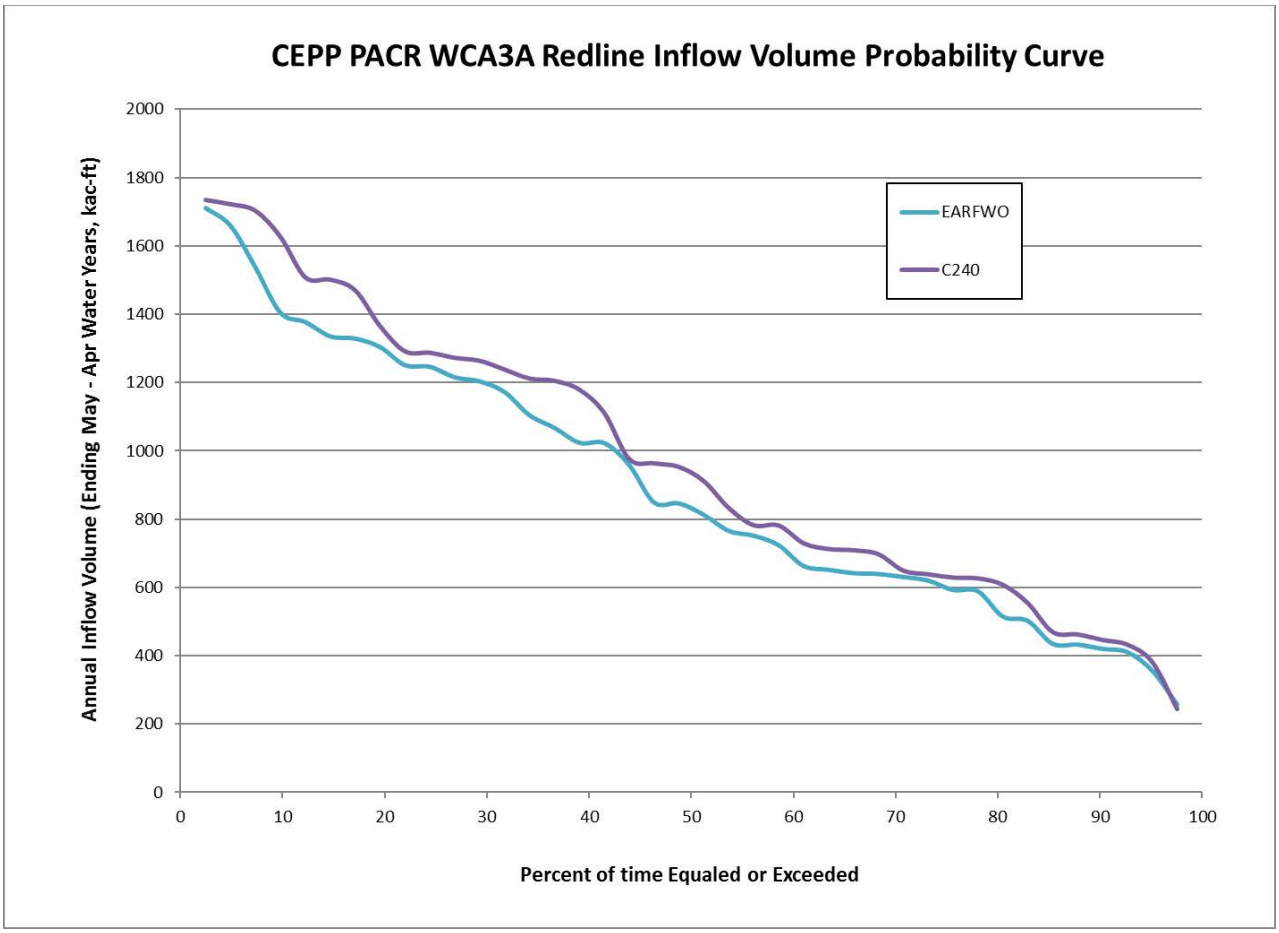

Figure B-47. CEPP PACR Northern WCA 3A Red Line Inflow Volume Probability Curve for EARFWO and TSP

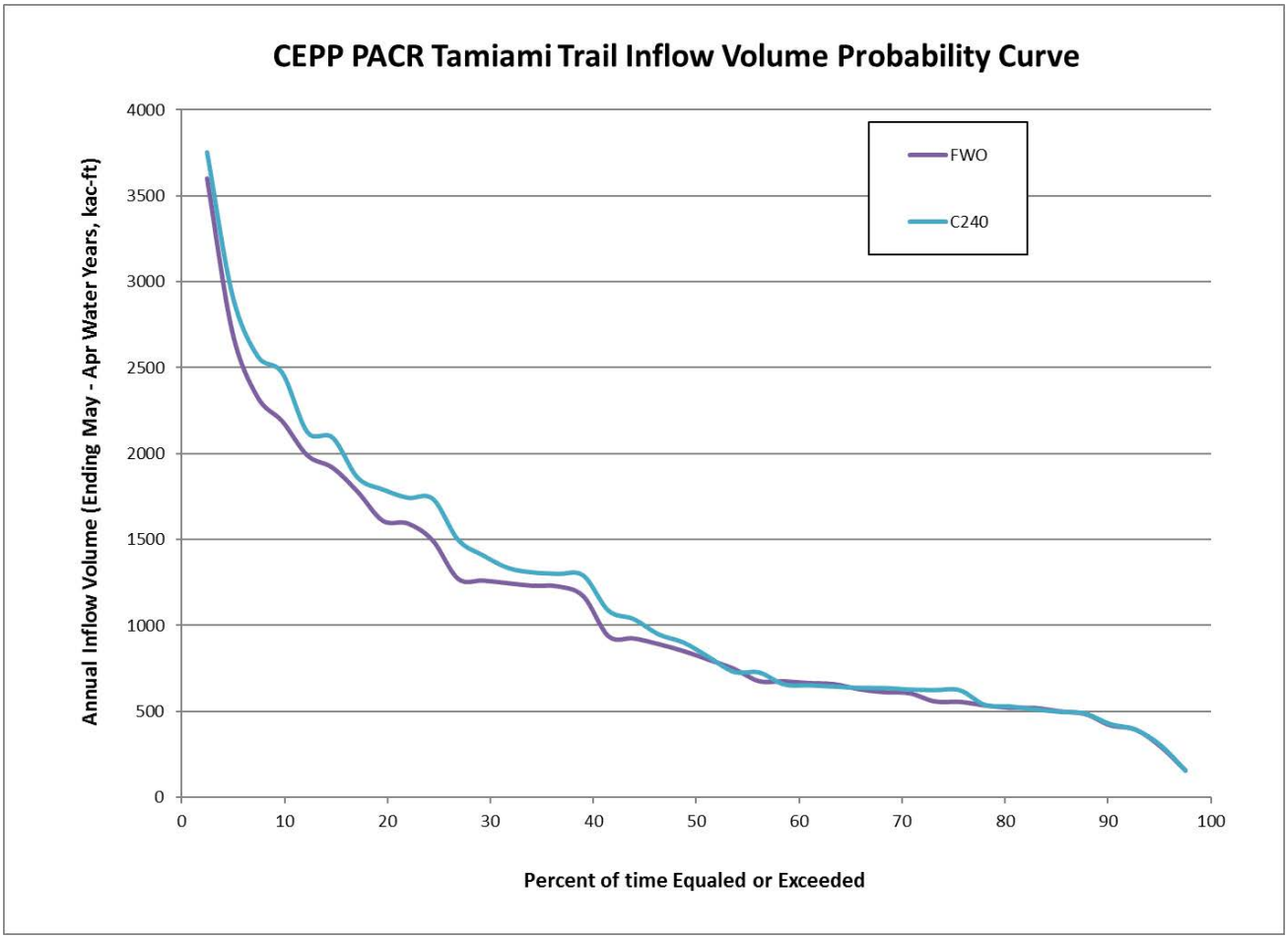

Figure B-48. CEPP PACR Tamiami Trail Inflow Volume Probability Curve for EARFWO and TSP

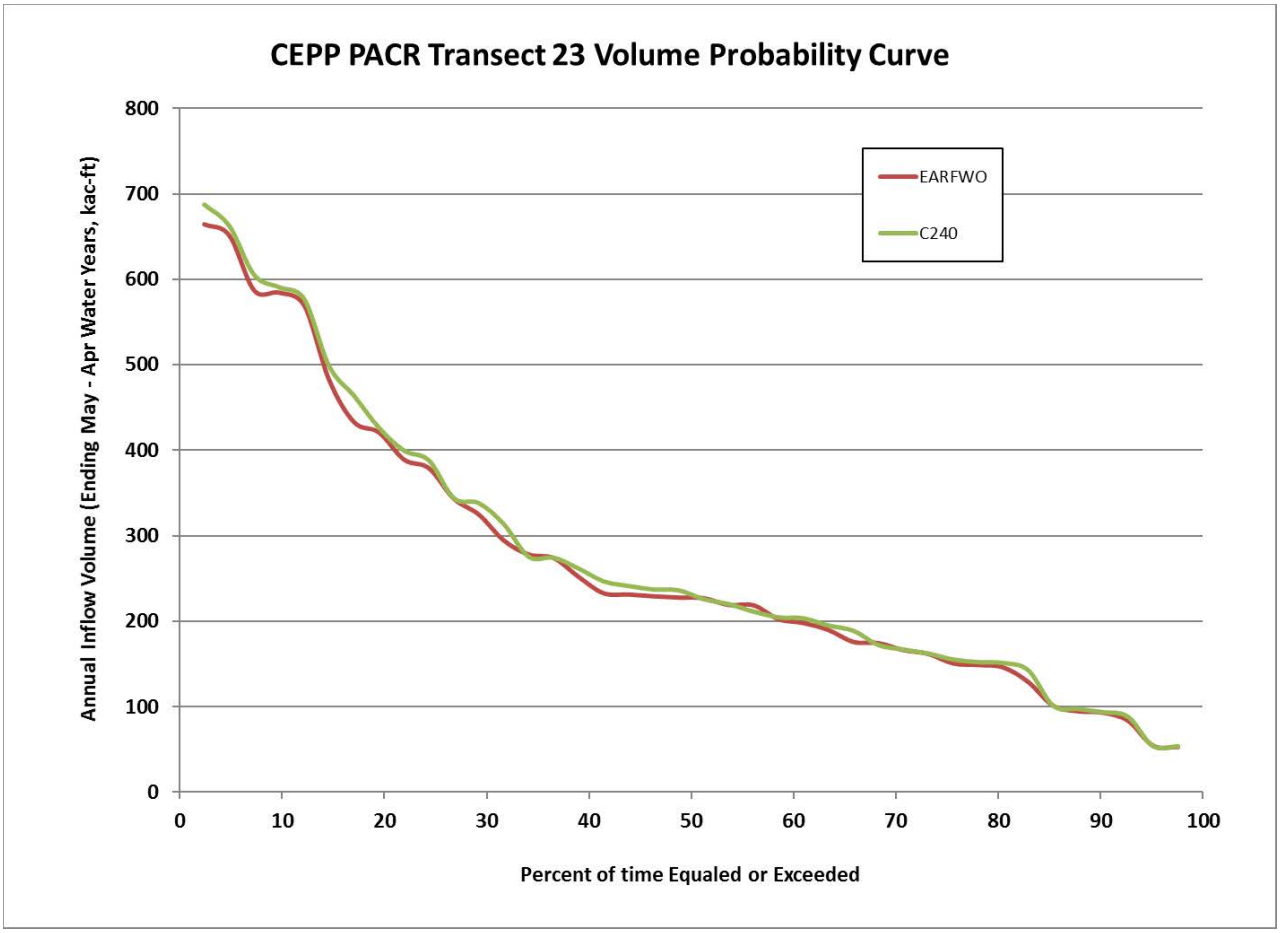

Figure B-49. CEPP PACR Florida Bay Transect 23 Inflow Volume Probability Curve for EARFWO and TSP

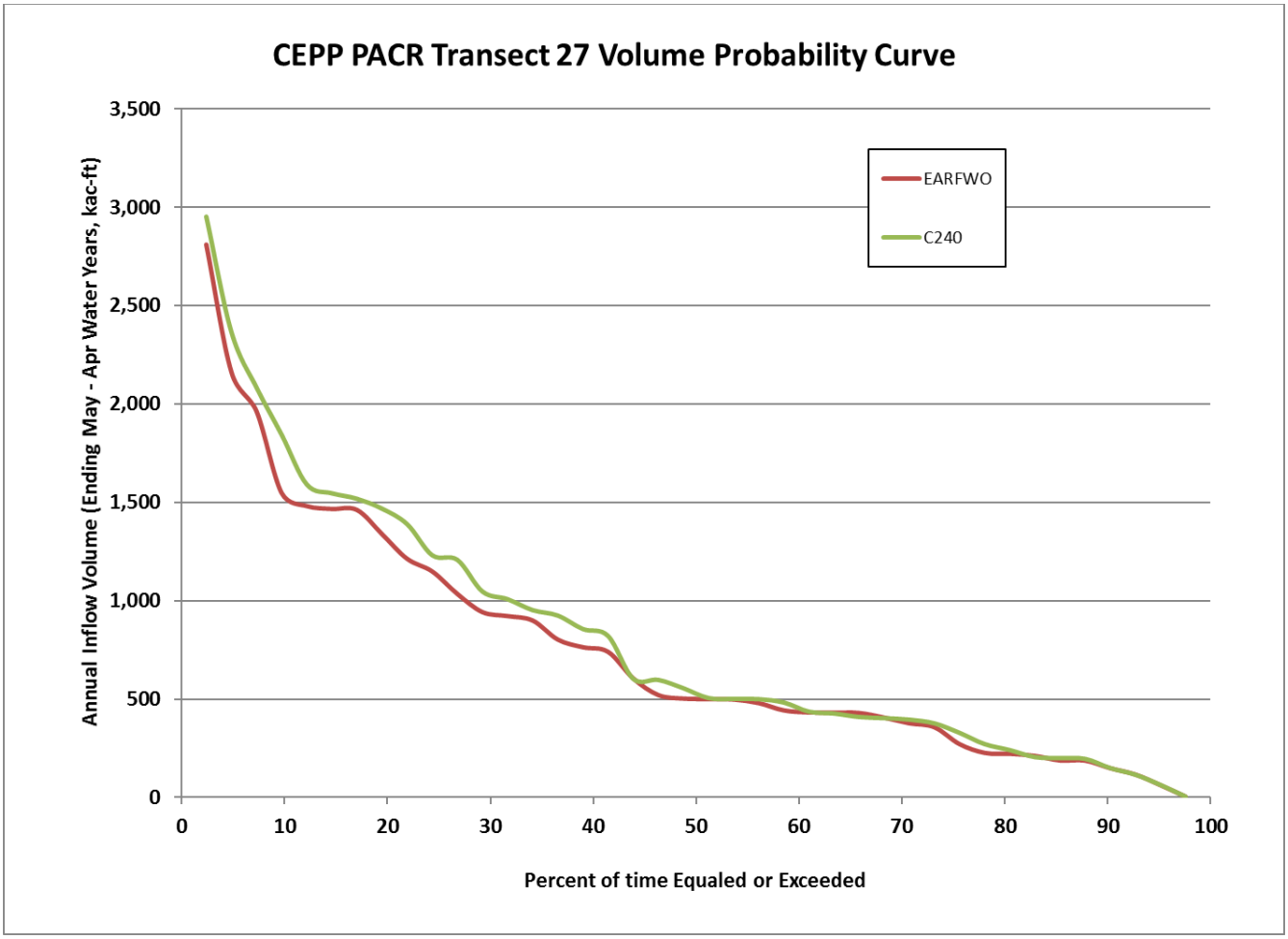

Figure B-50. CEPP PACR Everglades National Park – Shark River Slough Transect 27 Inflow Volume Probability Curve for EARFWO and TSP

B.2.6.2 Water for Other Water-Related Needs

Water stored in the A-2 Reservoir, a portion of which comes directly from Lake Okeechobee, could be returned to the Miami and/or North New River basins to maintain canal levels when excess capacity is available beyond restoration flows to the Everglades and the depth in the reservoir is above 8.2 feet (approximately one-third of the reservoir storage volume). The remaining water in the A-2 Reservoir below 8.2 feet in depth is solely dedicated for environmental purposes. If during water supply operations the full canal conveyance capacity is not being utilized, additional releases from the lake to the A-2 Reservoir could take place according to the operational protocol for Lake Okeechobee. However, the permitted allocations for LOSA water supply remains unchanged.

The ability of the A-2 Reservoir to provide water to meet other water-related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed for the TSP. Based on the analysis, the level of service for the LOSA water supply has not improved, nor has it been degraded by the project (refer to **Section B.2.3** and **Section B.3**). Therefore, no water was quantified for other water-related needs in the LOSA. However, by virtue of additional water being stored in A-2 Reservoir, additional water may reach water users located in LOSA.

B.3 CONCLUSIONS

B.3.1 Savings Clause - Elimination or Transfer of Existing Legal Sources of Water

The TSP would decrease high-volume freshwater discharges from Lake Okeechobee that are currently sent to the Northern Estuaries. Water stored in Lake Okeechobee would be sent southward through the canals of the EAA to the A-2 Reservoir. The A-2 Reservoir would provide storage capacity and attenuation of high flows, prior to delivery of the redirected water to new and existing STAs which would reduce phosphorus concentrations in the water to meet required State water quality standards. The treated water would be distributed across the northwestern boundary of WCA 3A to flow through and help restore more natural quantity, timing, and distribution of water to WCA 3A, WCA 3B, ENP, and Florida Bay.

With implementation of the TSP, sources of water to meet agricultural and urban demand in the LOSA and LECSAs would continue to be met by their current sources, primarily Lake Okeechobee, the Greater Everglades (including the WCAs), surface water in the regional canal network, and the Biscayne aquifer system. Sources of water for the Seminole Tribe of Florida and Miccosukee Tribe of Indians of Florida are influenced by the regional water management system (C&SF Project, including Lake Okeechobee); these sources would not be affected by the project. In addition, water supplies to ENP with implementation of the TSP exceed future without project and existing condition baseline volumes. Water sources for fish and wildlife located in the Northern Estuaries, WCA 2, WCA 3, and Florida Bay will not be diminished. Therefore, as a result of the TSP, just like with CEPP, there would be no elimination or transfer of existing legal sources of water supply for the following:

- Agricultural or urban water supply in the LECSA
- Agricultural or urban water supply in LOSA
- Allocation or entitlement to the Seminole Tribe of Florida under Section 7 of the Seminole Indian Land Claims Settlement Act of 1987 (25 U.S.C. 1772e)
- The Miccosukee Tribe of Indians of Florida
- Water supply for ENP
- Water supply for fish and wildlife

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.

B.3.2 Savings Clause – Flood Protection

Implementation of the TSP would not reduce the levels of service for flood protection within the areas affected by the project, including LOSA, EAA, LECSA 2, and LECSA 3.

Implementation of the project would not reduce the levels of service for flood protection within the areas affected by the project including the Seminole Tribe of Florida's Big Cypress Reservation. Implementation of the project would not reduce the levels of service for flood protection within the areas affected by the project including the Miccosukee Tribe of Indians of Florida's reservations and resort.

B.3.3 Project Assurances - Identifying Water for the Natural System

The identification of water for the natural system captures the quantity, timing, and distribution of water. Hydrologic model data extracted from the RSM-GL simulations were used to develop the volume probability curves at three locations in the regional system: inflows to WCA 3 inflows to ENP, and overland flows towards Florida Bay, including overland flows at Shark River Slough. These locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the TSP. Specifically, the volumes of water at the 10th, 50th, and 90th percentiles are identified and compared for the pre-project (future without) condition and the TSP (future with-project) conditions. The pre-project available water (EARFWO), the with-project total water available (TSP), and the water made available by the project (differences between TSP and EARFWO, which were computed for each water year within the RSM period of simulation) for the natural system can be found in **Table B-7** through **Table B-9**. The difference between the EARFWO and TSP shown in **Table B-9** may reflect a variety of conditions. The resulting difference between EARFWO and TSP is sorted (high to low) to generate the probabilities and may result from a variety of meteorological conditions. For example, during the extreme wet years the TSP allows for excess water to be stored in the reservoir to avoid high water conditions downstream. This operational capability avoids recreational closures and relieves stress on tree islands, etc., indicated by the reduction in flow volumes during extended wet events. During dry conditions, the inflows for one year in the period of record may be less in the TSP than the EARFWO due to diminishing supplies. The difference between the TSP and FWO at the 90th percentile and higher is less than 1-1.5% of the average annual increase at the 10th percentile.

Table B-7. Pre-Project Volume of Water Available for the Natural System

Pre-Project Water Available for the Natural System (EARFWO)			
Location	**Water Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WCA 3	1,023	723	257
ENP	2,711	1,271	535
Florida Bay	1,328	1,888	372

Table B-8. Total Volume of Water Available for the Natural System

Total Water Available for the Natural System (TSP)			
Location	**Water Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WCA 3	1,205	782	244
ENP	2,925	1,333	528
Florida Bay	1,521	1,945	367

Table B-9. Water Made Available by the Project for the Natural System

Water Made Available by the Project (difference between TSP and EARFWO)			
Location	Water Made Available equaled or exceeded 10% of Water Years (1,000 ac-ft)	Water Made Available equaled or exceeded 50% of Water Years (1,000 ac-ft)	Water Made Available equaled or exceeded 90% of Water Years (1,000 ac-ft)
WCA 3	182	58	-13
ENP	214	62	-7
Florida Bay	193	58	-5

B.3.3.1 Water to be Reserved or Allocated for the Natural System

As required by Section 601(h)(4)(A) of the of the WRDA 2000 and Section 385.35 of the Programmatic Regulations for the Implementation of CERP, the water made available by the project will be protected using the State of Florida's reservation or allocation authority under state law as in represented by **Table B-9**. Water made available by the TSP must be protected before the SFWMD and Department of the Army enter into one or more Project Partnership Agreements to construct the TSP project features. The SFWMD has already protected the pre-project water for the natural system in the Holey Land and Rotenberger Wildlife Management Areas; WCA 1, WCA 2A, WCA 2B, WCA 3A, and WCA 3B; and ENP through the restricted allocation criteria for the Everglades and North Palm Beach/Loxahatchee River Watershed waterbodies. See Section 3.2.1 of the SFWMD's Applicant's Handbook (Applicant's Handbook) for Water Use Permit Applications within the South Florida Water Management District.[2]

Lake Okeechobee was adopted as a minimum flow and minimum water level (MFL) waterbody by the SFWMD. MFLs are the minimum flow or minimum water level at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The LORS08 analysis revealed that the anticipated lower lake stages would turn Lake Okeechobee into a MFL waterbody in recovery. As part of the recovery strategy while LORS08 is in effect, the District adopted restricted allocation criteria for LOSA. The criteria limit users' withdrawals to their base condition water use. See Section 3.2.1 of the Applicant's Handbook. Applicants are not authorized to use additional volumes from Lake Okeechobee waterbodies unless they identify one of the specified sources listed in the rule. Furthermore, the SFWMD does not anticipate LOSA users requesting increases in allocation because they already have consumptive use permits with allocations that satisfy their 1-in-10 demand for existing crops.

B.3.4 Project Assurances – Identifying Water Made Available for Other Water Related Needs

The ability of the A-2 Reservoir to provide water to meet other water-related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed for the TSP. Based on the analysis, the level of service for the LOSA water supply has not improved, nor has it been degraded by the project (refer to **Section B.2.3** and **Section B.3**). Therefore, no water was quantified for other water related needs in the LOSA, LECSA 2, or LECSA 3.

[2] SFWMD. 2015. Applicant's Handbook for Water Use Permit Applications within the South Florida Water Management District. September 7, 2015. https://www.sfwmd.gov/sites/default/files/documents/wu_applicants_handbook.pdf

B.3.5 Project Assurances Commitments for All CERP Projects

The overarching objective of the CERP (referred to as simply the "Plan" in WRDA 2000 and the Programmatic Regulations) is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The federal government and the State of Florida are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to achieve and maintain the benefits to the natural system described in CERP. As envisioned in WRDA 2000 and the Programmatic Regulations, each PIR will identify this appropriate quantity, quality, timing, and distribution of water for the natural system.

The following language sets forth these commitments:

> *The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Federal Government and the non-Federal sponsor are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to ensure the restoration, preservation, and protection of the natural system as defined in WRDA 2000, for so long as the project remains authorized. This quantity, quality, timing, and distribution of water shall meet applicable water quality standards and be consistent with the natural system restoration goals and purposes of CERP, as the Plan is defined in the programmatic regulations. The non-Federal sponsor will protect the water for the natural system by taking the following actions to achieve the overarching natural system objectives of the Plan:*
>
> *1.Ensure, through appropriate and legally enforceable means under Federal law,*
>
> *that the quantity, quality, timing, and distribution of existing water that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report is available to the natural system, will be available at the time the Project Partnership Agreement for the project is executed and will remain available for so long as the Project remains authorized.*
>
> *2a. Prior to the execution of the Project Partnership Agreement, reserve or allocate for the natural system the necessary amount of water that will be made available by the project that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report.*
>
> *2b. After the Project Partnership Agreement is signed and the project becomes operational, make such revisions under Florida law to this reservation or allocation of water that the Federal Government and the non-Federal sponsor determines, as a result of changed circumstances or new information, is beneficial for the natural system.*
>
> *3. For so long as the Project remains authorized, notify and consult with the Secretary of the Army should any revision in the reservation of water or other legally enforceable means of protecting water be proposed by the non-Federal sponsor, so that the Federal Government can assure itself that the changed reservation or legally enforceable means of protecting water conform with the non-Federal sponsor's commitments under paragraphs 1 and 2. Any change to a reservation or allocation of water made available by the project shall require an amendment to the Project Partnership Agreement*

B.4 STATE COMPLIANCE REPORT

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CENTRAL AND SOUTHERN FLORIDA PROJECT
COMPREHENSIVE EVERGLADES RESTORATION PLAN

Central Everglades Planning Project
Post Authorization Change Report

State Compliance Report
Section 373.1501, Florida Statutes

February 13, 2018

Contents

Tables

Figures

List of Acronyms

A	
ac-ft	acre-feet
AM	Adaptive Management
ASA(CW)	Assistant Secretary of the Army for Civil Works
B	
BBCW	Biscayne Bay Coastal Wetlands
BCWPA	Broward County Water Preserve Areas
BMAP	Basin Management Action Plan
BMP	Best Management Practices
BO	Biological Opinion
C	
CE/ICA	Cost Effectiveness and Incremental Cost Analysis
CEM	Conceptual Ecological Model
CEPP	Central Everglades Planning Project
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CERPRA	Comprehensive Everglades Restoration Plan Regulation Act
cfs	cubic feet per second
C&SF	Central and Southern Florida
CO_2	carbon dioxide
COP	Combined Operating Plan
CSSS	Cape Sable seaside sparrow
CWA	Clean Water Act
D	
Decomp	Decompartmentalization and Sheetflow Enhancement project
DMSTA	Dynamic Model for Stormwater Treatment Areas
DSAC	Dam Safety Action Classification
DOI	Department of Interior
DPOM	Draft Project Operation Manual

DSMS	Dam Safety Modification Study
E	
EAA	Everglades Agricultural Area
EC	Engineering Circular
ECB	Existing Conditions Baseline
EDC	engineering during construction
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
ENP	Everglades National Park
E.O.	Executive Order
EQ	Environmental Quality
ER	engineering regulation
EPA	Everglades Protection Area
ERTP	Everglades Restoration Transition Plan
ESA	Endangered Species Act
F	
F.A.C.	Florida Administrative Code
F.S.	Federal Statute
FDEP	Florida Department of Environmental Protection
FEB	Flow Equalization Basin
FEIS	Final Environmental Impact Statement
FR/EIS	Feasibility Report/Environmental Impact Statement
ft	feet
FWC	Florida Fish and Wildlife Conservation Commission
FWO	Future Without (Project Condition)
G	
GDM	General Design Memorandum
H	
HEC-RAS	Hydrologic Engineering Center River Analysis System
HHD	Herbert Hoover Dike
HQUSACE	USACE Headquarters

HTRW	Hazardous, Toxic and Radioactive Waste
HU	habitat unit
I	
IDC	interest during construction
IOP	Interim Operations Plan
IRL-S	Indian River Lagoon-South (Project)
IWR	Institute for Water Resources
J	
K	
L	
LEC	Lower East Coast
LERR	Lands, Easements, Rights of Way, and Relocations
LNWR	Loxahatchee National Wildlife Refuge
LOOPS	Lake Okeechobee Operations Screening Model
LORS	Lake Okeechobee Regulation Schedule
LOSA	Lake Okeechobee Service Area
LOWRP	Lake Okeechobee Watershed Restoration Project
LTGM	Long-Term Geometric Mean
M	
M&I	Municipal and Industrial
MFL	Minimum Flows and Minimum Water Levels
mg/L	milligrams per liter
MGD	Million Gallons per Day
MISP	Master Implementation Sequencing Plan
MOA	Memorandum of Agreement
MSL	Mean Sea Level
MRR	Major Rehabilitation Report
MWD	Modified Water Deliveries
N	
NED	National Economic Development
NEPA	National Environmental Policy Act

NER	National Ecosystem Restoration
NESRS	Northeast Shark River Slough
NGVD	National Geodetic Vertical Datum
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NNR	North New River
NNRC	North New River Canal
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NRC	National Research Council
NRCS	Natural Resources Conservation Service
O	
OIWW	Okeechobee Intercoastal Waterway
OMRR&R	Operations, Maintenance, Repair, Rehabilitation, and Replacement
OTMP	Operational Testing and Monitoring Period
P	
PACR	Post Authorization Change Report
PDT	Project Delivery Team
PED	Preconstruction Engineering and Design
PET	Potential Evapotranspiration
PIR	Project Implementation Report
PPA	Project Partnership Agreement
ppb	Parts Per Billion
PWS	Public Water Supply
Q	
R	
RDO	Rain Driven Operations
RECOVER	Restoration Coordination and Verification

RED	Regional Economic Development
RESOPS	Reservoir Sizing Operations Screening Model
ROM	rough order of magnitude
RPM	reasonable and prudent measure
RSM-BN	Regional Simulation Model for Basins
RSM-GL	Regional Simulation Model for the Glades and Lower East Coast Service Area
S	
S&A	supervision and administration
SAD	South Atlantic Division (USACE)
SAJ	Jacksonville District (USACE)
SAV	submerged aquatic vegetation
SDCS	South Dade Conveyance System
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office(er)
SLR	Sea Level Rise
SPF	Standard Project Flood
SRS	Shark River Slough
STA	stormwater treatment area
T	
TC	terms and conditions
THPO	Tribal Historic Preservation Office(er)
TMDL	Total Maximum Daily Limit
TP	Total Phosphorus
TSP	Tentatively Selected Plan
TTNS	Tamiami Trail Modifications Next Steps
U	
U.S.	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture

USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

V

W

WCA	Water Conservation Area
WIIN Act	Water Infrastructure Investments for the Nation Act of 2016
WMA	Wildlife Management Area
WPA	Water Preserve Areas
WQBELs	Water Quality-Based Effluent Limits
WRAC	Water Resources Advisory Commission
WRDA	Water Resources Development Act
WRRDA	Water Resources Reform and Development Act
WSE	Water Supply and Environmental Regulation Schedule

X

Y

Z

1 Overview of Section 373.1501, Florida Statutes Requirements

Section 373.1501, Florida Statues (F.S.) requires that, in their role as local sponsor for the Comprehensive Everglades Restoration Plan (CERP), South Florida Water Management District (SFWMD) analyze and evaluate all needs to be met in a comprehensive manner, consider all applicable water resource issues, determine with reasonable certainty that all project components are feasible and cost-effective, and determine with reasonable certainty that all project components are consistent with applicable law and regulations, and can be permitted and operated as proposed. Section 373.1501 F.S. also requires that SFWMD provide reasonable assurances that the quantity of water available to existing legal users is 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 also requires SFWMD to ensure that implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to and relocation of existing utility or public infrastructure are minimized. This report, along with the additional detail provided in the Central Everglades Planning Project Post Authorization Change Report (CEPP PACR or PACR), provides the information necessary for the Florida Department of Environmental Protection (FDEP) to determine that SFWMD has conducted the necessary evaluations as set forth in Subsection 373.1501 F.S.

1.1 Introduction

The SFWMD, as local sponsor for the authorized Central Everglades Planning Project (CEPP) plan, has prepared a Post Authorization Change Report (PACR) Integrated Feasibility Study (Study) and Environmental Impact Statement (EIS) to increase the amount of water storage and treatment in the authorized CEPP that will be the project features of future Project Partnership Agreement (PPA) New Water and improve conveyance in the North New River and Miami Canals, to further reduce damaging discharges to the Northern Estuaries and send additional water south to the central Everglades. The Tentatively Selected Plan (TSP) provides an overall 55% reduction in discharge volumes and a 63% reduction in the number of discharge events to the Northern Estuaries from Lake Okeechobee, in conjunction with other authorized projects. High-flow discharges lasting more than 60 days in the Caloosahatchee River Estuary or more than 42 days in the St. Lucie Estuary have been found to be particularly damaging to the oyster populations. The additional storage and treatment proposed in the PACR would reduce the number of these discharges by an additional 40% in the Caloosahatchee Estuary and 55% in the St. Lucie Estuary, in addition to the benefits provided by CEPP. The reduction in discharges improves the salinity conditions in estuary by reducing the number of events that exceed the preferred salinity envelope by 39% in the St. Lucie Estuary and by 45% in the Caloosahatchee Estuary.

In addition to reducing damaging discharges to the Northern Estuaries, the TSP increases flows to the central portion of the Everglades from an average annual of approximately 210,000 acre-feet (ac-ft) to an average annual of approximately 370,000 ac-ft. This provides a significant increase in the quantity of water flowing to the central Everglades, which is essential to Everglades Restoration, achieves the CERP goal and will be protected for the natural system. The

PACR reaffirms that the project features that will be the subject of the other two future CEPP PPAs, namely CEPP PPA North and CEPP PPA South can accommodate these additional flows south to the central Everglades, that would result from additional canal conveyance, storage, and treatment wetlands proposed on lands within the Everglades Agricultural Area (EAA). Full benefits of the CEPP PACR may not be realized unless all components of the authorized CEPP plan and interdependent projects, such as Modified Water Deliveries to ENP and C-111 South Dade, are completed and achieve their stated objectives (see **Section 6.7.1** of the main report).

The CEPP PACR presents a description of existing and expected future conditions in the south Florida Everglades ecosystem, formulation and evaluation of plans considered to address ecosystem restoration needs in the region, analysis of environmental effects of the TSP, project costs, and implementation challenges.

1.1.1 Study Area

The study area for the CEPP PACR encompasses the Northern Estuaries (St. Lucie River and Estuary, Indian River Lagoon and the Caloosahatchee River and Estuary), Lake Okeechobee, the Everglades Agricultural Area (EAA), the Water Conservation Areas (specifically WCAs 2 and 3); ENP, the Southern Estuaries, and portions of the Lower East Coast (LEC). Adjacent areas were also evaluated. A description of the study area regions is provided in **Table 1-1** and a map of the CEPP PACR study area is provided in **Figure 1-1**.

Table 1-1. Description of the CEPP PACR Study Area / Region of Influence

CEPP PACR Study Area Region	Description of the Study Area Region
Lake Okeechobee	Lake Okeechobee is a large, shallow lake (surface area 730 square miles) 30 miles west of the Atlantic coast and 60 miles east of the Gulf of Mexico. It is impounded by a system of levees, with 6 outlets: St. Lucie Canal eastward to the Atlantic Ocean, Caloosahatchee Canal/River westward to the Gulf of Mexico, and four agricultural canals (West Palm Beach, Hillsboro, North New River, and Miami). The lake is surrounded by the 143-mile-long Herbert Hoover Dike. The lake has many functions, including flood risk management, urban and agricultural water supply, navigation, recreation, fisheries, and wildlife habitat. It is critical for flood control during wet seasons and water supply during dry seasons. Agriculture in the Lake Okeechobee Service Area (LOSA), including the Everglades Agricultural Area (EAA), is the predominate user of lake water. The lake is an economic driver for both the surrounding areas and south Florida's economy.
Northern Estuaries	Lake Okeechobee discharges into the two Northern Estuaries. The St. Lucie Canal flows eastward into the St. Lucie Estuary, which is part of the larger Indian River Lagoon Estuary. The Caloosahatchee Canal/River flows westward into the Caloosahatchee Estuary and San Carlos Bay, which are part of the larger Charlotte Harbor Estuary. The St. Lucie and Caloosahatchee estuaries are designated Estuaries of National Significance, and the larger Indian River Lagoon and Charlotte Harbor estuaries are part of the U.S. Environmental Protection Agency (USEPA)-sponsored National Estuary Program. The landscape includes pine-flatwoods, wetlands, mangrove forests, submerged aquatic vegetation, estuarine benthic areas (mud and sand), and near-shore reefs.

Table 1-1. Description of the CEPP PACR Study Area / Region of Influence (continued)

CEPP PACR Study Area Region	Description of the Study Area Region
Everglades Agricultural Area	The EAA is approximately 630,000 acres in size and is immediately south of Lake Okeechobee. Much of this rich, fertile land is devoted to sugarcane production, and is crossed by a network of canals that are strictly maintained to manage water supply and flood protection. The landscape includes natural and man-made areas of open water such as canals, ditches, and ponds, wetlands, and lands associated with agricultural and urban use. Within the EAA, there is approximately 45,000 acres of stormwater treatment areas (STAs) and the Holey Land and Rotenberg Wildlife Management Areas.
Water Conservation Areas (WCA)	WCA 2 and WCA 3 (the largest of the three water conservation areas) are situated southeast of the EAA and are approximately 1,328 square miles. The WCAs extend from EAA to Everglades National Park (ENP). They provide floodwater retention and water supply for urban and agricultural uses, and are the headwaters of ENP. The landscape includes open water sloughs, sawgrass marshes, and tree islands.
Everglades National Park	ENP was established in 1947, covering ~2,353 square miles (total elevation changes of only 6 feet from its northern boundary at Tamiami Trail south to include much of Florida Bay). The landscape includes sawgrass sloughs, tropical hardwood hammocks, mangrove forest, lakes, ponds, and bays.
Florida Bay	Florida Bay is a shallow estuarine system (average depth less than 3 feet) comprising a large portion of ENP. It is the main receiving water of the greater Everglades, heavily influenced by changes in timing, distribution, and quantity of freshwater flows into the Southern Estuaries. The landscape includes saline emergent wetlands, seagrass beds, and mangrove forests.
Lower East Coast (LEC)	The LEC encompasses Palm Beach, Broward, Monroe and Miami-Dade Counties. With the exception of Monroe County, water levels in this area are highly controlled by the Central and Southern Florida water management system to provide flood damage reduction and sufficient water supply to minimize the risk of detrimental saltwater intrusion. Biscayne Bay and the contiguous water bodies of Card, Little Card, and Barnes Sounds and Manatee Bay lie along the southeastern mainland boundary of the LEC and receive their freshwater supplies as inflows of surface and groundwater that are dependent on water table stages east of L-31 N. The CEPP PACR is focused on the portions of the LEC adjacent to the natural areas and susceptible to seepage.

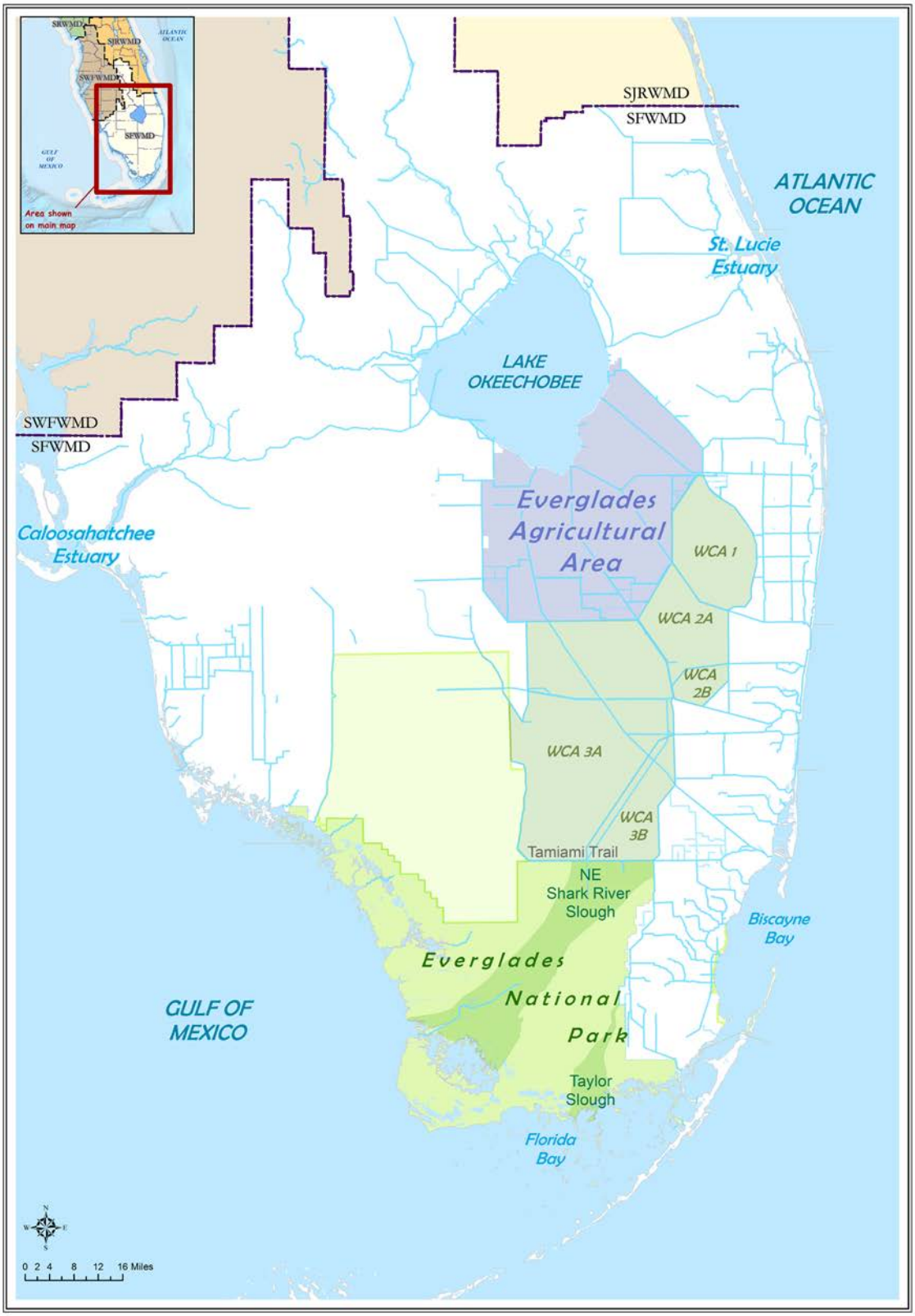

Figure 1-1. Map of Study Area

1.1.2 Project Objectives

The objective of the CEPP PACR is to further improve the quantity, quality, timing, and distribution of water flows to the St Lucie and Caloosahatchee Estuaries (Northern Estuaries), the Greater Everglades (Water Conservation Area 3 [WCA 3] and Everglades National Park [ENP]), and Florida Bay while maintaining flood control and water supply for existing legal users.

Since the approval of CERP in 2000, several projects have been Federally authorized and/or funded for construction. Authorized projects relevant to this CEPP PACR include Indian River Lagoon-South, Caloosahatchee River (C-43) West Basin Storage Reservoir, C-111 Spreader Canal Western, C-111 South Dade, Modified Water Deliveries to ENP, Biscayne Bay Coastal Wetlands Phase I, Site 1 Phase I, Broward County Water Preserve Areas, Herbert Hoover Dike Rehabilitation, and Tamiami Trail Next Steps. Construction of the A-1 Flow Equalization Basin (FEB) was completed by the SFWMD in 2015 as part of the State of Florida's Restoration Strategies Program and is fully operational. The SFWMD is expediting construction of two CEPP PPA South features—increasing the S-333 structure capacity and removal of Old Tamiami Trail under a Pre-Partnership Credit Agreement with the USACE. The State of Florida has also voluntarily provided funding and in-kind work to: implement the Florida Bay upper Taylor Slough project; improve C-111 South Dade operations; advance completion of the Tamiami Trail Next Steps bridging; and expedite completion of the Herbert Hoover Dike Rehabilitation. These expedited efforts, coupled with progress made on the State of Florida's Restoration Strategies Program, will allow for near-term improvements in system-wide operational flexibility and promote additional freshwater flow to the ENP and Florida Bay.

Despite the restoration progress that will result from implementation of the authorized CEPP plan, which provided the first increment of restoration, ecological conditions and functions within the Northern Estuaries and central portion of the Everglades ridge and slough community require additional infrastructure to achieve CERP restoration goals and objectives. Without additional water storage and treatment, such as those identified in the PACR and other CERP and non-CERP projects, ecological conditions and functions in estuaries on the east and west coasts of Florida will continue to experience adverse impacts due to excessive damaging regulatory releases from Lake Okeechobee during wet years, while the Greater Everglades requires additional flow with the proper timing and distribution to improve ecological conditions

The goal of the CEPP PACR is to develop a plan to provide sufficient conveyance, water storage and treatment capacity south of Lake Okeechobee in the EAA to further reduce damaging discharges to the Northern Estuaries and deliver additional flow to the Greater Everglades consistent with the CERP goals.

The Northern Estuaries were subject to excessively damaging regulatory releases in 2016 and 2017 resulting in successive years of environmental and economic impacts to these regions. To respond to these concerns, the Florida Legislature, through Florida State Law Chapter 2017-10, directed the SFWMD to advance project planning of the Everglades Agricultural Area Reservoir component and develop a CEPP PACR for additional storage and treatment south of Lake Okeechobee consistent with the CERP. The CEPP PACR builds upon the first increment of CEPP by providing additional water storage, treatment, and conveyance south of Lake Okeechobee to further reduce the volume, duration and frequency, of damaging regulatory discharges from Lake

Okeechobee to the Northern Estuaries by redirecting flow south to the central portion of the Greater Everglades consistent with the goals of the CERP.

Section 601(h) of WRDA 2000 states "[t]he overarching objective of the [CERP] Plan is the restoration, preservation, and protection of the South Florida Ecosystem while providing for other water-related needs of the region, including water supply and flood protection." As described in **Table 1-2**, the objectives of the CEPP PACR are fully consistent with the objectives of the CEPP and CERP.

Table 1-2. Goals and Objectives of CERP, CEPP, and CEPP PACR

CERP Objective	CEPP Objective	CEPP PACR Objective
CERP Goal: Enhance Ecological Values		
Improve habitat and functional quality	Reduce high-volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the Northern Estuaries	Further reduce high-volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the Northern Estuaries
	Restore seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades System	Further improve upon restoration of seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades System
	Improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and salt water intrusion	Further improve sheetflow patterns and surface water depths and durations in the Everglades system in order to reduce soil subsidence, the frequency of damaging peat fires, the decline of tree islands, and salt water intrusion
Increase the total spatial extent of natural areas	No corresponding CEPP objective; consider this objective in future increments	No corresponding CEPP PACR objective
Improve native plant and animal species abundance and diversity	Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization	No corresponding CEPP PACR objective
	Restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function	Further restore more natural water level responses to rainfall to promote plant and animal diversity and habitat function
CERP Goal: Enhance Economic Values and Social Well-Being		
Increase availability of fresh water (agricultural/municipal & industrial)	Increase availability of water supply	Increase availability of water supply
Reduce flood damages (agricultural/urban)	No corresponding CEPP objective; consider this objective in future increments	No corresponding CEPP PACR objective

Table 1-2. Goals and Objectives of CERP, CEPP, and CEPP PACR (continued)

CERP Objective	CEPP Objective	CEPP PACR Objective
Provide recreational and navigation opportunities	Provide recreational opportunities	Provide recreational opportunities
Protect cultural and archeological resources and values	Protect cultural and archeological resources and values	Protect cultural and archeological resources and values

1.1.3 Project Features

All project features in the future Project Partnership Agreement (PPA) North and PPA South components of the authorized CEPP plan are robust enough to accommodate the TSP and remain unchanged under this CEPP PACR. The TSP affects only the project features in the New Water PPA component of the CEPP as described in detail below.

The TSP includes a 240,000 ac-ft above-ground reservoir and a 6,500-acre STA, located on the A-2 parcel and A-2 Expansion area, that will work in conjunction with the existing 60,000 ac-ft A-1 FEB, STA-2, and STA-3/4 to meet State water quality standards (**Figure 1-2**). The proposed A-2 Reservoir is 10,500 acres and designed to have a normal full storage water depth of approximately 22.6 feet. This alternative also includes 1,000 cfs of additional conveyance capacity in the Miami Canal within the EAA and 200 cfs of additional conveyance capacity in the North New River Canal within the EAA. The A-2 Reservoir outflows can be sent to the new A-2 STA (located adjacent to and directly west of the A-2 Reservoir), to the existing A-1 FEB, to the existing STA-2, and/or to the existing STA-3/4. Outflows from the A-2 STA would be conveyed to the Miami Canal south of the existing G-373 divide structure. A-2 Reservoir outflows can also be conveyed to either the Miami or North New River Canals via the intake canal.

This combination of new and existing storage and treatment features provides maximum operational flexibility and efficiency. The TSP includes refined operations to provide water to meet other water related needs (i.e., water supply) in the EAA. These refined operations are described in detail in **Annex C** of the PACR.

Benefits gained from sending new water south from Lake Okeechobee in the authorized CEPP plan, and as further modified by this PACR, are derived in part from operational refinements that can take place within the existing, inherent flexibility of the 2008 Lake Okeechobee Regulation Schedule (LORS), and in part with refinements that are beyond the schedule's current flexibility. Modifications to 2008 LORS will be required to optimally utilize the added storage capacity provided by the authorized CEPP plan, and further increased by this PACR.

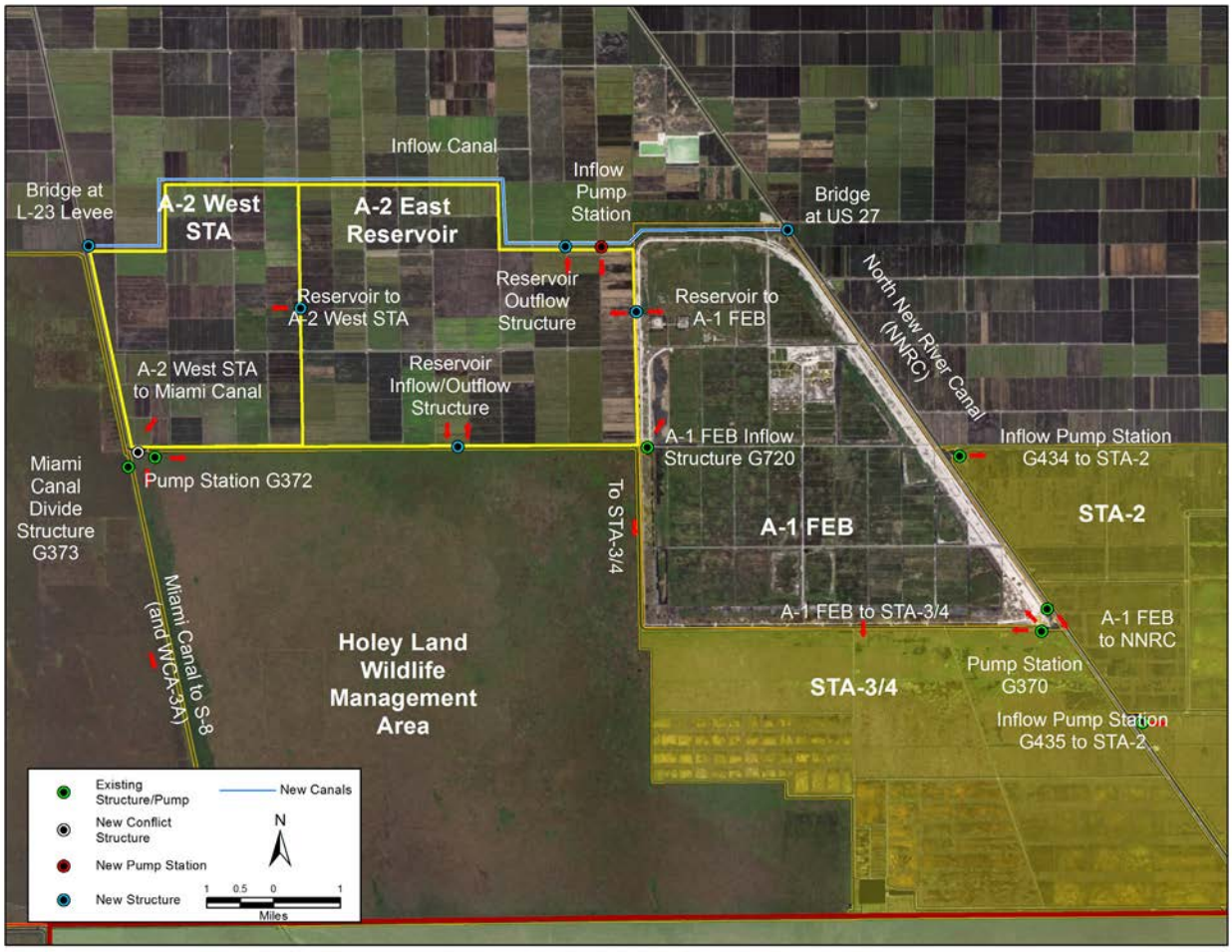

Figure 1-2. Tentatively Selected Plan (Alternative C240A)

The hydrologic modeling conducted for the TSP to optimize system-wide performance incorporated the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the alternatives included proposed revisions to the 2008 LORS flow chart guidance of maximum allowable discharges, which are dependent on the following criteria:

- Class limits for Lake Okeechobee inflow and climate forecasts, including tributary hydrologic conditions, seasonal climate outlook, and multi-seasonal climate outlook
- Stage level, as delineated by the Regulation Schedule management bands
- Stage trends (whether water levels are receding or ascending)

Most of the 2008 LORS refinements applied in the TSP modeling lie within the bounds of the operational limits and flexibility available in the current 2008 LORS, with the exception of the adjustments made to the class limits for the Lake Okeechobee inflow and climate forecasts. Under some hydrologic conditions, the class limit adjustments made to the Lake Okeechobee inflow and climate forecasts reduced the magnitude of allowable discharges from the Lake, thereby resulting in storage of additional water in the Lake in order to optimize system-wide

performance and ensure compliance with Savings Clause requirements. However, these class limit changes represent a change in the flow chart guidance that extends beyond the inherent flexibility in the current 2008 LORS. Additional information and documentation of the TSP modeling assumptions for Lake Okeechobee operations are found in the **Appendix A** of the CEPP PACR.

Independent of TSP implementation, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and Herbert Hoover Dike (HHD) infrastructure remediation. The U.S. Army Corps of Engineers (USACE) expects to operate under the 2008 LORS until there is a need for revisions due to the earlier of either of the following actions: (1) system-wide operating plan updates to accommodate CERP projects, or (2) completion of sufficient HHD remediation for reaches 1, 2, and 3 and associated culvert improvements. When HHD remediation is completed and the HHD Dam Safety Action Classification (DSAC) Level 1 rating is lowered, higher maximum lake stages and increased frequency and duration of high lake stages may be possible to provide the additional storage capacity assumed with the TSP. The future LORS which may be developed in response to actions (1) and/or (2) is unknown at this time. It is anticipated that the need for modifications to the 2008 LORS will be initially triggered by non-TSP actions that are expected to occur earlier than implementation of the authorized PACR and the proposed modifications presented as the TSP. CEPP implementation in the future, with or without the modifications proposed in the CEPP PACR, may itself require even further LORS revisions to optimize system-wide performance and ensure compliance with Savings Clause requirements.

1.2 State Authority for CERP Projects

This CEPP PACR has been prepared by the SFWMD under the authority provided by Section 203 of the WRDA of 1986, as amended, and in accordance with relevant U.S. Army Corps of Engineers (USACE) regulations and guidance. Upon approval by the Governing Board of the SFWMD, the CEPP PACR will be submitted to the Assistant Secretary of the Army for Civil Works (ASA(CW) for appropriate action. Section 203 provides that a non-Federal interest can submit a completed feasibility study to the ASA(CW) for review to determine if the study, and the process under which the study was developed, each comply with Federal laws and regulations applicable to feasibility studies of water resources development projects. Section 203 provides that within 180 days of receipt of the non-Federal feasibility study, the Secretary shall submit to the Committee on Environment and Public Works of the Senate and the Committee on Transportation and Infrastructure of the House of Representatives a report that includes the results of the Secretary's review of whether the feasibility study and the process under which the study was developed, comply with Federal law and regulations; a determination of whether the project is feasible; any recommendations concerning the plan or design of the project; and any conditions that the Secretary may require for construction of the project.

The USACE has provided technical assistance in the preparation of this CEPP PACR, as directed by the ASA(CW) (Fisher 2018). The Assistant Secretary considers this study unique and distinguishable for USACE technical assistance. This study has a goal of identifying a tentatively selected plan, confirming the Federal interest, and preparing the recommendation to Congress by October 1, 2018.

2 Water Resource Analysis and Evaluation

Under Subsection 373.1501(5)(a), F.S. the SFWMD shall "analyze and evaluate all needs to be met in a comprehensive manner and consider all applicable water resource issues, including water supply, water quality, flood protection, threatened and endangered species, and other natural system and habitat needs."

The TSP beneficially affects more than 1.5 million acres in the St. Lucie and Caloosahatchee Estuaries, WCA 3A, WCA 3B, Everglades National Park, and Florida Bay. The TSP would reduce high-flow discharge events to the Northern Estuaries lasting more than 60 days to the Caloosahatchee Estuary by 40% and would provide a 55% reduction in high-flow discharge events lasting more than 42 days in the St. Lucie Estuary, in addition to the benefits provided by the previously authorized projects. Furthermore, the TSP redistributes existing treated water in a more natural sheetflow pattern, the TSP provides an average of approximately 370,000 ac-ft per year of additional clean freshwater flowing into the central portion of the Everglades.

The same hydrologic models used for plan formulation are typically applied to additional analyses for this report. This ensures consistency when representing the project effects in the analyses subsequent to plan selection. The Regional Simulation Model (RSM) for Basins (RSM-BN) and the RSM Glades-LECSA (RSM-GL) hydrologic models were used to simulate and evaluate the environmental effects of the CEPP PACR array of alternatives through comparison with base conditions simulated with the same models. The RSM-BN is applied north of the L-4/L-5/L-6 levees for Lake Okeechobee, the EAA, and the Northern Estuaries; the RSM-GL is applied within the WCAs, ENP, and the LECSAs. The RSM models use a 41-year period of hydrologic record (1965 through 2005) that includes sufficient climatological variability (including natural fluctuations of water) to represent the full range of hydrologic conditions experienced within the south Florida region over a long-term period. No one modeling tool or representation of model results can definitively predict with project hydrologic conditions across the entire CEPP PACR project area given the large regional scope of the project, model tools limitations and assumptions, and future uncertainties regarding the effects of other projects. However, each snapshot of model results can form the basis for applying best professional judgment to determine whether the potential effects of CEPP PACR would reduce the availability of existing source of water or reduce the level of service for flood protection and to quantify the water necessary to achieve the benefits of the plan.

2.1 Project Objectives and Assumptions Associated with RSM Simulations

The analyses for State requirements includes considerations of three different sets of assumptions at two different points in time or conditions as depicted in **Table 2-1**; 1) The Existing Condition Baseline (EARECB) and 2) the Future Without Project baseline (EARFWO) and 3) future with the project (TSP). Comparison of the TSP to these new baselines resulted in different trends as seen during plan formulation for selected areas as discussed in the results section below. The model assumption tables for all base conditions are provided in the **Hydrologic Modeling Annex (A-2)** of the PACR to the Engineering Appendix (**Appendix A** of the PACR).

Table 2-1. Key Assumptions based on Modeling Reports from Engineering Appendix (Appendix A) and Hydrologic Modeling Annex (Appendix A, Annex A-2)

Condition	Intent	Equivalent for Central Everglades Planning Project (CEPP)	Model Scenario
Existing Conditions	Actual conditions at the time the Tentatively Selected Plan (TSP) is selected, including land use, operations, and demands. Demand can be either permitted or projected, whichever is greater.	2017 conditions with only the projects and operations approved and in effect. Includes 2008 Lake Okeechobee Regulation Schedule (LORS) and the Everglades Restoration Transition Plan (ERTP) for WCA 3A and the South Dade Conveyance System. Relative to the CEPP RSMBN ECB scenario, the RSMBN EARECB scenario is unchanged in the modeling domain with the exception of Lower Kissimmee River Restoration and the A-1 FEB. Permitted demands are included.	EARECB
Initial Operating Regime Baseline	Future conditions at the time the TSP is operational including land use, operations, and demands. Demands can be either permitted or projected, whichever is greater.	The future condition when the project will be initially operated, including other Non-CERP projects, CERP projects (with completed PIRs), and CEPP features, and associated operations. Includes LORS 2008 and ERTP. Permitted demands are included.	EARFWO

2.2 Volume Probability Curves and Stage Duration Curves

To identify the quantity, timing, and distribution of water for the natural system, a probabilistic approach was selected utilizing volume probability curves to depict the distribution of volumes of water that provide natural system benefits as a result of project features or to determine whether water is eliminated or transferred from natural systems. These volumes of water may include water that is available to meet natural system needs without project features and the water made available from CEPP PACR project features to meet natural system needs through the entire range of historic climatologic conditions. For purposes of identifying the increase in the volume of water for the natural system, volume probability curves were produced depicting the range of the quantities of water delivered for natural system areas and coastal estuaries under all climatic conditions through the RSM period of simulation used to perform project evaluations.

The volume probability curve indicates the probability (percentage of time equaled or exceeded, on the x-axis) that a certain quantity of water (expressed as flow or volume on the y-axis) is made available as a function of historical rainfall distribution. The water quantities are aggregated for each water year within the RSM period of simulation, defined as starting in May of year 1 and continuing through April of year 2 (40 total water years in the 1965-2005 RSM period of simulation). Once computed, the values are ranked from highest to lowest. Volume probability curves quantify the water, along with its timing and distribution to the natural system.

To identify whether the project reduces the level of service of flood protection, evaluations focus on changes to water stages and their frequency within canals and at selected representative

monitoring gauge locations within the LECSAs. The RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to indicate a potential change in flood risk. Like volume probability curves, stage duration curves indicate the probability (percentage of time equaled or exceeded, on the x-axis) that a certain stage (expressed in National Geodetic Vertical Datum [NGVD] on the y-axis) is achieved as a function of historical rainfall distribution. Stages are aggregated for each day in the RSM period of simulation. Once sorted, the values are ranked from highest to lowest. A more localized analysis, with higher resolution hydrologic and/or hydraulic models, will be performed if there is an indication of significant increase in flood risk from the regional analysis.

2.3 Water Supply

An existing legal use of water is defined in Florida State law as a water use authorized under a SFWMD water use permit or existing and exempt from permit requirements. Existing legal users of water including agricultural and urban in the LOSA and LECSAs will continue to be met by their current sources, primarily Lake Okeechobee, the Everglades (including the WCAs), surface water in the regional canal network, and the surficial aquifer system. All existing legal users will continue to have their needs met during implementation and once the project is operation.

2.3.1 Lake Okeechobee Service Area

LOSA water supply cutback severity, magnitude, and duration is improved when compared to the EARFWO for all of the 8 worst years in the POR. An additional 2% to 15% of the demands are met in the 8 years with the largest water supply shortages. (**Figure 2-1)** There is improvement in LOSA water supply demands that can be met with the TSP. Compared to the EARFWO, mean annual EAA water supply demands not met are decreased from 6% to 5% and for other LOSA basin demands not met decreased from 4% to 3%. (**Figure 2-2**).

An additional analysis was used to compare the ECB to TSP, and in this case water supply demands met also improved. LOSA water supply cutback severity, magnitude, and duration are improved when compared to the EARFWO for all of the 8 worst years in the POR. Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 13,000 ac-ft in the with-project condition compared to the existing baseline (TSP averages 23,000 ac-ft of cutbacks, and EARECB average is 36,000 ac-ft of cutbacks for LOSA).

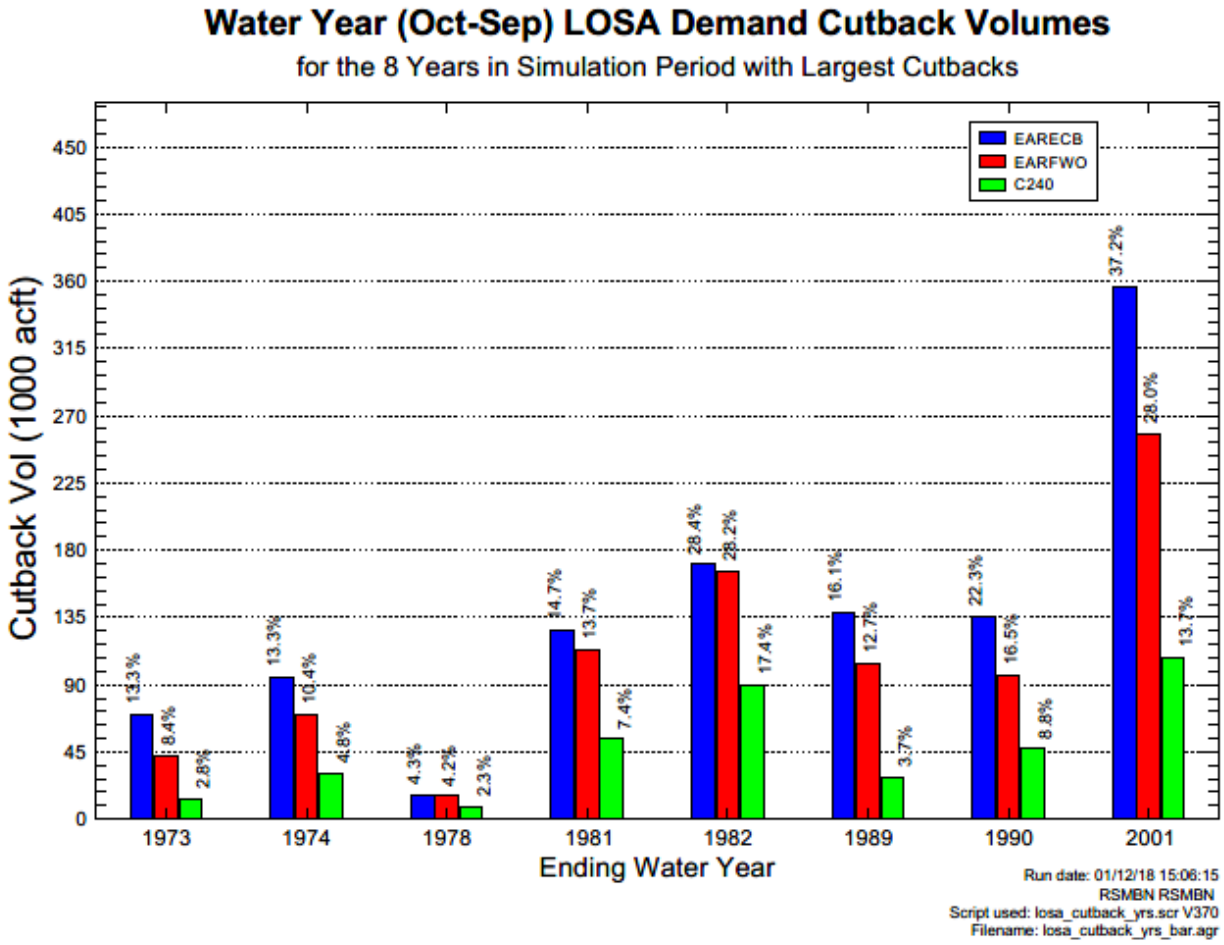

Figure 2-1. LOSA Demand Cutback Volumes for the 8 Years with the Largest Cutbacks

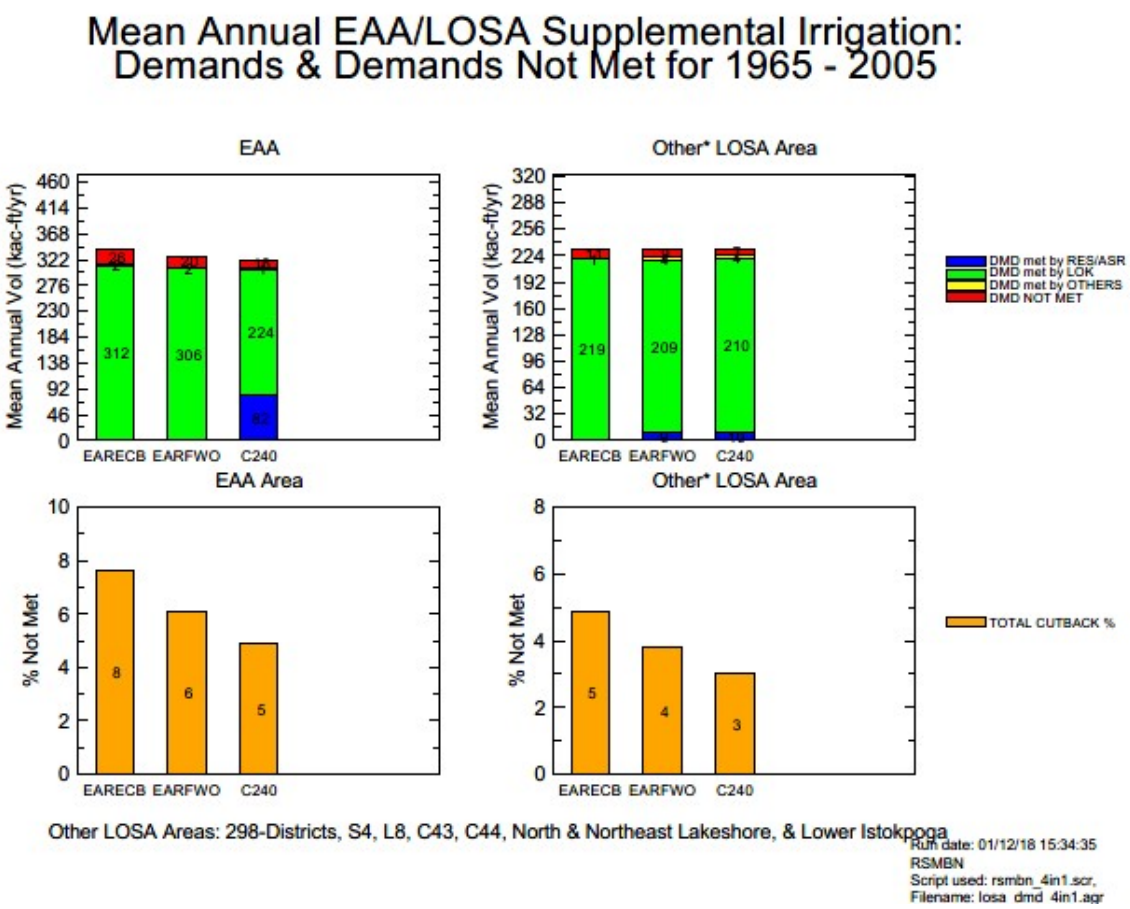

Figure 2-2. Mean Annual EAA/LOSA Supplemental Irrigation: Demands and Demands Not Met for 1965–2005

Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee would be stored in the A-2 Reservoir for other water related needs. This water for other water related needs is contingent on a LORS update to ensure the required operation flexibility and utilization of the A-2 Reservoir. The TSP differs from the EARFWO in how it meets other water related needs. Instead of discharging all water stored in the A-2 FEB to STA 3/4 as assumed in the future without project (EARFWO), the TSP returns water to the Miami and North New River to maintain canal levels when excess capacity is available beyond restoration flows. This added operation does not affect existing permitted allocations within the EAA. The additional water conveyed to both the Miami River and North New River canals included in the TSP improves the ability to meet existing permitted demands in the LOSA by retaining more water in the regional system and making it available to agricultural users. This operation also allows the A-2 Reservoir to cycle more often and capture more Lake Okeechobee regulatory releases or EAA runoff that can be directed to the STAs for treatment prior to reaching the Greater Everglades. Water for the natural system will be protected.

2.3.2 Lower East Coast Service Area

Existing legal uses of water in the Lower East Coast Service Area include groundwater withdrawn by public utility wellfields, private wells, agricultural irrigation wells, and surface water withdrawals for agricultural uses in the LECSA 2 and LECSA 3. The Seminole Tribe of Florida also withdraws groundwater to meet water supply demands in LECSA 2. The TSP features and operations are designed to maintain canal and groundwater stages, manage additional seepage quantities, and maintain overall flows to the LECSAs and Biscayne Bay. The water that the TSP provides to WCA 3A will be conveyed south to ENP, with some portion reaching the LECSA through recharge of the surficial aquifer system.

In the LECSA, the water supply for existing legal uses continues to be met by the regional system including Lake Okeechobee, the WCAs, and the surficial aquifer system when TSP is implemented. The ability to continue to meet urban and agricultural demands with TSP implementation is evaluated by assessing relative changes in the frequency of water supply cutbacks in LECSA 2 and LECSA 3. Although the RSM-GL model predictions of the absolute number of water supply cutback events and the corresponding frequency of occurrence have a high degree of uncertainty, relative comparisons between the RSM-GL base conditions and the RSM-GL with project condition (TSP) provide a meaningful comparison to quantify potential effects of the CEPP project. Water supply cutbacks to the LECSAs can be triggered by Lake Okeechobee stages or by local groundwater levels.

In the with-project condition (TSP) and future without (EARFWO), the number of water years with lake triggered cutbacks during the period of simulation is 13 events and local groundwater triggered cutbacks is 19 events in LECSA 2. The total number of cutbacks events and the resulting frequency for LECSA 2 remains the same for the two conditions at 32 events (**Figure 2-3** and **Figure 2-4**), indicating no change for water supply performance within LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events in the TSP or EARFWO modeling simulations. The number and frequency of water years with cutback events is also the same for the lake triggered cutback events in the EARFWO and TSP at 13 events (**Figure 2-5** and **Figure 2-6**).

Compared to the existing condition base condition (EARECB), the TSP has one less cutback event than the existing condition base condition (33 cutback events compared to 32 events) in LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events in the EARECB. The total number of lake triggered cutback events is the same for TSP and the EARECB, at 13 events (**Figure 2-3** through **Figure 2-8** and **Table 2-2**).

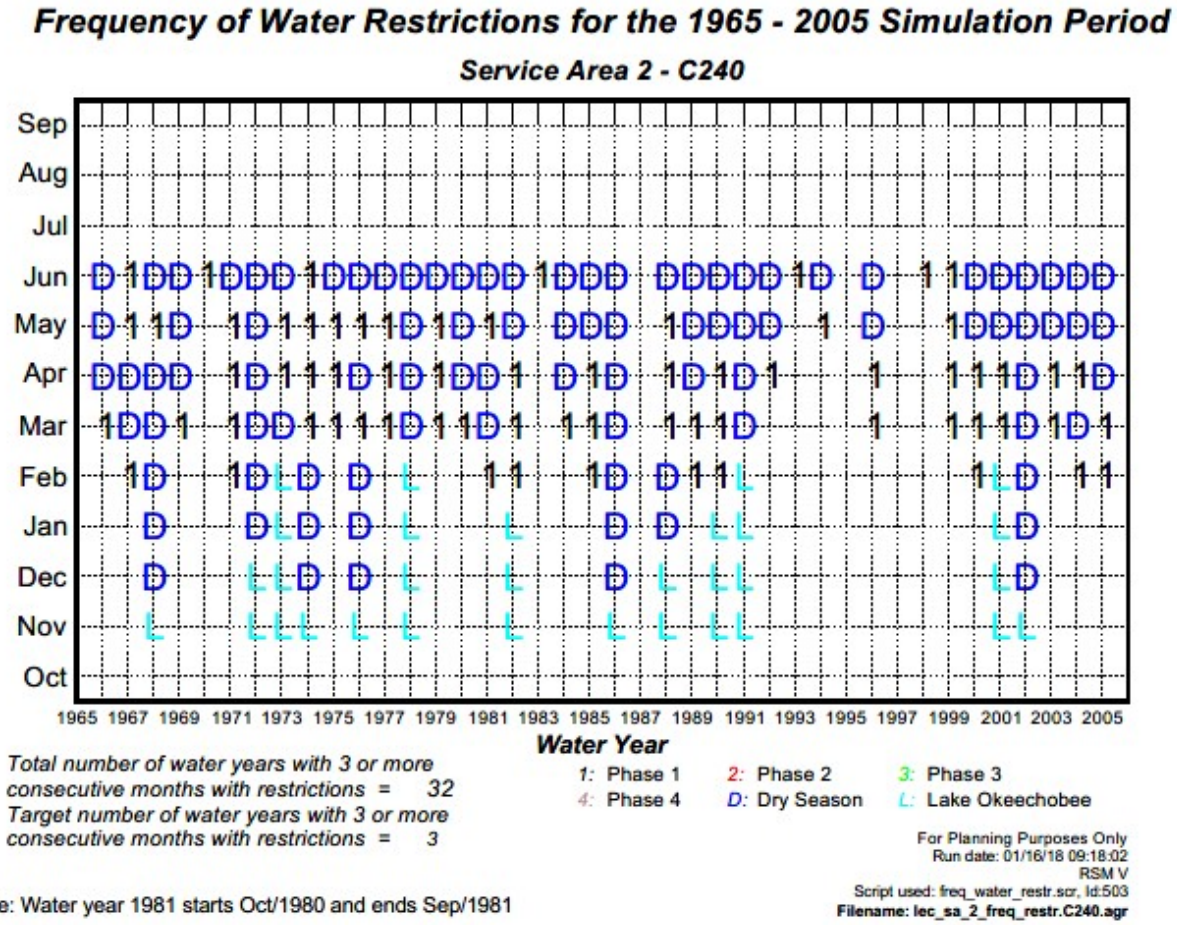

Figure 2-3. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 TSP

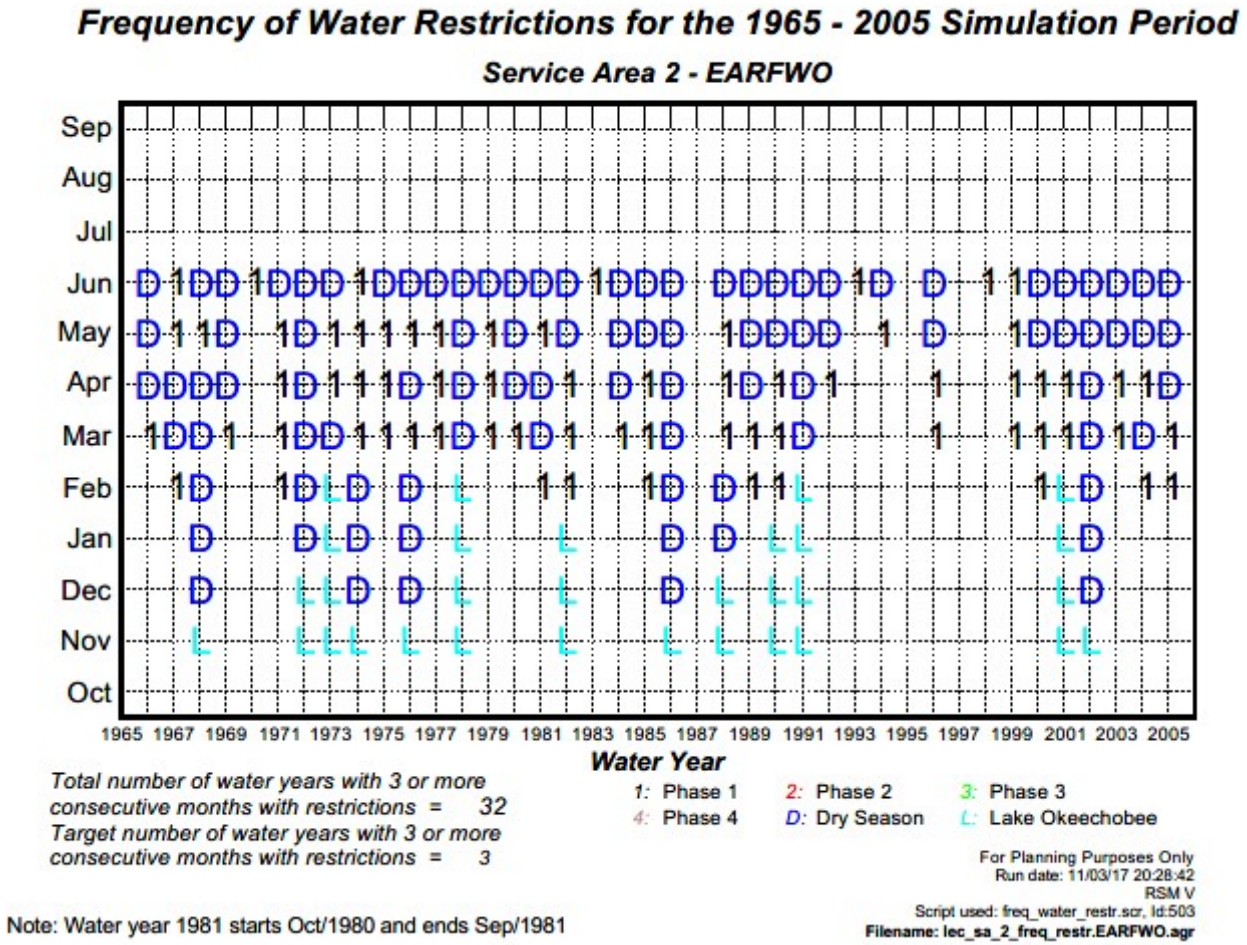

Figure 2-4. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 EARFWO

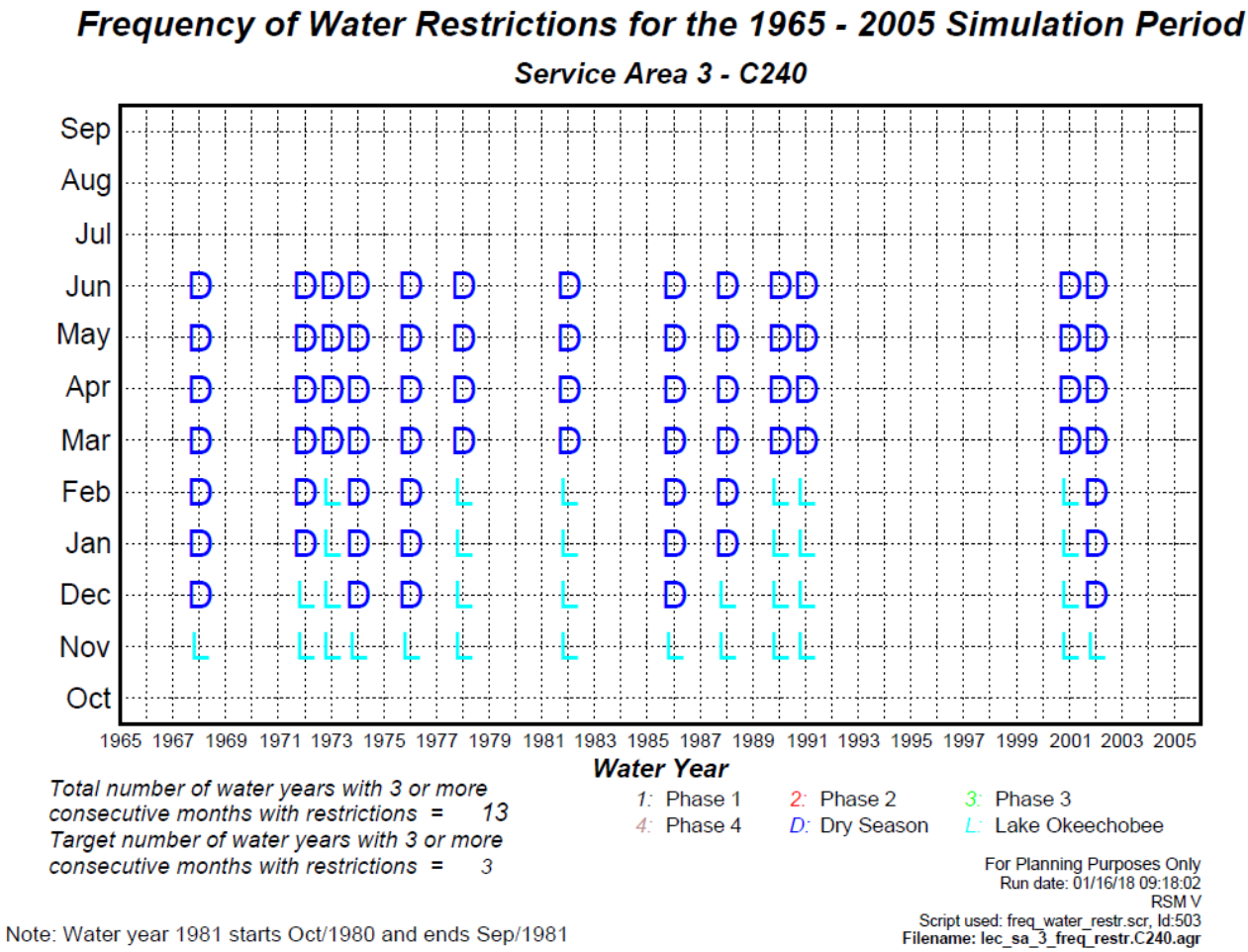

Figure 2-5. Frequency of Water Restrictions for the 1965-2005 Simulation Period for the LECSA 3 TSP

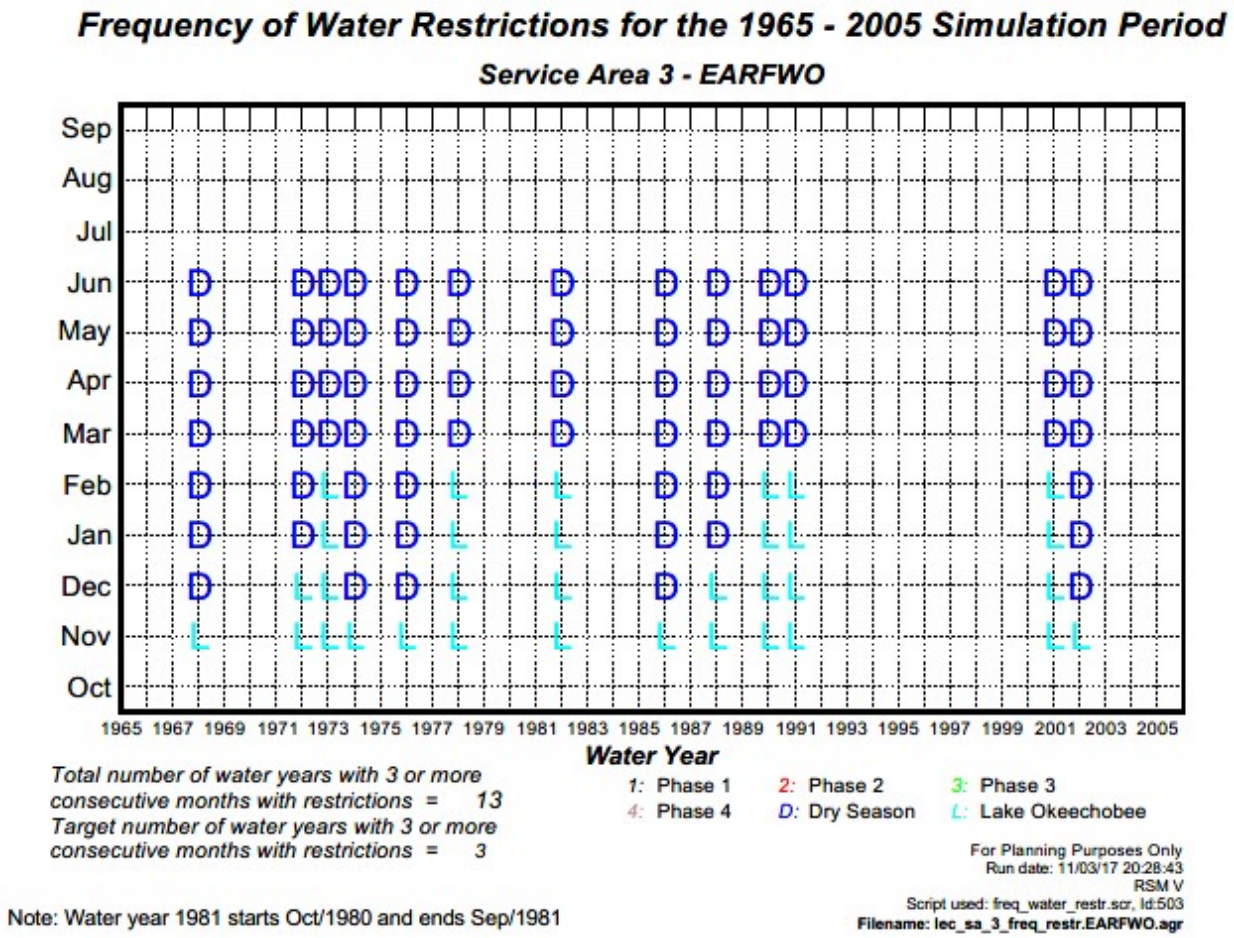

Figure 2-6. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 EARFWO

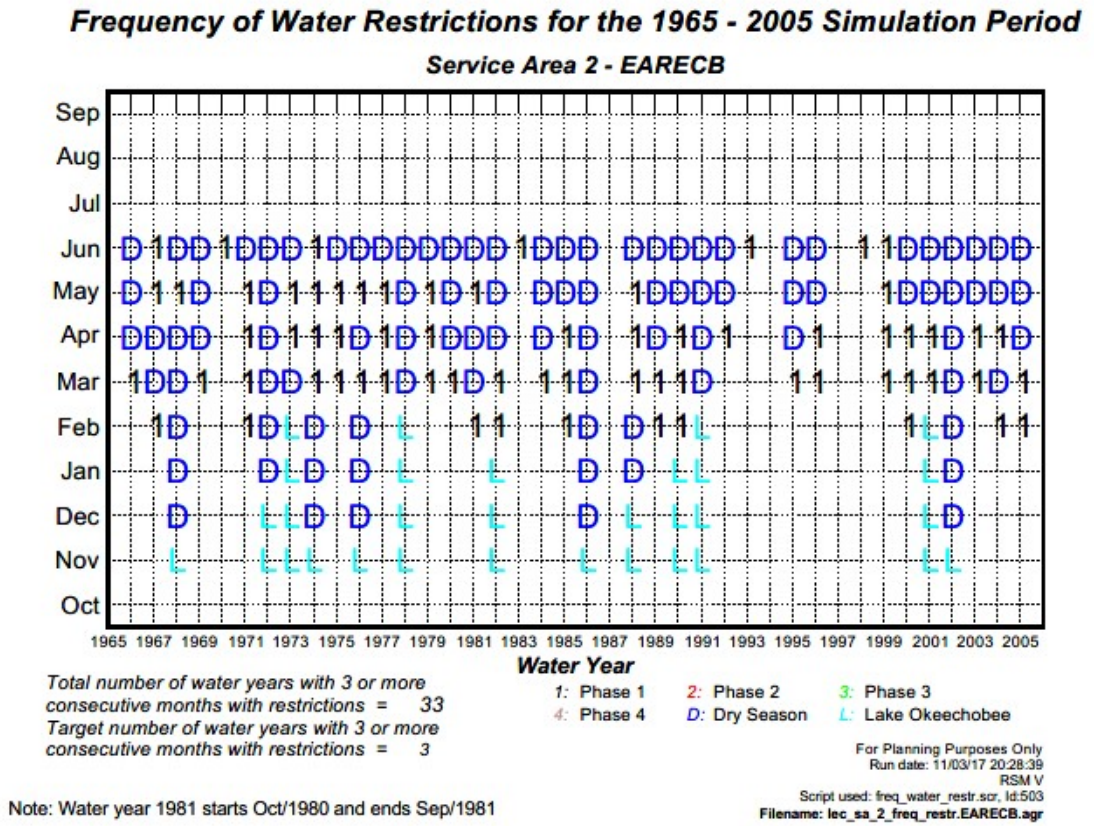

Figure 2-7. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 EARECB

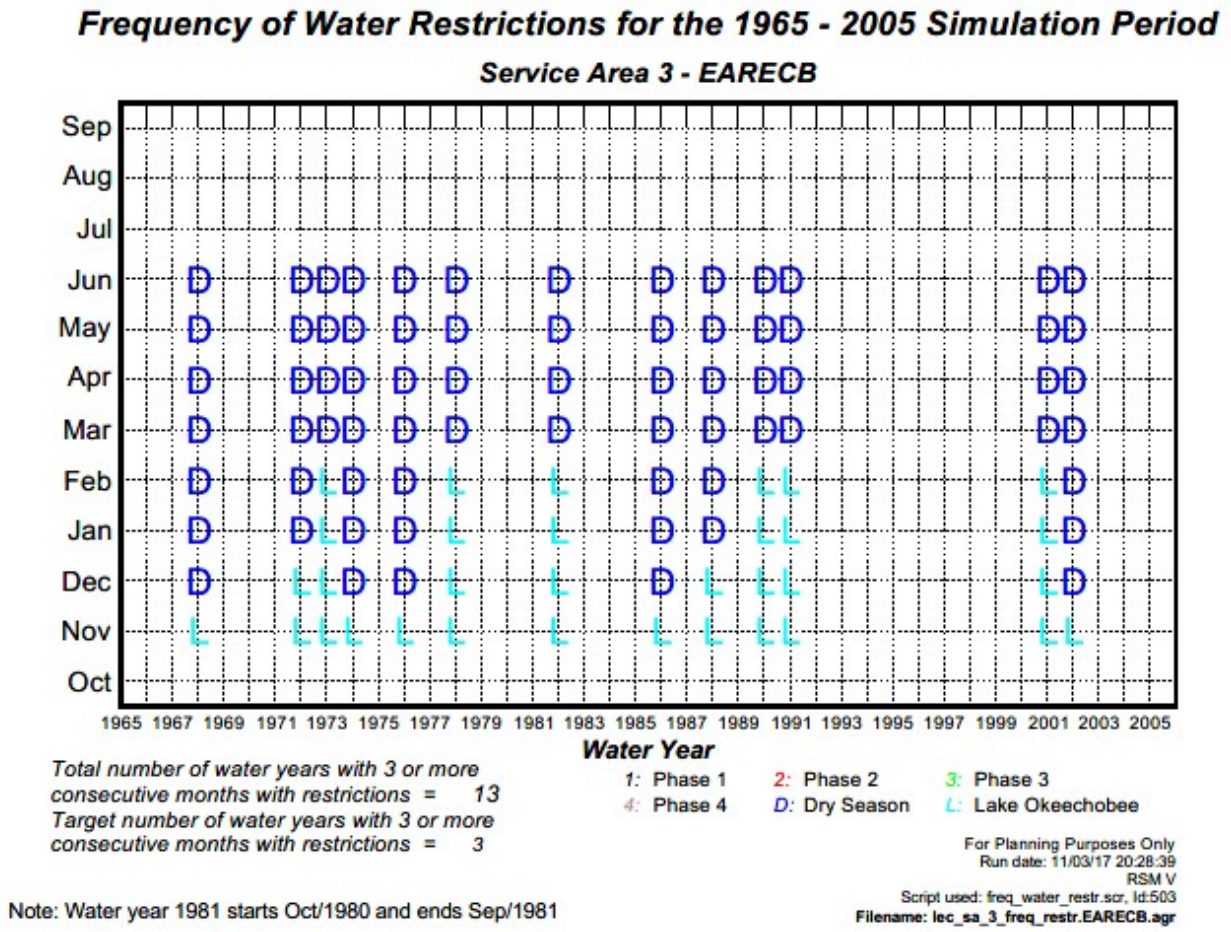

Figure 2-8. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 EARECB

Table 2-2. Number of Years with Water Restrictions in LECSA Triggered by Lake and Local Wells

Total Number of Years with Water Restrictions in the 41 year period of record			
	EARECB Lake/Local/Total	**EARFWO Lake/Local/Total**	**TSP Lake/Local/Total**
Lower East Coast Service Area 2	13/20/33	13/19/32	13/19/32
Lower East Coast Service Area 3	13/0/13	13/0/13	13/0/13

The TSP meets the requirements of 373.1501(5)(a) by analyzing and evaluating water supply needs within the areas affected by the project.

2.4 Water Quality

The TSP is projected to send approximately 370,000 acre-feet of additional water on an annual basis to the Everglades historical southerly flow path and will protected for the natural system. This additional water must meet State water quality standards contained in Chapter 62-302, Florida Administrative Code (F.A.C.). Nutrients such as phosphorous and nitrogen compounds are a concern in the WCAs, ENP, and Lake Okeechobee as they can result in an imbalance of flora and fauna. Excess nutrients come primarily from agricultural fertilizers; the decomposition of the peat soils in the area also contributes to excess phosphorus in the system. Phosphorus is the limiting nutrient for Lake Okeechobee, the WCAs, and ENP. The TSP will include 6,500 acres of Stormwater Treatment Areas (STAs) and be operated with STA2 and STA3/4 to ensure compliance with State water quality standards.

To demonstrate that all applicable water quality issues have been analyzed and evaluated, the Dynamic Model for Stormwater Treatment Areas (DMSTA) was used which predicted that all STA discharges will meet the water quality based effluent limit (WQBEL). However, regardless of modeling predictions, existing permit conditions require attainment with the WQBEL. This permit condition applies to both existing and future STAs. In addition, the project will be designed to treat all beneficial flows to the Everglades as predicted by the Regional Simulation Model to attain the WQBEL. Real-time operational decisions will prevent the majority of diversions predicted by DMSTA as was demonstrated in Water Year 2018 and during 2017 high water events in which no diversions occurred. Furthermore, the existing STA permits restrict diversions to specified, limited circumstances and these permit conditions will continue to apply in the future.

The TSP will increase flows into Everglades National Park. Under existing conditions, water quality entering Everglades National Park is subject to an annual limitation of phosphorus contained in both Appendix A of the Settlement Agreement between the USA and SFWMD (Case No. 88-1886-Civ-Moreno) and Section 62-302.540 (F.A.C). Compliance with the annual limitations set forth in both Appendix A of the Settlement Agreement and State water quality standards are currently determined through a methodology which establishes an inverse relationship between flow and concentration (i.e., additional flow yields a lower concentration limit). The State and Federal parties are currently evaluating the compliance methodology with the recognition that additional Federal and joint features which will substantially increase flow and distribution of flow to ENP are proposed to be implemented both in the near term and as part of overall CEPP

implementation, including this PACR. In order to operate the TSP, the current compliance methodology found in Appendix A of the Settlement Agreement and in State water quality standards must be updated to reflect the proposed system operation and continue to be protective of ENP. Compliance with future water quality standards, which may include the need for additional joint water quality features, will be determined as part of the detailed design process and prior to operation of such features which may have an impact on water quality.

TSP project features cannot proceed unless/until it is determined through the permitting process that construction and/or operation of the feature:

1. The project component will achieve the design objectives set forth in the detailed design documents submitted as part of the application.

2. State water quality standards, including water quality criteria and moderating provisions, will be met. Under no circumstances shall the project component cause or contribute to violation of State water quality standards.

3. Discharges from the project component will not pose a serious danger to public health, safety, or welfare.

4. Any impacts to wetlands or threatened or endangered species resulting from implementation of the project component will be avoided, minimized, and mitigated, as appropriate.

The relationship between CEPP, Restoration Strategies, and the need to meet Consent Decree obligations is captured in language negotiated between the State of Florida and the Federal government regarding compliance with State water quality standards and Consent Decree obligations for CEPP. The State's ability to support CEPP is contingent upon all parties following through with this agreed upon framework to address water quality issues that may occur as a result of the implementation of CEPP, which includes this CEPP PACR.

> *Restoration of the Everglades requires projects that address hydrologic restoration as well as water quality improvement. The National Academy of Sciences in its most recent biennial report on restoration progress in the Everglades has recognized this where it noted that near-term progress to address both water quality and water quantity improvements in the central Everglades is needed to prevent further declines of the ecosystem. The significant amount of water resulting from CEPP will significantly improve restoration of the Everglades. Both the federal and state parties recognize that water quantity and quality restoration should be pursued concurrently and have collaborated to develop and concur on a suite of restoration strategies being implemented by the state to improve water quality ("State Restoration Strategies"), as well as other state and federal restoration projects, both underway and planned, to best achieve Everglades hydrologic objectives. Specific examples of federally authorized projects include the Everglades Restoration Transition Plan, Modified Water Deliveries to Everglades National Park Project, and the Tamiami Trail Next Steps Project. One of the goals of these projects and their associated operating plans, as well as certain components of the CERP awaiting*

authorization or that are being planned as part of the Central Everglades Planning Project is to improve water quantity and quality in the Everglades through more natural water flow within the remnant Everglades which includes the water conservation areas and Everglades National Park ("ENP"). Variations in flows of the C&SF system may result from a variety of reasons. These reasons include natural phenomena (i.e. weather) and updates to the operating manuals to achieve the purposes of the C&SF project such as flood control and water supply.

One goal of the Consent Decree is to restore and maintain water quality within ENP. The Consent Decree established, among other things, long-term water quality limits for water entering ENP to achieve this goal. The existing limits for ENP are flow dependent and, generally, increased volume of water results in a lower allowable concentration of phosphorus to maintain the overall load of phosphorus entering the ENP. There will be redistribution of flows and increased water volume above existing flows associated with system restoration efforts beyond the current State Restoration Strategies projects. The Corps and its federal and state partners recognize that to achieve long-term hydrologic improvement, water quality may be impacted, particularly as measured by the current Consent Decree Appendix A compliance methodology. The Corps and the state partners agree that the monitoring locations/stations for inflows to ENP will require revision. The Technical Oversight Committee ("TOC") is currently conducting an evaluation of this and other aspects of the compliance methodology.

In an effort to address these potential impacts and determine updates to Appendix A to reflect increased inflows and new discharges into ENP since the Consent Decree was entered, the parties to the Consent Decree have established a process and scope for evaluating and identifying necessary revisions to the Appendix A compliance methodology utilizing the scientific expertise of the TOC. The TOC may consider all relevant data, including the 20 years of data collected since Appendix A was implemented. Ultimately, such evaluations and changes to the Appendix A compliance methodology would be recommended by the Consent Decree's TOC for potential agreement by all parties. Failure to develop a mutually agreed upon and scientifically supportable revised compliance methodology will impact the State's ability to implement or approve these projects.

The State's Restoration Strategies will be implemented under a Clean Water Act discharge permit that incorporates and requires implementation of corrective actions required under a state law Consent Order, as well as a Framework Agreement between the U.S. Environmental Protection Agency and the state discharge permitting agency, the Florida Department of Environmental Protection, to ensure compliance with Clean Water Act and state water quality requirements for existing flows into the Everglades. The Clean Water Act permit for the state facilities, the associated Consent Order (including a detailed schedule for the planning, design, construction, and operation of the new project features), and technical support documents were reviewed by, and addressed all of, the U.S. Environmental Protection Agency's previous objections related to the draft National Pollutant Discharge Elimination System ("NPDES") permits, prior to issuance.

All parties are committed to implementing the State Restoration Strategies, joint restoration projects, and associated operational plans, in an adaptive manner that is consistent with the objectives of the underlying C&SF Project. The Corps and the state will use all available relevant data and supporting information to inform operational planning and decision making, document decisions made, and evaluate the resulting information from those decisions to avoid adverse impacts to water quality where practicable and consistent with the purposes of the C&SF Project. Based upon current and best available technical information, the federal parties believe at this time that the State Restoration Strategies, implemented in accordance with the state issued Consent Order and other joint restoration projects, are sufficient and anticipated to achieve water quality requirements for existing flows to the Everglades. If there is an exceedance of the Appendix A compliance limits, which results from a change in operation of a Federal project, and it has been determined that an exceedance cannot be remedied without additional water quality measures, the federal and state partners agree to meet to determine the most appropriate course of action, including what joint measures should be undertaken as a matter of shared responsibility. These discussions will include whether it is appropriate to exercise any applicable cost share authority. If additional measures are required and mutually agreed upon, then they shall be implemented in accordance with an approved process, such as a GRR or LRR, and if necessary, supported through individual PPA's. Failure to develop mutually agreed upon measures and cost share for these measures may impact the State's ability to operate the Federal project features.

The State of Florida plans to proceed with the 1501 review process in advance of the final review by USACE headquarters and prior to the PACR being transmitted to Congress. The SFWMD and Department are proceeding with the formal review and approval process required under State law with the understanding there will be no change to the aforementioned agreed upon language. Substantive changes that are not agreeable to the State may impact the SFWMD's ability to serve as local sponsor, and FDEP's ability to approve CEPP and/or the CEPP PACR pursuant to 373.026(8)(b).

2.4.1 Water Quality for Lake Okeechobee, the Northern Estuaries, and WCA 3A

The TSP is not expected to affect Lake Okeechobee water quality. The Northern Estuaries should see improvements in salinity that result from additional reduced high flow events in the TSP as compared to the FWO and its associated Lake Okeechobee operations.

Due to improved hydropattern as a result of the TSP there would be reduced incidence of dry out of the northern marsh in WCA 3A which would limit peat oxidation and nutrient re-mobilization, potentially leading to lower downstream nutrient concentrations in southern WCA 3A. The increased flows within WCA 3A resulting from the TSP compared to expected changes in flow and flow patterns for the TSP would likely cause a negligible increase to nutrient loading in northern WCA 3A.

2.4.2 Water Quality for Everglades National Park and the Southern Estuaries

Water entering ENP at the northern end of SRS from WCA 3A as a result of the TSP would have comparable concentrations of TP as compared with the FWO condition. It is expected that changes in flow and distribution from implementation of the TSP and other Federal projects would impact compliance with Appendix A of the 1991 Settlement Agreement. Details regarding the agreement are discussed in Section 6.3.2 of the CEPP PIR. The TSP is expected to further improve marsh hydroperiods over FWO conditions. Effects to the Southern Estuaries would be a slight decrease in average salinity conditions.

2.4.3 Hazardous, Toxic and Radioactive Waste (HTRW)

The HTRW evaluation for the CEPP PACR requires an analysis of the potential effects to human health and ecological risk. Human health risks are typically evaluated by comparing chemical concentrations in all media (e.g., soil, groundwater, surface water, sediment) to human health-based cleanup target levels (CTLs) promulgated by FDEP in Chapter 62-777, F.A.C. Ecological risks are typically evaluated by comparing chemical concentrations to the Sediment Quality Assessment Guidelines (SQAGs) developed by FDEP for inland waters and to ecological restoration targets established by the USFWS. The A-2 Reservoir lands within the project boundary have been investigated in accordance with the *Protocol for Assessment, Remediation and Post-remediation Monitoring for Environmental Contaminants on Everglades Restoration Projects* jointly developed by FDEP, SFWMD, and U.S. Fish and Wildlife Service (USFWS). The protocol, which is commonly referred to as the Ecological Risk Assessment (ERA) Protocol, is intended to provide guidance on conducting environmental site assessments on agricultural lands proposed for use in projects to be inundated with water, such as for conversion to STAs, wetlands, reservoirs, and other aquatic features.

The A-2 parcel and A-2 Expansion area project features require land conversion from agricultural production to aquatic restoration that inundates the land with water. The avoidance of lands containing residual agricultural chemicals is not practicable. An updated environmental assessment of the TSP project boundary is currently underway. This updated assessment includes a site reconnaissance, updated regulatory database search, and a review of aerial photos of the current project boundary. Additionally, a more comprehensive assessment of the proposed A-2 Expansion area is being conducted. The assessments conducted to date do not include an assessment of approximately 50 percent of the proposed A-2 Expansion area. Upon completion of the updated assessment, a work plan would be submitted to the USFWS and FDEP to assess any point sources and regional impacts that may be identified on the A-2 Expansion area during the assessment update. Upon approval of the work plan, soil and groundwater sample collection and analysis would be conducted. Any necessary soil remediation of point sources and/or regional impacts would be completed as required by the FDEP and USFWS.

The 14,500-acre A-2 parcel that is proposed for the A-2 Reservoir was surveyed for hazardous, toxic, and radioactive waste (HTRW) as well as residual agricultural chemicals in the cultivated soils. The FDEP and USFWS reviewed the results of the environmental audits and risk assessments and concluded that the required remediation actions have been completed and that the detected residual agricultural chemicals in cultivated soils are present at concentrations that do not

present a risk to humans or environmental receptors. Since the A-2 parcel is currently under cultivation, close out environmental audits and sampling will be performed again prior to certification of the lands. **Annex H** of the PACR contain additional information on the HTRW materials identified.

2.5 Flood Protection

Under Subsection 373.1501(5)(a), F.S., the SFWMD shall "analyze and evaluate all needs to be met in a comprehensive manner and consider all applicable water resource issues, including … flood protection."

The TSP design features will maintain the existing levels of flood protection. A combination of modeling tools (Annex B of the CEPP PACR) was used to perform an analysis of flood protection impacts. Flood protection is evaluated by a combination of best professional judgment interpreting model results and engineering analyses. This varies from typical storm event analyses by using a long-period of record simulation and focusing on the wet events included within the 1965-2005 simulation period

As an example of an extreme wet event encompassed within the CEPP PACR RSM-BN/RSM-GL simulation period and therefore included in the CEPP PACR evaluations, Hurricane Irene in late 1999 (13-17 October) may be specifically considered. During this historical storm event, several monitoring sites in Broward, Miami-Dade, and Palm Beach counties, including WCAs 1, 2, and 3, received the 24-hour, 48-hour, and 72-hour maximum rainfall amounts that would be expected to occur once in 100 years, with cumulative rainfall in excess of 9 inches (SFWMD Technical Publication EMA #386, May 2000). Notably, however, as documented within the CEPP RSM model output hydrographs (a link to this data is provided in the CEPP Final PIR main report: http://www.evergladesplan.org/pm/projects/proj_51_cepp.aspx), peak stages within the simulation period of record for the CEPP project area typically occur outside of this 1999 event. The occurrence of the majority of peak stages for WCAs 1, 2, and 3 during 1994-1995 and the occurrence of peak stages for Lake Okeechobee during 1969-1970 indicates that for these specific areas, these other hydrologic combinations of storm events and wet antecedent conditions also observed within the simulation period may, in fact, correspond to a lower frequency of occurrence (return period greater than 100 years) than the 1999 event.

The four features or areas affected by the project that will be analyzed include 1) the potential risk to HHD due to changes in the lake's stages, 2) the A-2 reservoir and A-2 STA located in the EAA, 3) the effects of changed water levels in WCAs 3A on the East Coast Protective levees L-67 and L-30, and 4) the mix of agricultural and urban areas located east of the East Coast Protective levees L-31N and L-31W.

2.5.1 Lake Okeechobee Herbert Hoover Dike

Benefits gained from sending new water south from Lake Okeechobee are derived in part from operational refinements that can take place within the existing, inherent flexibility of the 2008 LORS, and in part with refinements that are beyond the schedule's current flexibility. Modifications to 2008 LORS will be required to optimally utilize the added storage capacity of the A-2 Reservoir to reduce damaging discharges to the Northern Estuaries and send approximately

370,000 ac-ft/yr on an annual average basis of new water available in CEPP PACR TSP south to the Everglades, while maintaining compliance with Savings Clause requirements for water supply and flood control performance levels.

The hydrologic modeling conducted for the TSP to optimize system-wide performance incorporated the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the TSP included proposed revisions to the 2008 LORS flow chart guidance of maximum allowable discharges, which are dependent on the following criteria:

- Class limits for Lake Okeechobee inflow and climate forecasts, including tributary hydrologic conditions, seasonal climate outlook, and multi-seasonal climate outlook
- Stage level, as delineated by the Regulation Schedule management bands
- Stage trends (whether water levels are receding or ascending)

Most of the 2008 LORS refinements applied in the TSP modeling lie within the bounds of the operational limits and flexibility available in the current 2008 LORS, with the exception of the adjustments made to the class limits for the Lake Okeechobee inflow and climate forecasts. Under some hydrologic conditions, the class limit adjustments made to the Lake Okeechobee inflow and climate forecasts reduced the magnitude of allowable discharges from the Lake, thereby resulting in storage of additional water in the Lake in order to optimize system-wide performance and ensure compliance with Savings Clause requirements. However, these class limit changes represent a change in the flow chart guidance that extends beyond the inherent flexibility in the current 2008 LORS. Additional information and documentation of the TSP modeling assumptions for Lake Okeechobee operations are found in the CEPP PACR **Appendix A, Annex A-2**.

Independent of TSP implementation, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and Herbert Hoover Dike (HHD) infrastructure remediation. The USACE expects to operate under the 2008 LORS until there is a need for revisions due to the earlier of either of the following actions: (1) system-wide operating plan updates to accommodate CERP projects as described in the CEPP PACR **Section 6.1.3.2**, or (2) completion of sufficient HHD remediation, as described in CEPP PACR **Section 2.5.2**. When HHD remediation is completed and the HHD DSAC Level 1 rating is lowered, higher maximum lake stages and increased frequency and duration of high lake stages may be possible to provide the additional storage capacity assumed with the TSP. The future LORS which may be developed in response to actions (1) and/or (2) is unknown at this time. It is anticipated that the need for modifications to the 2008 LORS will be initially triggered by non-TSP actions that are expected to occur earlier than implementation of the authorized CEPP and the proposed modifications presented as the TSP. CEPP implementation in the future, with or without the modifications proposed in this CEPP PACR, may itself require even further LORS revisions to optimize system-wide performance and ensure compliance with Savings Clause requirements.

Lake Okeechobee stage duration curves for the RSM-BN model representation of the EARECB (2008 LORS; note that plot lines overlap), EARFWO (2008 LORS, plus additional CERP and non-CERP projects and prescribed assumed operational flexibility), and TSP (LORS 2008, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as

Figure 2-9 (note: upper 25% of the stage duration curve is displayed). Peak stages for the CEPP PACR Savings Clause baselines and TSP are summarized as follows: 17.59 feet NGVD for the EARECB; 17.66 feet NGVD for the EARFWO; and 18.14 feet NGVD for TSP.

The USACE 2008 LORS Environmental Impact Statement (EIS) assessment recognized that minimizing the frequency of exceedance of the 17.25 feet elevation offers additional protection for public safety and the HHD, for the condition prior to completion of the current approved and planned HHD remediation measures, and this criterion was evaluated as a LORS project performance measure. The frequency of occurrence for lake stages above 16.0 feet, 16.5 feet, 17.0 feet, and 17.25 feet are summarized in **Figure 2-10**. The baselines and the TSP all show simulated stages above 17.25 feet NGVD: 11 days for the EARECB; 29 days for the EARFWO; and 60 days for TSP (note: there are 14,975 days in the RSM-BN 41-year period of simulation).

The assumed modified Lake Okeechobee operations with the project has a minimal increase the frequency, duration, and magnitude of Lake Okeechobee peak stages (compared to the EARFWO). Following completion of the HHD remediation, the degree to which higher maximum lake stages and increased frequency and duration of high lake stages would be accepted, if at all, will be contingent on the conclusions identified in the 2015 DSMR (note: this process is independent and separate from the CEPP and CEPP PACR project).

Given recognition of the DSMR uncertainty and the continued utilization of the 2008 LORS, the assessment of the Lake Okeechobee high water performance with the project indicated consistency with the HHD formulation assumptions established for the CEPP PACR future without project condition (EARFWO), which included general consideration of potential risk and uncertainty associated with increased lake stages. Lake Okeechobee high water performance requirements will likely need to be revisited following completion of the 2015 DSMR, but the CEPP PACR stage duration curve trends for increased high water conditions appear reasonable based on the current expectations for the HHD remediation.

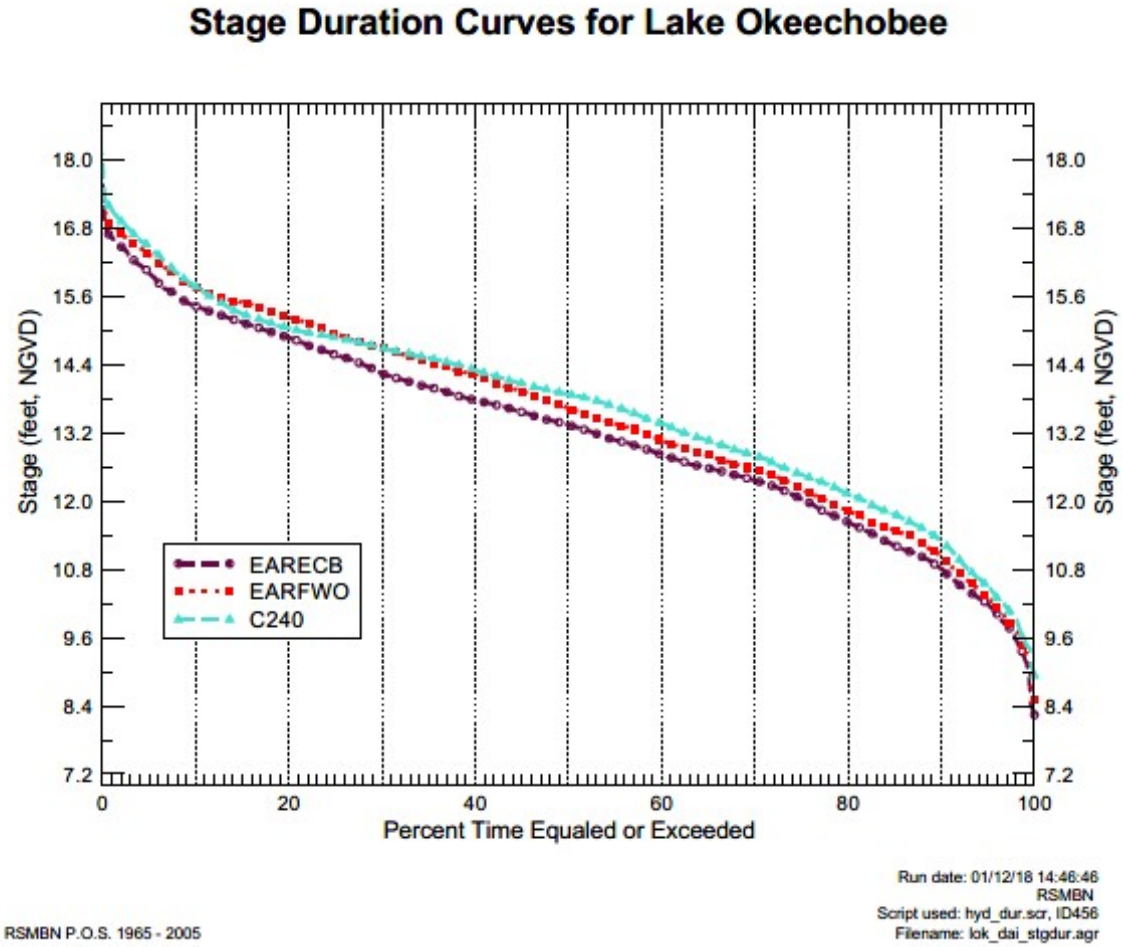

Figure 2-9. Lake Okeechobee Stage Duration Curve

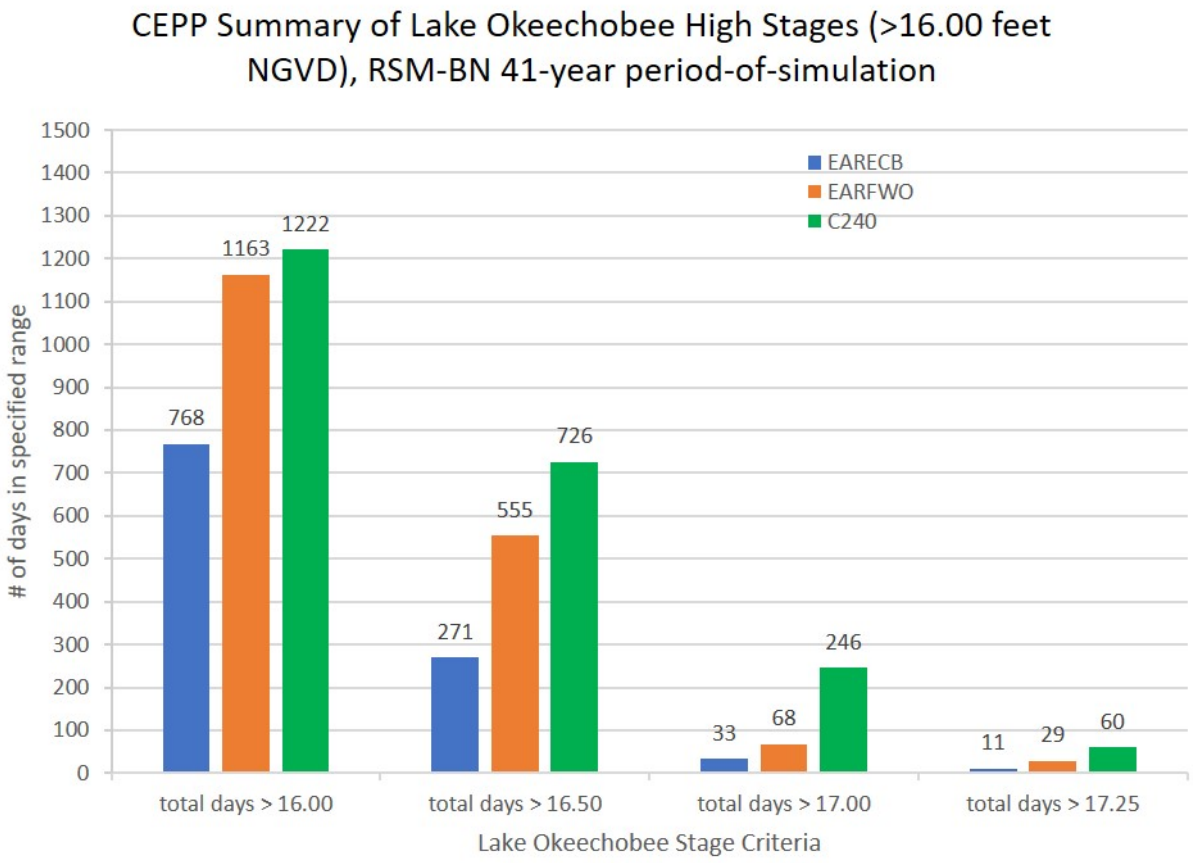

Figure 2-10. Occurrence Frequency of Lake Okeechobee High Stages

2.5.2 A-2 Reservoir and A-2 STA Located in the EAA

The stage duration curves are shown in **Figure 2-11** for the EARFWO (14,000-acre A-1 FEB only) and TSP. Ground surface elevation within the A-2 Reservoir was assumed at 10.00 feet NGVD for the RSM-BN modeling. Minor changes to groundwater levels are expected adjacent to the A-2 Reservoir (10,500 acres) and A-2 STA (6,500 acres), compared to the future without project condition (EARFWO) which includes the CEPP FEB on A-2. Modeling for both alternatives includes the SFWMD Restoration Strategies A-1 FEB.

The A-2 Reservoir design includes perimeter conveyance canals that surround the reservoir and will also collect seepage to limit potential impacts. The A-2 Reservoir at this time carries a high hazard potential classification (HPC) per CERP Design Criteria Memoranda (DCM) 1, which is extended to embankment design. Embankment top widths are 14 feet wide per DCM-4, with dam heights based on analysis of the DCM-2. The A-2 Reservoir embankment top elevation is established at 45.60 feet NAVD 88 (47.03 feet NGVD 29), more than three feet above the maximum surcharge pool elevation. As described in further detail in the Engineering Appendix (**Appendix A**), the maximum surcharge pool elevation is based on the greatest elevation resulting from the following storm routings: a. The Inflow Design Flood (IDF), which is identified as the 100-yr 24-hr storm event for the A-2 Reservoir location, per DCM-2; b. the 50 % 72-hr PMP per ER-

1110-8-2(FR); and c. wind setup and wave run-up analysis on critical fetch lengths with the impoundment at full pool. A weir-type spillway will provide uncontrolled discharge from the A-2 Reservoir during extreme events, when discharges are required to protect the embankment integrity. The spillway will include a 13.5-foot-long weir with crest elevation set at 32.60 ft NGVD. The spillway will discharge into the adjacent A-2 Inflow Canal along the northern portions of the A-1 and A-2 parcels. The weir will be located in line with the northern A-2 Reservoir embankment.

Within the RSM-BN simulated period of record (1965–2005), the maximum simulated stage in the A-2 Reservoir is 33.50 feet NGVD for the EARTSP, which corresponds to an elevation of 32.60 feet NGVD when the model volume is converted to the most up-to-date reservoir footprint. Based on the assumed ground surface elevation of 10.00 feet NGVD used in the RSM-BN model, the peak depth is 22.60 feet over the period of record. The A-2 Reservoir overflow spillway SW-1 was designed with a crest elevation of 32.53 feet NGVD, based on the average assumed ground surface elevation of 9.93 feet NGVD used for the preliminary (pre-PED survey) hydraulic design, as described in **Appendix A** of the CEPP PACR; based on this design, the A-2 Reservoir overflow spillway would only discharge if the A-2 Reservoir depth exceeds 22.60 feet. The spillway preliminary design details, including discharge location, did not warrant further analysis for the CEPP PACR Savings Clause evaluation of the TSP. During CEPP PACR formulation, no detailed modeling was performed to determine the extent or frequency of emergency discharges under extreme event outside of the 1965–2005 period of record that was analyzed.

For flood protection in the EAA, due to the additional storage volume provided by the A-2 Reservoir, construction and operation is expected to incidentally improve flood protection.

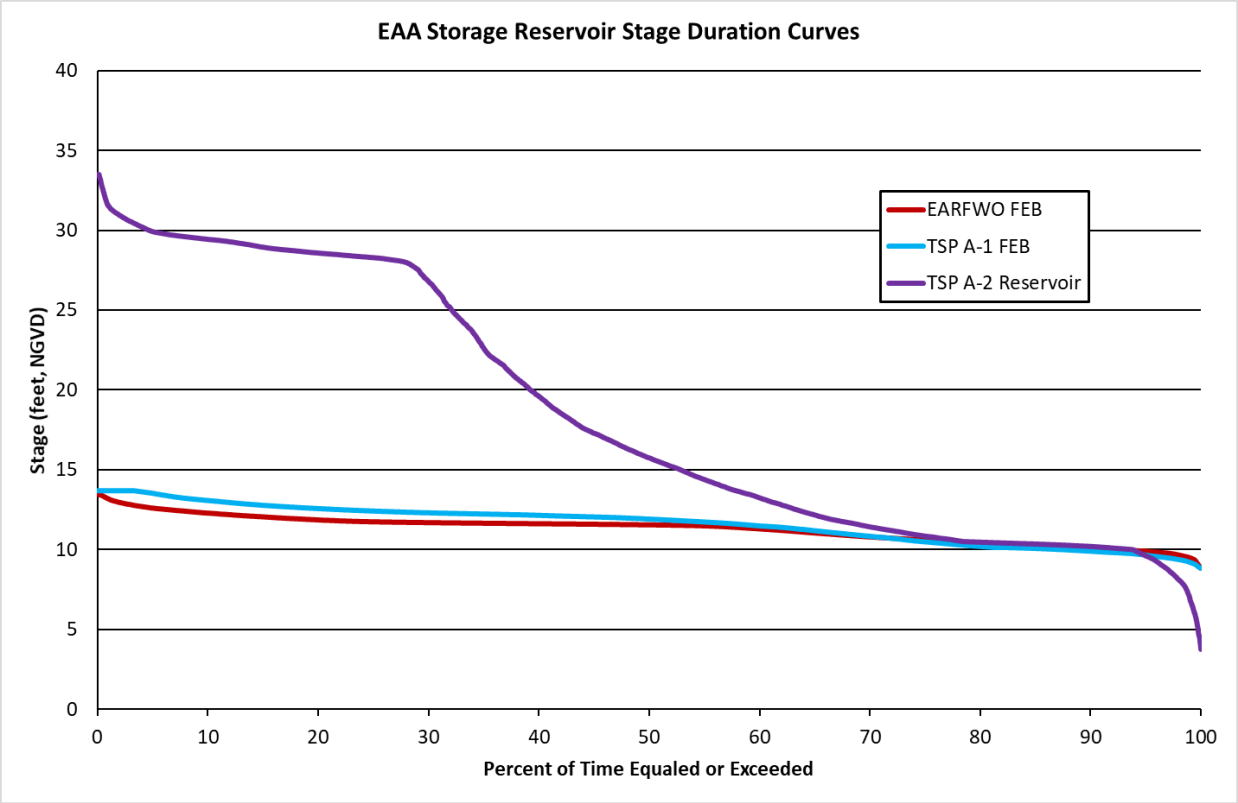

Figure 2-11. A-2 Reservoir and A-1 FEB Stage Duration Curves

2.5.3 WCA 3A and WCA 3B Water Stages Relative to the East Coast Protective Levee

Compared to the EARFWO, the TSP stages are higher by approximately 0.1–0.3 feet in the upper 10% of the stage duration curve for the WCA 3A three-gauge average stage, as shown in **Figure 2-12** (upper 25% of the stage duration curve); the TSP is lower than existing condition (EARECB). In order to consider potential differences during specific years, the annual duration of exceedance of the ERTP WCA 3A Zone A stage levels for the complete period of simulation (**Figure 2-13**) was evaluated. The annual durations were also displayed and assessed as a frequency curve (**Figure 2-14**). The total number of days above Zone A is summarized as follows for the EARFWO and TSP (with percent of total period of simulation, 14,975 days, in parentheses): EARFWO – 3,321 days (22%); and TSP – 3,849 days (26%).

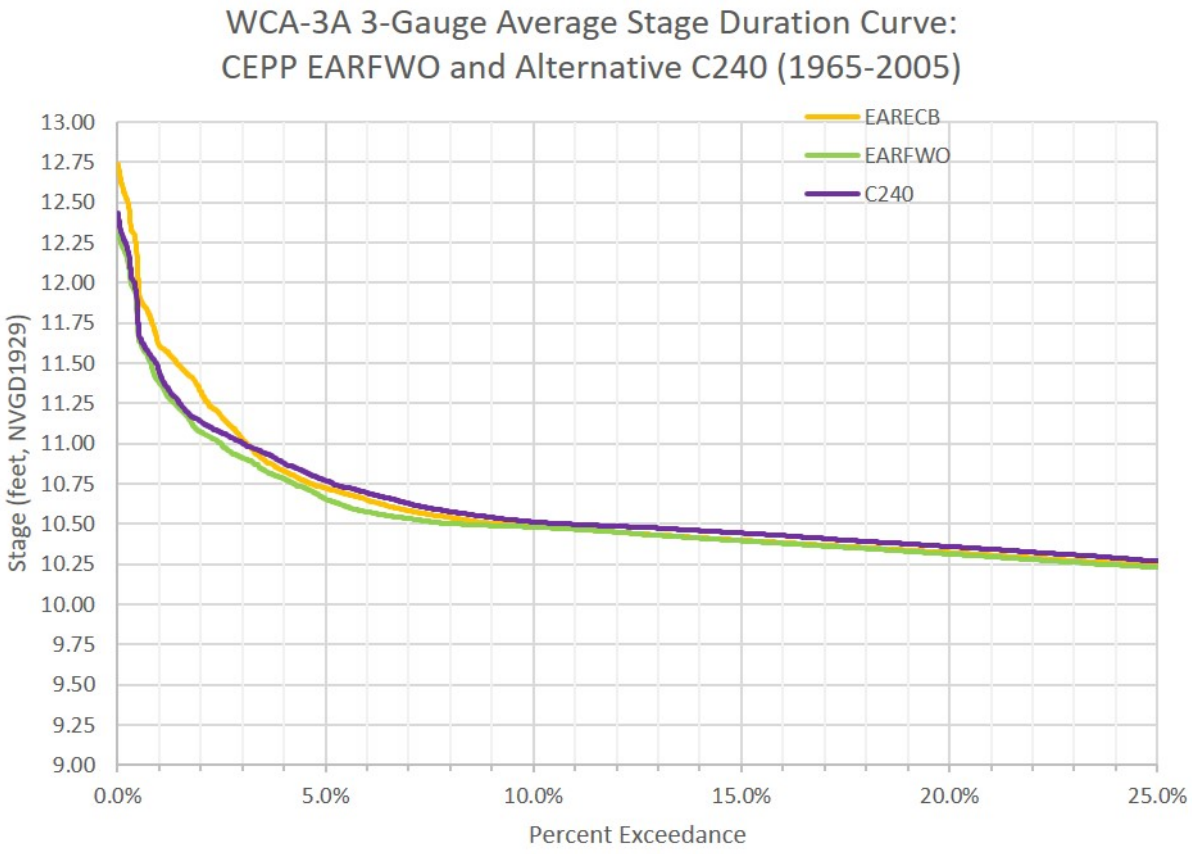

Figure 2-12. WCA 3A Three-Gauge Average Stage Duration Curve

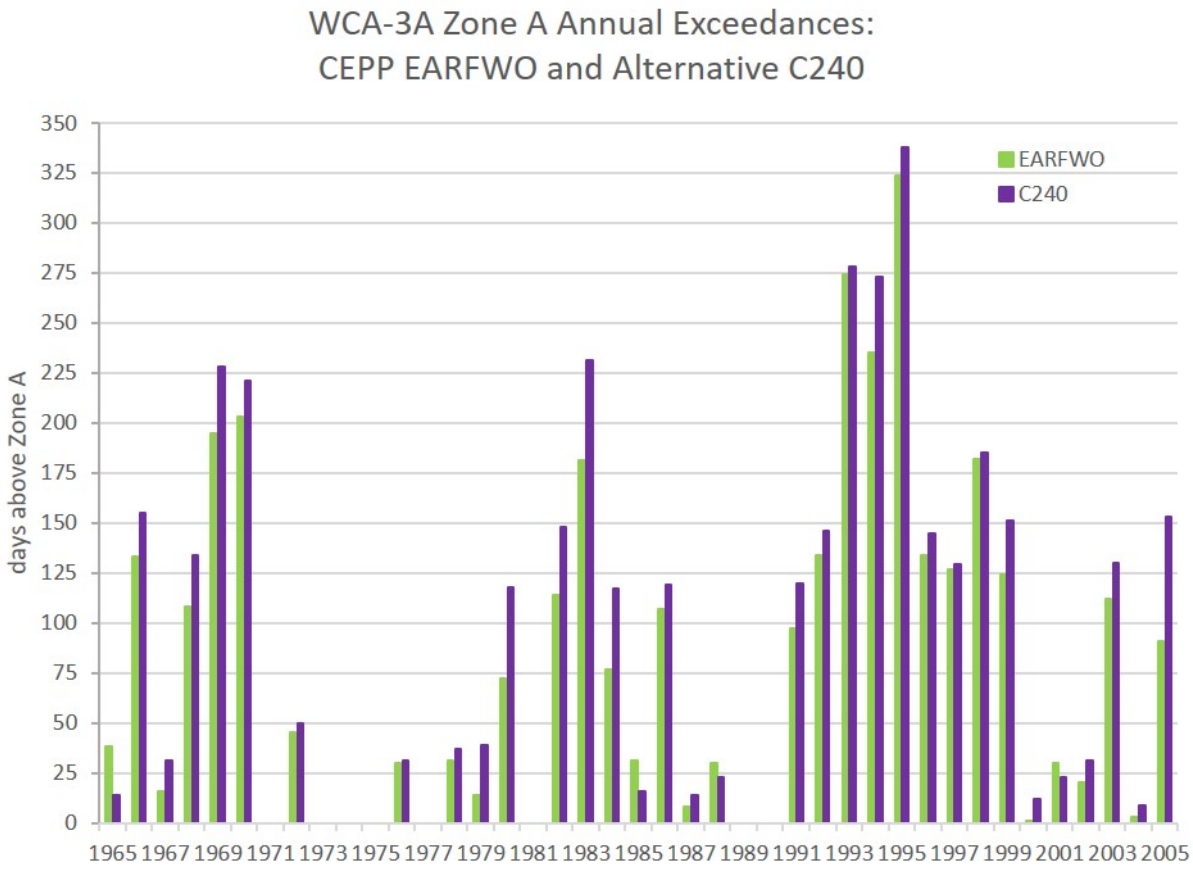

Figure 2-13. WCA 3A Three-Gauge Average Annual Zone A Exceedance Summary

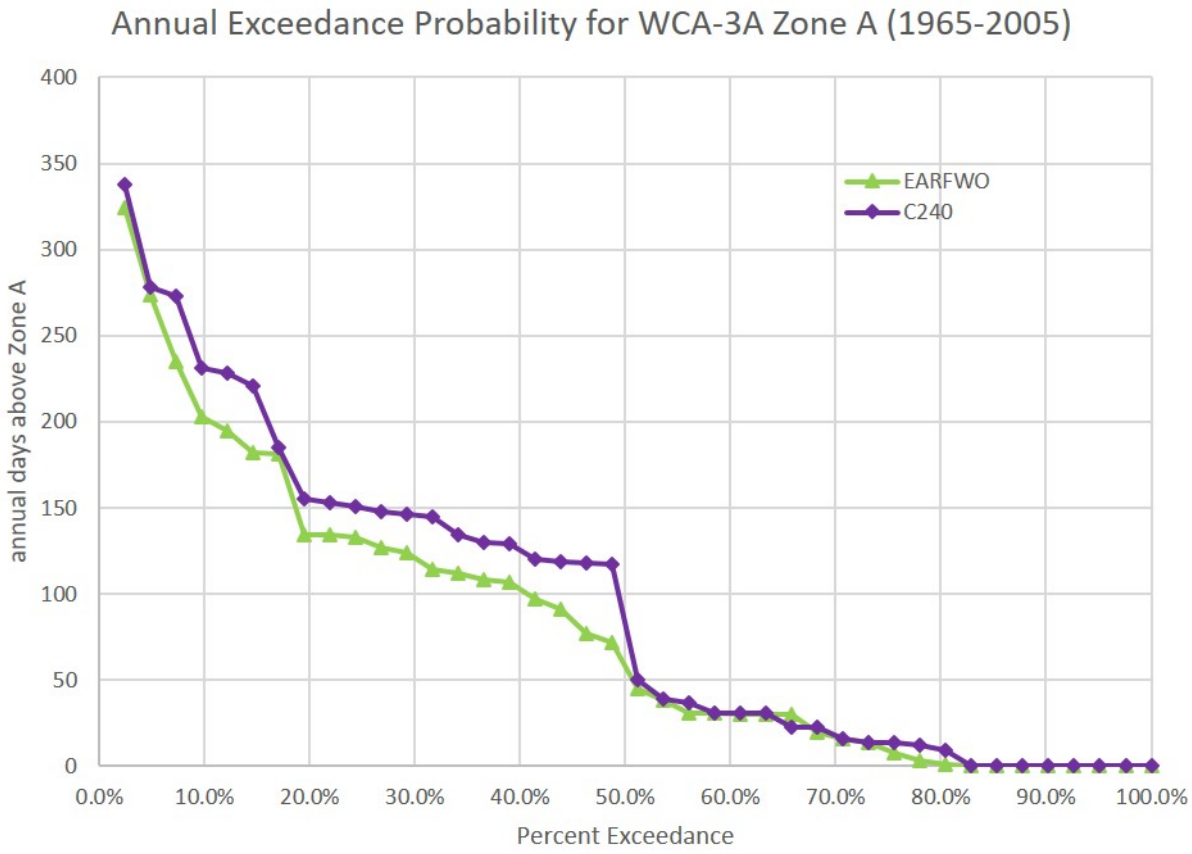

Figure 2-14. WCA 3A Three-Gauge Average Probability Exceedance Curve for Annual Zone A Exceedance

The detailed assessment of the frequency, duration, and peak stages of high water levels within WCA 3A concluded: 1) WCA 3A peak stages are lowered (these stages are most critical for WCA 3A design limitations); 2) the frequency and durations of Zone A exceedance are increased; 3) the increased frequency and durations occur during periods of the year when WCA 3A water levels are below peak critical levels; 4) CEPP infrastructure modifications (increased WCA 3A outlet capacity) and operations demonstrate that increased WCA 3A stages at the end of the dry season and start of the wet season can be effectively managed to avoid exacerbating high water conditions at the end of the wet season when Zone A levels off at 10.5 feet NGVD; and 5) CEPP infrastructure and operations utilized to achieve these performance levels need to be codified in the CEPP Project Operating Manual (POM). The requirements to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the EARFWO were, therefore, successfully achieved in the TSP.

2.5.4 Agricultural and Urban Areas Located East of the East Coast Protective Levees

Flood protection in Miami-Dade County is of special concern due to the proximity of agricultural land uses, urban areas, and the Everglades. A complex network of canals, structures, culverts, impoundments, and pumps work in tandem to minimize seepage losses from the Everglades yet

meet water supply and flood protection needs of agricultural and urban users. Selected gauges and groundwater difference maps were evaluated collectively to determine if the level of service for flood protection was affected.

For the agricultural and urban areas located east of the East Coast Protective Levees (L-31N and L-31W), the RSM-GL has no capability to precisely measure flood control on individual fields or during relatively short events, but the RSM-GL can be used as a coarse-scale tool to indicate a potential change in flood risk. Using the 1983 to 1993 stage duration curve data from the RSM-GL calibration and verification, the percentage of time the stage is above the root zone can be calculated and the information can be used to give an indication that additional flood control evaluation near a particular RSM-GL cell(s) may be needed. Six gauges or cells were evaluated consistent with REstoration COordination and VErification (RECOVER) performance measure (**Figure 2-15**). In addition, a gauge near Tamiami Trail, G-3439, was also evaluated. It is located near the neighborhoods called Belen, Sweetwater, Serena Lakes and Country Walk which have experienced flood conditions historically (**Figure 2-16**). The most important part of the stage duration curve for flood protection assessment is the range of higher stages during wetter periods. Specifically, frequency and magnitude evaluations are made in the upper 20 percentiles of the curve, and relative magnitude of difference evaluations are made at the 10 percent frequency of stage duration. Differences occurring deeper than 2 feet below land surface elevation are disregarded.

It should be noted that usefulness of the 1983-1993 calibration data used in the official RECOVER performance measure was determined based on the South Florida Water Management Model (SFWMM). Confirmation that the RSM's calibration data bodes similar results (the RSM-GL calibration period is 1984-1995, and the verification periods are 1981-1983 and 1996-2000) or can be applied in the same manner as SFWMM has not been completed. A more appropriate comparison is the EARECB baseline in the SDCS, which includes the ERTP water control plan.

Five cells evaluated met the RECOVER performance measure criteria. When comparing the 1983–1993 calibration data (**Figures 2-17 thru 2-22**), the without project condition (EARFWO), and the existing condition baseline (EARECB), five of the six indicator cells, stages in the with-project condition (TSP) are either the same or below the 1983-1993 calibration data and/or the groundwater stages are more than two feet below ground (at levels and would not affect crops). The stage duration curve for indicator Cell 4328 (**Figure 2-17**) for the with-project condition (TSP) is the same as the future without project condition (EARFWO) during the wettest hydrologic conditions, with stages approximately 0.5 feet above the calibration values and 0.2 feet above the EARECB for the upper 20 percentile. As further described within Annex B of the CEPP PIR, the predicted modeled performance for both the FWO condition and TSP is likely the result of the calibrated C-111 Canal roughness coefficient likely being set too high and causing higher upstream C-111 Canal stages (and adjacent groundwater levels). The hydrologic modeling results in this specific case are not representative of the performance that is expected following CEPP PACR TSP implementation, and it is recognized that the FWO simulated stages along this reach of the C-111 Canal and adjacent agricultural areas would not be deemed acceptable to local stakeholders.

G-3439, a monitored well located along the C4 Canal, was also evaluated (**Figure 2-23**). The with-project condition (TSP) performs the same as the without project condition (EARFWO). Comparison of the with-project to the existing condition baseline (EARECB) shows the water stages slightly reduced with TSP during the wettest half of the conditions.

Comparison of the regional groundwater stage difference maps for the EARFWO and TSP simulation results can identify where systemically higher groundwater levels, which may adversely impact flood protection, may occur. The October 1995 map was selected to determine if the project affected groundwater levels when regional groundwater levels are most likely to rise. The month of October typically has the highest rainfall of the year and 1995 is one of years with the highest wet season rainfall in the period of simulation. The with-project condition (TSP) and the without project conditions (EARFWO) were compared. The 1995 regional water levels are maintained or are the same for LECSA 2 and LECSA 3 (**Figure 2-24)**. The average October groundwater stage difference map for the complete period of simulation (1965–2005) indicates no changes within the urbanized LECSA 2 and LECSA3 for TSP compared to the EARFWO (**Figure 2-25**).

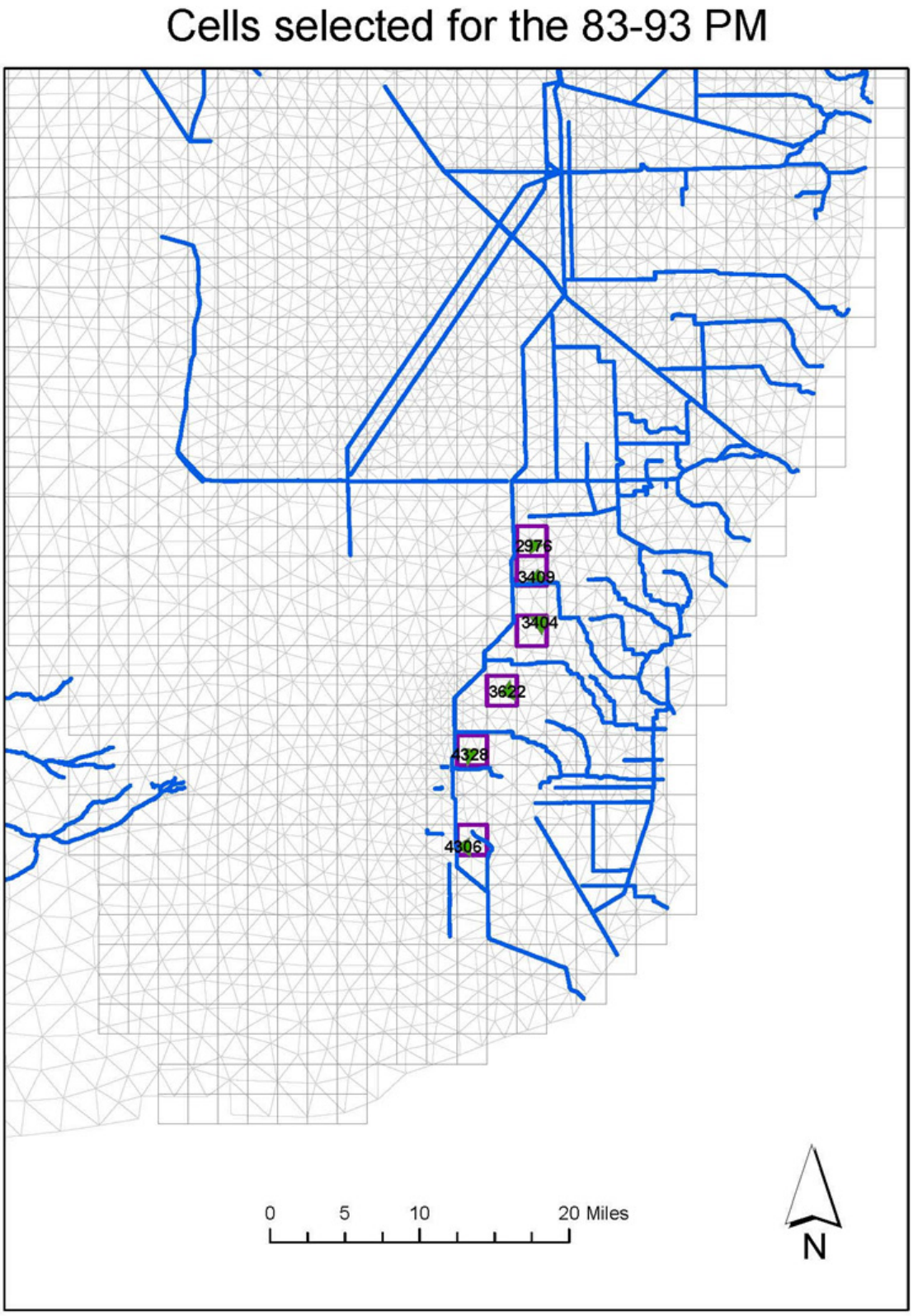

Figure 2-15. Location of Cells Evaluation for Potential Effects to Agriculture in South Miami-Dade County

Figure 2-16. Location of G-3439 (red dot) Relative to the Neighborhoods

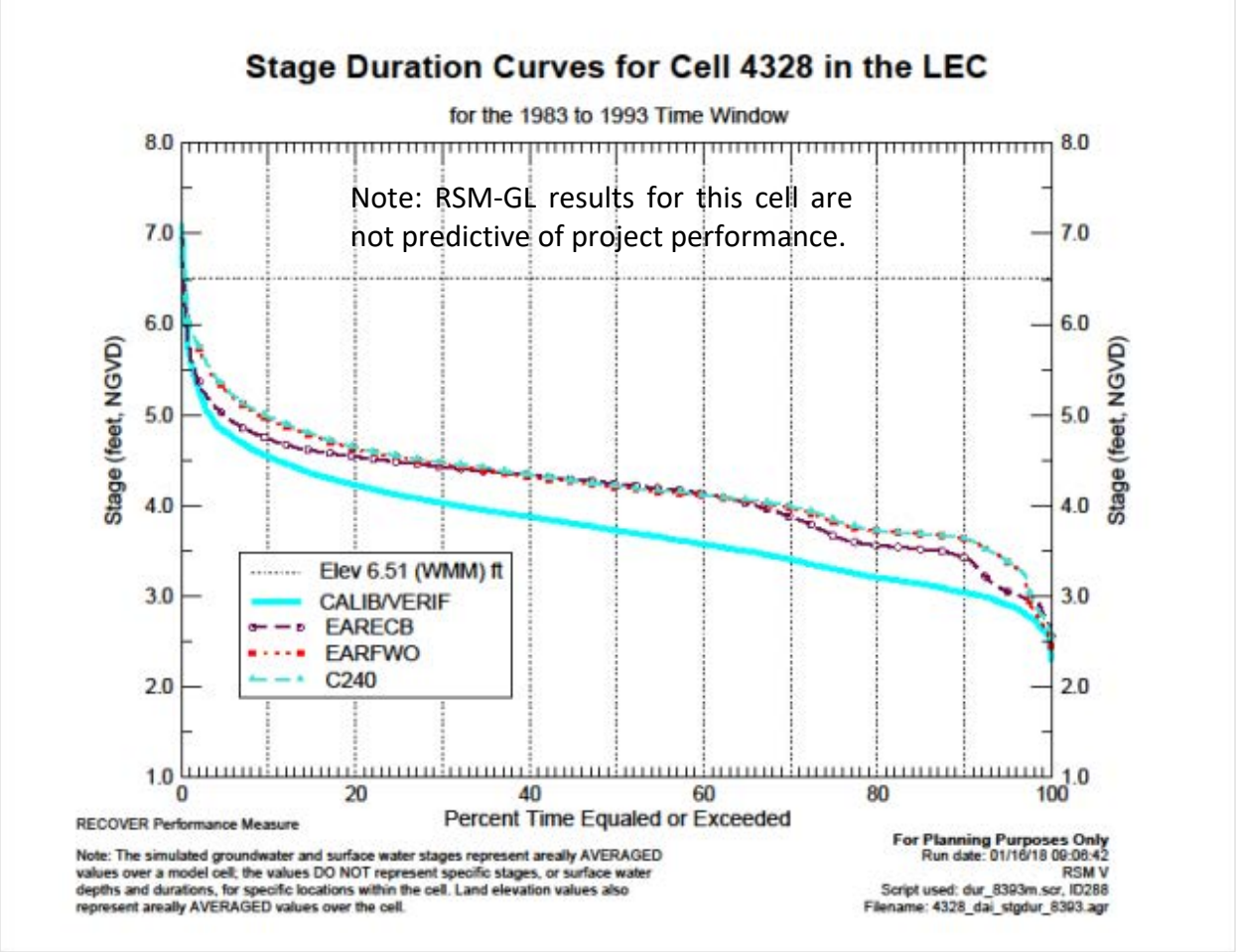

Figure 2-17. Stage Duration Curves for Cell 4328 in the LEC Service Area

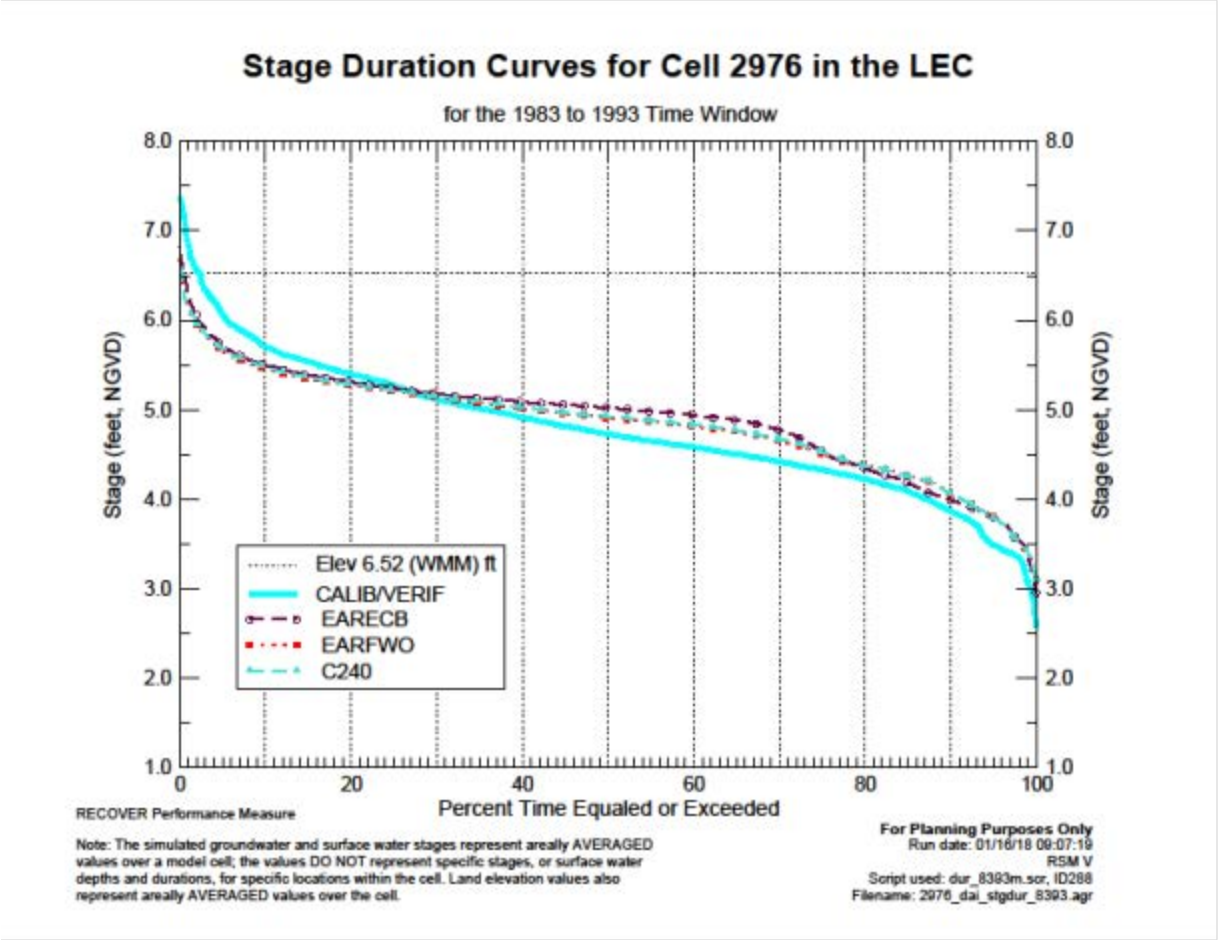

Figure 2-18. Stage Duration Curves for Cell 2976 in the LEC Service Area

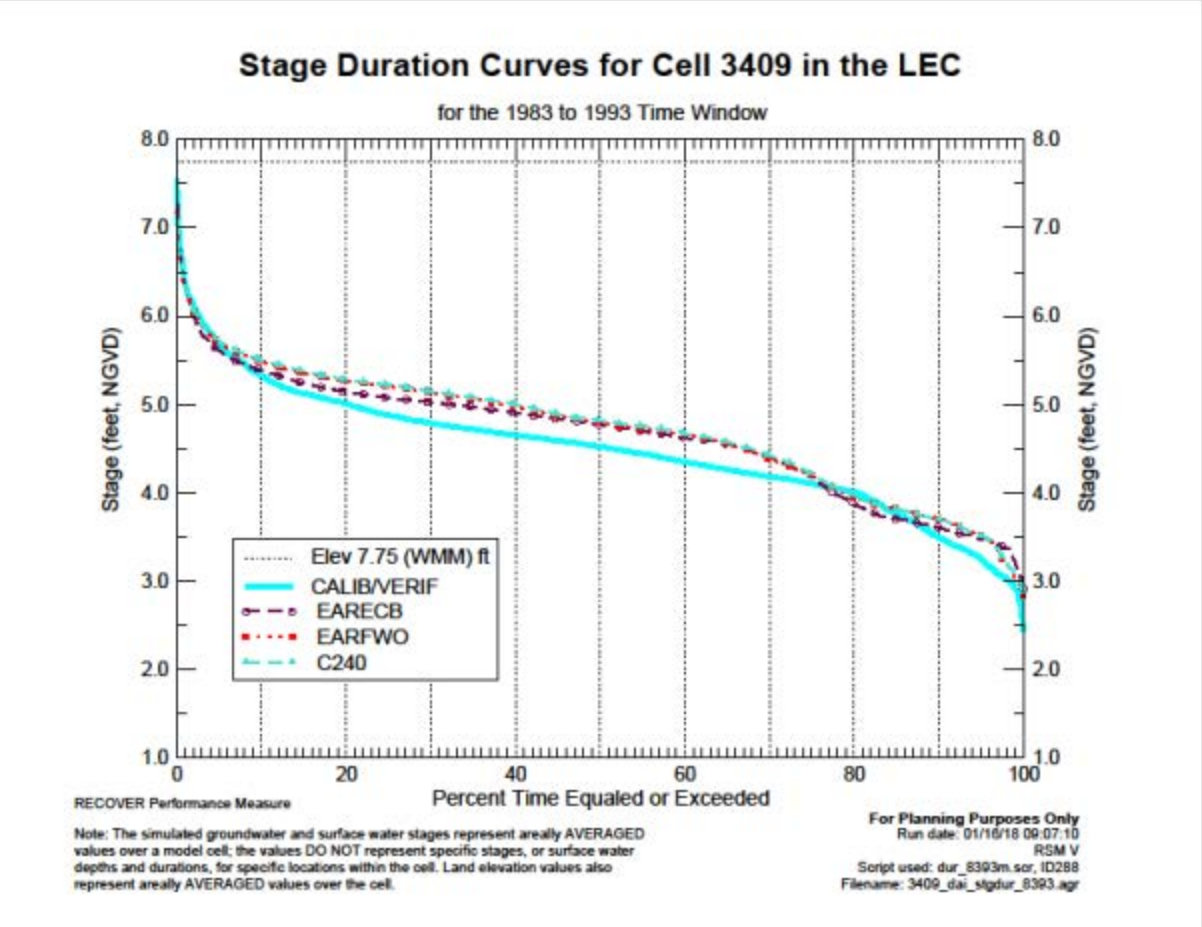

Figure 2-19. Stage Duration Curves for Cell 3409 in the LEC Service Area

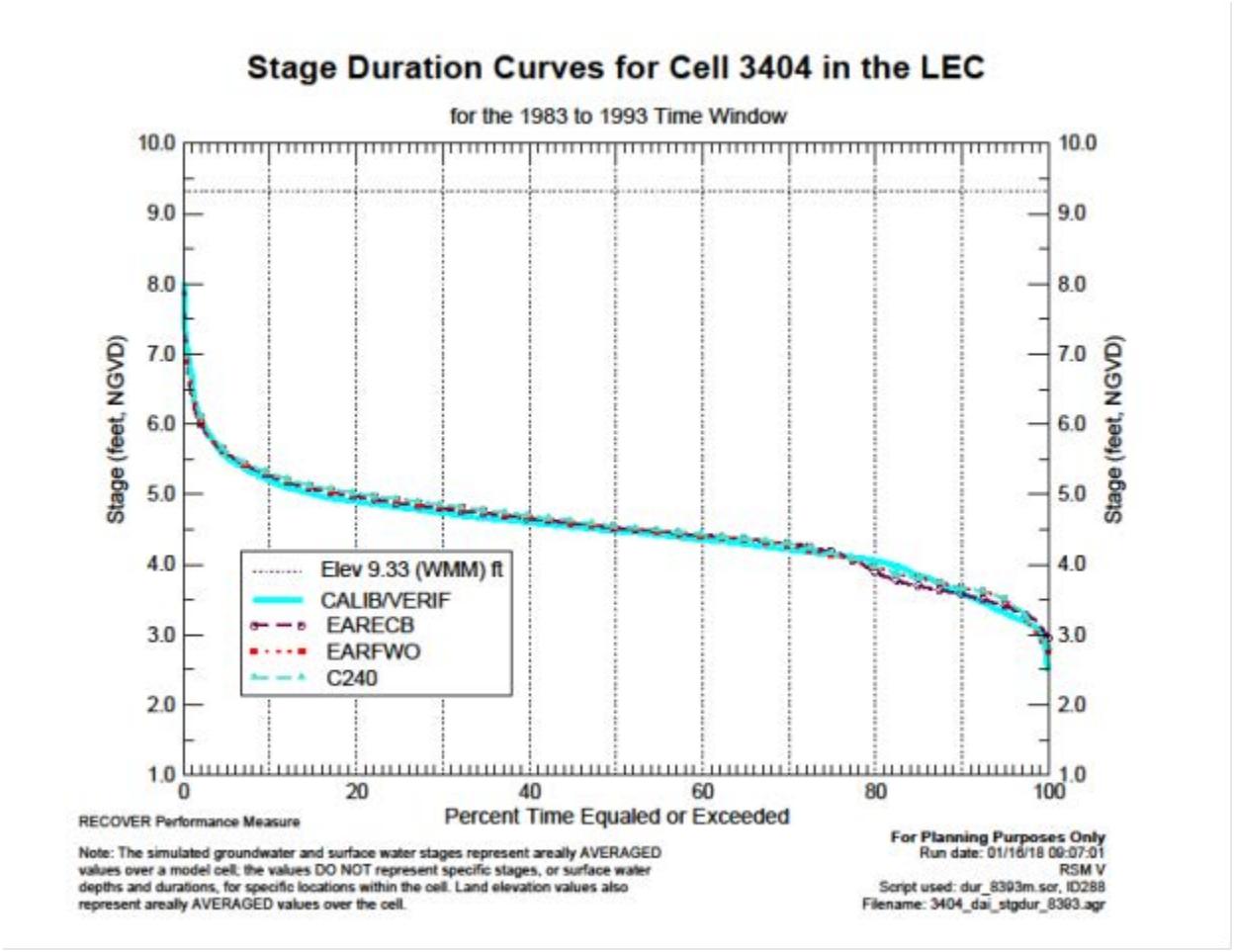

Figure 2-20. Stage Duration Curves for Cell 3404 in the LEC Service Area

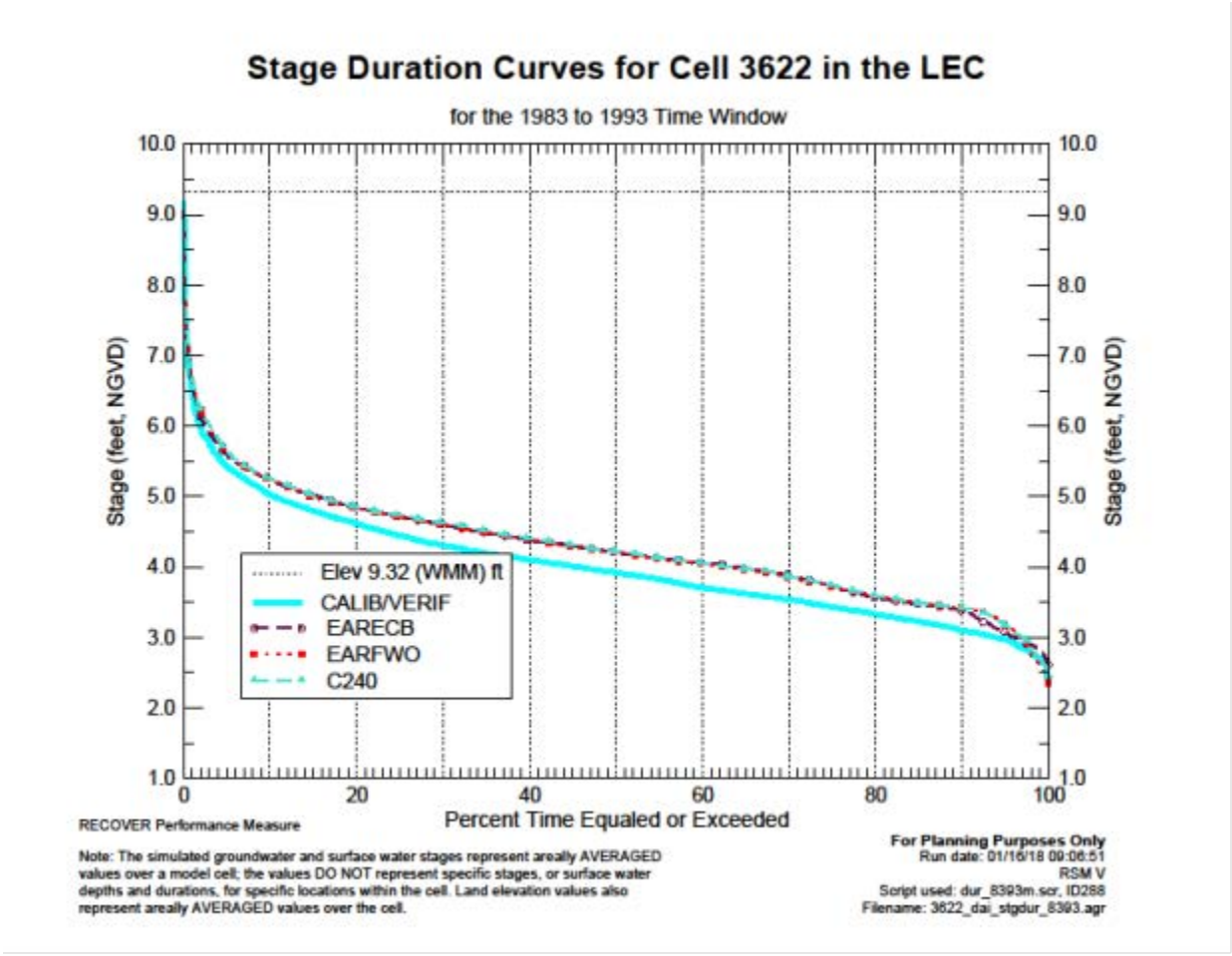

Figure 2-21. Stage Duration Curves for Cell 3622 in the LEC Service Area

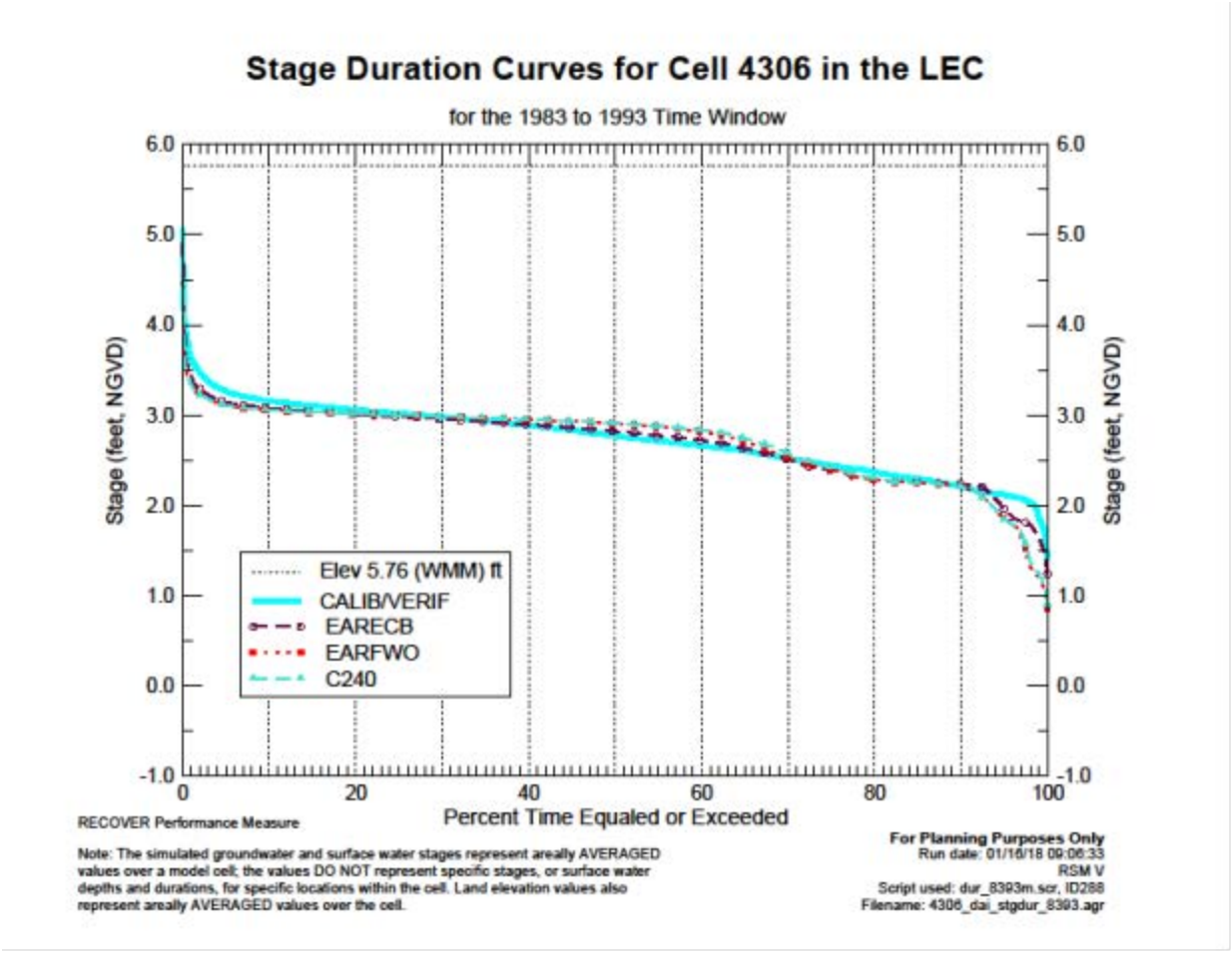

Figure 2-22. Stage Duration Curves for Cell 4306 in the LEC Service Area

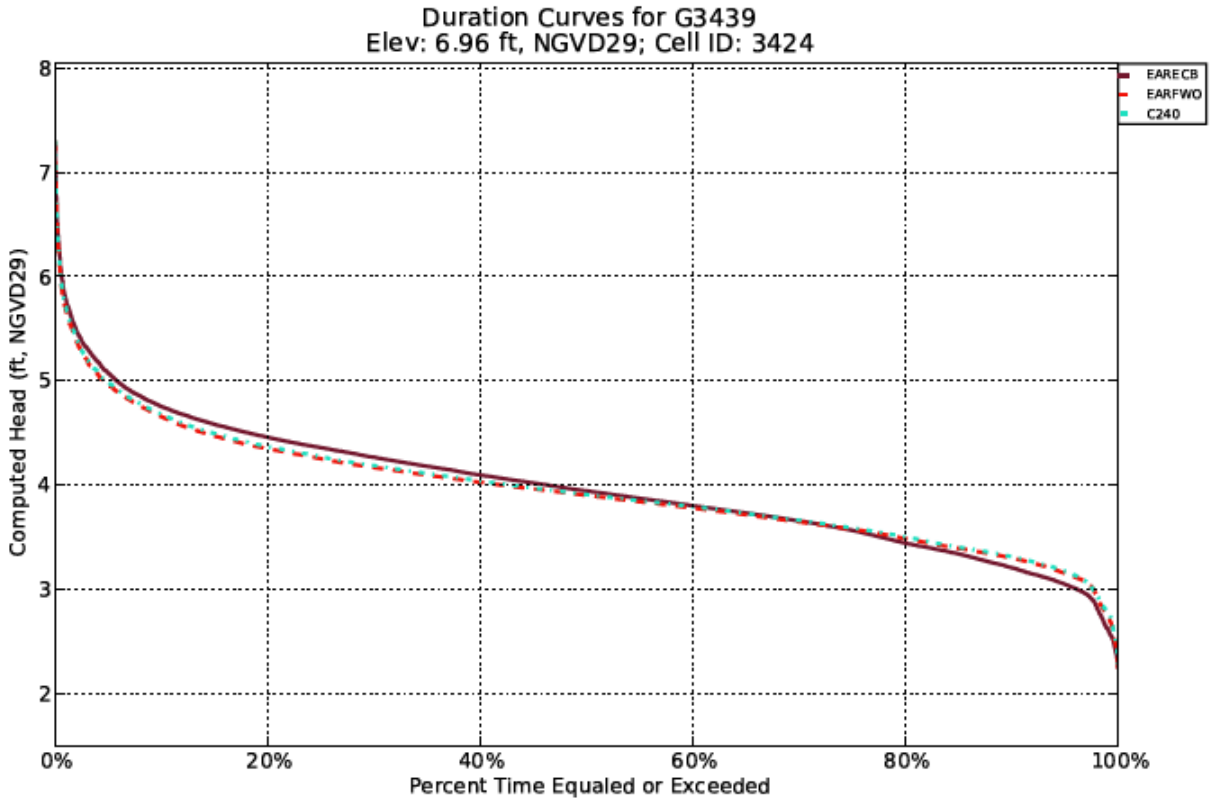

Figure 2-23. Stage Duration Curves for Well G-3439 in the LEC Service Area

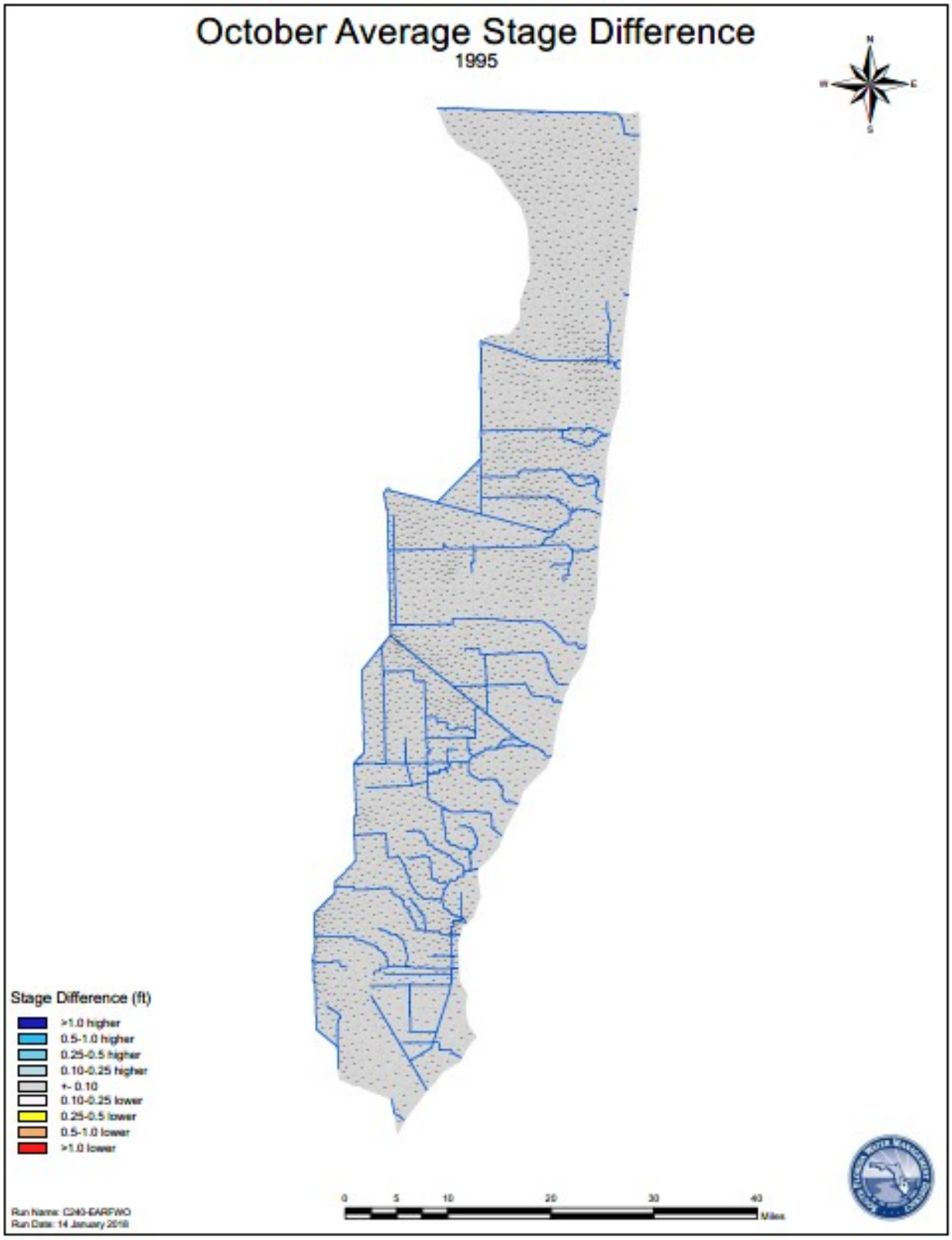

Figure 2-24. October 1995 Average Stage Difference between TSP and EARFWO

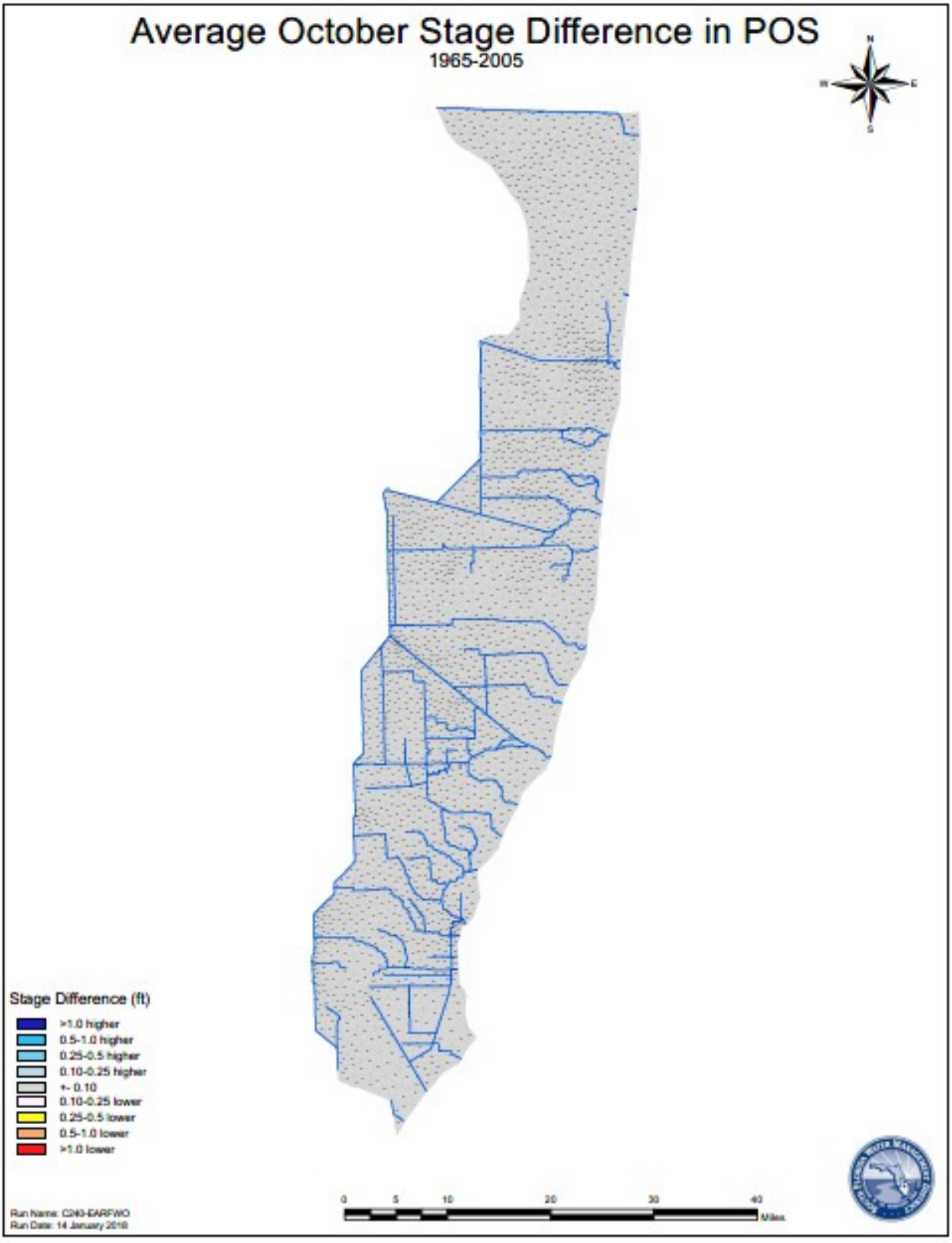

Figure 2-25. Average October Stage Difference Map between TSP and EARFWO for 1965–2005

2.6 Threatened and Endangered Species

The CEPP PACR affected area potentially contains habitat suitable for the presence, nesting, and/or foraging of 32 Federally-listed threatened, endangered, and candidate flora and vertebrate and invertebrate fauna. Federally threatened, endangered, and candidate species that may occur within the study area include:

Vertebrate fauna – Florida panther (*Puma concolor coryi*), Florida population of West Indian Manatee (Florida manatee) (*Trichechus manatus*) and its critical habitat, Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) (CSSS) and its critical habitat, Everglade snail kite (*Rostrhamus sociablis plumbeus*) and its critical habitat, Northern crested caracara (*Caracara cheriway*), piping plover (*Charadrius melodus*), red-cockaded woodpecker (*Picoides borealis*), roseate tern (*Sterna dougallii dougallii*), wood stork (*Mycteria americana*), American alligator (*Alligator mississippiensis*), Florida bonneted bat (*Eumops floridanus*), American crocodile (*Crocodylus acutus*) and its critical habitat, Eastern indigo snake (*Drymarchon corais couperi*), smalltooth sawfish (*Pristis pectinata*) and its critical habitat, green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), and loggerhead sea turtle (*Caretta caretta*).

Invertebrate fauna – Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*), Miami blue butterfly (*Cyclargus thomasi bethunebakeri*), Florida leafwing butterfly (*Anaea troglodyta floridalis*), Bartram's hairstreak butterfly (*Strymon acis bartrami),* and Stock Island tree snail (*Orthalicus reses* [not incl. *nesodryas*]).

Flora – Crenulate lead-plant (*Amorpha crenulata*), Cape Sable thorough-wort (*Chromolaena frustrata*) deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*), Garber's spurge (*Chamaesyce garberii*), Okeechobee gourd (*Cucurbita okeechobeensis* ssp. *okeechobeenis*), Small's milkpea (*Galactia smallii*), tiny polygala (*Polygala smallii*) and Johnson's seagrass (*Halophila johnsonii*) and its critical habitat.

Table 2-3 compares the FWO and all action alternatives with their potential effects on Federally listed threatened and endangered species. Further details on the life history of each species and their effects determinations can be found in the Biological Assessment in **Annex A** of the PACR. For a more detailed analysis, please refer to **Appendix C.2.1** of the PACR.

Table 2-3. Effects Comparison of FWO and CEPP PACR Alternatives on Federally-Listed Threatened and Endangered Species

Threatened and Endangered Species (Please refer to Biological Assessment [Annex A] for further details on life history of each species.)		
Species	**FWO**	**CEPP PACR Alternatives**
Everglade Snail Kite and its critical habitat	Rehydration and desirable vegetation shifts within northern WCA 3A, WCA 3B and increased hydroperiods within ENP would increase suitable habitat for apple snails, thereby increasing spatial extent of suitable foraging opportunities for snail kites providing a moderate and significant beneficial effect. Southern WCA 3A would continue to experience extended hydroperiods due to ponding along the L-67a and L-29. High water levels and extended hydroperiods have resulted in vegetation shifts within WCA 3A, degrading Everglade snail kite critical habitat.	Reduced frequency and duration of extreme low lake stages on Lake Okeechobee, slightly longer hydroperiods and desirable vegetation shifts within northwestern WCA 3A, and conversion of A-2 Expansion area to treatment wetlands could increase suitable habitat for apple snails, thereby increasing spatial extent of suitable foraging opportunities for snail kites, providing a minor beneficial effect. All alternatives may have a minor beneficial effect on Everglade snail kite critical habitat.
Cape Sable Seaside Sparrow (CSSS) (Hydroperiod and Nesting condition) and its critical habitat	The FWO has the potential to provide a major adverse effect and significant and unavoidable effect on hydroperiods within the marl prairies adjacent to NESRS. Longer hydroperiods than the existing condition are predicted within CSSS-E and southern portions of CSSS-A. Mitigation and monitoring will be performed to minimize the impacts.	The incremental effects of the minor increase in hydroperiod durations are anticipated to cause a minor to moderate negative effect on the CSSS nesting pattern as compared to the FWO. However, the mitigation efforts from the major adverse effects created by the FWO would be expected to continue (see **Annex D**).
Wood Stork	Beneficial and significant effects for habitat and foraging conditions for wood storks throughout much of the Greater Everglades.	All the alternatives provided relatively similar increases in hydroperiods. Any increase in hydroperiods provides longer duration foraging, as long as depths do not exceed 1 foot (ft). This is particularly important for wood storks because of their long nesting season and the need to fledge nestlings before the summer rains arrive.
Eastern Indigo Snake	Habitat loss from implementation of the FWO project components includes the footprint of the A-2 Reservoir and backfilling of the Miami Canal in WCA 3A.	Since Eastern indigo snakes occur primarily in upland areas, their presence within the Greater Everglades portion of the project area is somewhat limited; however, they have a high probability of occurrence within the project construction footprint. Standard protection measures for the Eastern Indigo snake will be implemented during construction in order to minimize impacts.

Table 2-3. Effects Comparison of FWO and CEPP PACR Alternatives on Federally-Listed Threatened and Endangered Species (continued)

Threatened and Endangered Species (Please refer to Biological Assessment (Annex A) for further details on life history of each species.)		
Species	**FWO**	**CEPP PACR Alternatives**
American Alligator (similarity of appearance to the American Crocodile)	Rehydration within northern WCA 3A, WCA 3B and increased hydroperiods within ENP increase spatial extent and quality of suitable habitat for the American alligator.	All action alternatives provide minor beneficial effects on habitat suitability for American alligator within the northern WCA 3A. Hydroperiod improvements within ENP would be expected to have a negligible or minor positive impact in the long term on the spatial extent and quality of suitable habitat for the American alligator.
American Crocodile and its critical habitat	Reduction in salinity fluctuations provides minor beneficial effects and improve habitat suitability for American crocodile	All alternatives would slightly increase freshwater flows, ultimately reducing salinity fluctuations, which would be expected to provide minor beneficial effects and improve habitat suitability for the American crocodile.
Manatee and its critical habitat	Reduction in discharge events from Lake Okeechobee to the Northern Estuaries would reduce stress on seagrass beds. Remaining high-volume discharge events would continue to degrade seagrasses. Increased flows to Florida Bay and the southern estuaries would improve salinity, thereby reducing stress on seagrasses. A reduction in seagrass habitat negatively effects Manatee foraging and critical habitat.	Reduction in high-volume discharge events from Lake Okeechobee to the Northern Estuaries would reduce stress on seagrass beds, thereby increasing foraging potential for manatees within this region and provide minor beneficial effects to the manatee and its critical habitat. All alternatives would increase flows to Florida Bay which would improve salinity, thereby reducing stress on seagrasses important to foraging manatees and provide minor beneficial effects to the manatee and its critical habitat. All alternatives may affect, but are not likely to adversely affect, designated critical habitat for the Florida manatee.
Panther	Loss of 14, 000 acres of upland habitat due to FEB and potential loss of upland habitat due to backfilling the Miami Canal in WCA 3A provides a minor adverse effect.	For all alternatives, increases in forage base due to hydrological improvements would provide a minor beneficial effect.
Smalltooth Sawfish and its critical habitat	The FWO conditions provides a minor beneficial effect to the smalltooth sawfish and its critical habitat by reducing the discharges from Lake Okeechobee to the Northern Estuaries. Reduction in flows to the Northern Estuaries will improve the overall salinity regime and habitat quality. Improving freshwater delivery to downstream estuaries in ENP and Florida Bay will reduce salinity fluctuations and increase habitat suitability for the smalltooth sawfish.	All of the alternatives have the potential to provide a minor beneficial effect to the smalltooth sawfish and its critical habitat by further reducing the high-volume discharges from Lake Okeechobee to the Northern Estuaries. Reduction in flows to the Northern Estuaries would improve the overall salinity regime and habitat quality. Improving freshwater delivery to downstream estuaries in ENP and Florida Bay may further reduce salinity fluctuations and increase habitat suitability for the smalltooth sawfish.

Table 2-3. Effects Comparison of FWO and CEPP PACR Alternatives on Federally-Listed Threatened and Endangered Species (continued)

Threatened and Endangered Species (Please refer to Biological Assessment (Annex A) for further details on life history of each species.)		
Species	**FWO**	**CEPP PACR Alternatives**
Green Sea Turtle, Hawksbill Sea Turtle, Leatherback Sea Turtle, Kemp's Ridley Sea Turtle, Loggerhead Sea Turtle	Reduction in discharge events from Lake Okeechobee to the Northern Estuaries would reduce stress on seagrass beds, thereby increasing foraging potential and nursery habitat for sea turtles thereby providing minor beneficial effects to sea turtles.	Further reduction in high-volume discharge events from Lake Okeechobee to the Northern Estuaries would reduce stress on seagrass beds, thereby increasing foraging potential and nursery habitat for sea turtles thereby providing minor beneficial effects to sea turtles. Increased flows to Florida Bay would improve salinity and reduce stress on seagrasses important to foraging sea turtles and would provide minor beneficial effects to sea turtles.

2.6.1 State Listed Species

The CEPP PACR project area contains habitat suitable for the presence, nesting, and/or foraging of 24 State-listed threatened, endangered, and species of special concern fauna and flora. State-listed species include:

Vertebrate fauna – Big Cypress fox squirrel (*Sciurus niger avicennia*), Everglades mink (*Mustela vison evergladensis*), Florida sandhill crane (*Grus canadensis pratensis*), snowy plover (*Charadrius alexandrius*), Southeastern American kestrel (*Falco sparveriuspaulus*), least tern (*Sterna antillarum*), white-crowned pigeon (*Columba leucocephalus*), gopher tortoise (*Gopherus polyphemus*), and rim rock crowned snake (*Tantilla oolitica*). Species of special concern include the Sherman's fox squirrel (*Sciurus niger shermani*), American oystercatcher (*Haematopus palliates*), black skimmer (*Rynchops niger*), burrowing owl (*Athene cunicularia*), reddish egret (*Egretta rufescens*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), roseate spoonbill (*Platalea ajaja*), and osprey (*Pandion haliaetus*) [the osprey is a State listed species only for the Monroe county population].

Flora - pine-pink orchid (*Bletia purpurea*), which frequents the edges of the farm roads just above wetland elevation; the lattice-vein fern (*Thelypteris reticulate*) which is found occasionally in the forested wetlands; Eaton's spikemoss (*Selaginella eatonii*) and Wright's flowering fern (*Anemia wrightii*), both found in the Frog Pond natural area; along with the Mexican vanilla plant (*Vanilla mexicana*) and Schizaea tropical fern (*Schizaea pennula*) located on tree islands in the upper Southern Glades region.

While small areas of habitat utilized by many of these animal species may be affected by this project, the alternatives are not likely to have a significant adverse effect on listed State species. Adverse effects are anticipated to be short-term on protected State species. Impacts to wading bird species as a group would be similar to those specified in **Section 2.6** affecting the wood stork. Subtle changes in water quality can also support the prey base so that net beneficial effects on forage availability can be variable. Overall, negligible adverse impacts are anticipated to State-

listed species as a result of this project. For a more detailed analysis, please refer to **Appendix C.2.1** of the PACR.

2.7 Other Natural System Habitat Needs

The TSP provides significant benefits within the project area; beneficially affecting more than 1.5 million acres in the Caloosahatchee and St. Lucie Estuaries, the Greater Everglades, and Florida Bay. High-flow discharges lasting more than 60 days in the Caloosahatchee Estuary or more than 42 days in the St. Lucie Estuary have been found to be particularly damaging to the oyster populations. The TSP would reduce high-flow discharge events to the Northern Estuaries lasting more than 60 days to the Caloosahatchee Estuary by 40% and would provide a 55% reduction in high-flow discharge events lasting more than 42 days in the St. Lucie Estuary, in addition to the benefits provided by the previously authorized projects. An oyster habitat suitability analysis showed that this additional improvement to the northern estuary flows over the FWO would increase oyster habitat by 81 acres in the Caloosahatchee Estuary and by 41 acres in the St. Lucie Estuary. The TSP also reduces the number, return frequency and severity of undesirable, damaging, high-volume discharges from Lake Okeechobee, improving salinity and water quality conditions in the St. Lucie and Caloosahatchee Estuaries. The positive effects on water front property values, tourism, recreation, marine, and other industries; and the overall health of the Northern Estuaries would have a direct improvement on the economics of these regions. In combination with the previously authorized projects, the TSP approaches the CERP goal of approximately 80% reduction, by providing a 55% reduction in discharge volumes and a 63% reduction in mean monthly high-flow discharge events to the Northern Estuaries from Lake Okeechobee. Salinity conditions in the estuaries would also be improved by reducing the number of Lake Okeechobee events that exceed the preferred salinity envelop by 45% in the Caloosahatchee Estuary and 30% in the St. Lucie Estuary.

In addition to reducing damaging discharges to the Northern Estuaries, the TSP would increase CEPP flows from an average annual flow of approximately 210,000 ac-ft to an average annual flow of approximately 370,000 ac-ft. This provides a significant increase in the quantity of water flowing to the central Everglades, which is essential to Everglades Restoration, achieves the CERP goal and will be protected for the natural system.

The additional water flowing into northern WCA 3A and ENP provided by the TSP would help to restore vegetative communities, habitat for fish and wildlife, all while providing additional improvement of natural processes critical for the development of peat soils and tree islands, which are essential features of the Everglades ridge and slough landscape. Additional overland flows and operational refinements in the South Dade Conveyance System would also provide some benefit to salinity in Florida Bay.

Further information pertaining to the evaluation of the TSP is described in **Appendix C.2.2** of the PACR.

3 Determination of Project Component Feasibility

Section 373.1501(5)(b), F.S., states that the SFWMD shall "determine with reasonable certainty that all project components are feasible based upon standard engineering practices and technologies and are the most efficient and cost-effective of feasible alternatives or combination of alternatives, consistent with Restudy purposes, implementation of project components, and operation of the project."

3.1 Standard Engineering Practices and Technologies

3.1.1 Summary of Project Features

All project features that will be the subject of the future CEPP PPA North and CEPP PPA South in areas south of the EAA would remain unchanged under this CEPP PACR. The TSP affects only the project features in the future New Water PPA component of the authorized CEPP as described in detail below.

The TSP includes a 240,000 ac-ft above-ground reservoir and a 6,500-acre STA, located on the A-2 parcel and A-2 Expansion area, that will work in conjunction with the existing 60,000 ac-ft A-1 FEB, STA-2, and STA-3/4 to meet State water quality standards. The proposed A-2 Reservoir is 10,500 acres and designed to have a normal full storage water depth of approximately 22.6 feet. This alternative also includes 1,000 cfs of additional conveyance capacity in the Miami Canal within the EAA and 200 cfs of additional conveyance capacity in the North New River Canal within the EAA. For this alternative, A-2 Reservoir outflows can be sent to the new A-2 STA (located adjacent to and directly west of the A-2 Reservoir), to the existing A-1 FEB, to the existing STA-2, and/or to the existing STA-3/4. Outflows from the A-2 STA would be conveyed to the Miami Canal south of the existing G-373 divide structure. A-2 Reservoir outflows can also be conveyed to either the Miami or North New River Canals via the intake canal.

This combination of new and existing storage and treatment features provides maximum operational flexibility and efficiency. The TSP includes refined operations to provide water to meet other water related needs (i.e., water supply) in the EAA. These refined operations are described in detail in **Annex C** of the PACR.

Figure 3-1. CEPP PACR Tentatively Selected Plan

3.1.2 Engineering and Design

Due to an expedited schedule, absence of site-specific data and limited data, design for alternative development employed best professional judgment and prior knowledge of existing CERP components. **Appendix A** of the PACR provides a limited level of design, and includes documentation of all engineering assumptions and conceptual designs. Pre-construction Engineering and Design (PED) for TSP features could begin after Congressional authorization and upon SFWMD's concurrence consistent with the implementation phases and cost sharing. SFWMD will prepare an Engineering Design Report updating the conceptual design and prepare initial, intermediate, and final plans and specifications for each phase of construction. All work will be coordinated and reviewed between the USACE and the SFWMD, and approved by the USACE and SFWMD prior to construction, to ensure that the work meets USACE standards and regulations and incorporates SFWMD design guidance, as applicable. PED will include site-specific surveys and geotechnical investigations. During the design phase, detailed analyses, subsurface and site investigations will be conducted to prepare construction documents. During PED, project assurances, Savings Clause analysis, and operating manuals will be updated consistent with the implementation phases, if necessary. After completion of 60 percent final plans and specifications for a given project feature, the lead construction agency (USACE or SFWMD) will prepare and submit a CERPRA permit application (Section 373.1502, F.S.) to the FDEP. The FDEP will review the application material to determine if reasonable assurance that the feature will be consistent with State water quality standards in compliance with rules in effect at the time of application. See **Appendix A** and **Annex C-2** of **Appendix A** of the PACR for limited design details and conceptual design plates.

3.2 Efficiency and Cost Effectiveness

The CEPP PACR addresses an additional increment of restoration beyond CEPP to further reduce high-volume regulatory discharges from Lake Okeechobee to the Northern Estuaries and to achieve the target flows to the Greater Everglades envisioned by CERP. In the CEPP PACR, the longer duration high-flow discharges that are most detrimental to estuarine species such as oysters and seagrasses would be reduced by 40% and 55% to the Caloosahatchee and St. Lucie Estuaries, respectively. These further reductions, which would improve salinity and water quality conditions, are estimated to result in an additional 81 acres of suitable habitat for oysters in the Caloosahatchee Estuary and an additional 41 acres in the St. Lucie Estuary. As such, the CEPP problems and opportunities, including undesirable discharges to the Northern Estuaries and restoration of flows to the Greater Everglades, drove the development of planning objectives for this CEPP PACR.

The CE/ICA is used to evaluate and compare the production efficiency of alternatives. This identifies the plans that reasonably maximize ecosystem restoration, a key criterion to select the TSP (equivalent to the National Ecosystem Restoration (NER) plan in USACE water resource planning guidance). Cost effectiveness analysis begins with a comparison of the costs and outputs of alternative plans to identify the least cost plan for every level of output considered. Alternative plans are compared to identify those that would produce greater levels of output at the same cost or lesser cost than other alternative plans. Alternative plans identified through this

comparison are the cost-effective alternative plans. Cost-effective plans are then compared by examining the additional (incremental) costs for the additional (incremental) amounts of output produced by successively larger cost-effective plans. The plans with the lowest incremental costs per unit of output for successively larger levels of output are the best buy plans. The results of these calculations and comparisons of costs and outputs between alternative plans provide a basis for addressing the decision question "Is it worth it?" i.e., are the additional outputs worth the costs incurred to achieve them?

The CE/ICA analysis follows guidance from the USACE ER 1105-2-100, Appendix E, para. E-36 (USACE 2000). Costs are based initially on a planning level estimate and benefits are based on the habitat unit (HU) evaluation. As per this guidance, CE/ICA analysis compares the alternative plans' average annual costs against the appropriate average annual HU estimates. The average annual outputs are calculated as the difference between with-plan and without-plan conditions over the period of analysis (through year 2076).

3.2.1 Costs of Array of Alternative Plans

Costs represent the difference between conditions without any plan (the "base condition" or "without project condition") and with a plan or alternative. For purposes of this report and analysis, National Economic Development costs (as defined by Federal and USACE policy) are expressed in 2018 price levels. Costs of a plan represent the value of goods and services required to implement and operate/maintain the plan. The cost estimate for the alternatives includes construction; lands, easements, right-of-ways, and relocation (LERR); PED; construction management; and Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R). It was developed through engineering design and cost estimation, and real estate appraisal efforts.

3.2.1.1 Overview of Real Estate Costs

For the TSP, fee title will be required for the project footprint of the A-2 Reservoir and A-2 STA. The estimated real estate cost for the A-2 parcel and A-2 Expansion area utilizing the actual acquisition costs are $60,882,368. Approximately $33,749,663 will be credited to the Federal Government and $27,132,705 will be credited to SFWMD which includes lands owned by the State of Florida valued at $12,628,700. SFWMD will re-certify the lands in WCA 3A/3B to the Federal Government when required for construction or operations at no cost to the CEPP project.

3.2.1.2 Average Annual Costs

The timing of a plan's costs is important. Construction and other implementation costs cannot simply be added to periodically recurring costs for project operation, maintenance, and monitoring if meaningful and direct comparisons of the costs of the different alternatives are to be made. A common practice of equating sums of money across time with their equivalent at an earlier point in time is the process known as discounting. Through this mathematical process, which involves the use of an interest rate (or discount rate) officially prescribed by Federal policy for use in water resource planning analysis (set at 2.75 percent at the time of the evaluation), the cost time streams for the alternative plans were mathematically translated into an equivalent time basis value. There is some uncertainty as to how any of the alternatives would be

implemented. It is recognized that any of the plans would likely be implemented over a considerable length of time. For purposes of this evaluation, construction costs are assumed to incur on an equal monthly basis during the implementation of the alternative plans and would be implemented with no fiscal appropriation constraints.

ER 1105-2-100 requires that interest during construction (IDC) be computed, which represents the opportunity cost of capital incurred during the construction period. IDC was computed for PED costs from the middle of the month in which the expenditures were incurred until the first of the month following the estimated construction completion date, and assumed a 5-year unconstrained construction timeline. IDC was computed for both real estate and construction costs. IDC was computed for the total real estate cost starting from the month prior to construction commencing. The total first cost is the sum of construction and other capital cost, such as real estate and pre-construction. The total project investment is the first cost plus IDC. **Table 3-1** summarizes the total investment cost and average annual costs of each alternative plan considered.

Table 3-1. Planning Level Construction and Investment Cost of Alternative Plans

Item Description	FWO	R240A	R240B	R360C	R360D	C360C
Alternative Construction & Implementation	$1,991,659,000	$1,737,273,387	$1,755,727,044	$2,108,489,398	$2,107,108,102	$2,108,489,398
Alternative Lands and Damages	$38,825,000	$ -	$ -	$ -	$ -	$ -
Total Alternative Costs	$2,030,484,000	$1,737,273,387	$1,755,727,044	$2,108,489,398	$2,107,108,102	$2,108,489,398
Costs Removed from CEPP	$ -	$399,219,000	$399,219,000	$399,219,000	$399,219,000	$399,219,000
Project Construction & Implementation	$1,991,659,000	$3,329,713,387	$3,348,167,044	$3,700,929,398	$3,699,548,102	$3,700,929,398
Construction Duration (Mo.)	60	60	60	60	60	60
Interest During Construction	$138,987,700	$232,363,700	$233,651,500	$258,269,000	$258,172,600	$258,269,000
Project Lands and Damages	$38,825,000	$38,825,000	$38,825,000	$38,825,000	$38,825,000	$38,825,000
Total Construction, IDC and Lands & Damages	$2,169,471,700	$3,600,902,087	$3,620,643,544	$3,998,023,398	$3,996,545,702	$3,998,023,398
Average Annual Cost	$80,359,200	$133,380,700	$134,112,000	$148,090,500	$148,035,700	$148,090,500
STA Annual O&M Cost	$ -	$1,932,000	$2,940,000	$2,175,000	$2,644,000	$2,175,000
RESERVOIR Annual O&M Cost	$ -	$2,829,000	$2,754,000	$3,193,000	$3,665,000	$3,193,000
CEPP O&M	$6,781,000	$ -	$ -	$ -	$-	$ -
CEPP O&M Removed from Alternatives	$ -	$1,359,221	$1,359,221	$1,359,221	$1,359,221	$1,359,221
Average Annual O&M Cost	$6,781,000	$10,182,779	$11,115,779	$10,789,779	$11,730,779	$10,789,779
Total Average Annual Costs	**$87,140,200**	**$143,563,479**	**$145,227,779**	**$158,880,279**	**$159,766,479**	**$158,880,279**

*Annual costs are based on a 50-year period of analysis. Costs do not include costs of recreation features.

*Costs are planning level costs and do not coincide exactly with the detailed costs of the Tentatively Selected Plan presented in other sections of the report.

*Computation of the detailed estimate for the Tentatively Selected Plan is based on additional engineering and design.

*Contingency used in planning level costs was 20% due to the high level of uncertainty in the design of alternatives.

3.2.2 Ecological Evaluation (Habitat Units)

The CEPP devised a project-specific tool, referred to as the CEPP Planning Model, to evaluate alternatives within the CEPP project area. The primary areas evaluated included the St. Lucie River and Estuary and a portion of the Southern Indian River Lagoon and the Caloosahatchee River and Estuary and a portion of San Carlos Bay, WCAs 3A and 3B, ENP, and Florida Bay. HUs were not calculated for Lake Okeechobee or Biscayne Bay, since the performance of these areas were considered a constraint during formulation of CEPP. The CEPP Planning Model is a Microsoft Excel® spreadsheet that utilizes project performance measures to derive a HU score that represents the ecological performance achieved by each alternative. The complete description of the model, equations, and calculations, and further information pertaining to the alternative evaluation is provided in **Appendix G**.

The CEPP Planning Model was developed by the USACE Jacksonville District with support from multiple Federal and State agencies. Members of the CEPP Project Delivery Team (PDT) included subject matter experts on Everglades' flora and fauna, with extensive experience working in south Florida and Everglades' wetlands ecosystems. Members of the PDT also included ecologists, hydrologists, and planners from the USACE, United States Fish and Wildlife Service (USFWS), NPS, SFWMD, and FDEP. The CEPP Planning Model underwent peer review per Engineering Circular (EC) 1105-2-412 (Assuring Quality of Planning Models), 31 March 2011, and was recommended for single-use on CEPP by the USACE National Ecosystem Restoration Planning Center of Expertise on July 24, 2013. The HQUSACE Model Certification Panel approved the CEPP Planning Model on August 13, 2013. The CEPP Planning Model was applied in the same manner and without modification to the planning process for this CEPP PACR to maintain continuity with the approved use of the model for CEPP planning. Application of the model was subjected to an independent peer review process.

The CEPP Planning Model was used to aggregate the results of project performance measures for the CEPP PACR to compare with the FWO. Each of the performance measures for the CEPP planning effort was derived from those approved for use in CERP by RECOVER. Eight performance measures were identified (**Table 3-2**). Performance measures were developed from the Northern Estuaries, Greater Everglades Ridge and Slough, and Florida Bay Conceptual Ecological Models (CEMs) (Barnes 2005, Ogden 2005, Rudnick et al. 2005, Sime 2005). CEMs, as used in the Everglades restoration program, are non-quantitative planning tools that identify the major anthropogenic drivers and stressors on natural systems, the ecological effects of these stressors, and the best biological attributes or indicators of these ecological responses (Ogden et al. 2005). These CEMs have been extensively peer reviewed and provide the framework for the planning and assessment of the CERP. Each performance measure has a predictive metric and targets based on hydrologic requirements necessary to meet empirical or theoretical ecological thresholds. Detailed estimates of hydrology across the 41-year period of record (January 1965 – December 2005) generated by the RSM-BN (for the Northern Estuaries) and the RSM-GL (for the Greater Everglades [WCA 3 and ENP] and Florida Bay) were used to calculate performance measure scores.

Table 3-2. Performance Measures Used to Quantify Plan Benefits

Region	Performance Measure (PM)	Description
Northern Estuaries	**Caloosahatchee Estuary** • PM 6.1 Low Flow Targets • PM 6.2 High Flow Targets **St. Lucie Estuary** • PM 7.1 Low Flow Targets • PM 7.2 High flow Targets	Measure of the frequency of flows correlated to downstream estuarine salinities favorable to estuarine and marine fish, shellfish, oyster and SAV.
Greater Everglades (WCA 3 and ENP)	**Hydrologic Surrogate for Soil Oxidation** • PM 3.1 Drought Intensity Index	Measure of cumulative drought intensity as an indicator of peat oxidation and risk of fire.
	Inundation Duration: Ridge and Slough Landscape • PM 1.1 Percent Period of Record of Inundation	Measure of the frequency and duration of marsh inundation.
	Number and Duration of Dry Events: Shark River Slough • PM 4.1 Number of Dry Events • PM 4.2 Duration of Dry Events • PM 4.3 Percent Period of Record of Dry Events	Measure of the number of times and mean duration of periods when water levels drop below ground.
	Sheet Flow in the Ridge and Slough Landscape • PM 2.1 Timing of Sheetflow • PM 2.2 Continuity of Sheetflow • PM 2.3 Distribution of Sheetflow	Measure of the agreement of seasonal timing of flows with pre-drainage timing and of the spatial uniformity of sheet flow across the landscape.
	Slough Vegetation Suitability • PM 5.1 Hydroperiod • PM 5.2 Dry down • PM 5.3 Dry Season Depth • PM 5.4 Wet Season Depth	Measure of hydrologic conditions favorable to two species (white water lily and spikerush) indicative of Everglades sloughs.
Florida Bay	**Salinity in Florida Bay** • PM 8.1 Dry Season Regime Overlap • PM 8.2 Wet Season Regime Overlap • PM 8.3 Dry Season High Salinity • PM 8.4 Wet Season High Salinity	Measure of temporal-seasonal agreement between predicted salinity regimes in Florida Bay and pre-drainage salinity targets.

Florida Bay HUs were calculated for the CEPP PACR utilizing the HU model and supporting the regression model developed and applied by ENP in CEPP. The changes in predicted Florida Bay salinity were calculated utilizing the regression relationship of water level stages in Taylor Slough, C-111 and Shark River Slough, and 17 monitoring stations in Florida Bay.

In order to calculate the comparable incremental change in HUs, the same tools were utilized for the CEPP PACR alternatives. Although it is recognized that these tools are imperfect in estimating actual ecological improvements in Florida Bay, mainly due to the differing acreages in the indicator regions and lack of groundwater information, the tools do allow for the necessary comparison called for in the Federal planning process. Modeling results show that all of the alternatives provide a modest improvement (around 0.5 salinity units) to the bay. SFWMD scientists look at ecosystem responses to explain habitat improvement; however, HUs only allow for the comparison of alternatives. The interior of Florida Bay is dominated by a complex array of small islands and mud embankments. Circulation patterns in the bay have a strong influence

on salinity, as exchanges of water between the basins are restricted by the mud embankments and the prevailing winds. The effect of small increases in surface water flow in Taylor Slough would have an influence in the nearshore area of northern Florida Bay.

Performance measure scores are displayed as a function of restoration potential or achievement of the target with the minimum value of zero representing a fully degraded ecosystem and a maximum value of 100 representing the restoration target. Habitat suitability indices associated with each performance measure are then summed and applied to the total spatial extent (acres) for each of the 17 zones (**Figure 3-2** through **Figure 3-5**) to produce HUs. HU results for the ECB, the FWO project condition, and the alternatives are displayed in **Table 3-3**.

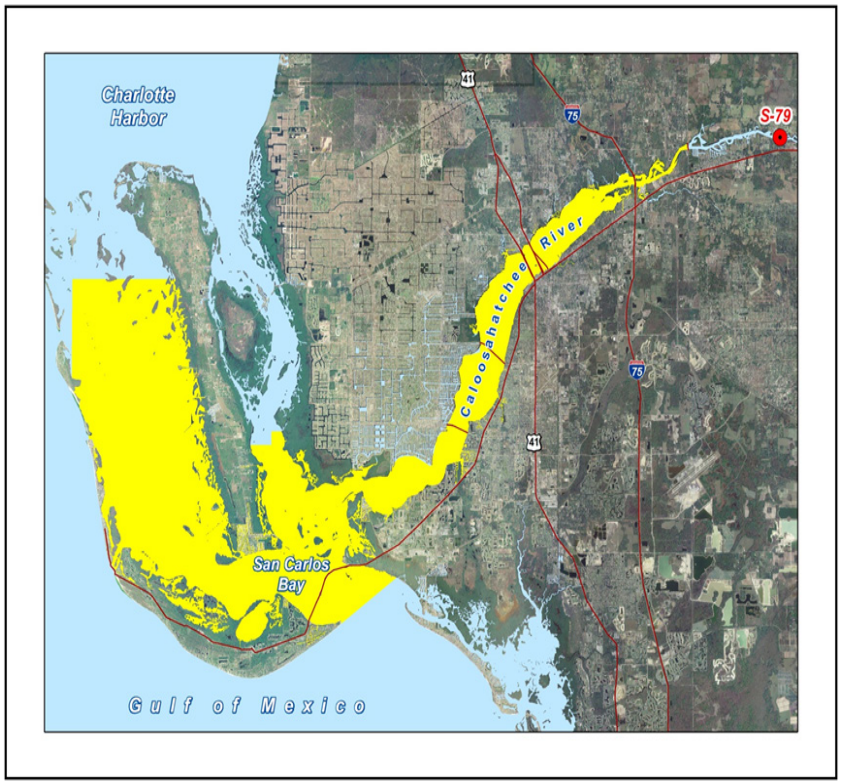

Figure 3-2. Zones for Habitat Suitability within the Caloosahatchee Estuary

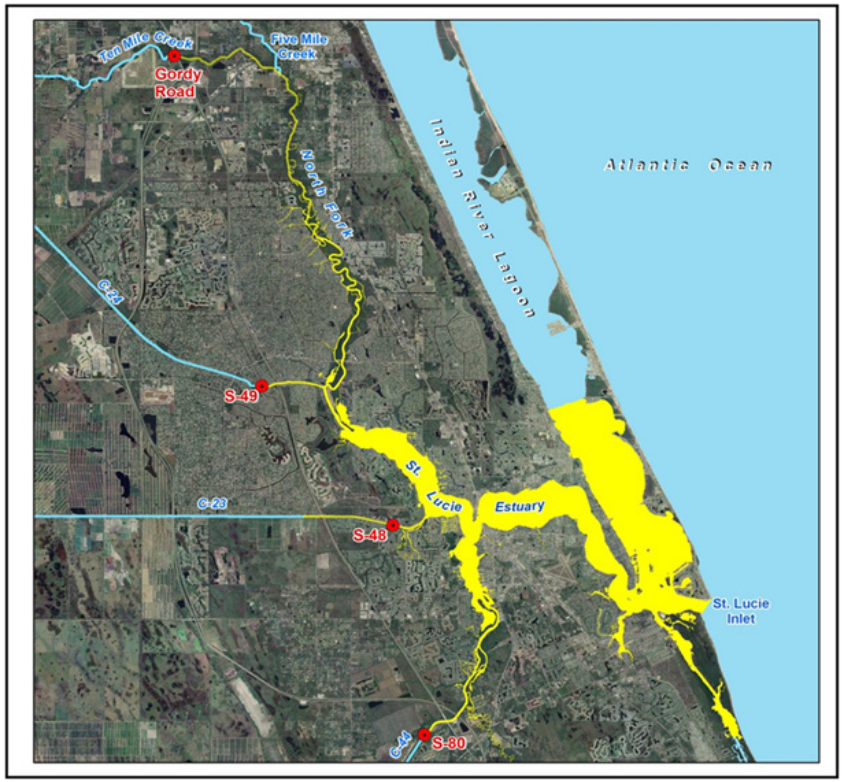

Figure 3-3. Zones for Habitat Suitability within the St. Lucie Estuary

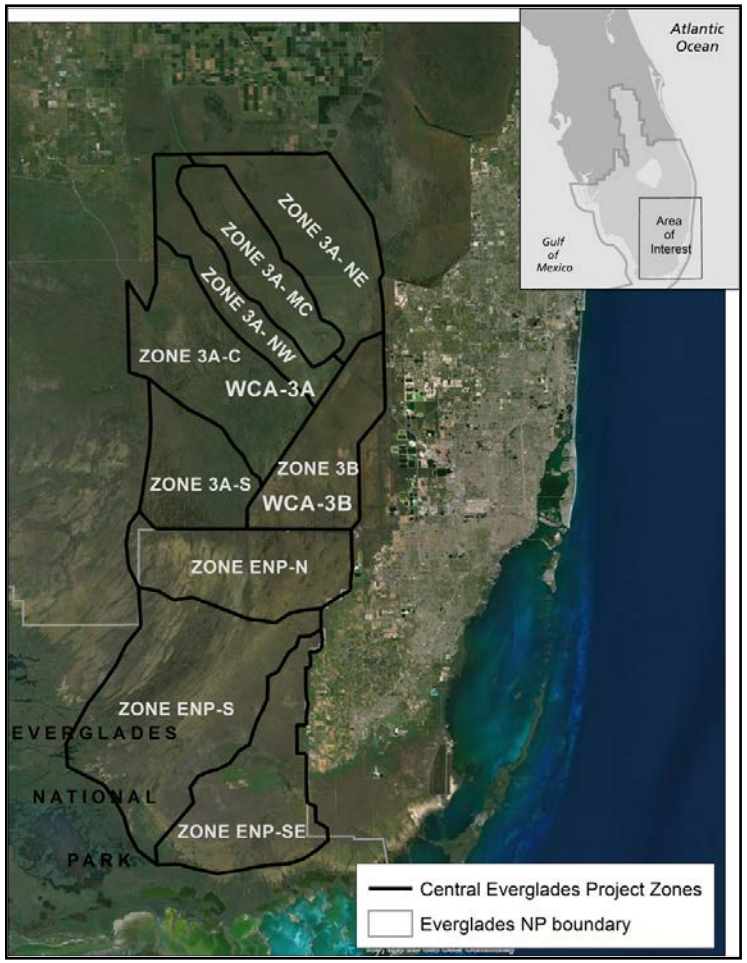

Figure 3-4. Zones for Habitat Suitability within WCA 3 and ENP

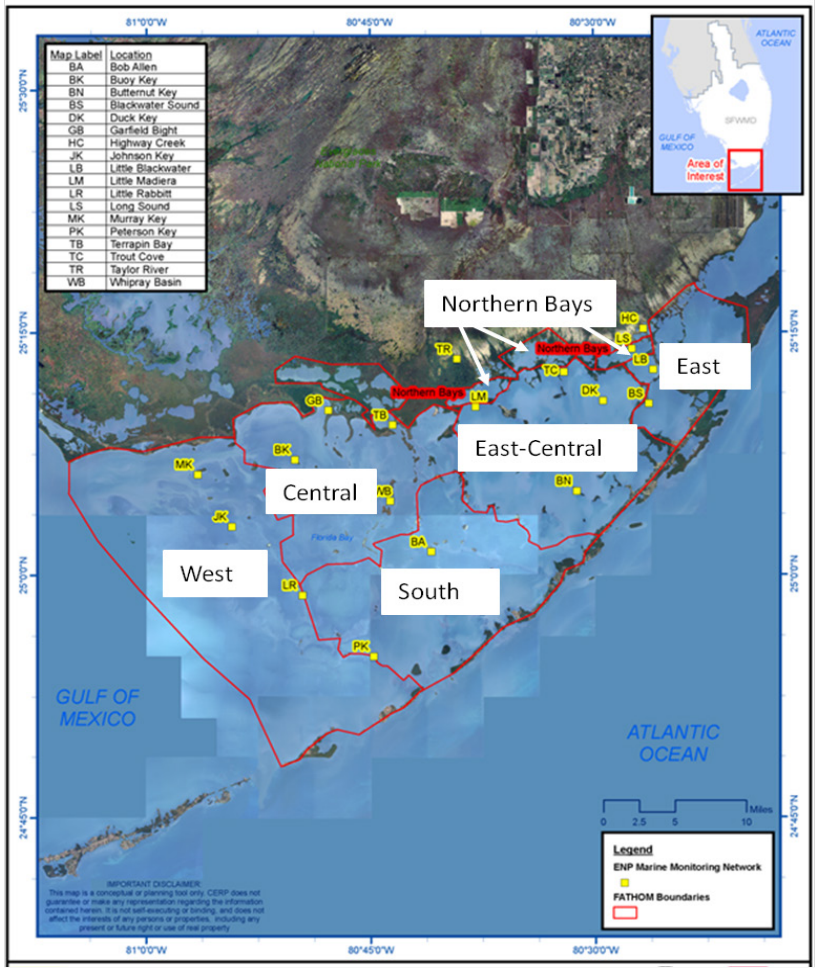

Figure 3-5. Zones for Habitat Suitability within Florida Bay

Table 3-3. Total Habitat Units for each Alternative Condition

Project Region (Zone)	ECB*	FWO**	Alt R240A Alt R240B**	Alt R360C Alt R360D**	Alt C360C**
Caloosahatchee Estuary (CE-1)	2,839	39,038	40,458	41,168	41,878
St Lucie Estuary (SE-1)	1,349	8,247	8,996	9,446	9,446
Total Northern Estuaries	**4,188**	**47,285**	**49,454**	**50,614**	**51,324**
Northeast WCA 3A (3A-NE)	44,451	91,372	92,606	92,606	92,606
WCA 3A Miami Canal (3A-MC)	32,847	54,746	56,310	56,310	56,310
Northwest WCA 3A (3A-NW)	30,970	54,198	55,606	55,606	55,606
Central WCA 3A (3A-C)	108,414	111,159	111,159	111,159	111,159
Southern WCA 3A (3A-S)	69,247	68,423	69,247	69,247	69,247
WCA 3B (3B)	55,697	59,125	59,982	59,982	59,982
Northern ENP (ENP-N)	57,557	97,596	100,098	100,098	100,098
Southern ENP (ENP-S)	124,068	169,400	171,786	174,172	174,172
Southeast ENP (ENP-SE)	79,711	83,764	83,764	83,764	83,764
Total Greater Everglades (WCA 3 and ENP)	**602,962**	**789,783**	**800,558**	**802,944**	**802,944**
Florida Bay West (FB-W)	23,700	41,100	44,200	44,200	44,200
Florida Bay Central (FB-C)	8,200	13,950	15,600	15,600	15,600
Florida Bay South (FB-S)	16,600	28,300	30,300	30,300	30,300
Florida Bay East Central (FB-EC)	22,000	34,300	36,100	36,900	36,900
Florida Bay North Bay (FB-NB)	2,150	2,660	2,790	2,790	2,790
Florida Bay East (FB-E)	9,060	9,820	10,200	10,200	10,200
Total Florida Bay	**81,710**	**130,130**	**139,190**	**139,990**	**139,990**
Total All Regions	**688,860**	**967,198**	**989,202**	**993,548**	**994,258**

* HU values for the ECB are consistent with CEPP.

** HU values for the FWO and alternatives are calculated for the full ecological response time.

Substantial benefits were attained through authorization of the CEPP. In the time since the CEPP planning effort, wetter than normal conditions have persisted in south Florida. These conditions have resulted in widespread algae blooms, public health impacts, and extensive environmental harm to the aquatic ecosystem. As indicated previously, CEPP envisioned that later studies would investigate additional scales to ultimately achieve the level of restoration envisioned by CERP. The goal of the CEPP PACR is to achieve the remaining level of restoration envisioned by CERP and reduce undesirable high regulatory releases from Lake Okeechobee currently impacting the Northern Estuaries.

3.2.2.1 Average Annual Habitat Units

The average annual HU outputs were calculated as the difference between the with-plan and without plan conditions over the period of analysis (through year 2076). The base year for the period of economic analysis for CEPP PACR is the year 2026. The average annual HU lift is calculated as subtracting the FWO project HUs from the future with project HUs for each year and averaging over the 50-year period of analysis. The anticipated time it will take to realize the benefits is necessary to calculate the average annual lift associated with each alternative.

Natural ecosystems are complex, dynamic systems and the exact functional form of the relationship among variables is rarely if ever known. South Florida ecosystems have been subject to extensive research and monitoring, and credible estimates of response times can be predicted based on how key ecosystem components have responded to varying hydrologic conditions. The rate at which CEPP PACR benefits accrue over various time intervals, depending on the region, was estimated using these inferences. Linear interpolation was used as a simple method for inferring the rate at which benefits would accrue between those time intervals for each of the three regions of the project area for both the FWO and future with project conditions.

3.2.2.2 Greater Everglades (WCA 3 and ENP)

Similar to CEPP, the CEPP PACR assumed an ecological response time for the Greater Everglades based on the ability of the authorized plan to improve conditions for aquatic and herbaceous vegetation communities, periphyton, piscivorous fish, aquatic prey base organisms, and hydroecological reshaping of ridges and tree islands. Also similar to CEPP, the ecological response time for the PACR was estimated to be approximately 75-100 years until full impact would be realized, with a large percentage of benefits accruing earlier as identified in **Table 3-4**. This is the same Greater Everglades response time as was assumed in the earlier CEPP planning effort.

Table 3-4. Ecological Response Time for Greater Everglades (WCA 3 and ENP) (USACE 2014)

Percentage of Benefit Achieved Over Time for the Greater Everglades				
0-2 Years*	**2-5 Years**	**5-10 Years**	**25-50 Years**	**75-100 Years**
50%	70%	80%	90%	100%

*Base year is 2022

3.2.2.3 Florida Bay

Similar to CEPP, the CEPP PACR assumed an ecological response time for Florida Bay based on the ability of the authorized plan to improve conditions for phytoplankton, zooplankton, seagrass, and large and small invertebrates. The ecological response time was estimated to be approximately 15-25 years until full impact would be realized, with a large percentage of benefits accruing earlier as identified in **Table 3-5**.

Table 3-5. Ecological Response Time for Florida Bay (USACE 2014)

Percentage of Benefits Achieved Over Time for Florida Bay				
0-2 years	**2-5 years**	**5-10 years**	**10-15 years**	**15-25 years**
40%	80%	90%	95%	100%

*Base year is 2022.

3.2.2.4 Northern Estuaries

Similar to CEPP, the CEPP PACR assumed an ecological response time for the Northern Estuaries was estimated based on the expected response time of oysters and submerged aquatic vegetation to improved salinities in CEPP. The ecological response time was estimated to be

approximately 6 years until full impact would be realized. The expected response time of oysters and submerged aquatic vegetation for the CEPP PACR is the same as was assumed in CEPP.

Table 3-6 includes the average annual lift when taking into account the ecological response times of each of the three regions described above.

Table 3-6. Average Annual Habitat Unit Lift

	FWO	Alt R240A Alt R240B	Alt R360C Alt R360D	Alt C360C
St Lucie Estuary				
Average Annual Habitat Units	8,247	8,996	9,446	9,446
Average Annual Habitat Unit Lift		749	1,199	1,199
Caloosahatchee Estuary				
Average Annual Habitat Units	39,038	40,458	41,168	41,878
Average Annual Habitat Unit Lift		1,420	2,130	2,840
Greater Everglades (WCA 3 and ENP)				
Average Annual Habitat Units	789,783	800,558	802,944	802,944
Average Annual Habitat Unit Lift		10,775	13,161	13,161
Florida Bay				
Average Annual Habitat Units	130,130	139,190	139,990	139,990
Average Annual Habitat Unit Lift		9,060	9,860	9,860
Total Average Annual Habitat Unit Lift		**22,004**	**26,350**	**27,060**

The HU benefits associated with each CEPP PACR alternative (R240A, R240B, R360C, R360D, and C360C) in **Table 3-6** equal the net change in HUs from the FWO condition (including the Federally authorized CEPP in place). In the CEPP PIR, consideration of an above-ground storage reservoir, in lieu of an FEB, was determined not to be cost effective at that time. However, this alternative was reconsidered given the continuing and persistent threat during wet periods to the ecological integrity and the economic viability of communities. The CEPP PACR goes further than CEPP to consider alternatives that will provide a more complete and effective plan to further reduce the quantity and duration of excessive regulatory releases to the Northern Estuaries while storing, treating, and distributing more of that water to the Greater Everglades ecosystem. The analysis in the CEPP PACR recognizes that the incremental cost of attaining the next increment of restoration benefits under CERP is likely to be substantially higher than previously authorized components of CEPP.

3.2.3 Cost Effective Analysis/Incremental Cost Analysis

The combined HU were used to ensure a cost-effective solution for CEPP. Consistent with CEPP, the CEPP PACR also combines HU scores for geographic areas to provide a valuable cumulative analysis for determining the plan that best meets the needs of the entire watershed.

3.2.3.1 CE/ICA Analysis – Total System-Wide Outputs

The CEPP PACR only considered the Total System-Wide outputs for the CE/ICA as can be seen in the following table (**Table 3-7**). The CE/ICA was performed using the USACE Institute for Water

Resources (IWR) Plan on all five alternatives. Five alternatives were used as inputs since the different designs yield different costs though they are assumed to yield the same HU scores. Alternatives R240A and C360C are identified as being best buys for the aggregated system-wide HUs. Alternative R240B is more costly than R240A and Alternative R360D is more costly than R360C (or C360C). Alternatives R360C and C360C have the same design and therefore cost the same but are operated differently and yield different HUs. Alternative C360C is operated for multiple purposes including water supply and as such more water can be stored without violating storage clauses for Lake Okeechobee. Therefore, Alternatives R240B and R360C are not cost effective for the production of system-wide HUs.

Table 3-7. Results of Cost Effectiveness Analysis for Total System-Wide Performance

Average Annual Cost	Alt R240A	Alt R240B	Alt R360C	Alt R360D	Alt C360C
Northern Estuaries	2,169	2,169	3,329	3,329	4,039
Greater Everglades (WCA 3 and ENP)	10,775	10,775	13,161	13,161	13,161
Florida Bay	9,060	9,060	9,860	9,860	9,860
Average Annual System Wide HUs	**22,004**	**22,004**	**26,350**	**26,350**	**27,060**
Average Annual Cost/Average Annual Habitat Units	**$2,564**	**$2,640**	**$2,723**	**$2,756**	**$2,651**
Cost Effective/Best Buy	**Best Buy**				**Best Buy**

Notes: Habitat Unit (HU) lift values for the Northern Estuaries, Greater Everglades, and Florida Bay for each alternative are the sum of the differences between FWO plan and plan on an average annual basis (see Table 4-8). Alternatives are arranged by increasing costs.

Alternative R240A is the best buy with the lowest cost per unit of habitat improvement ($2,564 average annual cost per average annual HU; **Table 3-8**). The second least cost alternative in terms of average cost per HU improvement Alternative C360C ($2,651 average annual cost per average annual HU; **Table 3-8**). Alternative C360C provides an incremental increase of 5,056 additional average annual HU lift over Alternative R240A with an incremental cost increase of $3,029 per average annual HU lift and an incremental average annual cost increase of $15,316,800 more than the Alternative R240A incremental average annual cost of $56,423,279 (**Table 3-8**).

Table 3-8. Results of Incremental Cost Analysis

Alt.	Average Annual Cost	Average Annual Habitat Units	Cost Per Average Annual Habitat Units	Incremental Average Annual Cost Increase	Incremental Average Annual Habitat Unit Increase	Incremental Average Annual Cost/ Average Annual Habitat Unit
R240A	$56,423,279	22,004	$2,564	$56,423,279	22,004	$2,564
C360C	$71,740,079	27,060	$2,651	$15,316,800	5,056	$3,029

3.3 Identification of the Tentatively Selected Plan (or Tentative National Ecosystem Restoration Plan)

The overarching goal of the CEPP PACR is the environmental restoration of an Everglades ecosystem considered to be of both national and international significance. An alternative plan that reasonably maximizes ecosystem restoration benefits compared to costs, consistent with the Federal objective, is identified as the NER. Selecting the TSP (or tentative NER plan) requires careful consideration of the plan that meets planning objectives and constraints and reasonably maximizes environmental benefits while passing tests of cost effectiveness and incremental cost analyses, significance of outputs, acceptability, completeness, efficiency, and effectiveness. In accordance with USACE guidance, the selected plan must be shown to be cost effective and justified to achieve the desired level of output (ER-1105-2-100 Appendix E, paragraph E-41).

The authorized CEPP plan was the first incremental step in increasing average annual flows to the central Everglades. This first increment of CEPP 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.

Screening efforts in plan formulation for the CEPP PACR utilized the CERP Goal and attempted to deliver the remaining one-third of new water essential to Everglades restoration consistent with the CERP performance goal.

Early screening outcomes identified a high potential for this project to meet or exceed the CERP Goals in sending water to the central Everglades. The screening analysis compared the Pre-CERP Baseline (USACE 2005) with the CERPA scenario from the RECOVER 2005 Initial CERP Update effort (RECOVER 2005) to establish the CERP Goal for flow to the central portion of the 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 (1965-2000) available from RECOVER.

This CERP Goal flow target, based on a 36-year period of record, became the updated target for continued plan formulation work. Alternative C240A was ultimately able to achieve 97% of the CERP Goal over this 36-year period of record (see **Figure 3-6**). However, consistent with CEPP, Alternative C240A was modeled and analyzed over the longer 41-year period of record (1965-2005). Similar to CEPP, the 41-year period of record was used in the evaluation of effects for the CEPP PACR. This evaluation of Alternative C240A provides an approximately 370,000 ac-ft increase in average annual flow to the central Everglades achieving the CERP Goal. Also, consistent with CEPP, the 41-year period of record was used for the water quality evaluation to ensure adequate treatment of the increase flow.

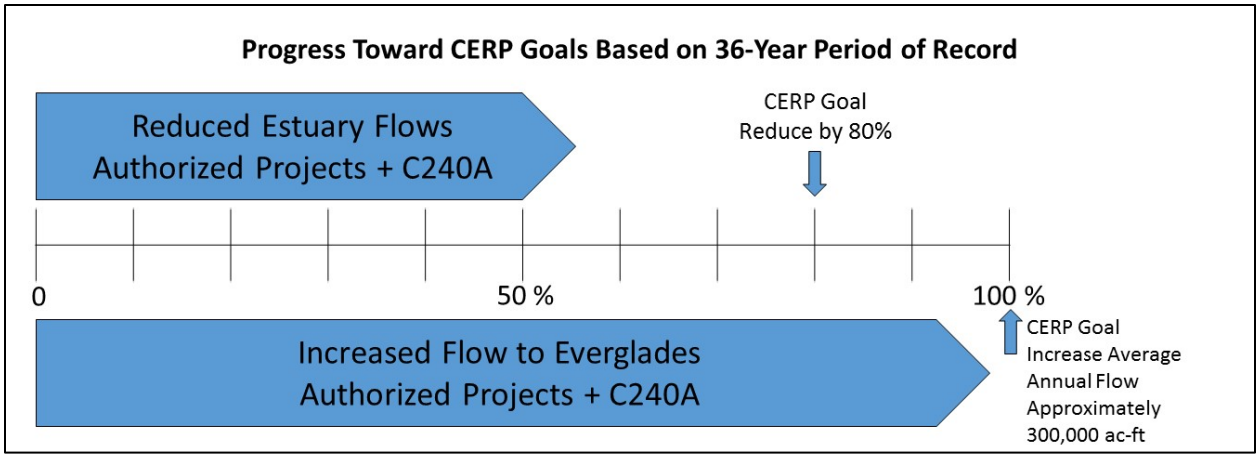

Figure 3-6. Progress toward Meeting CERP Restoration Goals with Alternative C240A

3.3.1 Operational Refinements of the Array and Identification of the TSP (Tentative NER Plan)

Alternative designs to decrease the construction costs and add multi-purpose operations to a 240,000 ac-ft storage reservoir were recommended based on the acceptability analysis (**Section 4.1.2** of the main report) and efficiency analysis (**Section 4.2.3.2** of the main report). The incremental annual average cost versus annual average HUs illustrated that Alternative R240A ($2,564) is incrementally more cost effective than the Alternative C360C ($3,029) (**Table 3-9**). Learning from the operational benefits gained from Alternative C360C, similar operations were applied to the 240A design configuration (**Figure 3-7**). Operations were refined for Alternative R240A, creating Alternative C240A, to provide additional ecological benefits to the Northern Estuaries, the Greater Everglades, and for other water-related needs of the region. Alternative C240A performed better than the more costly best buy, Alternative C360C (**Appendix G** and **Table 4-12**). Alternative C240A would be expected to offer a total 28,768 HU lift over the FWO. The C240A alternative preserves the A-1 FEB of the States Restoration Strategies Program project features. The average annual cost per average annual HUs of Alternative C240A is $1,961 because Alternative C240A has the same cost as Alternative R240A but offers more ecological benefits in terms of HUs.

Table 3-9. Alternative Benefits as Habitat Units

Project Region (Zone)	ECB[1]	FWO[2]	Alt R240A Alt R240B[2]	Alt C240A	Alt R360C Alt R360D[2]	Alt C360C[2]
Caloosahatchee Estuary (CE-1)	2,839	39,038	40,458	41,168	41,168	41,878
St Lucie Estuary (SE-1)	1,349	8,247	8,996	9,296	9,446	9,446
Total Northern Estuaries	**4,188**	**47,285**	**49,454**	**50,464**	**50,614**	**51,324**
Northeast WCA 3A (3A-NE)	44,451	91,372	92,606	95,076	92,606	92,606
WCA 3A Miami Canal (3A-MC)	32,847	54,746	56,310	59,438	56,310	56,310
Northwest WCA 3A (3A-NW)	30,970	54,198	55,606	57,013	55,606	55,606
Central WCA 3A (3A-C)	108,414	111,159	111,159	111,159	111,159	111,159
Southern WCA 3A (3A-S)	69,247	68,423	69,247	69,247	69,247	69,247
WCA 3B (3B)	55,697	59,125	59,982	59,982	59,982	59,982
Northern ENP (ENP-N)	57,557	97,596	100,098	98,847	100,098	100,098
Southern ENP (ENP-S)	124,068	169,400	171,786	171,786	174,172	174,172
Southeast ENP (ENP-SE)	79,711	83,764	83,764	83,764	83,764	83,764
Total Greater Everglades (WCA 3 & ENP)	**602,962**	**789,783**	**800,558**	**806,312**	**802,944**	**802,944**
Florida Bay West (FB-W)	23,700	41,100	44,200	44,200	44,200	44,200
Florida Bay Central (FB-C)	8,200	13,950	15,600	15,600	15,600	15,600
Florida Bay South (FB-S)	16,600	28,300	30,300	30,300	30,300	30,300
Florida Bay East Central (FB-EC)	22,000	34,300	36,100	36,100	36,900	36,900
Florida Bay North Bay (FB-NB)	2,150	2,660	2,790	2,790	2,790	2,790
Florida Bay East (FB-E)	9,060	9,820	10,200	10,200	10,200	10,200
Total Florida Bay	**81,710**	**130,130**	**139,190**	**139,190**	**139,990**	**139,990**
Total All Regions	**688,860**	**967,198**	**989,202**	**995,966**	**993,548**	**994,258**

[1] HU values for the ECB are consistent with CEPP.

[2] HU values for the FWO and alternatives are calculated for the full ecological response time.

3.3.2 Identifying the Tentatively Selected Plan

Alternative C240A (**Figure 3-7**) is identified as the TSP because it offers the lowest cost reservoir and operational design but provides similar benefits, in terms of HUs, as the larger 360,000 ac-ft storage reservoir when water supply is a component of operations (Alternative C360C). The Alternative C240A allows the same level of benefits, for less cost and meets the expressed desires of stakeholders by:

- Decreasing the occurrence of undesirable regulatory releases from Lake Okeechobee moving closer to the CERP Goal
- Increasing flows to the central Everglades to an average annual 370,000 ac-ft achieving the CERP Goal

The C240A alternative project features consist of:

- 240,000 ac-ft storage reservoir
- 10,500-acre reservoir, approximately 23 ft deep
- 6,500 acre STA

- Conveyance improvements to the Miami and NNR Canal (1,200 cfs)
- Multi-purpose project operations

Figure 3-7. CEPP PACR Tentatively Selected Plan

3.4 Consistency with Restudy Purpose

The purpose of the CERP is to modify structural and operational components of the C&SF Project to achieve restoration of the Everglades and the south Florida ecosystem, while providing for other water-related needs such as urban and agricultural water supply and flood protection. The 68 components identified in the Yellow Book will work together to benefit the ecological structure and function of more than 2.4 million acres of the south Florida ecosystem by improving and/or restoring the proper quantity, quality, timing and distribution of water in the natural system. CERP will also address other concerns such as urban and agricultural water supply and maintain existing levels of service for flood protection in those areas served by the project. The CERP components were originally planned for implementation over an approximate 40-year period. The CERP is designed to achieve more natural flows by redirecting current flows that are currently discharged to the Atlantic Ocean and Gulf of Mexico, to a more restored flow of water that is distributed throughout the system similar to pre-drainage conditions.

The CEPP study recommends increments of the following components that were included in CERP (the Component designations below are consistent with the CERP designations in the Yellow Book):

- Everglades Agricultural Storage Reservoirs (Component G)
- WCA 3 Decompartmentalization and Sheetflow Enhancement (Components AA and QQ)
- S-356 Pump Station Modifications (Component FF)
- L-31 N Improvements for Seepage Management (Component V)
- System-wide Operational Changes – Everglades Rain-Driven Operations (Component H)
- Flow to Northwest and Central WCA 3A (Component II)

The purpose of the CEPP PACR is consistent with CERP, specifically to improve the quantity, quality, timing, and distribution of water flows to the Northern Estuaries, central Everglades (WCA 3) and ENP. Too much water from Lake Okeechobee during the wet season, and too little water during the dry season impacts salinity levels within the Northern Estuaries, stressing estuarine ecosystems. Construction and operation of the WCAs compartmentalized a significant extent of the historical Everglades landscape and in turn degraded the structure and function of the remaining system. As a result, the Everglades are approximately half their original size, water tables are lowered, wetlands altered, freshwater flows diverted, water quality degraded, and habitats invaded by non-native plants and animals. All of these impacts are caused directly or indirectly by changes in hydrology. Changes in hydrology have led to the degradation of the historic slough, tree island, and sawgrass mosaic that previously characterized much of the study area, as well as the marl prairies that exist in the southern portion of the area in ENP. The changes in the landscape pattern have had adverse effects on wildlife while changes in hydrology of the freshwater systems have led to effects on the estuarine and marine environments of Florida Bay. Alterations in seasonal inflow deliveries to Florida Bay have resulted in extreme salinity fluctuations.

The scope of the CEPP PACR focuses on the final increments of four specific components of the CERP (the assigned letter refers to its CERP designation):

- Everglades Agricultural Storage Reservoirs (Component G)
- Flow to Northwest and Central WCA 3A (Component II)
- Environmental Water Supply Deliveries to the St. Lucie Estuary (Component C)
- Environmental Water Supply Deliveries to the Caloosahatchee Estuary (Component E)

The CEPP PACR also includes consideration of updated System-wide Operational Changes – Everglades Rain-Driven Operations (Component H).

Although implementation of features of the CEPP PACR would represent significant achievement of CERP goals, construction of the TSP is essential to more fully meeting the quantity, quality, timing and distribution of water envisioned in CERP.

3.5 Implementation of Project Components

Implementation of the CEPP plan, as modified by the TSP, will occur over several years, dictated by State and Federal appropriations. This subsection discusses the major implementation phases that are expected to occur after Congressional authorization and appropriation of funding for project construction. Multiple PPAs will be executed prior to construction. Each PPA will cover a separable element that groups inter-related project features to provide hydrologic and ecological benefits. These PPAs include the construction of logical groupings of plan elements that maximize early benefits to the extent practicable consistent with project dependencies (**Figure 3-8**) and the CEPP AM and Monitoring Plans (see **Annex D** of the PACR).

A multiple PPA approach incorporates the adaptive management process, per the guidance of the Programmatic Regulations for the CERP (2003) and the WRDA of 2007. Sequencing of the PPAs will allow earlier restoration benefits by initially building project components that take advantage of existing water in the system and meets State water quality standards, while providing assurances of sound financial investments. However, to accelerate benefits and reduce ongoing impacts, multiple PPAs may be executed in parallel.

The Everglades lie at the center of the complex south Florida regional water management system in which water distributed to any part of the system affects many others. The current system provides most of the inflows to the project area at the peak of the wet season; however, flow is not spatially distributed as desired due to structural limitations and other project constraints. Providing supplemental flows during the periods outside of the peak wet season is ecologically important to reverse the current adverse effects of marsh dry out during the dry months. Providing storage and treatment will serve to both increase water volume and improve the timing of deliveries to the Everglades. Additional storage will also reduce the frequency of undesirable high water volume discharges to the Northern Estuaries.

The total benefits predicted (See **Section 6.2.1** of the main report) with implementation of the tentatively selected plan cannot be achieved without the combination of storage and treatment, distribution and conveyance, and seepage management.

The benefits and construction of PPA North is not dependent on implementation and construction of PPA South and vice versa. The benefits of the CEPP PACR and PPA New Water (Seepage Management Project) are dependent on features in PPA North and PPA South. Construction of the CEPP PACR and PPA New Water (Seepage Management Project) is anticipated to be in parallel with construction of PPA North and PPA South components. **Figure 3-8** includes an implementation scenario with unconstrained resources and funding to demonstrate the duration of construction per PPA, while considering construction dependencies and limitations such as staging and access. This figure illustrates a best-case implementation scenario for simultaneous execution and construction of all three PPAs, which would achieve realization of the full CEPP PACR benefits within 12 years.

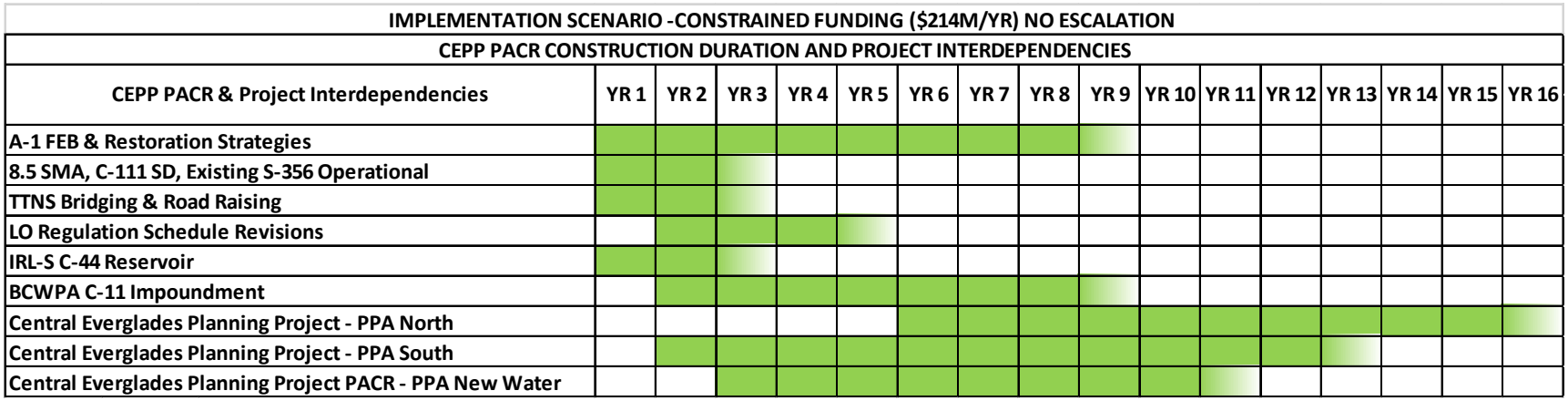

Figure 3-8. CEPP PACR Constrained Construction Duration and Project Interdependencies

Uncertainty surrounding the timing of CEPP project dependencies, funding, resources, stakeholder input and potential conflicting priorities will likely lead to a longer implementation period. The SFWMD is committed to engaging in a public process to integrate CEPP PACR into the IDS that defines the order in which CERP projects would be planned, designed, and constructed. **Figure 3-8** illustrates the construction duration associated with implementation scenario that constructs PPA North and PPA South in parallel with PPA New Water.

Other viable options for the implementation of construction phases and subsequent groupings into PPAs may be considered in the future. This flexibility is essential to successful CEPP and CEPP PACR implementation given the uncertainties associated with the lengthy implementation period and the inevitable improvement in scientific knowledge about the functioning of the greater Everglades that will occur as planned CERP and non-CERP projects are completed. Deviation from the PPAs outlined above (i.e., PPA North, PPA South, and PPA New Water) would require coordination with SFWMD, HQUSACE, and the Office of the ASA (CW). For example, coordination is required if tentatively selected plan features are reassigned to a different PPA then as originally established and presented in the Final PIR/EIS. Features included in the tentatively selected plan cannot be added to any of the implementation phases without proper coordination or NEPA analysis if necessary.

Federal laws and regulations applicable to implementing the CERP require PIRs to address certain assurances as part of the project recommendation for approval and subsequent implementation. For the CEPP PIR, the analyses for CEPP associated with Section 601(h)(4) and 601 (h)(5) of WRDA 2000 and the Programmatic Regulations for the CERP (33 CFR Part 385) for Project-Specific Assurances and Savings Clause were conducted for the recommended plan. The recommended plan will be implemented in multiple PPAs. The USACE and the SFWMD will undertake updated project assurances and Savings Clause analyses, if necessary, for the implementation phases that are selected to be included in a Project Partnership Agreement or amendment thereto prior to entering into the PPA or PPA amendment. The USACE District Engineer will ensure that Project-Specific Assurances and Savings Clause requirements are met per PPA, per applicable policies and laws. NEPA documentation will be updated, if applicable, as revisions are made to Water Control Plans and/or Project Operating Manuals associated with each PPA. Compliance with the requirements of the Savings Clause will be maintained throughout the entirety of the CEPP and CEPP PACR implementation period.

4 Determination of Project Consistency with Applicable Laws and Regulations

4.1 Compliance with Federal Environmental Laws, Regulations & Executive Orders

Table 4-1 summarizes required compliance with specific Federal acts, Executive Orders, and other applicable environmental laws, and provides a summary of the compliance status associated with each act, E.O., or applicable law. Detailed descriptions indicating the coordination completed to date and the status of any ongoing or compliance issues are located in **Appendix C.4** of the PACR.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan

Law, Policy, and Regulations	Status	Comments
Anadromous Fish Conservation Act	In compliance with this Act.	Proposed action would not adversely affect anadromous fish species.
Archaeological Resources Protection Act of 1979	In compliance with this act and will continue to comply throughout construction and operation.	Further investigations may be needed once the project is authorized and the Preconstruction, Engineering and Design (PED) has started.
American Indian Religious Freedom Act	In compliance with this Act.	The policy of the U.S. is to protect and preserve for American Indians, Alaska Native Groups and Native Hawaiians, their inherent rights of freedom to believe, express, and exercise traditional religions. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites.
Bald and Golden Eagle Protection Act	In compliance with this Act.	Proposed action would not adversely affect the bald eagle. No permits for takes are required.
Clean Air Act of 1972	In compliance with this Act, will obtain any required permits.	Potential for permanent sources of air emissions. Air emissions permit may be required for large diesel pumps.
Clean Water Act of 1972	In compliance with this Act and will obtain a Section 404 Department of the Army permit from USACE, a Water Quality Certification (WQC) from the State of Florida and any required National Pollutant Discharge Elimination System (NPDES) permits and will update 404(b) analysis prior to construction.	In accordance with the Clean Water Act, a Section 404(B)(1) Evaluation will be completed and will be contained within **Appendix C.4**. A Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permit would be sought from the State of Florida for WQC and a Department of Army Section 404 permit will be obtained from the USACE prior to construction of the project.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan (continued)

Law, Policy, and Regulations	Status	Comments
Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990	The official Coastal Barrier Resources System (CBRS) maps were reviewed and the project does not fall into any designated CBRS areas. These Acts are not applicable to this project.	There are no designated coastal barrier resources in the project area that would be affected by this project.
Coastal Zone Management Act of 1972	In compliance with this Act and obtaining concurrence by the State of Florida. The activity will be in compliance with the Coastal Zone Management Act at the time of construction.	A Florida Coastal Zone Consistency Determination will be prepared in accordance with the provisions of 15 CFR 930 and will be located in **Appendix C.4**. The USACE will make a determination whether the proposed action is consistent to the maximum extent practicable with the enforceable policies of Florida's approved Coastal Zone management program. To ensure the project's continued consistency with the FCMP, concerns identified by the reviewing agencies will be addressed prior to project implementation, and the State's continued concurrence will be based on the activities' continued compliance with FCMP authorities, including Federal and State monitoring of the activities to ensure their continued conformance, and the adequate resolution of issues identified during this and subsequent regulatory review.
Endangered Species Act of 1973	In compliance with this Act and ongoing consultation throughout the PED and construction phase as appropriate.	The purpose of the ESA is to protect and recover imperiled species and the ecosystems upon which they depend. It is administered by the U.S. Fish and Wildlife Service (USFWS) and the Commerce Department's National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife such as whales and anadromous fish. Coordination with the aforementioned agencies is on-going.
Estuary Protection Act of 1968	In compliance with this Act.	The objectives of the proposed action are focused on environmental protection. The proposed action provides increased opportunities to redirect water that is currently discharged to the Caloosahatchee and St. Lucie Estuaries at undesirable times or in undesirable quantities for flood control purposes, allowing for the re-establishment of oyster and sea grass populations that are important for providing water quality and habitat functions within the northern estuaries.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan (continued)

Law, Policy, and Regulations	Status	Comments
Federal Water Project Recreation Act/Land and Water Conservation Fund Act	In compliance with this Act.	Effects of proposed action on outdoor recreation have been considered in **Section 5.2.15.3** and **Appendix C.2.2.15**. Proposed action would not adversely affect existing recreational opportunities and additional recreational opportunities will likely be realized.
Fish and Wildlife Coordination Act of 1958, as amended.	In compliance with this Act.	Proposed action will be coordinated with USFWS. The Final Fish and Wildlife Coordination Act (FWCA) Report will be included in **Annex A**.
Farmland Protection Policy Act of 1981	Currently in compliance and will be in full compliance with the Act at the time of construction.	Coordination with the U.S. Department of Agriculture, Natural Resources Conservation Service (USDA/NRCS) to meet the requirements of the Farmland Protection Act is ongoing. Coordination with NRCS was done during the planning phase and NRCS concluded that they would defer to PED due to the large footprint of the project action area and the relatively smaller construction footprint in order to more accurately determine level of acres affected. When detailed design information that locates each of the plan components is completed, it can then be determined how many acres of unique farmland would be affected by the Project. Refer to **Appendix C.4** for more information.
Magnuson-Stevens Fishery Conservation and Management Act	In compliance with this Act.	An Essential Fish Habitat (EFH) assessment will be prepared and coordinated with the NMFS.
Marine Mammal Protection Act of 1972	In compliance with this Act.	Project site and adjacent canals lie outside of the areas mapped as being accessible to Manatees within the USFWS/FWC September 2006 Manatee Accessibility Map. No impacts to marine mammals are anticipated.
Marine Protection, Research and Sanctuaries Act	This Act is not applicable.	The term “dumping” as defined in the Act does not apply to this project. Proposed action does not consider ocean disposal of dredged material.
National Environmental Policy Act of 1969	This document is intended to satisfy all requirements of the National Environmental Policy Act (NEPA) of 1969.	NEPA Scoping Meetings were held on 10/23/17 and 10/26/17.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan (continued)

Law, Policy, and Regulations	Status	Comments
National Historic Preservation Act of 1966	In compliance with this act and will continue to meet the requirements of it throughout construction and operation.	This act establishing the Advisory Council on Historic Preservation, State Historic Preservation Office, National Register of Historic Places, and the Section 106 review process. The Section 106 Process is further explained and defined in 36 CFR Part 800 and will be part of the project compliance throughout. Further, it will be part of the Federal consultation process with the Tribes.
Native American Graves Protection and Repatriation Act	This Act is applicable since Federal funding was used to purchase the lands within the footprint of the project. In compliance with this act and will continue to meet the requirements of this act throughout construction and operation.	NAPGPRA applies to Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony as defined in the statute and regulations that are: -in Federal possession or control; or –in the possession or control of any institution or State or local government receiving Federal funds; or –excavated intentionally or discovered inadvertently on Federal or Tribal lands.
Resource Conservation and Recovery Act, as Amended by the Hazardous and Soils Waste Amendments of 1984, CERCLA as Amended by the 5.26.21 Superfund Amendments and Reauthorization Act of 1996, Toxic Substances Control Act of 1976.	The District has completed a limited environmental assessment on the proposed project foot print. Previous and current activities conducted within the proposed project area are in compliance with the referenced acts. The District will continue to meet the requirements of these acts during the construction and operation.	The District and their contractors will implement procedures during the construction and operation to ensure compliance with the acts' requirements specifically those actives associated with hazardous and toxic chemical documentation, communication, handling, storage and disposal. In the event that any activities or materials that are regulated during the construction or operation of the project are necessary /discovered the District will conduct the appropriate notification and take the necessary actions.
Rivers and Harbors Act of 1899	In compliance with this Act.	Proposed action would not obstruct navigable waters of the United States.
Submerged Lands of 1953	In compliance with the goals of this Act.	The proposed project would reduce damaging freshwater flows to the Caloosahatchee Estuary and the St. Lucie Estuary and will ultimately benefit the ecological habitats that occur on submerged lands of the State of Florida. The proposed project does not occur on submerged lands and no construction is expected on submerged lands.
Wild and Scenic River Act of 1968	This Act is not applicable.	No designated wild and scenic rivers are located within project area.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan (continued)

Law, Policy, and Regulations	Status	Comments
Executive Order (E.O.) 11514, Protection of the Environment.	In compliance with this E.O.	The objectives of the proposed action are focused on environmental protection.
E.O. 11593 Protection and Enhancement of the Cultural Environment	In compliance with this E.O.	The area of potential effect for cultural resources for this proposed action will include only State and DOI owned lands. Consultation is ongoing to ensure compliance for this E.O.
E.O. 11988 Flood Plain Management	In compliance with this E.O.	Purpose of E.O. is to discourage Federally induced development of floodplains. Commitment of lands to restoration precludes such development.
E.O. 11990 Protection of Wetlands	In compliance with this E.O.	Each Federal agency must provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. Each agency, to the extent permitted by law, must avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds: there is no practical alternative to such construction; the proposed action includes all practical measures to minimize harm to wetlands that may result from such use. In making this finding the head of the agency may take into account economic, environmental and other pertinent factors (Section 2(a)). Each agency must also provide opportunity for early public review of any plans or proposals for new construction in wetlands (Section 2(b)). .
E.O. 12962, Recreational Fisheries	In compliance with this E.O.	Proposed action is expected to have a beneficial affect with improvements to recreational fisheries in the Caloosahatchee and St. Lucie Estuaries.
E.O. 12898 Environmental Justice	In compliance with this E.O.	The proposed action does not present any environmental impacts that are high, adverse and disproportionate to low income, or minority populations. Sufficient scoping and public participation ensured potential impacts were understood by the public. No comments were presented as possible environmental impacts that may be disproportionate to low income or minority populations.

Table 4-1. Compliance with Federal Environmental Laws, Regulations, and Executive Orders: Tentatively Selected Plan (continued)

Law, Policy, and Regulations	Status	Comments
E.O. 13007 Indian Sacred Sites	This E.O. is not applicable as the project will not involve Federal lands.	This E.O. is directed towards executive branch agencies with statutory or administrative responsibility for the management of Federal lands. The proposed action would not affect Department of Defense owned or USACE-managed lands.
E.O. 13045 Protection of Children	In compliance with this E.O.	Proposed action is not expected to have environmental or safety risks that may disproportionately affect children.
E.O. 13089 Coral Reef Protection	This E.O. is not applicable	Coral reefs are not affected.
E.O. 13122 Invasive Species	In compliance with this E.O.	A nuisance and exotic vegetation control plan has been prepared to prevent or reduce establishment of invasive and non-native species within the project area. Control plan is located in **Annex G**.
E.O. 13175 Consultation and Coordination with Indian Tribal Governments	In compliance with this E.O.	Coordination with members and representatives of the Seminole Tribe of Florida and the Miccosukee Tribe of Indians of Florida are ongoing. See **Appendix C.3** and **Appendix C.5** for specifics. Pursuant to E.O. 13175, the USACE developed the November 1, 2012 Tribal Policy Memorandum, which dictates Federal responsibilities, including Trust Responsibilities, to Federally recognized Tribes.
E.O. 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	In compliance with this E.O.	The proposed action will meet the requirements of E.O. 13186 including evaluating the effects on migratory birds, with emphasis on species of special concern.
Memorandum on Government to Government Regulations with Native American Tribal Governments	In compliance with this Memorandum.	The USACE has consulted with the Miccosukee Tribe of Indians of Florida and Seminole Tribe of Florida throughout CEPP planning process (see **Appendix C.3** and **Appendix C.5**).
Seminole Indian Claims Settlement Act of 1987	In compliance with the Act.	This Act also involves an agreement known as the Water Rights Compact, which specifically defines tribal water rights.

4.2 Compliance with USACE CERP Agricultural Chemical Policy

The USACE HTRW policy (ER 1165-2-132) directs that Construction of Civil Works projects in HTRW-contaminated areas should be avoided where practicable. In September 2011, the ASA(CW) provided clarification to this HTRW policy for CERP Projects (Memorandum for Deputy Commanding General for Civil and Emergency Operations, Subject: Comprehensive Everglades

Restoration Plan (CERP) – Residual Agricultural Chemicals, Dated September 14, 2011). This policy was incorporated into the formulation of the proposed project as discussed in **Appendix C.2.2.12**. If specific criteria are met, this policy memorandum allows residual agrichemicals to remain on project lands and allows the USACE to integrate response actions directly into the construction plan. The SFWMD will request application of the policy to the A-2 parcel and A-2 Expansion area lands.

The Agricultural Chemical section of **Appendix C.2.2** of the CEPP PACR partially fulfills the requirements established in the aforementioned policy for the A-2 parcel and A-2 Expansion area portion of the CEPP PACR. Pursuant to paragraph 4 of the policy and prior to beginning construction, the Jacksonville District will obtain written documentation of regulatory approval(s) for all response actions from the SFWMD, and enter into an agreement with the SFWMD wherein the USACE accepts and expends funds, contributed by the SFWMD, for performance of the approved response action(s).

The A-2 parcel and A-2 Expansion area project features require land conversion from agricultural production to aquatic restoration that inundates the land with water. The avoidance of lands containing residual agricultural chemicals is not practicable. An updated environmental assessment of the TSP project boundary is currently underway. This updated assessment includes a site reconnaissance, updated regulatory database search, and a review of aerial photos of the current project boundary. Additionally, a more comprehensive assessment of the proposed A-2 Expansion area is being conducted. The assessments conducted to date do not include an assessment of approximately 50 percent of the proposed A-2 Expansion area. Upon completion of the updated assessment, a work plan would be submitted to the USFWS and FDEP to assess any point sources and regional impacts that may be identified on the A-2 Expansion area during the assessment update. Upon approval of the work plan, soil and groundwater sample collection and analysis would be conducted. Any necessary soil remediation of point sources and/or regional impacts would be completed as required by the FDEP and USFWS.

The results of the January and February 2013 assessment indicated that the A-2 parcel 14,408-acre site contains low concentrations of residual copper and other agricultural chemicals. The testing indicated that soils do not exhibit any hazardous waste characteristic under the Resource Conservation and Recovery Act. Based on the sampling, it is reasonable to surmise that the chemical concentrations are indicative of the lawful application of commercially available products intended to enhance agricultural production. The chemicals detected on-site are active ingredients found in commercially available products registered under the Federal Insecticide, Fungicide and Rodenticide Act. The USFWS and FDEP have preliminarily determined that the residual agricultural chemicals found on the A-2 parcel lands do not present a risk to protected resources.

Based on the results of the 2013 soil testing, the USFWS and FDEP are recommending that during the initial operations of the A-2 Reservoir, the SFWMD perform testing of water for several contaminants (2,4-D, atrazine, barium, metribuzin, phorate, dieldrin, chromium, mercury, selenium, copper) as well as testing of periphyton and apple snails for copper. A start-up operation sampling event should be performed at the 30- or 60-day period from inundation, as well as an additional surface water sampling event that should be performed after one year of

operations. Upon completion of the updated assessment of the expansion area, a review of the monitoring plan would be conducted. The FDEP and USFWS have not at this time recommended remedial action to address residual agricultural chemicals on the A-2 Expansion area.

The non-Federal sponsor would be 100% responsible for the cost of actions taken due to the presence of residual agricultural chemicals, at no expense to the Federal Government. Any future costs associated with the presence of residual agricultural chemicals at the Federal project site would be 100% non-Federal sponsor cost and responsibility. The costs for characterization of the project lands in preparation for conducting a response action for the residual agricultural chemicals and removal of soils that are hazardous waste would be included as 100% non-Federal sponsor responsibility. The CESAJ shall not conduct actions to address residual agricultural chemicals for the SFWMD during the OMRR&R phase of the project.

4.3 Compliance with Florida Statutes

As described in **Section 1** of this report, the State of Florida has enacted several laws pertaining to implementation of CERP projects. These include amendments to Section 373.026 (8) F.S., which establishes a requirement for the SFWMD to submit a State Compliance report pursuant to Section 373.1501 F.S., for review and approval by FDEP prior to formal submission of a request for authorization from Congress and prior to receiving an appropriation of State funds for construction and other implementation activities (except the purchase of lands from willing sellers); the enactment of Section 373.1501 F.S., which establishes the intent of the Florida Legislature with respect to CERP and the criteria for FDEP approval and the procedures to be followed by the SFWMD and FDEP for submitting and reviewing requests for approval; the enactment of Section 373.1502 F.S., which establishes permitting requirements and a process for the submittal, review, and issuance of certain regulatory permits for CERP projects; and the enactment of Section 373.470 and Section 373.472 F.S., establishing the "Save Our Everglades Trust Fund," funding and reporting requirements, and procedures for distributions from the trust fund.

In addition to the above-described statutory requirements, other sections of Chapters 373 (Water Resources) and 403 (Environmental Control) of the F.S. include requirements that may apply to various aspects of CERP project planning and implementation. In particular, Chapter 403 F.S. and the administrative laws adopted in accordance with Chapters 373 and 403 F.S., contain the requirements for facilities that involve the discharge or potential discharge of pollutants to surface and groundwaters, and the discharge of air pollutants, including facilities regulated under the Federal Clean Water and Safe Drinking Water Acts and the Federal Clean Air Act.

Chapter 2017-10 Laws of Florida (Section 373.4598 F.S.) directed the SFWMD to work with the USACE to jointly develop a PACR for CEPP to revise the project component located on the A-2 parcel with the goal of increasing water storage provided by the A-2 project component to a minimum of 240,000 acre-feet, and to explore options for incorporating the A-1 and A-2 parcels into a combined water storage component with no less than 360,000 acre-feet of storage. Section 373.4598 F.S. also authorized water quality features that are required to meet State and Federal water quality standards, and to increases in canal conveyance needed to reduce discharges to the St. Lucie and Caloosahatchee Estuaries. Recognizing that an emergency exists regarding high-volume freshwater discharges to the St. Lucie and Caloosahatchee Estuaries, Section 373.4598

F.S. includes reporting requirements, strict timeframes for achieving key milestones, and requirements related to funding. Section 373.4598 F.S. specifies land acquisition from willing sellers, termination of leases, and prohibits eminent domain. The CEPP PACR has met all requirements to date.

Based on the information contained in this document, the TSP complies with the applicable provisions of the F.S. Detailed explanation of how the project complies with the applicable requirements for CERP projects contained in the F.S. can be found throughout this document, and documents referenced herein.

4.4 Permits, Entitlements, and Certifications

The SFWMD will need to obtain a Section 404 Clean Water Act Permit prior to being allowed to perform work in jurisdictional wetlands, or within other Waters of the United States. The decision to issue the required permit will be based on a public interest review which will include coordination with other Federal agencies such as USFWS, NMFS, SHPO, and the Tribes. Although much of the project area will likely be determined to be jurisdictional, most of the area has been severely degraded by past farming activities, and the area currently serves to provide limited wetland functions and values. Despite the limited functions and values being provided, the project will have to demonstrate avoidance, minimization, and mitigation for any project-related functional wetland losses.

The SFWMD will also need to obtain a State Water Quality Certification and Coastal Zone Consistency Determination, both of which are prerequisites to issuance of the Section 404 Permit, and both of which will be included within applicable State permits.

The TSP would not substantially impact or modify the existing A-1 FEB located adjacent to the project's eastern boundary. However, some minor modifications to the A-1 FEB Everglades Forever Act Permit (EFA Permit No. 0313994) may be needed to address operational changes and/or structures which may ultimately connect TSP features to the A-1 FEB.

In addition to the requirements described above, prior to construction, contractor will need to obtain coverage under the Generic Permit for Stormwater Discharge from Large and Small Construction activities pursuant to Chapter 62-621.300 (4) F.A.C. from the FDEP, and will also need to obtain any Consumptive Use permits for temporary Construction dewatering activities.

All required Federal and State permits and/or modifications to existing permits would be acquired prior to construction activities.

4.5 Compliance with Applicable Water Quality Standards and Permitting Requirements

The TSP is anticipated to improve water quality within the Northern Estuaries by reducing the magnitude, frequency, and severity associated with releases to these estuaries. Associated reductions in the frequency and/or rate of backflow to Lake Okeechobee should result in water quality improvements to the Lake, including reductions in the 2008 EPA and 2001 FDEP Total Maximum Daily Load (TMDL) Waste Load Allocation for Lake Okeechobee inflow sub-basins.

Construction and operation of the A-2 Reservoir, with the A-2 STA, and conveyance improvements is predicted to maintain compliance with State water quality standards,

specifically the WQBEL for Everglades STA. Although completion of all project components should lower the flow weighted mean total phosphorus concentrations entering the ENP, it is slightly less clear how increased flow to Shark River Slough would affect compliance with Appendix A of the Everglades Settlement Agreement/Consent Decree. In light of this uncertainty, the Technical Oversight Committee is currently reviewing applicability of the current Appendix A compliance methodology for a restored ecosystem. With respect to the Loxahatchee National Wildlife Refuge (WCA 1) and Taylor Slough, relative to the FWO, no change to Settlement Agreement compliance is anticipated.

Any short-term impacts to water quality associated with construction of the TSP would be ameliorated by construction sequencing, implementation of Best Management Practices for erosion and sedimentation control, and monitoring during construction. Longer-term impacts to water quality associated with the operation of project features would be addressed through operational monitoring and adaptive management actions.

4.6 Pre-Application Conferences

In accordance with Section 373.1501(5)(c), F.S., a pre-application conference was held on January 12, 2018, at the SFWMD B-1 3-A Bridge Conference Room in West Palm Beach, Florida and via webinar. Representatives from the following agencies were invited to attend the conference:

- SFWMD
- FDEP
- USACE
- USFWS
- USDA/NRCS
- NOAA
- FP&L
- Palm Beach County
- Broward County
- FDACS
- SHPO
- FDOT
- FWC
- USEPA
- Miccosukee Tribe
- Seminole Tribe of Florida

The meeting summary, and a list of attendees, can be found at the end of this report. Information gained at the pre-application conference was considered by the SFWMD in preparing the CEPP PACR.

5 Reasonable Assurances

Under Section 373.1501(5)(d), F.S. the SFWMD shall "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."

The same hydrologic models used for plan formulation are typically applied to the reasonable assurances analysis. This ensures consistency when representing the project effects in the analyses subsequent to plan selection. The RSM-BN and the RSM-GL hydrologic models were used to simulate and evaluate the environmental effects of the CEPP final array of alternatives through comparison with base conditions simulated with the same models. The RSM-BN is applied north of the L-4/L-5/L-6 levees (the CEPP formulation Redline) for Lake Okeechobee, the EAA, and the Northern Estuaries; the RSM-GL is applied within the WCAs, ENP, and the LECSAs. The RSM model uses a 41-year period of hydrologic record (1965 through 2005) which includes sufficient climatological variability (including natural fluctuations of water) to represent the full range of hydrologic conditions experienced within the South Florida region over a long-term period.

No one modeling tool or representation of model results can definitively predict with project hydrologic conditions across the entire CEPP PACR project area given the large regional scope of the project, model tools limitations and assumptions, and future uncertainties regarding the effects of other projects. However, each snapshot of model results can form the basis for applying best professional judgment to determine whether the potential effects of TSP would reduce the availability of water to existing legal users or reduce the level of service for flood protection.

5.1 Water Supply Assurance

An existing legal use of water is defined as a water use authorized under a SFWMD water use permit or existing and exempt from permit requirements. Existing legal users of water including agricultural and urban in the LOSA and LECSAs will continue to be met by their current sources, primarily Lake Okeechobee, the Everglades (including the WCAs), surface water in the regional canal network, and the surficial aquifer system. On an average annual basis, the LOSA demands will continue to be met Lake Okeechobee with storage of a portion of the water in the A-2 Reservoir. Therefore, all existing legal users will continue to have their needs met during implementation and once the project is operation.

5.2 Flood Protection Assurance

Under Section 373.1501(5)(d), F.S. the SFWMD shall "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."

The TSP also ensures that CERP implementation does not reduce the level of service for flood protection consistent with the WRDA 2000 Savings Clause. Comparison of canal stages and groundwater levels at key locations indicates the project will not reduce the flood protection within the areas affected by the project, including the EAA, LECSA 2, and LECSA 3. This includes the Seminole Tribe of Florida's Big Cypress Reservation and the Miccosukee Tribe of Indians of Florida's reservation areas and resort.

5.3 Adaptive Management to Meet the Needs of the Natural Environment

5.3.1 Adaptive Management and Monitoring

The CEPP PACR Adaptive Management Plan (AM Plan) and Monitoring Plan (MP) relies heavily on the CEPP plan presented in Annex D of the CEPP PIR (2014). This 2014 plan was modified to focus on only the areas being affected by the A-2 Reservoir and A-2 STA in the CEPP PACR. The CEPP AM Plan and MP identified the monitoring information needed to inform CEPP implementation and to document restoration progress to agencies, the public, and Congress. The overall objective of both the CEPP and CEPP PACR AM Plan and MP is to focus resources on refinement of the project to fine-tune performance due to inevitable uncertainties, based on existing knowledge and knowledge that will be gained through monitoring and assessment.

CERP's interagency science group, RECOVER, provided significant support in the development of CEPP's AM Plan and Monitoring Plan, as did Project Delivery Team (PDT) scientists, engineers, and water operators. Expertise included input from more than 10 agencies and both Tribes (Miccosukee and Seminole) of south Florida, consisting collectively of decades if not centuries of scientific and operational knowledge of the Everglades, Lake Okeechobee, the Lower East Coast, and the South Florida estuaries. Using this knowledge, key questions were identified for analysis to inform CEPP design, implementation, and potential adjustments for optimizing project performance.

The CEPP PACR AM Plan and Monitoring Plans contain descriptions of monitoring that should address specific uncertainties identified during CEPP and CEPP PACR planning, required parameters such as water quality and water levels, and ecological features that track project progress toward success. The monitoring data will indicate progress toward the objectives of CEPP PACR, and conformance to applicable legal requirements. The monitoring descriptions are found in detail in **Annex D Part 1 Sections D.1.3 – D.1.4** of the PACR and in **Annex D Parts 2, 3, and 4** of the PACR. For each region of south Florida in the CEPP PACR study area, the monitoring parameters, their value to the TSP, timeframe needed to see changes, measurement frequencies, decision criteria for triggering adaptive management options, and suggested adaptive management options are provided in the AM Plan text; the information is also summarized per region in **Tables D.1.3 – D.1.9** of the PACR. Monitoring durations, which are specified in **Annex D** of the PACR, are dependent on the intended use of the monitoring: regulatory monitoring will be continued as long as required by applicable regulations and the adaptive management and

ecological success monitoring will continue up to 10 years, per WRDA 2007 Section 2039, in coordination with the construction phases of CEPP, as modified by the CEPP PACR.

Part 1 of the AM and Monitoring Plans (**Annex D** of the PACR) is the CEPP PACR AM Plan. A fundamental principle of AM is that a project can be adjusted to achieve higher performance toward the project's goals and objectives and to remain within its constraints. In AM, the adjustments are based on a scientifically efficient and sound process of learning from data. These adjustments should be viewed as intelligently fine-tuning the project, the need for which is almost inevitable in large-scale, long-term restoration projects like CERP, CEPP, and CEPP PACR. Given this fundamental principle of AM, the CEPP PACR AM Plan provides suggestions for potential improvements and refinements of aspects of the project if necessary, called Adaptive Management Options (AM Options). The suggestions are based on current experience and knowledge and are not required actions, nor are they meant to limit agencies from considering other options. The AM Options are included in the CEPP PACR cost estimates and described here per WRDA 2007 USACE implementation guidance (August 2009). The AM Options are not automatic; they are informed suggestions provided as part of the TSP that capture current knowledge of what may be needed in the future to adjust and maximize performance as CEPP PACR implementation progresses.

6 Coordination with Existing Utilities and Public Infrastructure

Paragraph 373.1501(5)(e) F.S., requires the SFWMD to "Ensure that implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to and relocation of existing utility and public infrastructure are minimized."

6.1 Summary of Utilities and Coordination with Utilities and Public Infrastructure

The CEPP PACR leverages the coordination efforts with utilities and other entities responsible for public infrastructure that were completed as part of the CEPP Planning Project. The original coordination, and additional coordination which will be conducted throughout design, is intended to avoid and minimize impact to utilities and roads in the project area.

Annex D (Real Estate) of the PACR describes the utilities that are included within the CEPP PACR project footprint as well as some of the actions that may need to be taken to implement the project.

The SFWMD will undertake specific outreach efforts to coordinate implementation of the project components with existing utilities and public infrastructure as well as minimize impacts to and relocation of existing utilities and public infrastructure. A comprehensive list of agencies, utilities, or other public infrastructure entities that provide services within the project vicinity is being developed by SFWMD. Each party will be contacted with a letter or telephone call, or when appropriate, a meeting will be arranged.

The purpose of this advance coordination is to (1) review the network of existing and proposed utility facilities and roads in the area; (2) identify which utility facilities can be removed (or relocated) and the process and timeframes for implementing their removal (or relocation) consistent with the project schedule; (3) identify those facilities that need to remain that may be impacted by the proposed project; (4) discuss options for minimizing and/or avoiding impacts to the facilities that need to remain and, if necessary, relocation options; and (5) identify any other potential utility and public infrastructure issues that need to be addressed during the planning, design, and/or construction process.

This effort will help strengthen working partnerships with local agencies and utility companies affected by the projects, and to identify new local issues to consider as detailed design progresses. Most importantly, the process allows the USACE and SFWMD to conclude that no insurmountable obstacles exist that would prevent or significantly alter the design and construction of the projects. Through these coordination efforts, the SFWMD will ensure that the implementation of the project components minimizes impacts to and relocation of existing utilities or public infrastructure.

7 Increased Water Supply Available from Project

Paragraph 373.470(3)(c), F.S. requires the SFWMD, in cooperation with the USACE, to identify the increase in water supplies resulting from each CERP project, which shall be allocated or reserved by SFWMD.

Viewed from a programmatic perspective, the identification of water for the natural system associated with the CERP involves an analysis of four different aspects of ecological responses to hydrologic changes: (1) responses to the change in the quantity of water received by the natural system; (2) responses to the timing of those deliveries; (3) responses to the distribution of water delivered to the natural system; and (4) responses to the quality of the water received by the natural system. In a project specific sense, however, the relative importance of each of these aspects (quantity, timing, distribution, and quality) will vary from project to project depending upon the specific objectives established for the project.

7.1 Identifying Water for the Natural System

The TSP will provide additional water to the natural system. In addition to reducing damaging discharges to the Northern Estuaries, the TSP would increase flows south to the central portion of the Everglades to an average annual of approximately 370,000 ac-ft, which is essential to Everglades Restoration and achieves the CERP goal. The CEPP PACR reaffirms that the CEPP PPA North and South project features can accommodate the additional flows south to the central Everglades, that would result from additional canal conveyance, storage, and treatment wetlands proposed on lands within the EAA.

The habitat unit benefits were calculated during plan formulation at three locations: inflows to WCA 3, inflows to ENP, and overland flows to Florida Bay. These locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the TSP. Surface water inflows to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, flows into northeast WCA 3A via the S-150 gated culvert, and STA-56 outflows to northwest WCA 3A for the EARECB, EARFWO base conditions; for the TSP, the combined flows from the S-8 pump station discharges to the Miami Canal and discharges to the S-8A gated culvert (which diverts water to the L-4 Levee degrade gap) are included in addition to S-150 and STA-5/6 outflows to WCA 3A. Quantification of flows into WCA 3 can be found in **Figure 7-1.**

Surface water inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G;) and S-356. Quantification of flows into ENP can be found in **Figure 7-2**. Overland flows to Florida Bay are quantified for RSM-GL Transect 23 (southeast ENP; transects 23-A, 23-B, and 23-C combined) and Transect 27 (Central Shark River Slough) (**Figures 7-3 and 7-4**). **Figure 7-5** shows the locations of the overland flow to Florida Bay transects.

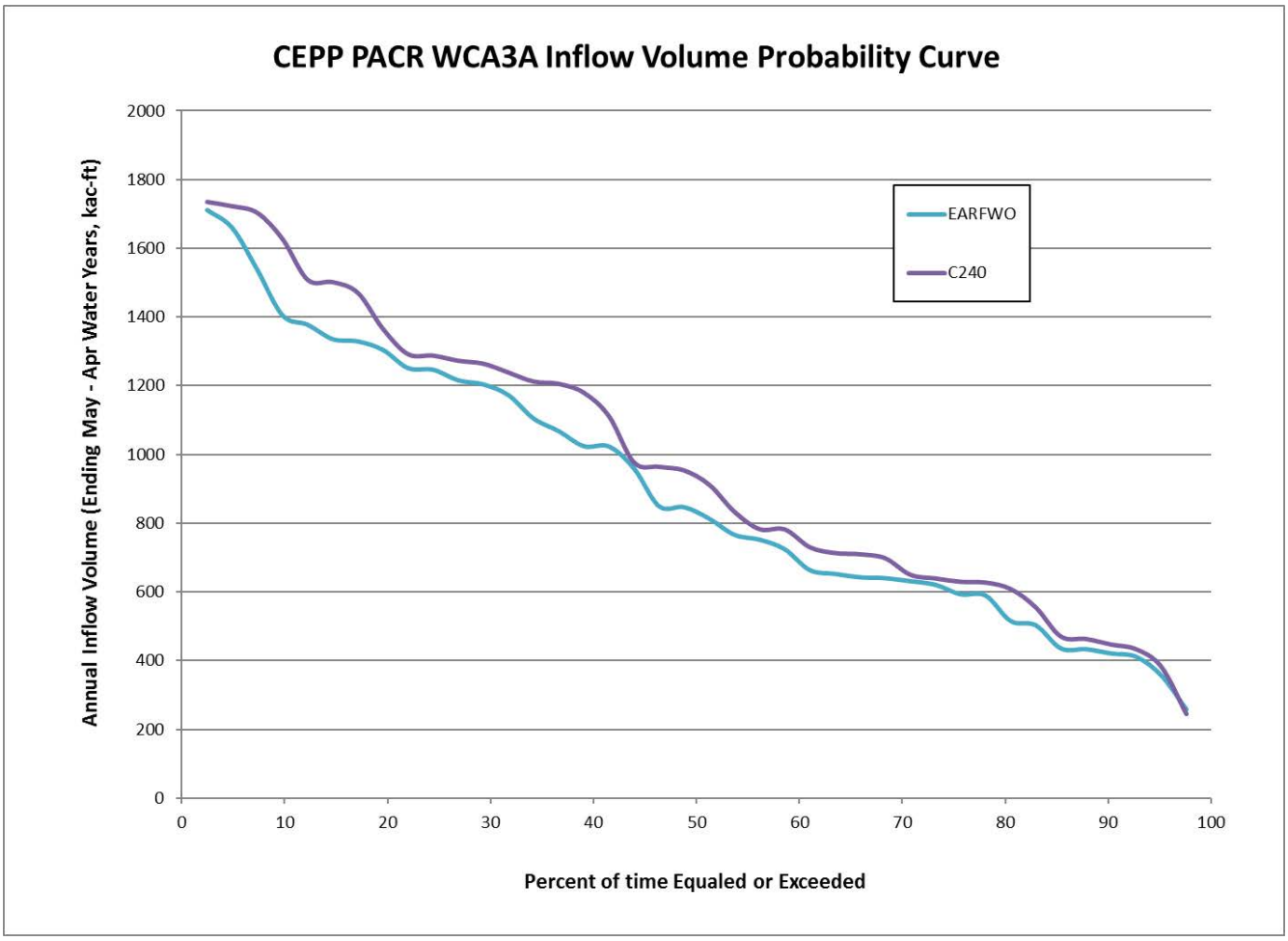

Figure 7-1. CEPP PACR WCA 3A Inflow Volume Probability Curve for EARFWO and TSP

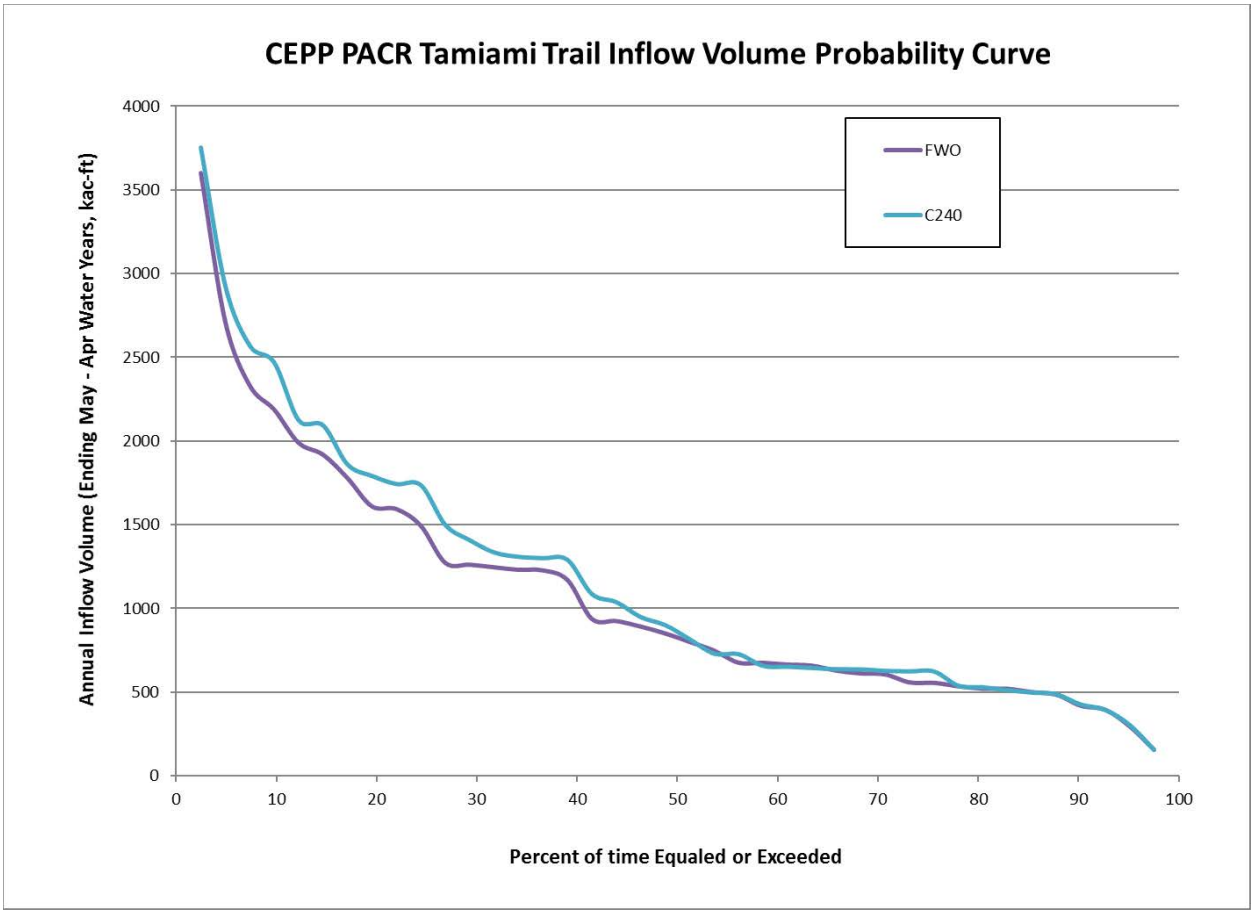

Figure 7-2. CEPP PACR Tamiami Trail Inflow Volume Probability Curve for EARFWO and TSP

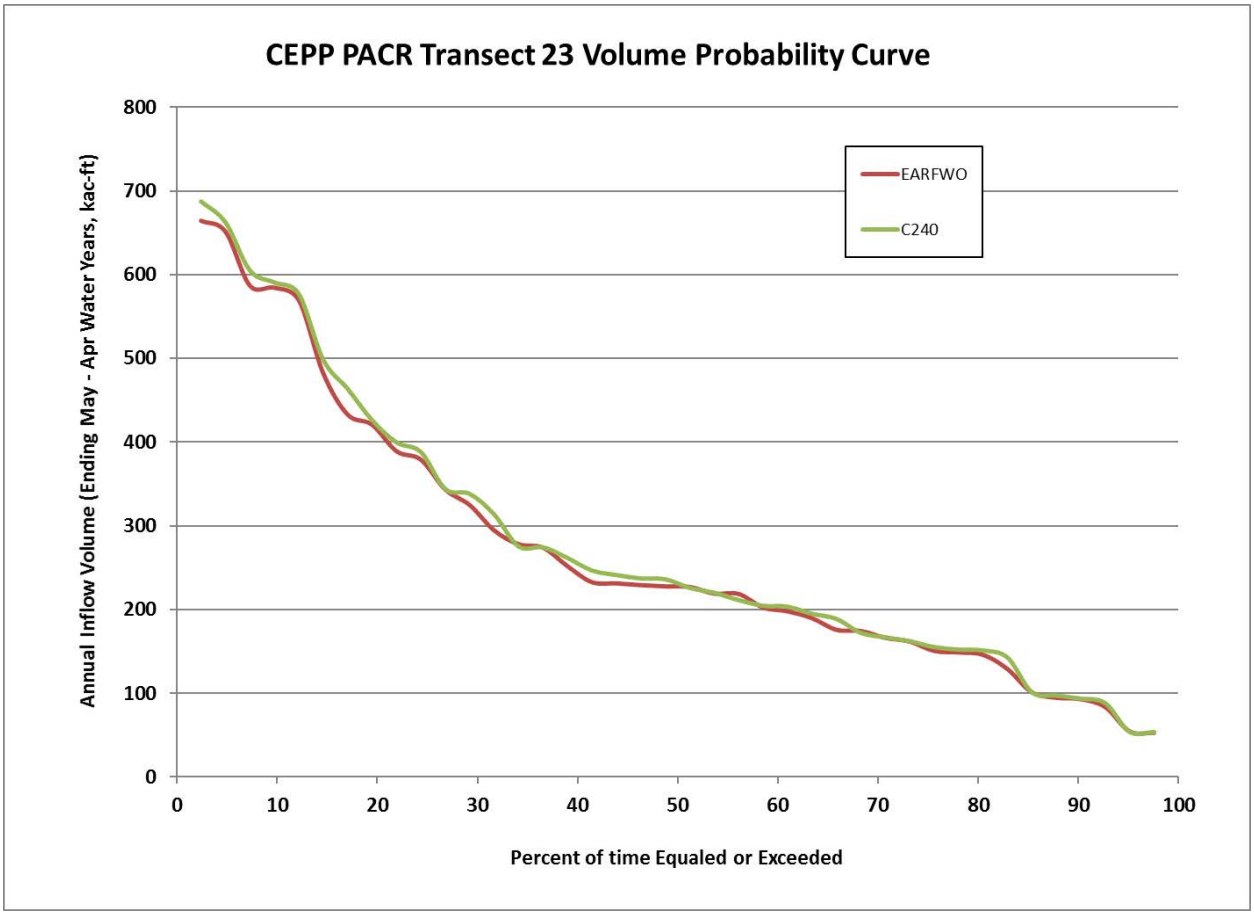

Figure 7-3. CEPP PACR Florida Bay Transect 23 Inflow Volume Probability Curve for EARFWO and TSP

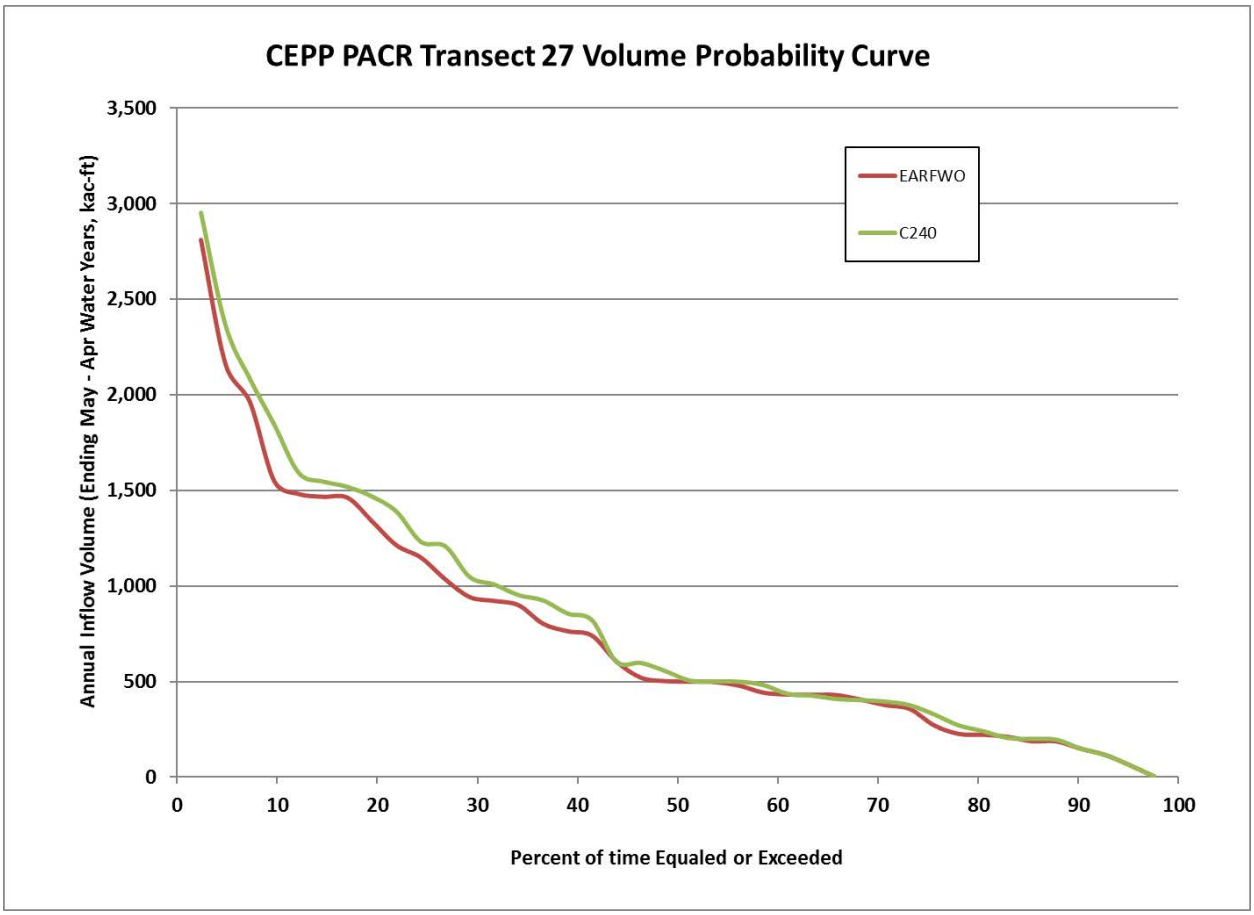

Figure 7-4. CEPP Transect 27 Volume Probability Curve

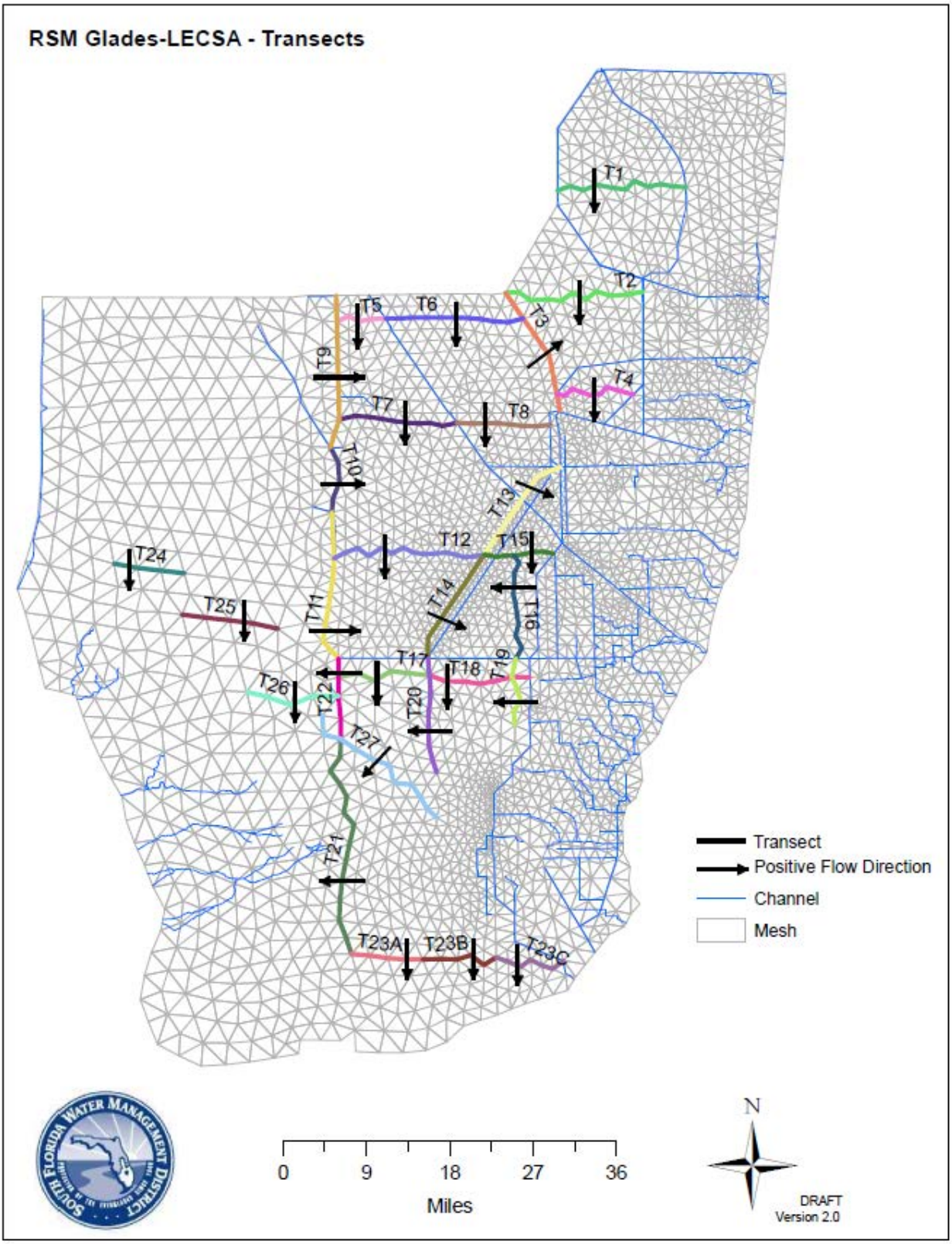

Figure 7-5. RSM Glades-LECSA Transect Locations

The volume of water at the 10th, 50th, and 90th percentile was extracted from the RSM-GL simulation data applied to develop the volume probability curves. The future water in the system, including the other CERP projects assumed in place prior to CEPP PACR implementation, is represented by the EARFWO model simulation, the total water available (TSP), and the water made available by CEPP (differences between TSP and EARFWO) for the natural system can be found in **Tables 7-1**, **7-2,** and **7-3.**

Table 7-1. Pre-Project Volume of Water Available for the Natural System

Pre-Project Water Available for the Natural System (EARFWO)			
Location	**Water Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WCA 3	1,404	846	432
ENP	2,711	1,271	535
Florida Bay	1,328	1,888	372

Table 7-2. Total Volume of Water Available for the Natural System

Total Water Available for the Natural System (TSP)			
Location	**Water Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WCA 3	1,626	952	446
ENP	2,925	1,333	528
Florida Bay	1,521	1,945	367

Table 7-3. Water Made Available by the Project for the Natural System

Water Made Available by the Project (difference between TSP and EARFWO)			
Location	**Water Made Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Made Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Made Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WCA 3	182	58	-12
ENP	214	62	-7
Florida Bay	193	58	-5

7.2 Water to be Reserved or Allocated for the Natural System

As required by Paragraph 373.470(3)(c), F.S., the Implementation of CERP, the water made available by the project will be protected using the State of Florida's reservation or allocation authority under State law as identified in **Table 7-3**. The SFWMD has protected the water for the natural system in the Holey Land and Rotenberger Wildlife Management Areas; WCA 1, WCA 2A, WCA 2B, WCA 3A, and WCA 3B; and ENP through the Restricted Allocation Area Rule for the

Everglades and North Palm Beach/Loxahatchee River Watershed Waterbodies, which was adopted in 2007.

In February 2007, the SFWMD Governing Board adopted restricted allocation area criteria for the Everglades and Loxahatchee River Watershed water bodies (Section 3.2.1.E, Basis of Review). This criterion limits allocations to conditions or withdrawals in the Lower East Coast Service Area and North Palm Beach County/Loxahatchee River Watershed, depending on the specific use class that existed as of April 1, 2006, known as the "base condition water use." The rule only allows allocations over the "base condition water use" through alternative source development, implementation of offsets (e.g., recharge barriers and recharge trenches), or identification of terminated or reduced water uses that existed as of April 1, 2006. Wet season water can be allocated if the permit applicant demonstrates that such flows are not needed for restoration of the Everglades pursuant to CERP or for the Loxahatchee River Watershed water bodies, pursuant to the *Northern Palm Beach County Comprehensive Water Management Plan*. Otherwise, water in the Everglades and the Northwest Fork of the Loxahatchee River water bodies or their integrated conveyance systems that are hydraulically connected including primary canals of the C&SF Project and related secondary and tertiary canals cannot be allocated for consumptive uses. By limiting allocations, restricted allocation area criteria function similar to a water reservation rule that also limit allocations.

The SFWMD also protects and conserves Florida's water resources through a minimum flows and minimum water levels (MFLs) program. Establishing MFLs is an important step in the SFWMD's work of planning for adequate water supplies while also protecting water resources from significant harm. In South Florida, minimum levels have been established for lakes, wetlands and aquifers. Minimum flows have been set for rivers, streams and estuaries. MFLs are defined as the minimum flows or minimum water levels, adopted by the SFWMD Governing Board pursuant to Sections 373.042 and 373.0421, Florida Statutes (F.S.), at which further withdrawals would be significantly harmful to the water resources or ecology of the area. Establishing MFLs for all of South Florida is an ongoing effort. The Priority Water Body List and Schedule for developing or re-evaluating MFLs is submitted annually to the FDEP. The District publishes a draft technical document summarizing the methods, models and data that provide the scientific basis of an MFL, which may be subject to periodic re-evaluation and/or scientific peer review by an independent panel of experts. The MFL development process also includes public rule development meetings that allow interested stakeholders opportunities to provide comments on the draft technical document and proposed draft rule language prior to Governing Board approval and adoption. The MFL is then implemented through the SFWMD's consumptive use permitting and water supply planning programs. MFLs adopted by the SFWMD are contained in Chapter 40E-8, Florida Administrative Code (F.A.C) and MFLs for surface waters are defined in Rule 40E-8.221, F.A.C.

If actual flows or levels are, or during the next twenty years expected to be below established MFL, the District develops and implements a recovery or prevention strategy as defined in Rule 40E-8.421, F.A.C. The MFL recovery and prevention strategies are implemented in phases with consideration of the SFWMD's mission in managing water resources. Part of the SFWMD's MFL prevention and recovery strategy includes the implementation of project components identified in the CERP. The SFWMD, as the non-federal sponsor of the C&SF Project, is charged with implementing the CERP, in accordance with the WRDA 2000 WRDA, Title VI entitled

"Comprehensive Everglades Restoration," and in accordance with State law. Assurances regarding water availability for consumptive uses and protection of natural systems are set forth in WRDA 2000 and Chapter 373, F.S. Additional quantities of water for both consumptive uses and the natural systems made available from the CERP are documented and protected on a project basis. For project components implemented under CERP, the additional quantity, distribution and timing of delivery of water that is made available for the natural system, will be identified consistent with purposes of the CERP. Under State law, protection of water made available by the project for the natural system will be utilized for the intended purposes. Implementation of the TSP will be in compliance with the established MFLs within the region of the project.

During water supply operations when the full canal conveyance capacity is not being utilized, additional releases from the lake to the A-2 Reservoir could take place according to the operational protocol for Lake Okeechobee. Water stored in the A-2 Reservoir could be used for water supply deliveries if the water depth in the reservoir is greater than 8.2 feet. Water stored in the A-2 Reservoir could be returned to the Miami and/or North New River basins to maintain canal levels when excess capacity is available beyond restoration flows to the Everglades if the water depth in the reservoir is greater than 8.2 feet. The remaining water in the A-2 Reservoir below 8.2 feet in depth is solely dedicated for environmental purposes.

7.3 Identifying Water Made Available for Other Water Related Needs

The ability of the A-2 Reservoir to provide water to meet other water-related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed for the TSP. 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.

8 References

Fisher, Ryan. 2018. Memorandum for Commanding General, U.S. Army Corps of Engineers. Subject: South Florida Water Management District – Section 203 everglades Agricultural Area Southern Reservoir Study. Office of the Assistant Secretary Civil Works. January 10, 2018.

EAA Storage Reservoir Feasibility Study
1501 Pre-Application Meeting & Briefing

B-1 3-A Bridge Conference Room
January 12, 2018 - 2:00 pm to 4:00 pm
Audio Connection
6800 (Internal Number)
(561) 682-6800 (WPB Local Number)
(855) 682-6800 (Toll Free Nationwide)
Access Code: 998 839 687
Meeting URL:
https://webmeeting.sfwmd.gov/orion/joinmeeting.do?MTID=a8f2de42fb3b4c3e6dd5bd442e2c66e8

I. Welcome & Introductions

John Shaffer, South Florida Water Management District (SFWMD or District), welcomed everyone, completed the roll call (attached), and reviewed the agenda (attached).

II. Requirements of 373.1501

Mr. Shaffer explained 373.1501 F.S., which codifies the District's roles, responsibilities as the Local Sponsor for Everglades Restoration Projects and Comprehensive Everglades Restoration Plan (CERP) projects, and reviewed the specific requirements of 373.1501(5) F.S., which states the District's is required to:

- Analyze and evaluate needs in a comprehensive matter and to consider all applicable water resources,
- Determine that components are feasible, efficient, and cost effective,
- Determine that project components are consistent with laws and regulations, and can be operated as proposed,
- Provide reasonable assurances regarding existing legal users and existing levels of flood protection, and
- Ensure that components are coordinated with utilities and public infrastructure and impacts minimized.

III. Project Study, Scope, and Schedule

Jennifer Leeds, SFWMD, reviewed the Everglades Agricultural Area (EAA) Storage Reservoir Project timeline, explained the three steps process; public scoping, alternative evaluations/feasibility level analysis and submittal of the Post Authorization Change Report (PACR) to the Assistant Secretary of the Army (ASA) by March 30, 2018. Ms. Leeds emphasized that the deadlines are included in the Laws of Florida Chapter 2017-10.

Ms. Leeds provided an overview of the Central Everglades Planning Project (CEPP) and the components of the Project Partnership Agreement (PPA) New Water, PPA North and PPA South. Ms. Leeds explained this PACR is only modifying the A-2 feature.

Ms. Leeds provided a summary of Florida State Law, Chapter 2017-10:

- Identifies two separate storage volumes options, (240,000 acre-feet (AF) on the A-2 site and 360,000 AF if the TSP were to also utilize the A-1 site),
- The TSP is required to meet state water quality standards,
- Provide an update the Florida Legislature by January 9, 2018, and
- Submit the PACR to the ASA's Office by March 30, 2018.

Ms. Leeds presented the project's goals, objectives, and constraints (see attached presentation).

IV. Performance Measures & Project Benefits

After describing how modeling fit into the project planning process, Ms. Leeds described the three modeling scenarios [which were representative of the five subsequently developed alternatives], as follows;

- 240,000 AF, A-2 Reservoir with no change to the Flow Equalization Basin (FEB), and a 6,500 acre Stormwater Treatment Area (STA),
- 360,000 AF reservoir and a 11,500 acre STA utilizing the footprints of both the A-2 and A-1 sites,
- 360,000 AF reservoir and a 11,500 acre STA utilizing the footprints of both the A-2 and A-1 sites with operations altered to allow the facility to assist in meeting water supply needs.

Ms. Leeds presented the stage duration curves for Lake Okeechobee which indicated similar performance between three alternatives. The graphics indicated reductions in the number of excursions from the salinity envelopes for the St Lucie and Caloosahatchee estuaries as well as reductions in the volume of demand cutbacks for the Lake Okeechobee Service Area (LOSA), and examples of overland flow vector graphics for the Everglades

V. Array of Alternatives

Ms. Leeds provided a description of the top preforming array of alternatives and presented the benefits that can be achieved in the top performers, Alternative R240A, and Alternative C360C. Alternative R240A and Alternative C360C meet the federal process requirements of Cost Effectiveness and Best Buy. Ms. Leeds explained that, based on the additional benefits associated with allowing the reservoir stored water to be used to meet LOSA water supply needs, at its January 2018 meeting, the District's Governing Board directed staff to apply similar operational flexibilities and optimize Alternative R240A, as was done for Alternative C360C.

VI. 1501 Compliance

Ms. Leeds presented each of the following sub-topics related to compliance with specific aspects of compliance with 373.1501(5) F.S.:

- **Water Quality**
  Proposed STAs have been modeled to meet water quality-based effluent limits (WQBEL) as defined in Consent Orders, and no alternatives considered are anticipated to cause or contribute to violations to State Water Quality standards.

- **Reasonable Assurances**
  Screening level evaluations indicate that neither of the cost effective/best buy alternatives (are anticipated to diminish water available to existing legal users or reduce the level of service for flood protection.

- **Environmental Compliance**
  1. The District has led the planning process consistent with the National Environmental Policy Act (NEPA) and the Federal-to-Federal consultation will be conducted under Section 203 of the Water Resources Development Act (WRDA). The District anticipates that the US Army Corps of Engineers (USACE) will:
     a. Transmit the Biological Assessments (BAs) to the United States Fish & Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), which will result in Biological Opinions (BOs) / concurrence from both agencies,
     b. Transmit an Essential Fish Habitat (EFH) assessment to the NMFS,
     c. Initiate consultation with the Tribal Nations, and
     d. Compliance with the Coastal Zone Management Act (CZMA), Magnuson-Stevens Act, and the Marine Mammal Protection Act will all be confirmed following agency review of the PACR.

- **Utilities & Infrastructure**
  Major utility and infrastructure within or adjacent to the project footprint includes: US Highway 27, Florida Power & Light (FPL) transmission line corridor, an adjacent farm infrastructure and mining operations north of the A-1 parcel. Detailed coordination efforts during preliminary design phase to identify potentially impacted facilities will take place.

VII. Next Steps

Ms. Leeds presented the next steps related to development of the PACR, as follows;

- February 13, 2018 - DEP Begins Review of 1501 Report
- February 27, 2018 - DEP Provides Compliance Report Letter of Approval & Executive Order
- March 30, 2018 - Submit PACR to ASA(CW)
- October 1, 2018 - ASA(CW) Submit PACR to Congress

VIII. Discussion (Comments & Questions)

- Deena Woodward, State Historic Preservation Office (SHPO), did not have specific comments or questions at this time; however, comments or questions may arise during the NEPA process.

- Barron Moody, Fish & Wildlife Commission (FWC), asked if the assurances were based solely on the performance metrics or were they based on other considerations, to which Brenda Mills (SFWMD) responded, assurances are generally based on the same performance metrics used for plan formulation. Mr. Moody also inquired as to the level of design detail included in the draft report as FWC may have wildlife concerns (e.g., littoral design), Ms. Leeds responded the level of design will be similar to what you would typically see in Project Implementation Report (PIR). Generally, a 15% level of design is needed to provide the rough order of magnitude cost. Ms. Leeds added the District will incorporate lessons learned from previous reservoir levee designs projects.

- Rebecca Elliot, Florida Department of Agriculture & Consumer Services (FDACS), explained FDACS' focus is on water supply and flood protection, and at this point FDACS has no concerns; however, they will have an independent review of the modeling.

- Jamie Higgins, United States Environmental Protection Agency (EPA), commented EPA's appreciation for being included in the process and would like to continue to receive information on this project as it becomes available.

- Frank Powell, Florida Department of Environmental Protection (DEP), announced Natalie Barfield of DEP as the point of contact for the 1501 Report and asked if the District intended to share the Draft PACR with the other agencies on January 31, 2018, expressed concern with the expedited schedule for DEP's staff to complete the 1501 Report review, work through any issues, and for DEP to issue a Letter of Approval, and an Executive Order. Mr. Powell added DEP's staff will work diligently to meet the established deadlines, and asked if there is flexibility in the February 27, 2018, deadline? Eva Vélez (SFWMD) explained that draft information will be provided on January 30, 2018 and noted DEP's concerns with the expedited timeline set forth in Laws of Florida Chapter 2017-10.

- Frank Powell (DEP) inquired as to whether all water will be discharged via S-8, to which Walter Wilcox (SFWMD) responded that water leaving the storage reservoir will not always flow through S8, adding that, once water leaves the reservoir it travels to downstream STAs (STA 3/4 & STA 2 complexes and proposed STA), the routing options into the Greater Everglades are the same as what was envisioned in CEPP. A majority of the water gets routed through the L6/L5/L4 canals and into the NW corner of WCA 3A. Some water will go to S-8 and some water will be discharged into WCA 2A.

- Frank Powell provided clarification regarding the WQBEL, adding that the proposed STA is not part of the Consent Order or Restoration Strategies, it is part of CERP. Ms. Vélez thanked Mr. Powell for the clarification.

- Frank Powell asked if [similar to the CEPP PIR] the PACR would address sequencing and dependencies. Mr. Shaffer responded that unlike CEPP, which recommended numerous components, this project's PACR will include limited sequencing. Ms. Vélez added that the PACR would however, address dependencies, and that there is a need to open the southern part of the system to allow for flow.

- In response to a question from Stan Ganthier (DEP), Ms. Vélez explained TSP and other familiar terminology will be utilized when the ASA's office is engaged in the process and that SFWMD will identify one best performing alternative.

- Frank Powell asked if the 1501 statement regarding water quality [presumably the "Negotiated Language Between the State of Florida and the Federal Government Regarding Compliance with State Water Quality Standards and Consent Decree Obligations for CEPP"], which is also contained within Section 8.3 of the CEPP PIR, would "carry forward" into the EAA Storage Reservoir project's (A-2 Reservoir) 1501 Report. This was subsequently confirmed by District Staff.

- Eva Vélez explained that the CEPP PACR will be submitted to the USACE on March 30, 2018, and it is expected that the NEPA process will begin on that date with a Notice of Intent for the Environmental Impact Study, and the USACE will proceed with review of the 203 Report, which requires the review to be completed by OCT (180 days).

- Stan Ganthier asked if the A-2 Reservoir 1501 Report will be a new 1501 Report or a revision to the CEPP 1501 Report. Mr. Shaffer responded that it will be a new 1501 Report that assumes CEPP is in place and is intended to evaluate the merits of just the A-2 Reservoir and new STAs.

EAA SR Project 1501 Pre-Application Meeting/Briefing Attendees

Agency	Name
FDEP	Natalie Barfield
FDEP	Tom Behlmer
FDEP	Kelli Edson
FDEP	Stanley Ganthier
FDEP	Aric Larson
FDEP	Frank Powell
FDEP	Jordan Pugh
FDEP	Tracy Robb
FDEP	Ed Smith
SHPO	Deena Woodward
FWC	Barron Moody
USFWS	Lindsay Nestor
FDACS	Rebecca Elliot
FDACS	Ray Scott
EPA	Cecilia Harper
EPA	Jamie Higgins
SFWMD	Michael Albert
SFWMD	Luis Colon
SFWMD	Jennifer Leeds
SFWMD	Nimmy Jeyakumar
SFWMD	Brenda Low
SFWMD	Jeremy McBryan
SFWMD	Brenda Mills
SFWMD	John Mitnik
SFWMD	Armando Ramirez
SFWMD	John Shaffer
SFWMD	Eva Velez
SFWMD	Leslie Waugh
SFWMD	Walter Wilcox
SFWMD	Clay Brown
J-Tech	Dennis Barnett
J-Tech	Jamie Childers
J-Tech	Gerogia Vince

Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

March 5, 2018

Mr. Ernie Marks
Executive Director
South Florida Water Management District
3301 Gun Club Road
West Palm Beach, FL 33406

Dear Mr. Marks:

The South Florida Water Management District (District) submitted the State Compliance Report for the Comprehensive Everglades Restoration Plan (CERP) Central Everglades Planning Project (CEPP) Post Authorization Change Report (PACR) on February 13, 2018, to the Florida Department of Environmental Protection (Department) for review pursuant to §373.026(8)(b), Florida Statutes (F.S.). The Department reviewed these documents and has determined that sufficient information was provided to demonstrate that the project, as proposed, is consistent with the requirements of §373.026, F.S., and that the District has complied with its responsibilities under §373.1501(5), F.S. The attached Final Order constitutes Department approval of the CEPP PACR, which is required before the project is submitted to Congress for authorization or receives an appropriation of state funds.

The Department is pleased to support this step in achieving progress towards meeting the state's objectives for the restoration of the greater south Florida ecosystem. We look forward to continued coordination with both the District and the United States Army Corps of Engineers as we move forward together with implementation of the CERP program. If you have any questions regarding this letter, please feel free to contact Frank Powell at (850) 245-3188.

Sincerely,

Edward C. Smith

Edward C. Smith, Director
Office of Ecosystem Projects

Enclosure

Enclosure:
Final Order – CEPP PACR

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In re: Post Authorization Change Report to the Central Everglades Planning Project

OGC No. 18-0138

/

FINAL ORDER APPROVING THE CENTRAL EVERGLADES PLANNING PROJECT POST AUTHORIZATION CHANGE REPORT EVERGLADES AGRICULTURAL AREA RESERVOIR

Pursuant to Sections 373.026(8)(b) and 373.1501(9) of the Florida Statutes (F.S.), the State of Florida Department of Environmental Protection (Department) enters this Final Order in response to the South Florida Water Management District's (District) submittal of the Final State Compliance Report for the Comprehensive Everglades Restoration Plan (CERP) - Central Everglades Planning Project (CEPP) Post Authorization Change Report (PACR). The submittal accompanies the Draft PACR proposing the Tentatively Selected Plan for the Everglades Agricultural Area Reservoir (Alternative C240A) for the CEPP located in Palm Beach County, Florida. The submittal and associated materials have been reviewed for compliance with the criteria in Section 373.1501(5), F.S., as outlined below.

1. Alternative C240A is an ecosystem restoration project designed to improve the quantity, quality, timing, and distribution of water flows to the central Everglades Water Conservation Area (WCA) 3 and Everglades National Park (ENP). The proposed plan also provides flexibility in Lake Okeechobee operations by increasing storage, treatment and conveyance to the south, which will reduce harmful discharges from Lake Okeechobee to the St. Lucie and Caloosahatchee Estuaries. The principle features of Alternative C240A are a 10,500-acre reservoir, approximately 23 feet deep (240,000 acre-feet); a 6,500 acre Stormwater Treatment Area (STA); and conveyance improvements to

the Miami and North New River Canals within the Everglades Agricultural Area. Alternative C240A will significantly increase CEPP flows to the central portion of the Everglades from an average annual flow of approximately 210,000 acre-feet to an average annual flow of approximately 370,000 acre-feet.

2. Alternative C240A is a modification of CEPP. On April 10, 2014, the Department issued its approval of CEPP pursuant to Sections 373.026(8)(b) and 373.1501(9), F.S.

3. The purpose of the Section 373.026(8)(b), F.S., review procedure is to ensure the State of Florida, at a preliminary stage in the process, is sufficiently familiar and comfortable with the project to allow the District to continue pursuing the project through the remaining state and federal processes. Therefore, before the District submits any project component to Congress for authorization or receives an appropriation of state funds, the Department is required to review the project component in accordance with Section 373.026(8)(b), F.S. This review process does not supercede, nor is a substitute for, any Department permitting action regarding the project.

4. In issuing this Order, the Department finds that the District has provided sufficient information to demonstrate compliance with the criteria outlined in Section 373.1501(5), F.S., for the amendments to CEPP as set forth in Alternative C240A. The Department bases this finding primarily on the following documents:

a. South Florida Water Management District, Central Everglades Planning Project - Post Authorization Change Report, State Compliance Report, Section 373.1501, F.S. (February 13, 2018);

b. South Florida Water Management District, Central Everglades Planning Project – Draft Post Authorization Change Report (February 16, 2018);

c. South Florida Water Management District, Governing Board Meeting, Everglades Agricultural Area Storage Reservoir Project Update, Agenda Item 27 (February 8, 2018);

d. United States Army Corps of Engineers (Corps), Report of the Chief of Engineers, Central Everglades Planning Project, Comprehensive Everglades Restoration Plan, Central and Southern Florida Project (December 23, 2014);

e. United States Army Corps of Engineers, Jacksonville District – Final Integrated Project Implementation Report and Environmental Impact Statement (PIR/EIS) - Central Everglades Planning Project (December 2014);

f. South Florida Water Management District, Governing Board Resolution No 2013-0815 (August 2013);

g. South Florida Water Management District, Governing Board Resolution No 2014-0410 (April 2014);

h. South Florida Water Management District, Letter of Support for the Central Everglades Planning Project Final Integrated Project Implementation Report and Environmental Impact Statement (April 2014); and

i. South Florida Water Management District, Central Everglades Planning Project Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents (April 2014)

5. Section 373.1501(5)(a), F.S.: Comprehensive Needs Analysis and Evaluation: Based upon the information provided, the Department concludes that the District has met their requirements set forth in Section 373.1501(5)(a), F.S. The District has analyzed and evaluated the Project such that all needs will be met in a comprehensive manner and that all applicable water resource issues have been adequately considered,

including water supply, water quality, flood protection, threatened and endangered species, and other natural system and habitat needs.

a. Other Natural System and Habitat Needs – The District has adequately demonstrated that natural system and habitat needs were considered through the plan formulation process, in which alternatives were developed and refined according to their ability to meet the goals and objectives of the project. As required by CERP, the project will produce important environmental benefits by providing specified flows and more natural hydropatterns in the central Everglades and reducing harmful discharges to the Caloosahatchee and St. Lucie Estuaries. Furthermore, the District has stated the additional flows to the Everglades will be protected by rule.

b. Water Quality – The District has adequately demonstrated that all applicable water quality issues have been analyzed and evaluated. These analyses were primarily based on the Dynamic Model for Stormwater Treatment Areas (DMSTA). The DMSTA modeling predicts that STA discharges will meet the applicable water quality based effluent limit (WQBEL). Regardless of the modeling predictions, existing permit conditions ultimately require attainment with the WQBEL. The permit condition will continue to apply to both current and future STAs. The following is also assumed and expected:

1) The project will be designed to treat all beneficial flows to the Everglades Protection Area predicted by the Regional Simulation Model so that the applicable WQBEL will be attained.
2) The real time operational decisions made by the District will prevent the majority of diversions predicted by DMSTA, as demonstrated in Water

Year 2018. Moreover, the Department's existing permits restrict diversions to specified, limited circumstances, and these permit conditions will continue to apply in the future.

3) The modeling contains various conservative assumptions and practices to provide certainty that the applicable WQBEL will be achieved by the project. Although all modeling and associated assumptions have some level of uncertainty, permitting requirements applicable to the STAs ensure the WQBEL will ultimately be achieved. In the event the WQBEL is not attained, additional actions to meet water quality requirements must be undertaken. For example, the District could convert portions of the A-1 Flow Equalization Basin to a STA.

c. Flood Protection – The District has adequately demonstrated that flood protection issues have been analyzed and evaluated. The District performed modeling and engineering analyses to demonstrate the project will maintain or improve levels of flood protection to the project area, including the Seminole Tribe of Florida's Big Cypress Reservation and the Miccosukee Tribe of Indians of Florida's reservation areas. 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.

d. Threatened and Endangered Species – The District has adequately considered potential impacts to threatened and endangered species. To comply with the Endangered Species Act (ESA), the District has drafted a Biological Assessment (Annex A) in preparation for consultation with the U.S. Fish and

Wildlife Service. The SFWMD understands that the USACE will be initiating government-to-government consultation upon submittal of the PACR to the Assistant Secretary of the Army Civil Works. The District has coordinated and will continue to coordinate with the United States Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission to address potential impacts to threatened and endangered species that may arise as a result of the project.

e. Water Supply – The District has demonstrated that water supply issues were adequately considered. The project shall not diminish the quantity of water available to existing legal users. Water for the natural system necessary to ensure project benefits will be protected under Florida law.

6. Section 373.1501(5)(b), F.S.: Determination of Project Feasibility: Based upon the information provided, the Department concludes that the District has met their requirements set forth in Section 373.1501(5)(b), F.S. The District has determined with reasonable certainty that the Project is feasible based upon standard engineering practices and technologies and is the most efficient and cost-effective of feasible alternative, consistent with Restudy purposes, implementation of project components, and operation of the Project.

7. Section 373.1501(5)(c), F.S.: Consistency with Applicable Law and Regulations: Based upon the information provided, the Department concludes that the District has met their requirements set forth in Section 373.1501(5)(c), F.S. The District has determined with reasonable certainty that the Project is consistent with applicable laws and regulations, and can be permitted and operated as proposed. A pre-application conference for the CEPP-PACR EAA Reservoir was held on January 12, 2018, between agencies with applicable regulatory jurisdiction, as required by Section 373.1501(5)(c),

F.S.

8. Section 373.1501(5)(d), F.S.: Reasonable Assurances: Based upon the information provided, the Department concludes that the District has met their requirements set forth in Section 373.1501(5)(d), F.S. The District has provided reasonable assurances that the quantity of water available to existing legal users shall not be diminished by implementation of the Project 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, and that water management practices will continue to adapt to meet the needs of the restored natural environment. 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.

9. Section 373.1501(5)(e), F.S.: Coordination with Existing Utilities and Public Infrastructure: Based upon the information provided, the Department concludes that the District has met their requirements set forth in Section 373.1501(5)(e), F.S. The District provided information to ensure that implementation of the Project has been coordinated with existing utilities and public infrastructure, and that impacts to and relocation of existing utilities or public infrastructure are minimized.

10. The Department finds that amendments to CEPP as set forth in Alternative C240A, meet the criteria of Section 373.1501(5), F.S. Such finding is predicated upon acceptance of the conditions in the referenced documents by the Corps without substantive changes. If the Department finds that the District or Corps has made substantive changes to the referenced documents, the Department may vacate this Order.

THEREFORE, IT IS ORDERED that Alternative C240A is approved without amendment under Section 373.026(8)(b), F.S.

NOTICE OF RIGHTS

This agency action is final and effective unless a timely petition for an administrative hearing is filed under §§ 120.569 and 120.57, F.S., before the deadline for filing a petition. The procedures for petitioning for a hearing are set forth below.

A person whose substantial interests are affected by the Department's proposed agency action may petition for an administrative proceeding (hearing) under §§ 120.569 and 120.57, F.S. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. Petitions by the applicant or any of the parties listed below must be filed within 21 days of receipt of the written notice. Petitions filed by other persons must be filed within 21 days of publication of the notice or receipt of the written notice, whichever occurs first. The petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. The failure of any person to file a petition within the appropriate time period shall constitute a waiver of the person's right to request an administrative determination (hearing) under §§ 120.569 and 120.57, F.S. Any subsequent intervention (in a proceeding initiated by another party) will be only at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

A petition that disputes the material facts on which the Department's action is based must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, any e-mail address, any facsimile number, and telephone number of the petitioner, if the petitioner is not represented by an attorney or a qualified representative; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the agency's proposed action;

(f) A statement of the specific rules or statutes the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and

(g) A statement of the relief sought by the petitioner, stating precisely the action petitioner wishes the agency to take with respect to the agency's proposed action.

A petition that does not dispute the material facts on which the Department's action is based shall state that no such facts are in dispute and otherwise shall contain the same information as set forth above, as required by Rule 28-106.301, F.A.C.

Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any such final decision of the Department have the right to petition to become

a party to the proceeding, in accordance with the requirements set forth above.

Mediation is not available in this proceeding.

Any party to this order has the right to seek judicial review of it under § 120.68, F.S., by filing a notice of appeal under rule 9.110 of the Florida Rules of Appellate Procedure with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, and by filing a copy of the notice of appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice of appeal must be filed within 30 days after this order is filed with the clerk of the Department.

DONE AND ORDERED on this 5th day of March, 2018, in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

Noah Valenstein
Secretary

FILED, on this date, pursuant to 120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk 3/5/18 Date