ANNEX B

ANALYSES REQUIRED BY WRDA 2000 AND FLORIDA STATE LAW

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ANALYSES REQUIRED BY WRDA

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. 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 South Florida Water Management District (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. 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 procedures be developed for identifying water generated by CERP for use in the human environment. Identification of the quantity, timing, and distribution of this water for other water-related should be included in PIRs.

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://www.evergladesplan.org/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 scale and available were applied to conduct the necessary analyses. The analyses completed for the CEPP PIR, which are 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 project objectives.

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

Section B.2.3 contains a description of the assumptions, concepts, and methodologies applied for the CEPP 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 final 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 formulation redline) 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 entire CEPP 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 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 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 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 study area, as described in **Section 2.5** of the PIR 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 alternatives were analyzed as the next–added increment of CERP projects to be added to a system of projects identified as likely to have been implemented prior to implementation of the CEPP project. The CEPP recommended plan (Alt 4R2) was formulated, evaluated, and justified based on the ability of the CEPP recommended plan: (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. All of 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.

CEPP achieves the project objectives by changing the timing, distribution, and volume of water conveyed, to the natural system. The large regional scale of the CEPP 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 Savings Clause and project assurances analyses 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 National Ecosystem Restoration (NER) Plan, which is described in **Section 4.6.2** of the PIR 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 three different points in time or conditions as depicted in **Table B-2**. Following identification of the recommended plan in June 2013, the CEPP base condition assumptions established for plan formulation were subsequently revisited and updated to represent the most current information for the analysis of Savings Clause requirements and Project-Specific Assurances. Specifically, the Existing Condition Baseline (ECB) was updated to 2012EC and the Future Without Project baseline (FWO) was updated utilizing new information for the Initial Operating Regime Baseline (IORBL1). Comparison of the CEPP Recommended Plan (Alt 4R2) 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 (ECB, 2012EC, FWO, and IORBL) and Alternative 4R2 (Alt 4R2) are provided in Reference 2 of the Hydrologic Modeling Annex (A-2) to the Engineering Appendix (Appendix A).

The revised 2012 Existing Condition Baseline (2012EC) updated the ECB to include implementation of Everglades Restoration Transition Plan (ERTP) operations for WCA-3A and the South Dade Conveyance system, in addition to minor localized corrections to improve RSM-GL representation of the S-9/S-9A operations and the L-28 weir (all other ECB assumptions remain unchanged). The revised Initial Operating Regime Baseline (IORBL1) updated the FWO to include the 2.6 mile western Tamiami Trail bridge proposed with the initial increment of the DOI Tamiami Trail Next Steps Project (based on best available phased implementation information from DOI), operational updates to the CERP Indian River Lagoon South (IRLS) project (based on best available information from the IRLS project team), and operational refinements to the CERP Broward County Water Preserve Area project (to reduce excess discharges to tide via S-29, including accounting for the effects of the Lake Belt expansion assumed in the CEPP FWO condition), in addition to the same minor localized corrections included with the 2012EC to improve RSM-GL representation of the S-9/S-9A operations and the L-28 weir (all other FWO assumptions remain unchanged). The 2012EC and the IORBL1 represent the existing condition baseline and future without project baseline assumptions for purposes of completing the CEPP assessments for the Savings Clause and Project Assurances. Compared to the FWO baseline, the updated IORBL1 baseline indicates significant hydrologic differences with respect to the Saint Lucie Estuary and Biscayne Bay, with other portions of the CEPP project area performing similar to the FWO; a summary of these performance differences between the FWO and IORBL1 is provided in Appendix C.2.2 for the St. Lucie Estuary and Biscayne Bay.

The CEPP PIR report documentation and two complete sets of RSM-BN and RSM-GL hydrologic model performance measure output are posted on the Everglades Plan public web site for the CERP: http://www.evergladesplan.org/pm/projects/proj_51_cepp.aspx

The following complete performance measure data sets are provided to facilitate additional review of the hydrologic modeling output for the baselines and the Recommended Plan Alt 4R2:

- ECB, FWO, Alternative 4R, Alternative 4R2 (comparison used for NEPA evaluation in Section 5 of the main PIR report)
- ECB, 2012EC, IORBL1, Alternative 4R2 (comparison used for the Savings Clause and Project Assurances evaluation in Annex B of the PIR report)

Final CEPP hydrologic modeling products have been uploaded to the CERP Model Management System (MMS), a geographic information system (GIS) based application that includes model input data, select model output data, source code/executable files and documentation. CEPP modeling products in MMS can be accessed directly at the MMS project page through the Everglades Plan public web site: http://cerpmap1.cerpzone.org/arcgisapps/CERPMMS/CerpReport/ProjectReport.aspx?projectID=687

Table B-1. Comprehensive Everglades Planning Project (CEPP) Objectives and Regional Changes to Quantity, Timing, Distribution, and Quality of Water

CERP GOAL: Enhance Ecological Values	
CEPP Objective	**Resulting Effect of Recommended Project**
Restore seasonal hydroperiods and freshwater distribution to support a natural mosaic of wetland and upland habitat in the Everglades system.	Increase in water conveyed to WCA 3A and WCA 3B in the dry season, decrease in water conveyed to WCA 2A and WCA 2B, and change in timing to improve ability to meet hydropattern and water quality restoration targets.
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 saltwater intrusion.	
Reduce high volume discharges from Lake Okeechobee to improve the quality of oyster and submerged aquatic vegetation (SAV) habitat in the Northern Estuaries.	Reduce high flow discharges to the Northern Estuaries by constructing increased water storage within the EAA, redirecting Lake Okeechobee discharges south for ultimate delivery to WCA 3A and the Everglades, and proposed minor modifications to the Lake Okeechobee Regulation Schedule that moderately increase the frequency, duration, and magnitude of peak lake stages.
Reduce water loss out of the natural system to promote appropriate dry season recession rates for wildlife utilization.	Increase in water conveyed to WCA 3A and WCA 3B, decrease in water conveyed to WCA 2A and WCA2B, change in timing to improve ability to meet hydropattern and water quality restoration targets, and increased canal discharges to Biscayne Bay.
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 water supply.	Increase water available in Lower East Coast Service Area 2 and Lower East Coast Service Area 3 for other water related needs.

Table B-2. Key Assumptions based on Summary Tables from EN Appendix and H&H Annex

Condition	Intent	Equivalent for Central Everglades Planning Project (CEPP)	Model Scenario
Pre-CERP Baseline	Conditions on the date of enactment of WRDA 2000 (December 2000), to provide a baseline to compare effects of project	Includes conditions in 2010 and most closely represents the Pre-CERP Baseline for LECSA 3, WCA 3 and ENP. Significant changed assumptions from the Pre-CERP Baseline include the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) and the Interim Operating Plan (IOP) for WCA 3A and the South Dade Conveyance System (SDCS) in the existing conditions baseline (ECB). A Pre-CERP Baseline is not available with the RSM.	**ECB**
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.	2012 conditions with only the projects and operations approved and in effect. Includes 2008 LORS and the Everglades Restoration Transition Plan (ERTP) for WCA 3A and the SDCS. Permitted demands are included.	**2012EC**
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 associated operations. Includes LORS 2008 and ERTP. Permitted demands are included.	**IORBL1**

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 CEPP 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 CEPP 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 CEPP project, as described in Section B.2.1, focus on meeting hydrologic restoration targets for the 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, the effects of the CEPP project alone can be isolated from intervening non-CERP and/or other CERP project effects. 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 CEPP project 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., LORS 2008, Modified Waters Deliveries to Everglades National Park (MWD), C-111 South Dade, IOP, ERTP, Everglades Construction Project (ECP), 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 CEPP 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 to the representation of the existing condition at the time of the Recommended Plan selection (2012EC base condition) includes the effects of intervening non-CERP activities since it reflects 2012 conditions. The second potential comparison to the ECB, which represents system condition at the start of CEPP formulation in 2010-2011, does not include effects from implementation

of the ERTP for WCA 3A and the SDCS (October 2012), an intervening non-CERP activity. The original Pre-CERP Baseline, which is not used for the CEPP 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 the effects of the CEPP project only is the Initial Operating Regime with the project (Recommended Plan Alt 4R2) compared to the Initial Operating Regime without the project (IOR Baseline IORBL1). However, based on the plan formulation assumptions established for CEPP, the simulations for Alt 4R2 and the IORBL1 also include the effects of intervening CERP activities that were assumed to be implemented prior to the CEPP for the future without project condition, including: 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. 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 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 (IORBL1) and the updated Existing Condition baseline (2012EC) shall not constitute a Savings Clause violation for CEPP. Non-CEPP Savings Clause impacts that are projected with implementation of intervening CERP activities will need to be addressed during implementation of these non-CEPP CERP projects. 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.

For the CEPP, the equivalent step-wise comparisons can be found in **Table B-3**.

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

Step	Base Condition Model Run	With Project Model Run
1	Existing Conditions Baseline – 2012EC	Initial Operating Regime – Alt 4R2
2	Existing Condition Baseline for formulation (2010) – ECB	Initial Operating Regime – Alt 4R2
3	Initial Operating Regime without the project – IORBL1	Initial Operating Regime – Alt 4R2
If no reduction at any step, then requirements of Savings Clause have been met.		

In this analysis, the focus is to determine the potential effects of CEPP, and the analysis therefore compares the Initial Operating Regime with the project (Alt 4R2) to the Initial Operating Regime baseline without the project (IORBL1). This comparison segregates the effects of the intervening CERP and intervening non-CERP projects. In addition, Alt 4R2 is also compared to the two existing baseline conditions (2012EC and ECB). This additional analysis informs evaluators of the cumulative potential effects of both CEPP 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 of Existing Legal Sources

WRDA 2000, Section 601(h)(5)	User or Natural System Evaluated in CEPP
(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 • Biscayne Bay • 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 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. Significant changes to LECSA 1 (Palm Beach County) and the North Palm Beach Service Area are not indicated in the CEPP 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 the 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 objectives is for reduction of damaging high flows. For WCA 2 and WCA 3, the change in flows relative to CEPP objectives was evaluated. In addition, the hydrologic performance in WCA 2A consistent the mitigation associated with the pre-CEPP construction and operation of Compartment B of the ECP Stormwater Treatment Area (STA) 2 was also evaluated. For Biscayne Bay, the total water conveyed through coastal structures grouped by spatial regions (North, Central, South-Central, and South) within the bay is evaluated. The South-Central region flows were also compared to the target flows identified in the Biscayne Bay Water Reservation Rule recently adopted by the SFWMD. The overland flows to Florida Bay at selected transects, Transect 27 for western Florida Bay and Transect 23 (including T23A, 2T3B, and T23C) for east/central Florida Bay), were also evaluated (**Figure B-1**).

In addition to the potential effects of changing the timing, distribution, or quantity of water due to CEPP implementation, the CEPP project features can directly impact the availability of water supplies. In CEPP, backfilling the Miami Canal directly affects the ability to convey water to the LECSA to meet agricultural and urban needs under certain conditions. The potential to limit conveyance options was evaluated by identifying alternatives routes and their capacities.

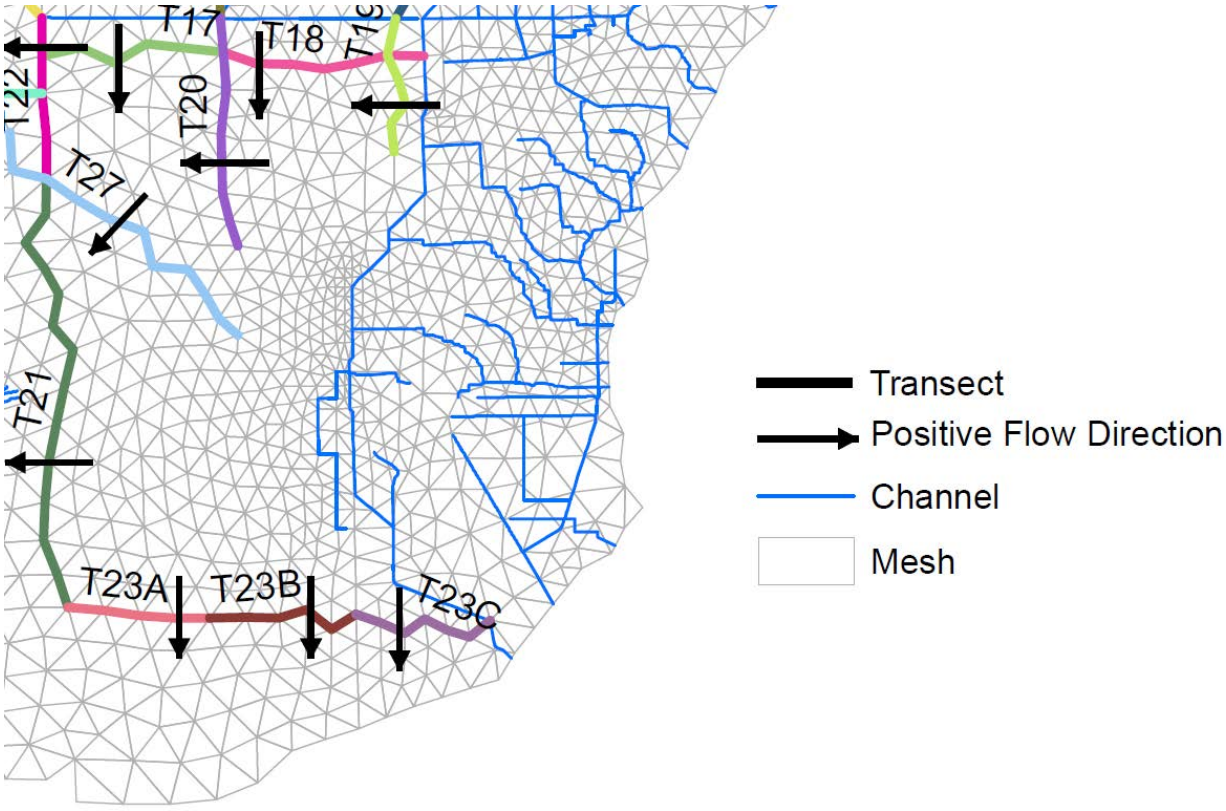

Figure B-1. Location Map for RSM-GL Transects Used for Florida Bay Analysis

B.2.2.1 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 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 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 draft 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 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 Flow Equalization Basin (FEB) 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.

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 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 USACE Major Rehabilitation Report (MRR) from 2000 divided the 143 mile dike into eight (8) Reaches with the initial focus on Reach 1. The current approved and planned remediation measures will address the highest points of potential failure in the system based on known areas of concern. These USACE efforts are intended to lower the DSAC rating from Level 1. The CEPP future without project condition assumes the planned remediation of HHD will lower the DSAC risk rating and be completed by 2022. These remediation measures will not resolve all issues with the HHD dam, nor will all current design criteria be met. To assess other issues and address future modifications with HHD, a comprehensive potential failure mode analysis and risk assessment is being performed and will be included in the ongoing USACE Dam Safety Modification Report (DSMR). This report is scheduled for completion/approval in 2015.

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.

FEB Located in the EAA

Consistent with CEPP modeling assumptions for the action alternatives, operational stages for the EAA FEB storage feature were typically managed between 1 and 3 feet depth, with no additional structural inflows from Lake Okeechobee allowed when the FEB depth exceeded 3.8 feet. Structural inflows to the FEB would be discontinued when depths exceed 4 feet, although additional rainfall may further increase stages. Hydraulic design of the FEB perimeter levee system included consideration of the stage variability for FEB operations. Within the RSM-BN modeling conducted to support the CEPP preliminary screening and alternative evaluations, the SFWMD Restoration Strategies FEB located on the EAA A-1 parcel and the CEPP FEB on the EAA A-2 parcel are represented as a single storage feature. Consistent with the evaluation approach identified in Draft Guidance Memoranda 3, the FEB 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, and the assessment does not further consider specific design flood targets such as the 10-year or 100-year flood event.

Detailed CEPP assessments within the EAA were not conducted because the RSM-BN does not simulate groundwater within the EAA. Therefore, based on the CEPP plan formulation modeling, it could not be determined whether the A-2 FEB meets the Savings Clause requirements to maintain the pre-existing levels of flood protection. Further assessment of potential effects from the A-2 FEB will be deferred to the preconstruction engineering and design phase (PED), and the A-2 FEB will be designed to specifications that meet applicable flood protection requirements. Information regarding the FEB design considerations for flood protection is included in Section B.3.2.2.

WCA 3A and WCA 3B

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).

The information on which the USACE relied on to require the ERTP WCA 3A Zone A as an interim risk reduction measure for WCA 3A high water levels did not change prior to CEPP formulation, and no new information was available compared to the July 2010 assessment included as Appendix A-5 of the ERTP Final EIS. Throughout CEPP formulation, the USACE advocated that CEPP formulation efforts attempt to

maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the CEPP Future Without Project (FWO) condition used during formulation, which includes ERTP, given recognition of the WCA 3A high water concerns identified with ERTP; prior to CEPP formulation, the USACE explicitly recognized that 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 developed for CEPP (IORBL1) and the with-project condition (Alt 4R2); comparisons to the existing condition baseline (ECB and/or EC2012) are not provided since these comparisons were not utilized by USACE EN-W, as the ECB used during CEPP formulation included the IOP operations that were identified during ERTP as being no longer viable for water management within WCA 3A. EN-W also indicated that it would continue to rely on the WCA 3A three-gauge average stages for assessment of WCA 3A high water frequency, durations, and peak stages, consistent with the original WCA 3A design assumptions and the ERTP assessment (average of stages at the monitoring gages of 3A-3, 3A-4, and 3A-27); increased weight would not be considered for a single gage, such as 3A-28 (Site 65). It was further noted that if CEPP can provide operational assurances of additional WCA 3A outlet capacity under high water conditions, including adequate consideration of potential WCA 3B seepage management and/or ecological operational limitations, the EN-W may be able to further consider proportional relaxation of the WCA 3A future without project high water duration and frequency targets.

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 percent 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 2012EC and IORBL1 baselines in the SDCS, which include the same water control plan for this part of the system, ERTP.

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 10 percentile, which were assumed as a representative indicator of potential increased flood protection risk.

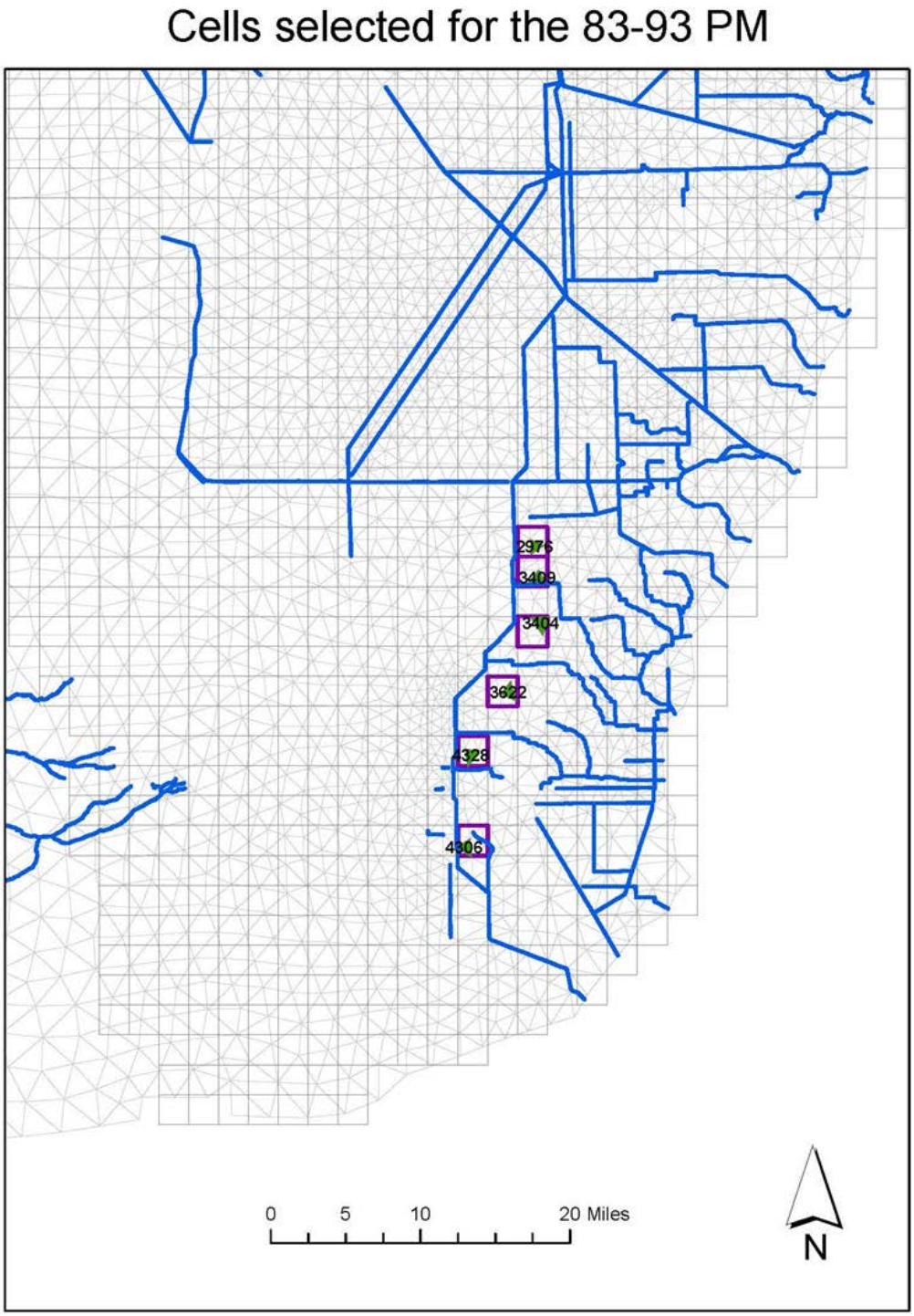

Figure B-2. Location of Cells Evaluation for Potential Effects to Agriculture in South Miami-Dade County

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 CEPP plan formulation resultant from water being made available by the project. The ability of the CEPP project features to provide water to meet other water-related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed for the recommended plan. The basins where the project potentially supplies water for the natural system or other water-related needs are listed below:

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

Identification of the water made available by the CEPP project requires additional analyses of the RSM-BN and RSM-GL results for the Recommended Plan Alt 4R2. The identification of water involves both 1) existing water in the system at the time of PIR development 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.

For CEPP, 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, the 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 without project initial operating regime (IORBL1). The total water available with the CEPP project is represented by the with project condition. For CEPP, the with project condition is equivalent to the Alt 4R2 model run. The difference between these two conditions represents the water made available by the project (Alt 4R2 minus IORBL1) as depicted in **Table B-5.**

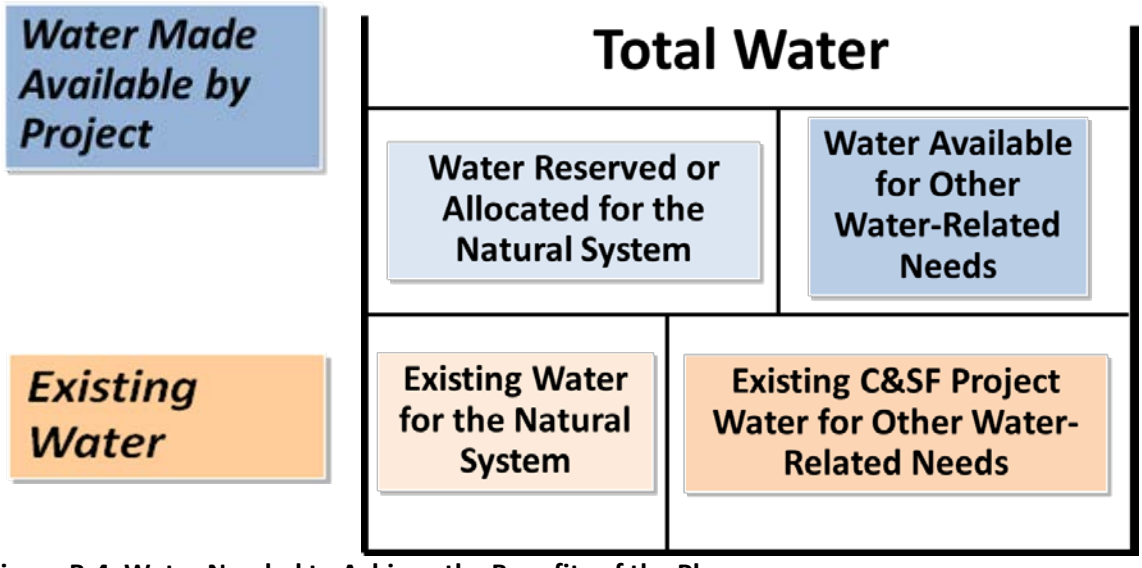

Figure B-4. Water Needed to Achieve the Benefits of the Plan

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	IORBL1
Total water for the natural system	ALT 4R2
Identification of water made available by the project	Difference between ALT 4R2 and IORBL1

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 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. These specified locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the recommended plan. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alt 4R2, 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/STA-6 outflows to WCA 3A. Inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G; Alt 4R2 only) and S-356 (Alt 4R2 only). Overland flows to Florida Bay are quantified for RSM-GL Transect 23 (southeast ENP) and Transect 27 (Central Shark River Slough). 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 Alt 4R2 and the IORBL1. The difference between these conditions is the water made available by the CEPP project for the natural system. CEPP 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 (IORBL1) in LECSA-2 and LECSA-3 that could be met without affecting the benefits accrued to the natural system. The increase in demand is included in the with project condition, Alt 4R2.

B.3 Results

B.3.1 Elimination or Transfer of Existing Legal Sources of Water

B.3.1.1 Lake Okeechobee Service Area

Due to the reduction in irrigated land with the inclusion of the FEB on the EAA A-2 site, the demand for supplemental irrigation is reduced from an annual average of 339 thousand acre-feet (kAF) in the future without project condition (IORBL1) to 328 kAF in Alt 4R2.

Consistent with the WRDA 2000 and the Programmatic Regulations, the Savings Clause analysis removes the effects of the intervening non-CERP projects. The volume of demand not met for the LOSA during the eight years with the largest water shortage cutbacks in the period of simulation is the same or slightly improved when comparing the with project condition, Alt 4R2, and the without project

condition, IORBL1. In six of these years, the volume of demand not met is reduced (improved water supply performance) by approximately one to seven percent. In the two remaining years where the volume of demand not met increases compared to the without project condition (1981 and 1982), the increase is one percent or less (**Figure B-5**). Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 6 kAF (1%) in the with project condition compared to the without-project condition (Alt 4R2 and IORBL1 average 29 kAF and 35 kAF of cutbacks for EAA and Other LOSA combined, respectively) (**Figure B-6.**).

An additional analysis compares the 2012EC and ECB to Alt 4R2. The water supply demands met improve slightly. Of the eight years with the largest water shortage cutbacks, seven years indicate reduced cutbacks ranging between less than one to six percent for the with project condition (Alt 4R2), compared to the existing condition (2012 EC and ECB). In one year, 1989, the cutback percentage is increased by approximately one percent. Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 4 kAF (<1%) in the with project condition compared to the existing baselines (Alt 4R2 averages 29 kAF of cutbacks, and 2012EC/ECB average 33 kAF of cutbacks for EAA and Other LOSA combined).

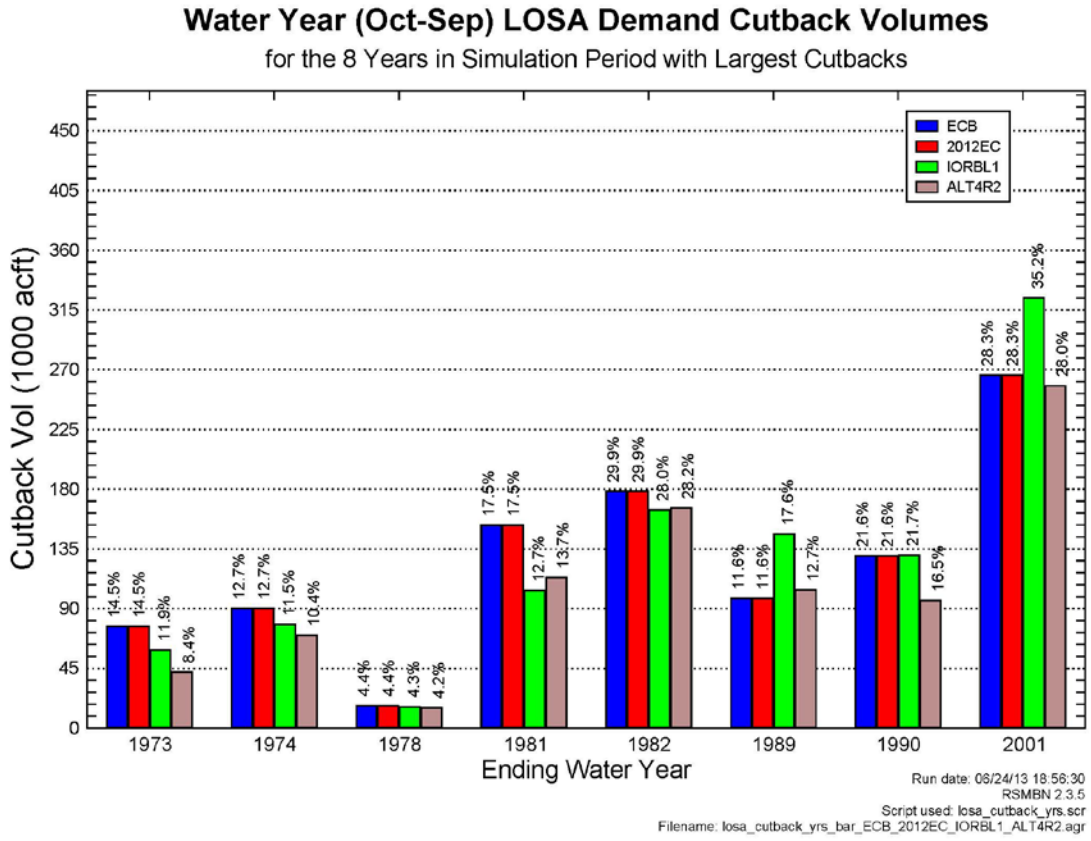

Figure B-5. LOSA Demand Cutback Volumes for the 8 Years with the Largest Cutbacks

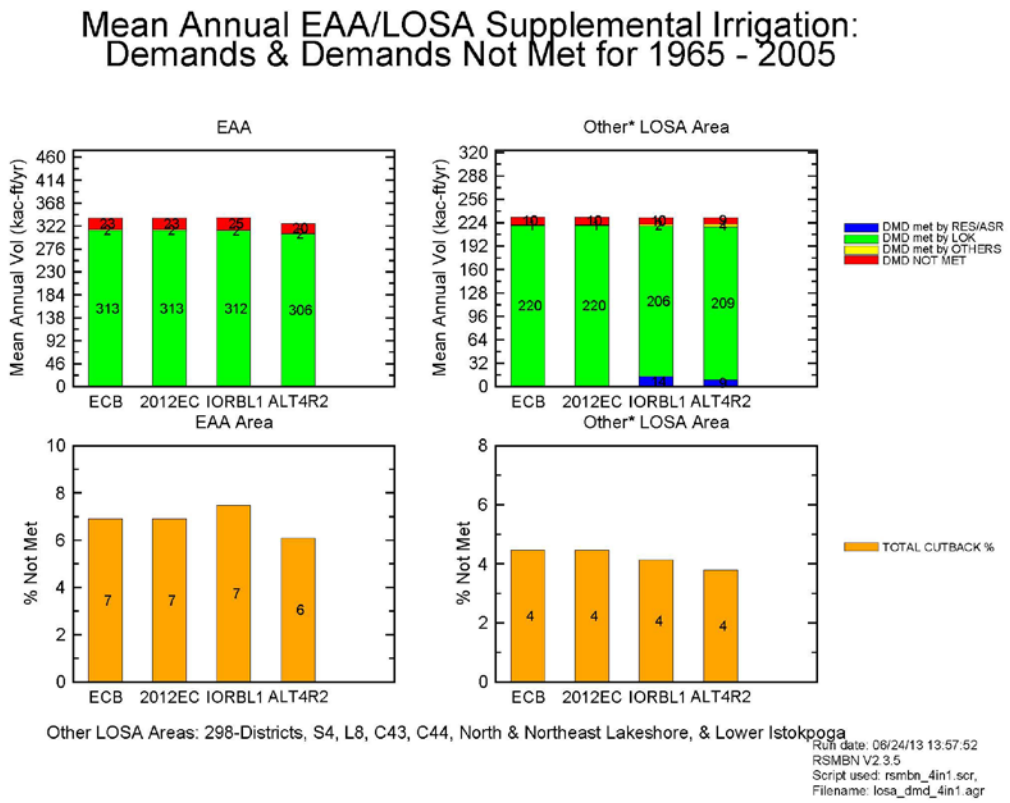

Figure B-6. Mean Annual EAA/LOSA Supplemental Irrigation: Demands & Demands Not Met for 1965–2005

Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee will be transferred to WCA 3 and further south as a result of the implementation of the recommended plan. This transfer is anticipated to occur after the modification of the Lake Okeechobee Regulation Schedule that will allow full utilization of the CEPP A-2 FEB. The recommended plan has identified an additional source of water of comparable quantity and quality that will be available to replace the water sent south. Instead of discharging all water stored in the reservoir to tide via the S-80 or to meet C-44 Basin agricultural water supply demands, as assumed in the future without project IORBL1 baseline condition operations, the recommended plan retains a portion of the water stored in the CERP IRL-S C-44 Reservoir/STA in the regional system for backflow to Lake Okeechobee via the C-44 Canal and raises the Lake Okeechobee stage criteria to allow increased C-44 Canal backflow. This added operation does not affect existing permitted allocations within the C-44 Basin. The additional C-44 Canal backflow operations to Lake Okeechobee included in the CEPP recommended plan 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. The operations do not benefit agricultural users in the C-23 Basin. The CEPP recommended plan backflow operations capture a portion of releases from the C-44 Reservoir/STA that would otherwise be directed to the Saint Lucie Estuary as excess water.

Specifically, the future without project condition (IORBL1) allows backflow to Lake Okeechobee from the C-44 Canal when S-308 (the Lake Okeechobee discharge structure to the C-44 Canal) is not open for regulatory discharges and when the stage in Lake Okeechobee is 0.25 feet below the base of the 2008 LORS low sub-band (within the baseflow sub-band), which varies between 13.0 and 14.5 feet NGVD seasonally. This operational assumption is consistent with the existing operational protocols of Lake

Okeechobee (2008 LORS) and the SFWMD Lake Okeechobee Water Shortage Management (LOWSM) operations. Discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are otherwise limited to environmental deliveries for the St. Lucie Estuary and C-44 Basin agricultural water supply demands during these backflow operations.

The CEPP recommended plan operations expand on the IORBL1 backflow to Lake Okeechobee through the following operational changes: 1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and 2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule (the bottom of this zone varies seasonally between 12.6 and 13.0 feet NGVD) to provide an additional source of backflow water to Lake Okeechobee. Water captured in the C-44 Reservoir/STA, includes excess water conveyed from the C-23 Canal and Basin (approximately 6 kAF on an average annual basis) that is not needed to meet the IRL-S North Fork water reservation target. The recommended plan operational changes result in an average annual increase in C-44 Canal backflow volume to Lake Okeechobee of 57.3 kAF (97.3 kAF in the recommended plan, compared to 40.0 kAF in the IORBL1) and an average annual increase in C-44 Reservoir discharges to the C-44 Canal of 21.3 kAF (37.6 kAF in the recommended plan, compared to 16.3 kAF in the IORBL1).

The transfer of water from Lake Okeechobee to WCA 3 would not be implemented until the CERP C-44 Reservoir/STA, the canal connecting the C-44 Reservoir to both the C-23 Basin and the C-23 Canal, and the CEPP FEB on the EAA A-2 site are operational. If the canal to the C-23 Basin and the C-23 Canal is not operational when the CEPP FEB on the EAA A-2 site is ready to store water, the operations, and ultimately the delivery of water from Lake Okeechobee to the CEPP FEB, may need to be modified to avoid elimination of this portion of the source of water for the LOSA. The water retained in Lake Okeechobee also maintains the level of service for water supply for existing legal users dependent on Lake Okeechobee and its connected conveyance system. Specifically, this includes the agricultural users in the LOSA and the Seminole Tribe of Florida.

B.3.1.2 Lower East Coast Service Area

Existing legal sources of water in the Lower East Coast Service Area (LECSA) 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. CEPP Alt 4R2 project 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 the CEPP project provides to WCA 3A will meet State water quality standards as required by Section 385.53(b)(3)(i) of the Programmatic Regulations. This additional water 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 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 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 (Alt 4R2) 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. If the local groundwater levels trigger increased water shortage cutbacks, the trigger may either be the result of changed local groundwater conditions resulting directly from the CEPP project or more locally triggered cutback events becoming apparent as the lake triggered cutback events decline in frequency with the moderate to significant increase to Lake Okeechobee stages with Alt 4R2. In the case of the CEPP, increased LECSA water shortage cutbacks triggered by local groundwater stages are the result of the increased stages in Lake Okeechobee.

In the with project condition (Alt 4R2), 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. For the future without condition (IORBL1), the number of water years with lake triggered cutbacks is 16 events and groundwater triggered cutbacks is 16 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 significant change for water supply performance within LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events indicated in the Alt 4R2 or IORBL1 modeling simulations. The number and frequency of water years with cutback events declines since the lake triggered cutback events decline from 16 with the IORBL1 to 13 with Alt 4R2 due to the rise in lake stages with the inclusion of the project (**Figure B-9** and **Figure B-10**), indicating a small water supply improvement within LECSA 3. CEPP implementation will provide increased stages and extended hydroperiods within WCA 3B and NESRS, resulting in a net increase in average annual groundwater seepage flows from these natural areas to the adjacent LECSA 3. The increased seepage flows may slightly alter the water quality composition within the LECSA 3 surficial aquifer, through the relative increased contribution of groundwater seepage flows to the surficial aquifer recharge compared to the contribution from regional C&SF canal flows. These changes should result in either no significant change or a potential minor improvement to the water quality of withdrawals from the proximate public water supply wellfields within LECSA 3.

Comparisons to the existing condition base conditions (2012EC and ECB) indicate one additional water year cutback event with the existing condition compared to Alt 4R2 in LECSA2 (33 cutback events compared to 32 events). For LECSA 3, there are no locally triggered groundwater cutbacks events. The total number and frequency of lake triggered cutback events are the same for Alt 4R2 and the 2012EC/ECB, at 13 events (**Figure B-11** through **Figure B-14**).

A comparison of the regional groundwater stage difference map comparing Alt 4R2 and the IORBL1 was used to identify where systemic groundwater reductions may occur. The April 1989 and April 2001 difference maps were selected to determine whether the CEPP 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 Alt 4R2 and the IORBL1, the average April 1989 regional water levels were maintained (no significant change, compared to the IORBL1) in LECSA 2 and improved (higher levels) in LECSA3 (**Figure B-15**). 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 Alt 4R2 and the IORBL1, the average April 2001 regional water levels were maintained in LECSA 2, with only localized stage reductions observed for the CERP BCWPA C-11 impoundment (**Figure B-16**). Within LECSA3, April 2001 regional water levels were improved (higher levels) in northern LECSA3 (north of the S-331 pump station along the L-31N Canal, and generally maintained across most of southern LECSA3. However, during April 2001, minor localized groundwater reductions (0.10–0.15 feet) are observed along the C-111 Canal between S-331 and S-18C. Localized changes observed in this area may be addressed through further

operational refinements for 8.5 SMA, S-331, and the C-111 detention areas during PED, possibly with some additional water also being routed to Biscayne Bay. The groundwater stage difference map for April 1978, with 1978 being considered an average (non-drought) rainfall year, also warrants further discussion due to significantly drier stages observed across significant portions of LECSA3 east of the L-30 and L-31N Canals (**Figure B-17**)**.** Although this groundwater map indicates groundwater reductions between 0.25 and 1.0 feet during April 1978, minimum stages along the L-30 and L-31N Canals are maintained between 5.25 and 5.50 feet NGVD, which is significantly higher than the groundwater stages of 3.5–4.5 feet NGVD typical of drought conditions. The April 1978 groundwater stage reduction is therefore not indicative of a water supply performance concern with Alt 4R2. The root cause of this significant change is an undesirable dry season stage reversal within the WCA 3A and WCA 3B marsh starting in mid-January 1978, which is apparent in the stage hydrographs for Central WCA 3A (3A-4 gage), Southern WCA 3A (3A-28 gage; **Figure B-18**), and WCA 3B (Site 71) for the IORBL1, ECB, and 2012EC baselines. The ALT4R2 operations were regionally optimized to achieve dry season ecological targets and recession rates within WCA-3A, and the 1978 dry season stage reversal is no longer observed in the Alt 4R2 results. The hydrograph changes associated with this significant operational change within WCA 3A (stages are reduced by approximately 1.5 feet) are, in turn, translated and attenuated within the downstream stage hydrographs within WCA 3B and to the adjacent L-30 Canal (**Figure B-19**), and this change can be traced back to conditions within south-central CA-3A and WCA-3B. The average April groundwater stage difference map for the complete period of simulation (1965–2005) indicates no significant changes within LECSA 2 and LECSA3 (**Figure B-20**).

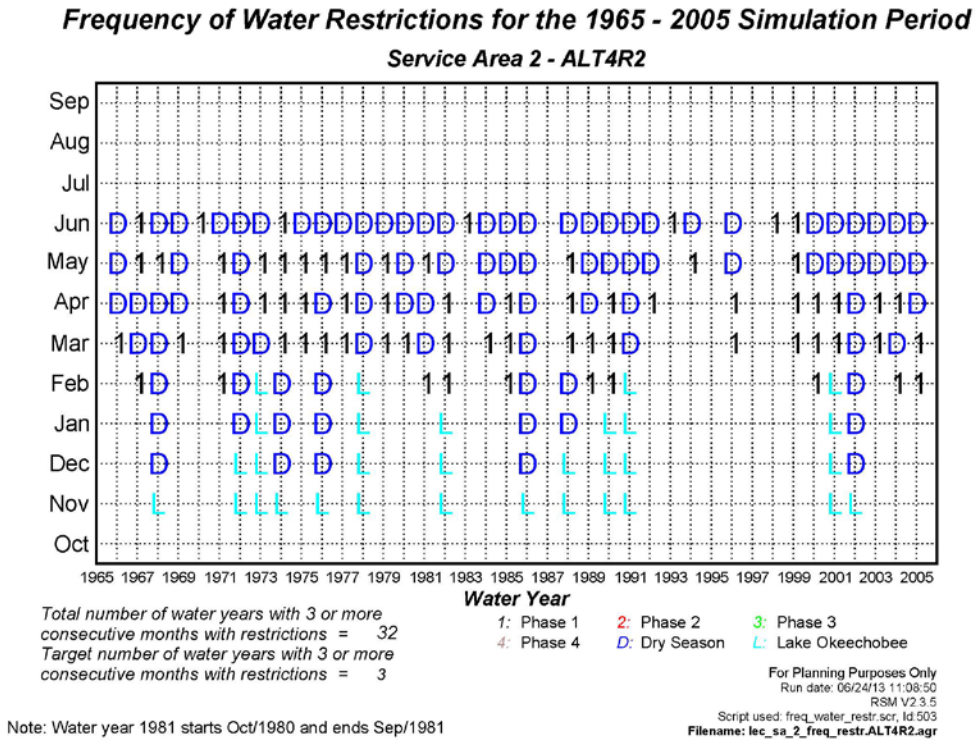

Figure B-7. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 Alt 4R2 Scenario

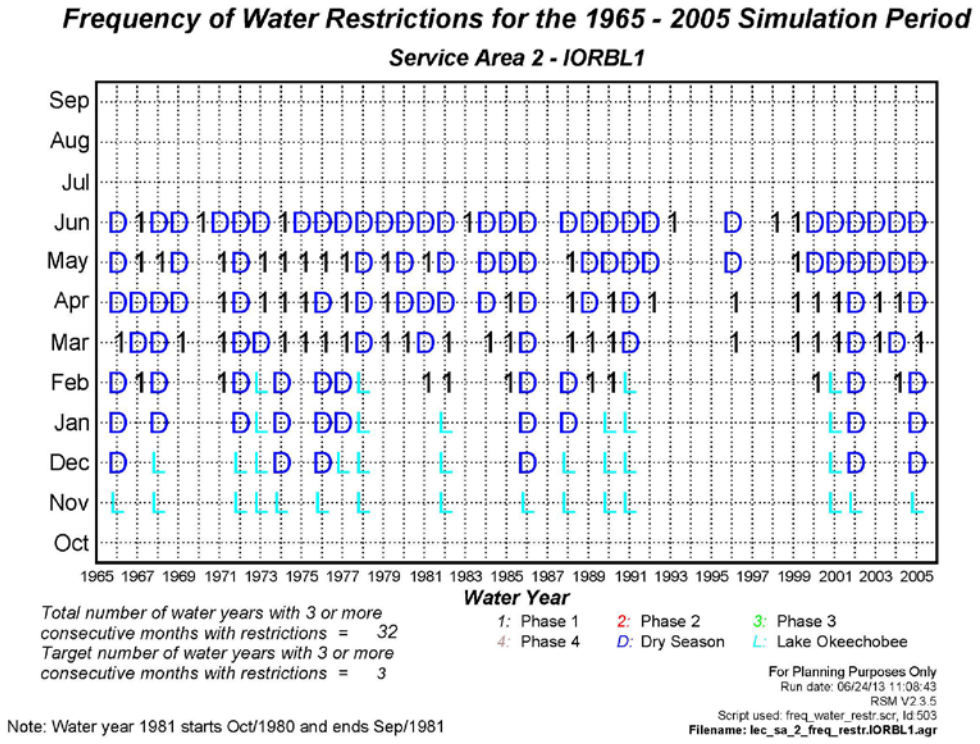

Figure B-8. Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 IORBL1 Scenario

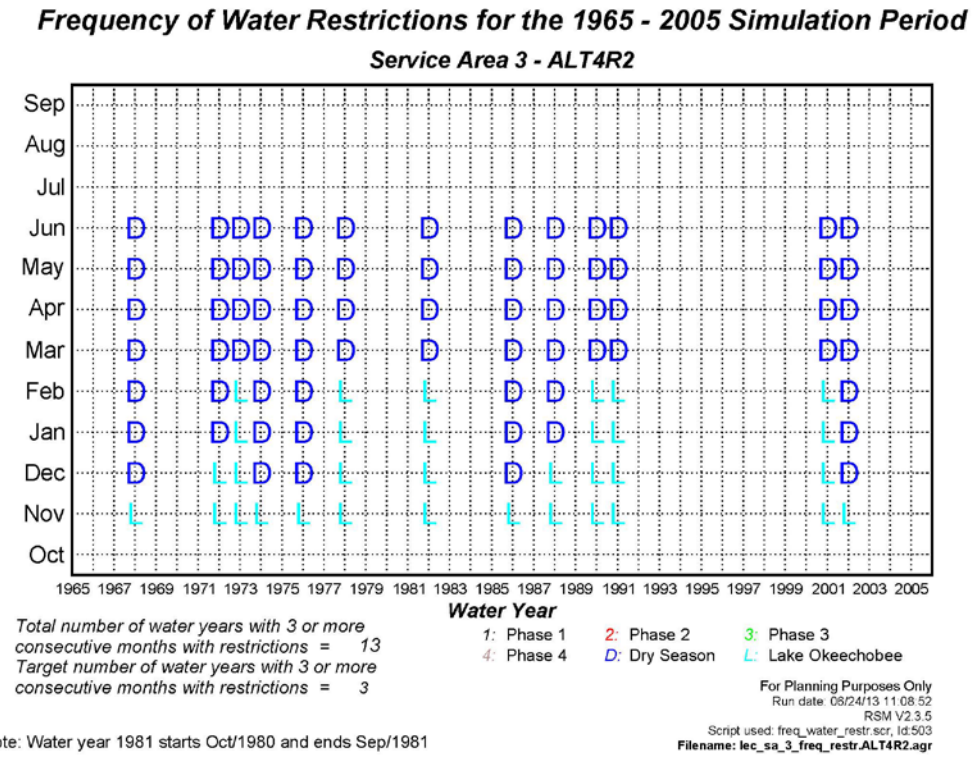

Figure B-9. Frequency of Water Restrictions for the 1965-2005 Simulation Period for the LECSA 3 Alt 4R2 Scenario

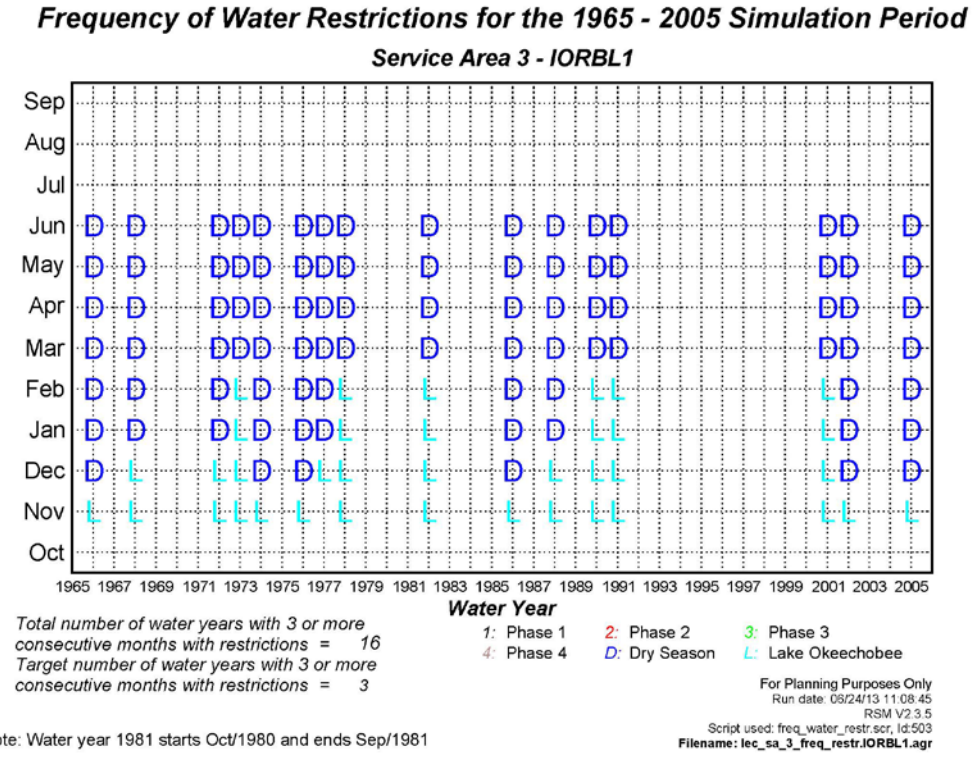

Figure B-10. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 IORBL1 Scenario

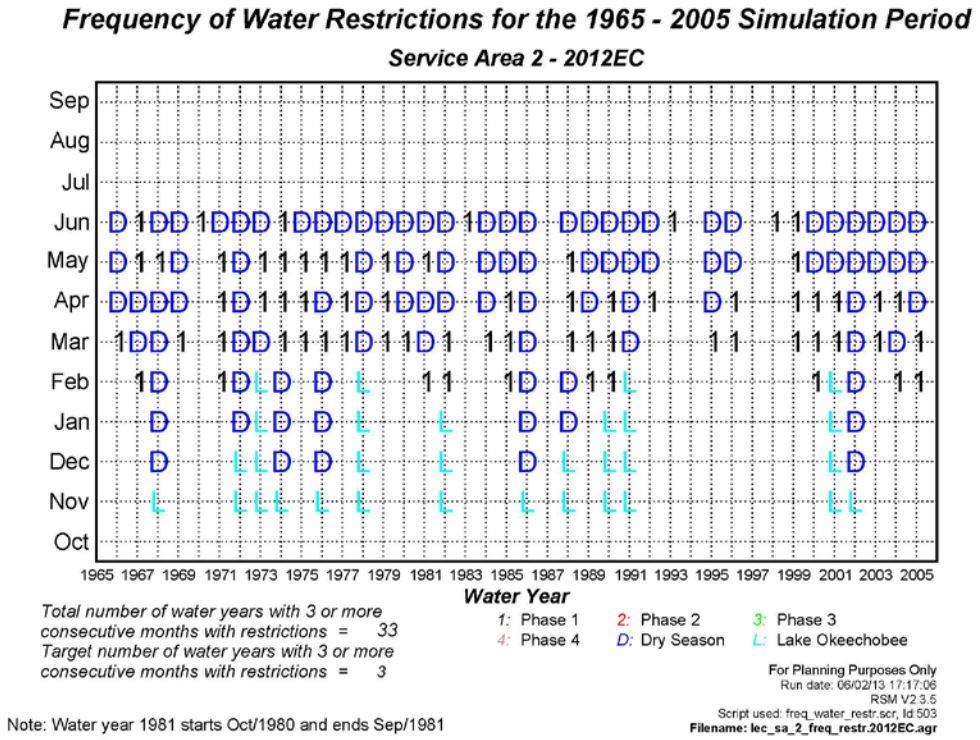

Figure B-11. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 2012EC Scenario

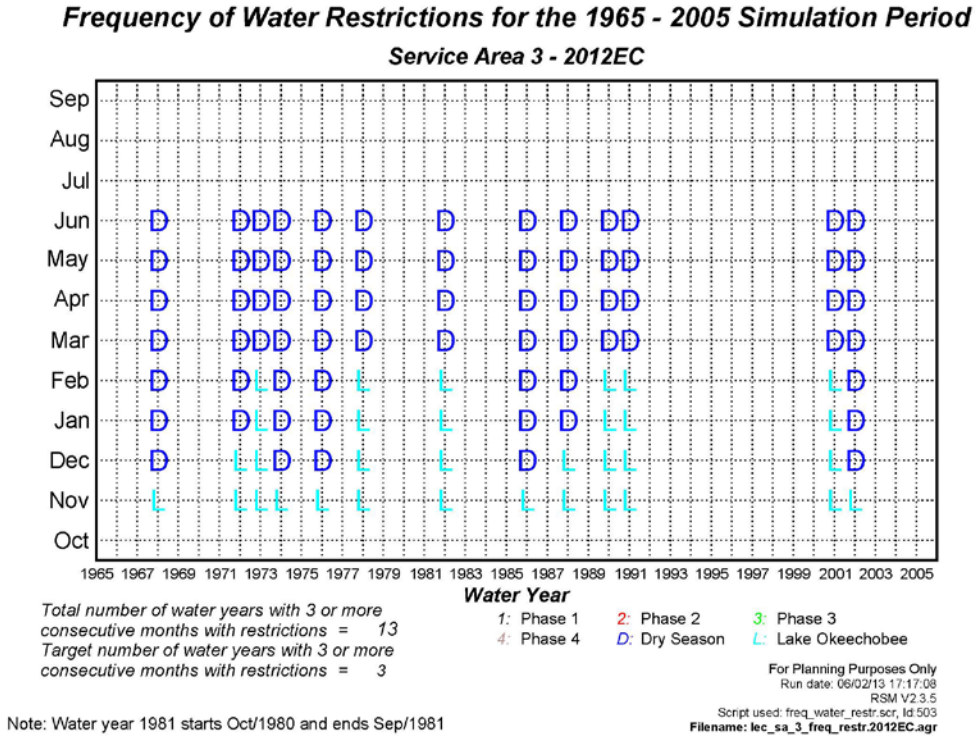

Figure B-12. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 2012EC Scenario

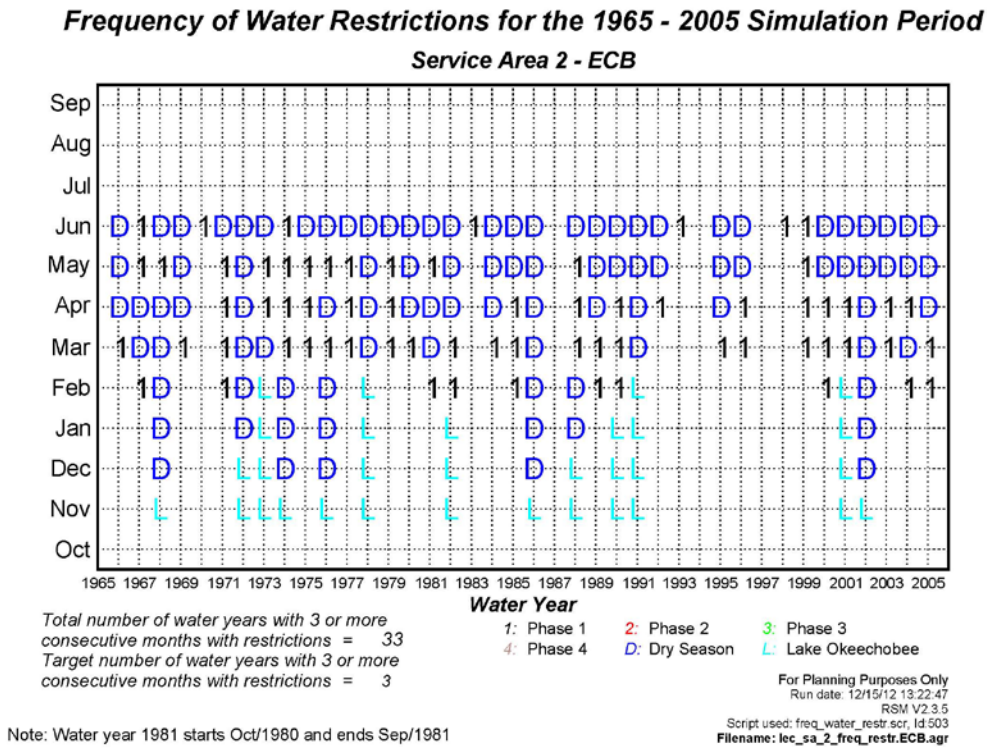

Figure B-13. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 ECB Scenario

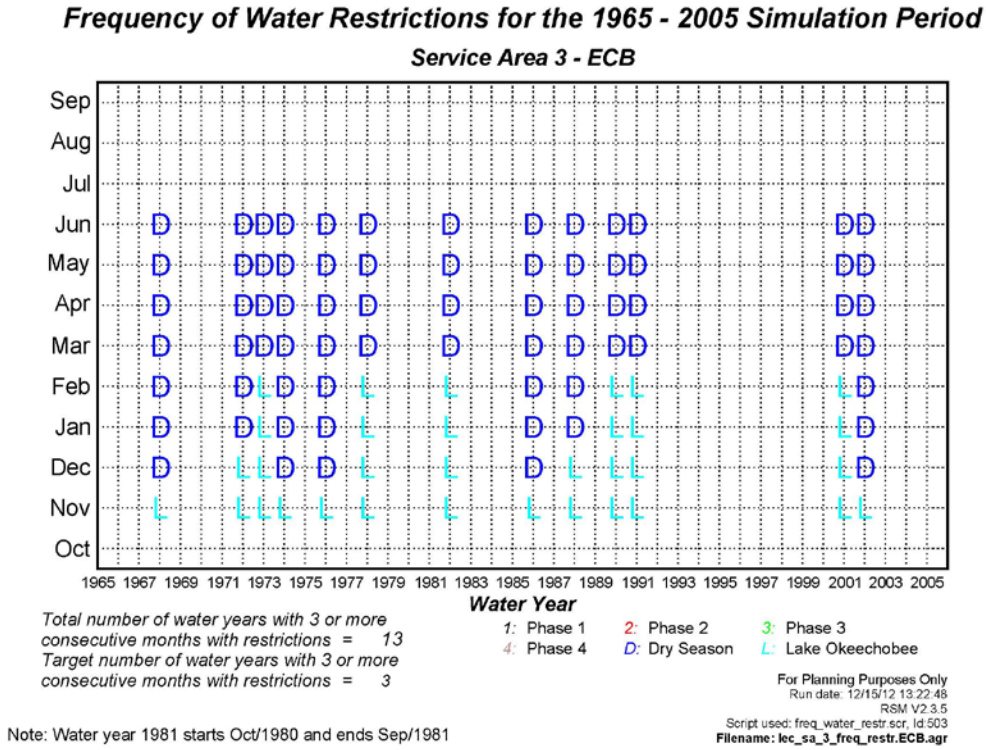

Figure B-14. Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 ECB Scenario

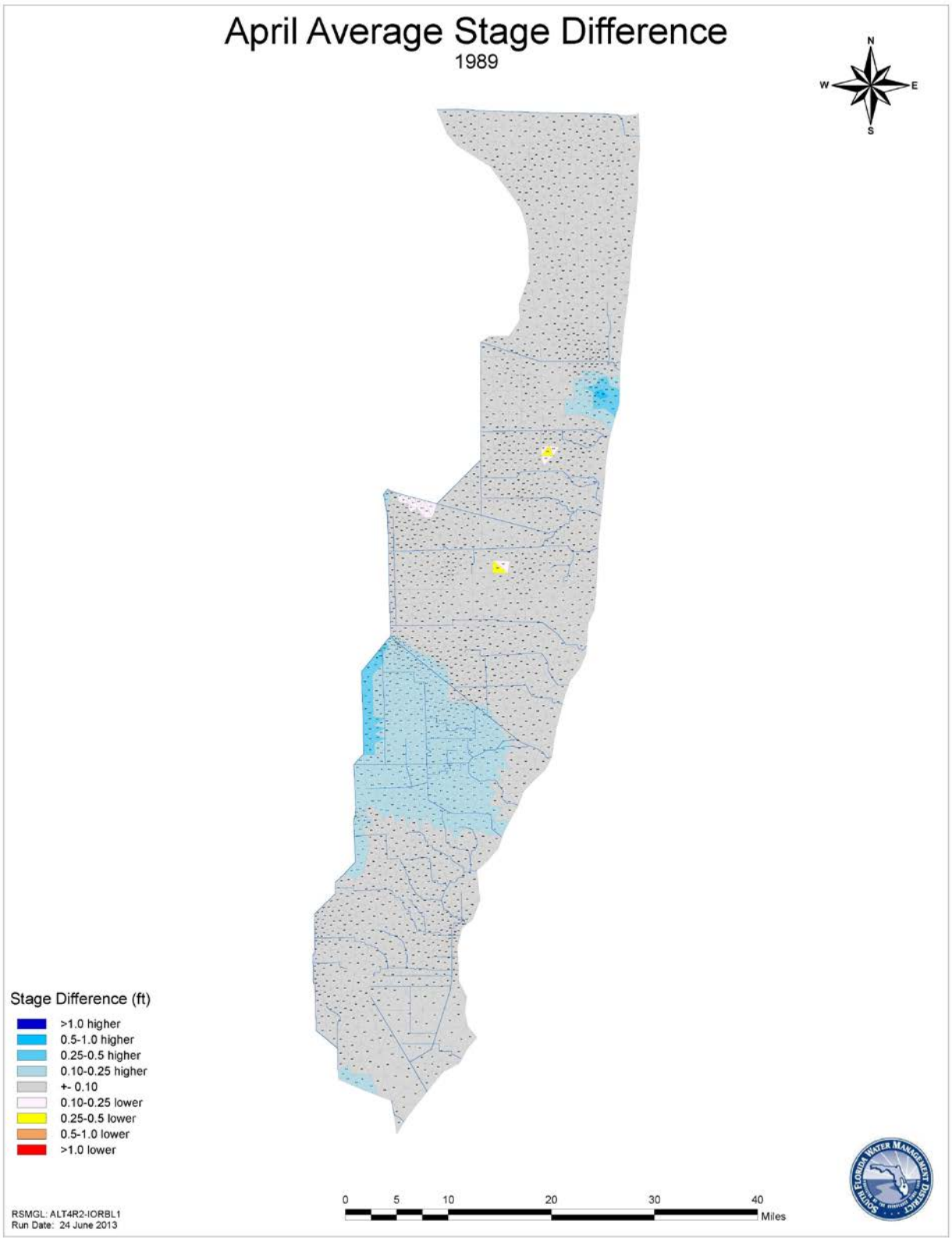

Figure B-15. April 1989 Groundwater Stage Difference Map for Alt 4R2 and IORBL1

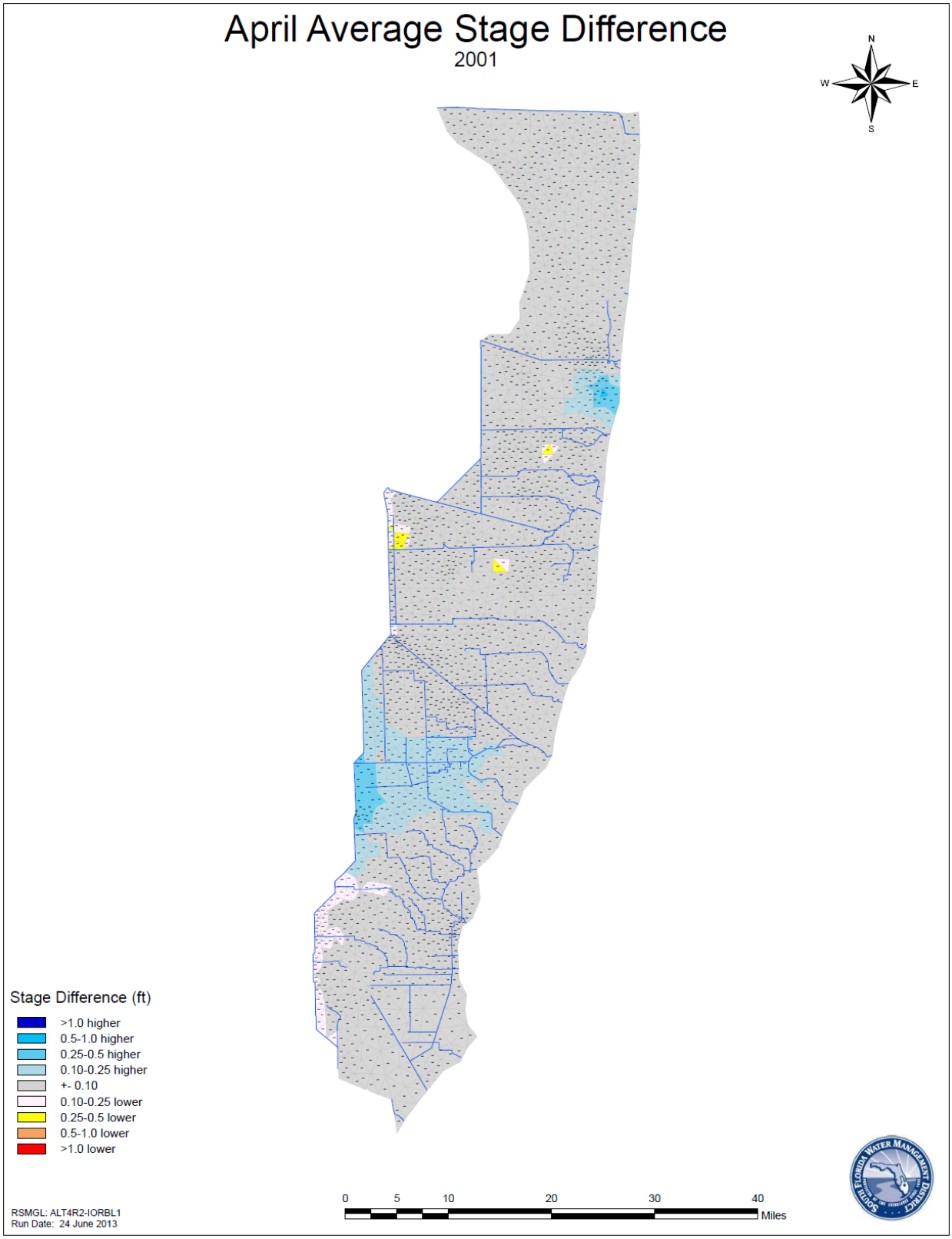

Figure B-16. April 2001 Groundwater Stage Difference Map for Alt 4R2 and IORBL1

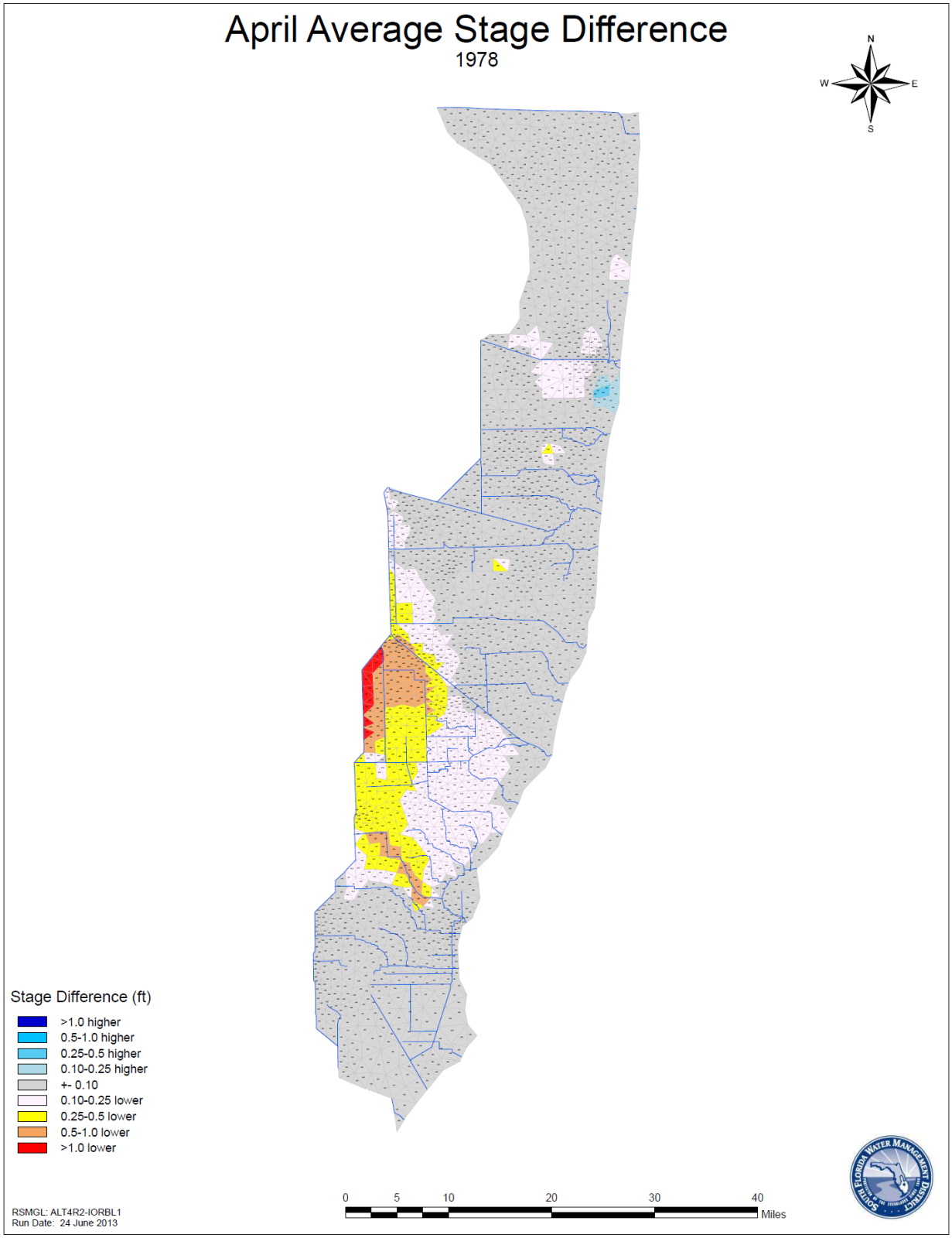

Figure B-17. April 1978 Groundwater Stage Difference Map for Alt 4R2 and IORBL1

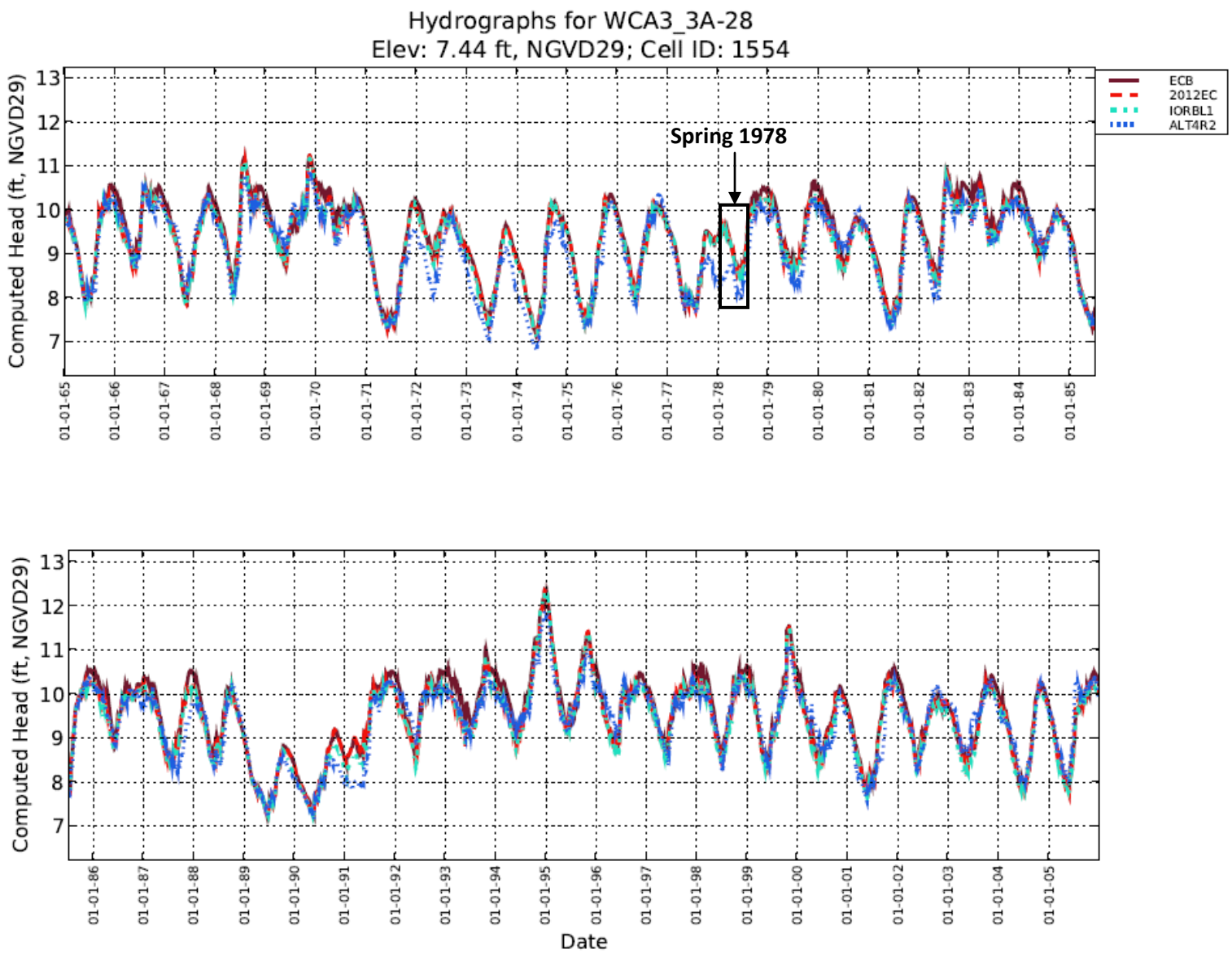

Figure B-18. Stage Hydrograph for Southern WCA 3A (3A-28) for 1965-2005 Period of Simulation

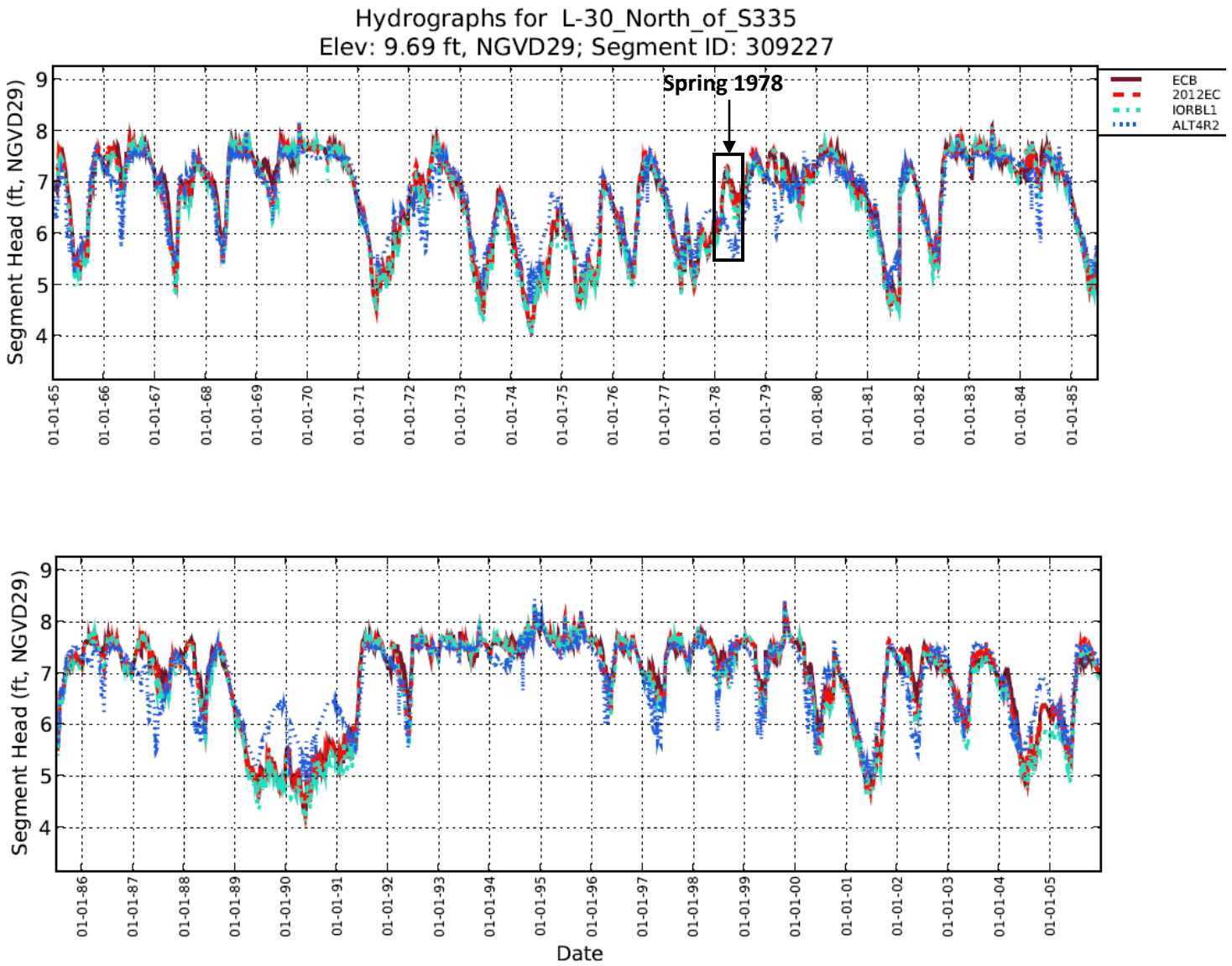

Figure B-19. Stage Hydrograph for L-30 Canal, East of WCA 3, for 1965-2005 Period of Simulation

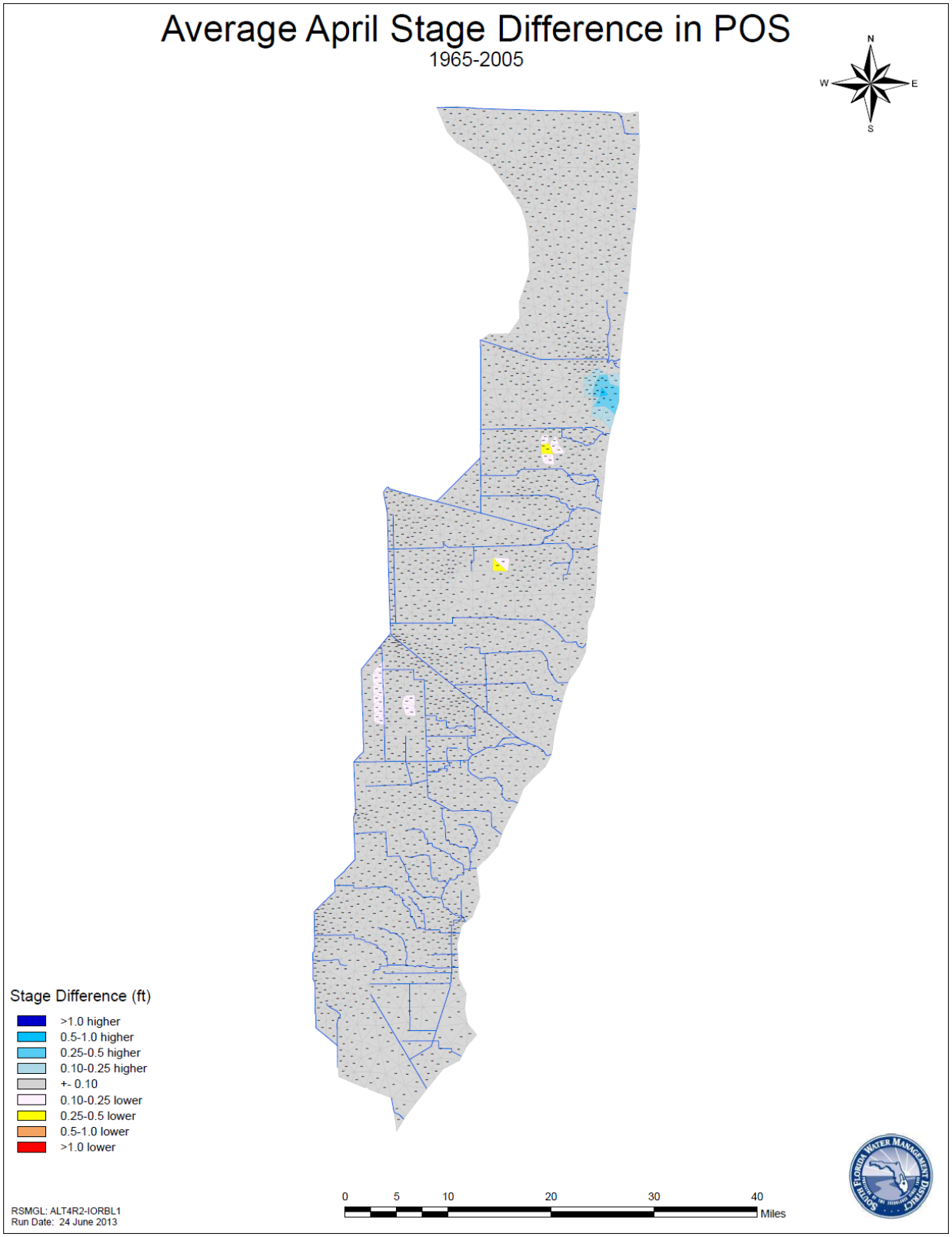

Figure B-20. Average April Stage Difference Map between Alt 4R2 and IORBL1 for 1965–2005

Ability to Delivery Water to LECSA with Miami Canal Backfilled

CEPP Alt 4R2 proposed to backfill the Miami Canal in WCA 3 from one to two miles south of the S-8 pump station to just north of I-75. Water supply deliveries previously made through the Miami Canal would be rerouted through the North New River (NNR) Canal (**Figure B-21**). Since 2003, this eastern route has been preferentially utilized by the SFWMD for water supply deliveries due to its proximity to Stormwater Treatment Area (STA) 3/4.

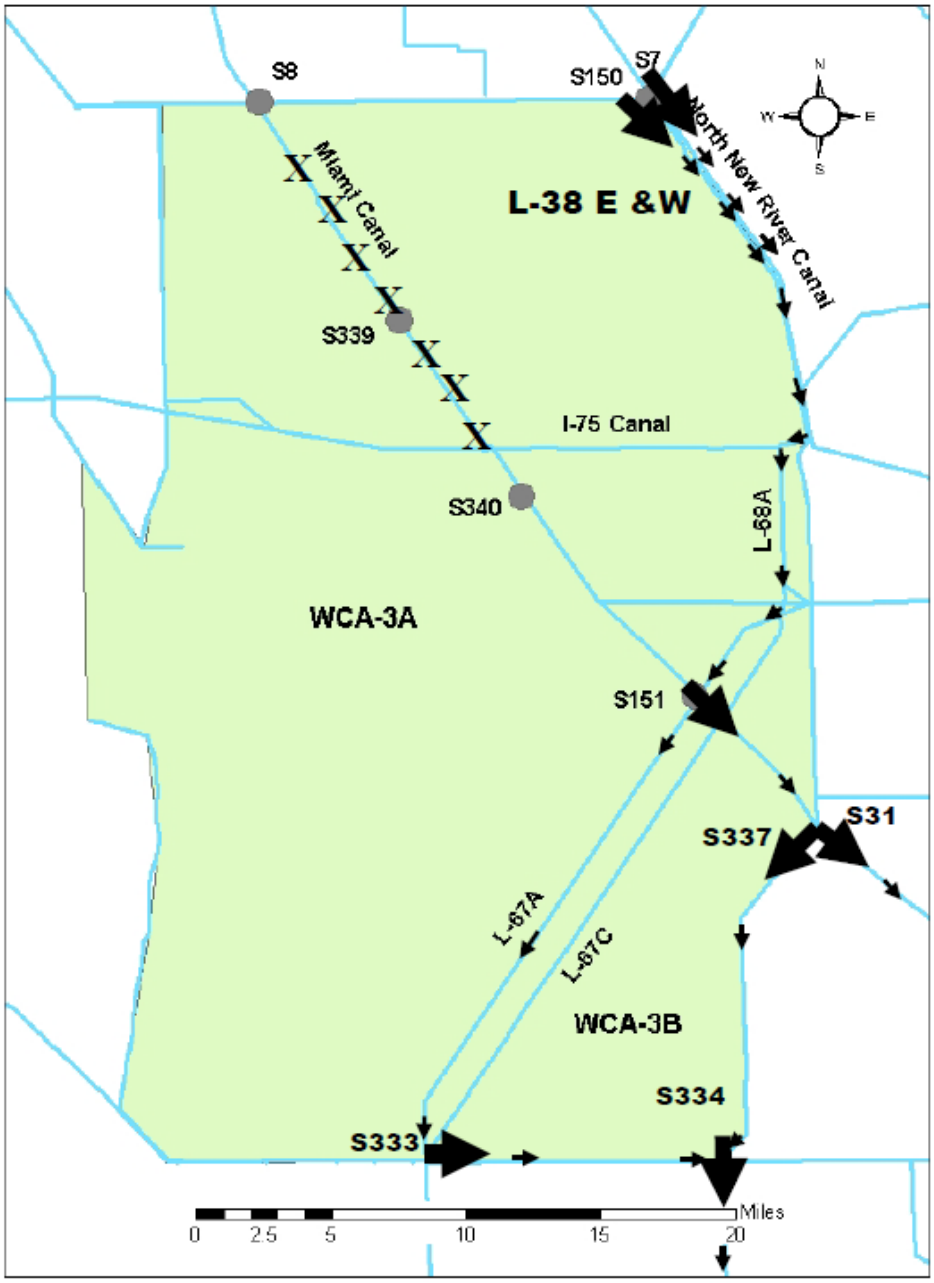

Figure B-21. Water Delivery Route with Miami Canal Filled in WCA 3A

Based on SFWMD's existing operation rules for water delivery to Miami Dade County, water supply deliveries to Miami-Dade County and the SDCS are made from WCA 3A at the S-333 and S-151 structures. When the water level in WCA 3A is at its floor elevation (when headwater at S-333 is at or below 7.5 feet NGVD), a corresponding volume of water is passed into the north end of WCA 3A through S-8, S-7, or S-150 facilities roughly equaling the amount of water released at S-333 or S-151. Based on SFWMD's operation rules for water delivery to LECSA 3 and the WCA 3A Regulation Schedule, water supply is delivered from WCA 3A and not from Lake Okeechobee. Therefore, the conveyance for water supply is more critical at the southern end of the system. Water is taken out of WCA3A at the southeast end and conveyed into WCA 3A at the north end. Through evaporation, rainfall, groundwater and marsh interaction with water in the channel, both quantity and quality of the water entering northern WCA 3A and discharged from southern WCA 3A are different. When WCA 3A is at or below floor elevation, water supply deliveries and corresponding recharge for WCA 3A is based on a conservation of mass approach for WCA 3A; water managers attempt to balance the water anticipated for water supply demands, evaporation and seepage with a roughly equal quantity input into WCA 3A from Lake Okeechobee or the EAA, depending on availability.

Under the CEPP Alt 4R2, the southern one-third of the L-67A/L-67C levees and adjacent borrow canals are proposed to be modified to provide inflows to WCA 3B within the proposed Blue Shanty flowway, and a new spillway divide structure is proposed along the eastern L-29 Canal to allow flexibility for environmental deliveries to Everglades National Park (ENP) across the Tamiami Trail, both east and west of the divide structure. These environmental deliveries may conflict with water supply deliveries to SDCS so the alternate route through structures S-151, S-337 and down the L-30 borrow canal will continue to provide a path for deliveries to the SDCS.

The system-wide conditions have changed considerably since 2000 and these changes to the water supply delivery approach represent intervening non-CERP activities. The original Pre-CERP Baseline, which was developed to represent conditions in place at the time of WRDA 2000 (December 2000), 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. Since 2000, the regional water delivery system has undergone significant changes in operations due to a number of regional and local factors, including implementation of regional operational changes with IOP (2002), ERTP (2012), and the 2008 LORS (2008).

For the CERP WCA 3A Decompartmentalization project (Decomp), the USACE and SFWMD completed an analysis examining the sum of flow at S-7, S-150 and S-8 in cubic feet per second (cfs) over the period from January 1, 1999 to December 31, 2008 (**Figure B-22** and **Table B-6**). Consistent with the operating criteria used to establish water supply delivery mode to LECSA 3, the data was been filtered to show only values when the S-12 structures are not open and there is flow at S-334 or S-337. The periods shown are also consistent with periods when headwater stages at SDCS structures S-176 , S-177 and S-18C would indicate a demand for water (stage less than or equal to 4.0, 3.0 and 2.0 ft NGVD, respectively). Between 1999 and 2008, nine periods were identified when flow at S-7, S-150 and S-8 occurred at the same time as flows from S-334 and/or S-337. For the majority of the days when these conditions were met, the sum of flow at S-7, S-150 and S-8 has been less than 600 cfs. **Figure B-22** and **Table B-6** annotate those times where the total flow exceeded 600 cfs. In all of the cases when the flow exceeded 600 cfs, the discharges resulted from flood control operations, either in response to or in anticipation of wet conditions in the EAA due to a significant rainfall event or high stages in the EAA.

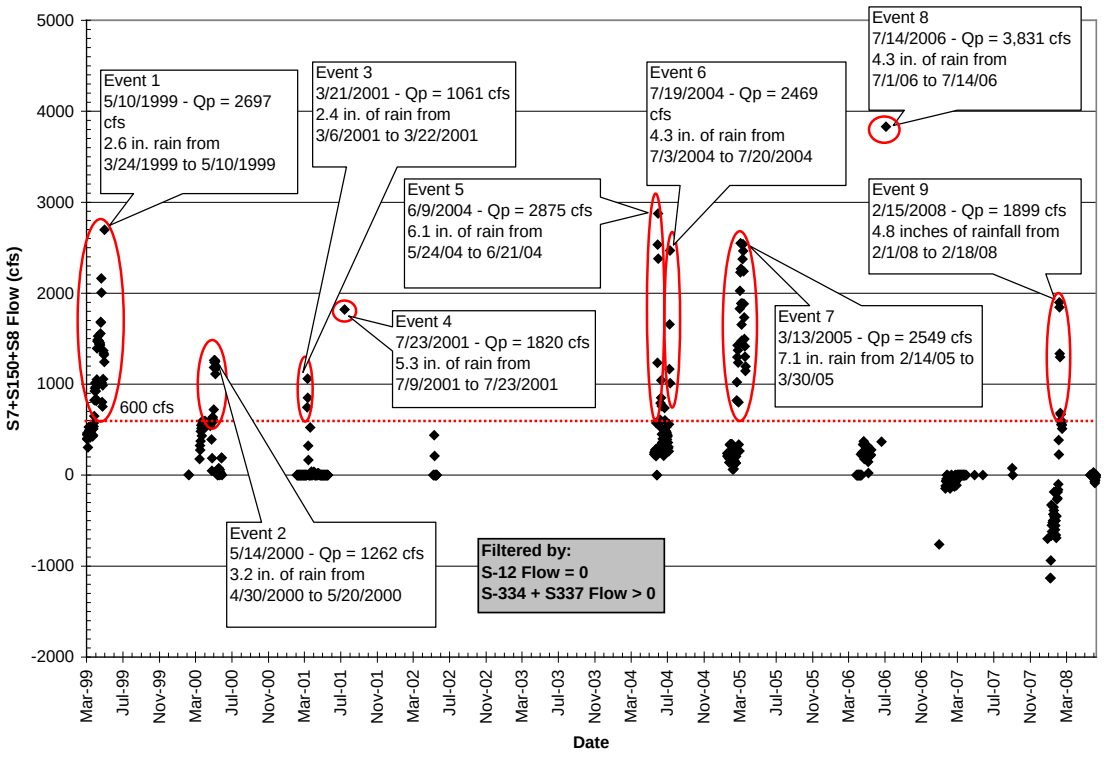

Figure B-22. Decomp Assessment of S-7, S-150, and S-8 Flows for 1999-2008

Table B-6. Summary Table of Pumping/Delivery Events greater than 600 cfs from 1999 to 2008 at S8+S7+S150

Pumping Event (Rainfall Map #)	Pumping Dates (start date to end date)		Peak Pumping Rate (cfs)	Rainfall Period (includes 2 weeks prior to pumping)		Total Rainfall in EAA basin over Rainfall Period (inches)
1	4-6-1999	5-10-1999	2697	3-24-1999	5-10-1999	2.6
2	5-13 -2000	5-20-2000	1254	4-30-2000	5-20-2000	3.2
3	3-20-2001	3-22-2001	1061	3-6-2001	3-22-2001	2.4
4*	7-23-2001	7-23-2001	1820	7-9-2001	7-23-2001	5.3
5*	6-7-2004	6-21-2004	2875	5-24-2004	6-21-2004	6.1
6*	7-17-2004	7-20-2004	2469	7-3-2004	7-20-2004	4.3
7	2-28-2005	3-30-2005	2549	2-14-2005	3-30-2005	7.1
8*	7-14-2006	7-14-2006	3831	7-1-2006	7-14-2006	4.3
9	2-15-2008	2-18-2008	1899	2-1-2008	2-18-2008	4.8

* Denotes Wet Season Event

With most of the northern portion of the Miami Canal backfilled (north of I-75) and WCA 3A below its floor elevation, the eastern water supply delivery route (**Figure B-21**) is the only conveyance route available to provide water from Lake Okeechobee to offset water supply delivery from WCA 3A. The CEPP Alt 4R2 may affect one of the two water supply delivery routes from WCA 3A to the SDCS. The route that continues down L-67A to S-333/S-334 may not always be available due to environmental delivery schedules still under development. However, the route directing water from L-67A in WCA-3A through S-151, S-337 and the L-30 Canal is always available and has sufficient capacity to deliver the pre-existing water supply delivery requirements of 600 cfs. Therefore, the proposed backfill of the northern portion of the Miami Canal will not diminish the capacity for water supply deliveries to the LECSA.

B.3.1.3 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 (Alt 4R2) and the without-project condition (IORBL1). In the with project condition (Alt 4R2), the unmet demand volume and percentage of demand not able to be met are 1 kAF and 3.2 percent, respectively; for the without-project condition (IORBL1), the unmet demand volume and percentage of demand not able to be met are 1 kAF and 3.9 percent, 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 (Alt 4R2), the unmet demand volume and percentage of demand not met are 1 kAF and 3.6 percent, respectively; for the without-project condition (IORBL1), the unmet demand volume and percentage of demand not met are 1 kAF and 3.9 percent, respectively. Based on this comparison, water supply performance for the Seminole Tribe of Florida Brighton and Big Cypress Reservations is slightly improved with CEPP implementation.

For the additional evaluations, the base conditions 2012EC and ECB perform similar to the IORBL1 and therefore essentially the same as Alt 4R2. For the Brighton Reservation, the baselines, 2012EC and ECB, volume and percentage of demand not met are 1 kAF and 3.8 percent. For the Big Cypress Reservation, the baselines, 2012EC and ECB, the volume and percentage of demand not met for both conditions are 1 kAF and 4.8 percent (**Figure B-23** and **Figure B-24**).

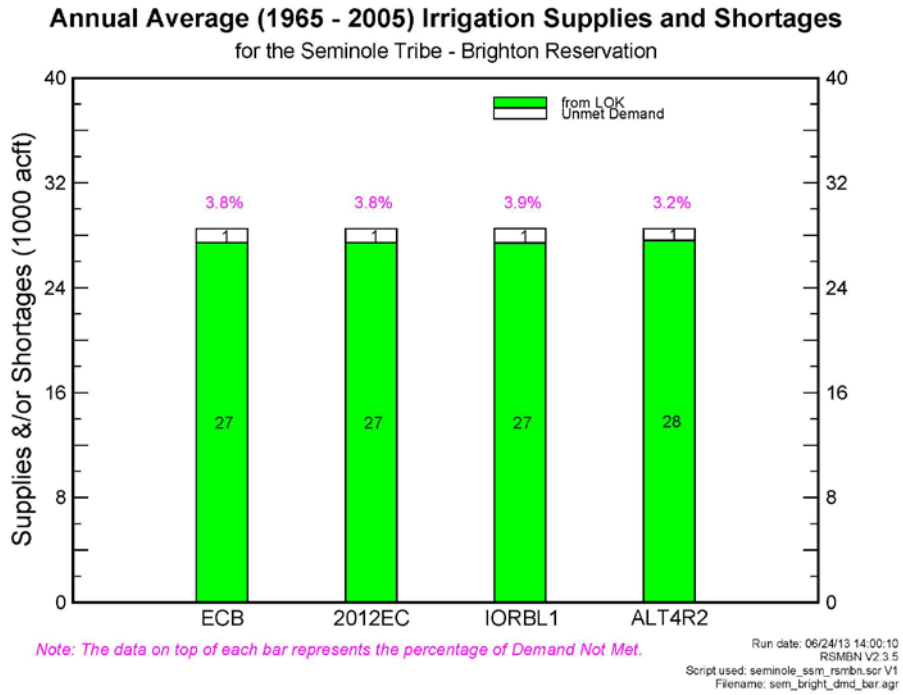

Figure B-23. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe of Florida – Brighton Reservation

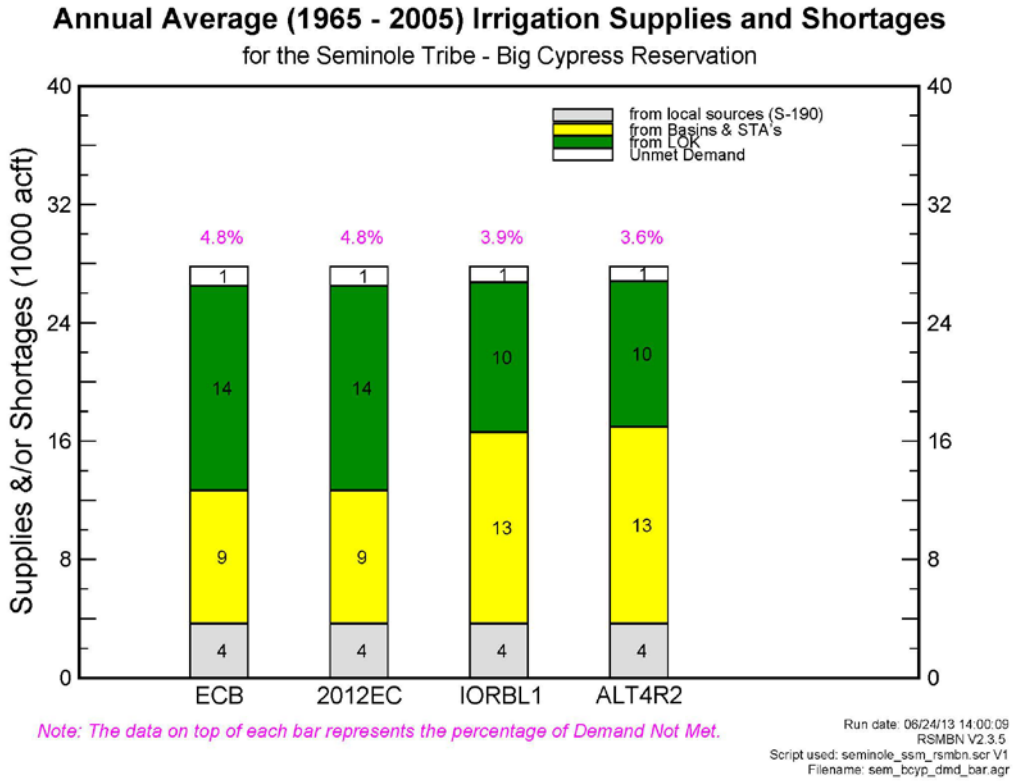

Figure B-24. Annual Average (1965–2005) Irrigation Supplies and Shortages for the Seminole Tribe of Florida – Big Cypress Reservation

B.3.1.4 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 will not be reduced or negatively affected by CEPP.

B.3.1.5 Everglades National Park

For ENP, water deliveries at Tamiami Trail are displayed in **Figure B-25**. 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; Alt 4R2 only) and S356 (Alt 4R2 only). The with project condition, Alt 4R2, deliveries exceed the without project condition, IORBL1, for each year.

Comparisons to the existing condition baselines (2012EC and ECB) also indicate that the with project condition deliveries exceed the existing condition deliveries for each year as well.

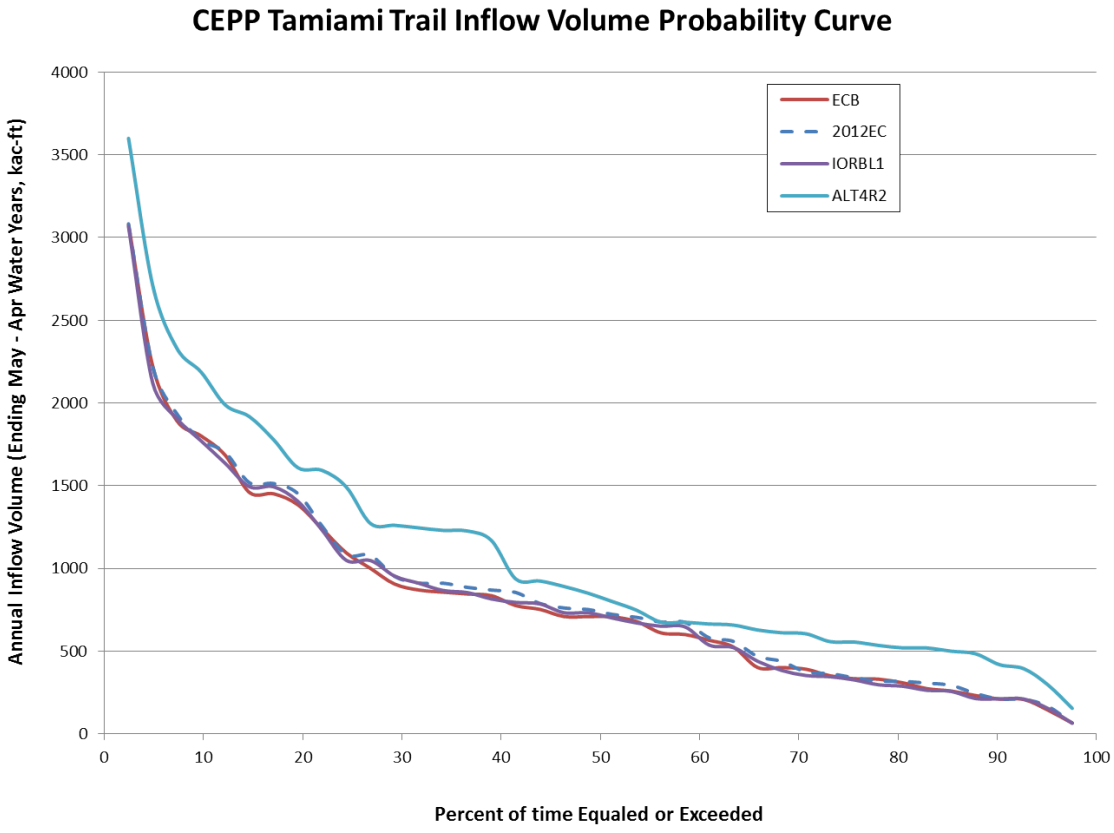

Figure B-25. CEPP Tamiami Trail Inflow Volume Probability Curve

B.3.1.6 Water Supply for Fish and Wildlife

Caloosahatchee Estuary

The low flow criteria for the Caloosahatchee Estuary is an average monthly flows of less than 450 cfs. In the Caloosahatchee Estuary, the number of months the low flow criteria is not met is similar in the with project (Alt 4R2) and without-project (IORBL1) conditions (**Figure B-26**). The estuary low flow criteria are not met for 23 months out the 41-year period of simulation (492 total months) in Alt 4R2 and 27 months in the IORBL1.

Comparisons to the existing condition baselines show significant improvement in low flow performance with Alt 4R2. Both the 2012EC and ECB show 116 months when average monthly flows are less than 450 cfs, compared to 23 months in Alt 4R2. Neither of the existing condition baselines benefit from the inclusion of the CERP Caloosahatchee River (C-43) West Basin Reservoir, which is included in the future without (IORBL1) assumptions.

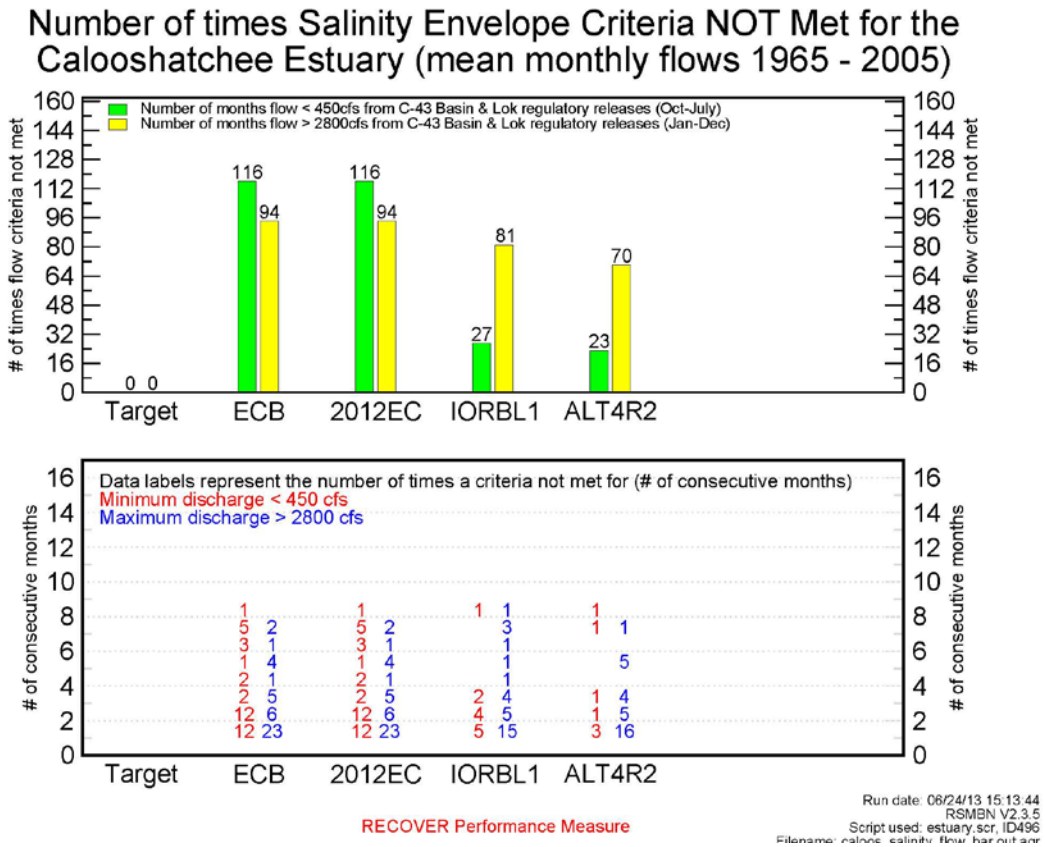

Figure B-26. Number of Times Salinity Envelope Criteria Not Met for the Caloosahatchee Estuary (mean monthly flows 1965–2005)

St Lucie Estuary

The low flow criteria the St. Lucie Estuary is an average monthly flows of less than 350 cfs. In the St. Lucie Estuary, the number of months the low flow criteria is not met increases in the with project (Alt 4R2) condition, compared to the without-project condition (IORBL1) (**Figure B-27**). The low flow criteria are not met in 65 months out the 41-year period of simulation in Alt 4R2 and 53 months in the IORBL1. The CEPP with project condition reduces the frequency of achieving the low flow target.

Comparisons to the existing condition baselines show a significant improvement in low flow performance with Alt 4R2. Both the 2012EC and ECB show 89 months when average monthly slows are less than 350 cfs, compared to 65 months for Alt 4R2. Neither of the existing condition baselines benefit from the inclusion of the Indian River Lagoon-South Project's C-44 Basin Reservoir, which is included in the future without (IORBL1) assumptions.

Consideration of overall estuary performance indicates that Alt 4R2 provides an improvement over IORBL1 for both the St. Lucie Estuary (SLE) and Caloosahatchee Estuary (CE). In all cases, the high flow monthly exceedance counts in both the moderately high categories (SLE: 2000-3000 cfs; CE: 2800-4500 cfs) and the extremely high categories (SLE: >3000 cfs; CE: >4500 cfs) are improved. The low flow counts in the SLE warranted further review under the Savings Clause evaluation. The number of low flow exceedances increases from 53 in the IORBL1 to 65 in Alt 4R2. Detailed evaluation of these 12 additional months over the 41 year period of simulation, when the low flow criteria was not met for Alt 4R2, included evaluation of the magnitude of the monthly flow volume difference and the timing and duration of the events. In most cases flows came close to meeting the target (350 cfs) and only occurred one or two months in a row. However during the following four years; 1977, 1981, 1989 and 1990, the differences compared to the low flow criteria were either more extreme (flows closer to 200 cfs or less) or occurred for several months (5-6) in a row. It is worth noting also that during the entire period of record flows, mean monthly flows were not below 150 cfs. It has been observed over the past 25 years that the salinity in the middle Saint Lucie Estuary, at the (US1) bridge site, requires many months of extremely dry conditions in order for salinity to increase into ranges outside the preferred ecological envelope of 8-20 practical salinity units (psu). Although no formal study proves the hypothesis, anecdotal evidence (including monitoring and modeling) shows that currently the majority of the 350 cfs minimum target is provided to the SLE through subsurface, groundwater and un-gauged tributary flows. Consistent with this hypothesis, when there are several months in a row of zero flow out of the major gauged canals in the watershed, often the SLE salinity stays within the preferred ecological envelope. More substantial overall improvements to the health of the SLE will be realized by the reduction in high flows with Alt 4R2 when compared to IORBL1, as moderate high flows are reduced by a 10 months and extreme high flows are reduced by 5 months.

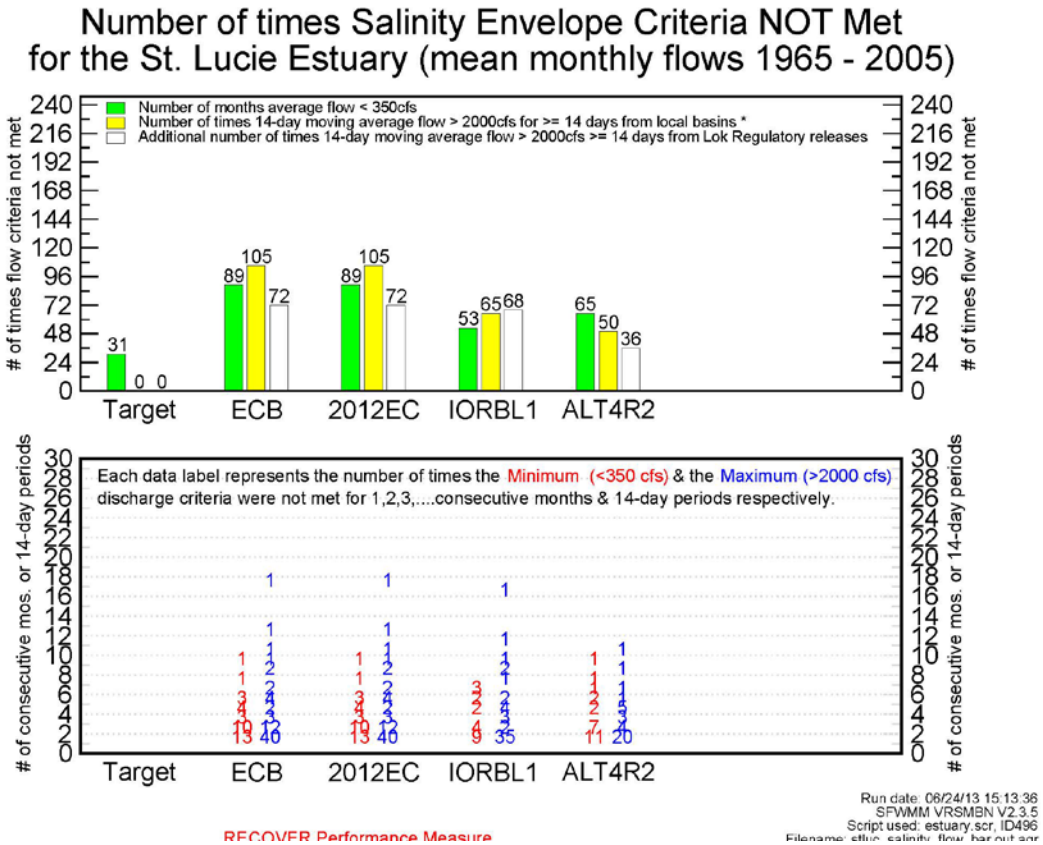

Figure B-27. Number of Times Salinity Envelope Criteria Not Met for the St. Lucie Estuary (mean monthly flows 1965–2005)

WCA 2A

The IORBL1 condition has higher inflows to WCA 2A from STA-2 than the ECB/2012EC condition (377 kAF for IORBL1, as compared to 230 kAF for the ECB/2012EC), resultant from assumed implementation of STA-2 Compartment B, the SFWMD Restoration Strategies project, and the associated water deliveries to WCA2A. The S-7 pump station also contributes inflows to WCA 2A; S-7 inflows are reduced from 115 kAF in the ECB/2012EC to 75 kAF in the IORBL1, with this WCA 2A inflow operational shift accounting for 27 percent of the increase from STA-2 to WCA 2A. The IORBL1 provides more water than WCA 2A needs, especially when considering that 90 percent of the tree islands in WCA 2A were previously "drowned" due to deep water stress in the 1960s. Alt 4R2 utilizes some of this excess IORBL1 water, in addition to the additional flows redirected south from Lake Okeechobee, to increase the hydroperiods and achieve restoration objectives in WCA-3 and ENP through the L-6 diversion operations. With the L-6 diversion operations, for Alt 4R2, average annual inflows from STA 2 (including Compartment B) to WCA 2A are significantly decreased from 377 kAF in the IORBL1 to 236 kAF in Alt 4R2 (a 37% decrease); S-7 inflows are also reduced from 75 kAF in the IORBL1 to 68 kAF in Alt 4R2, due to operations to redirect a portion of STA-3/4 discharges away from WCA 2A to WCA 3A via the S-8 pump station. The with project condition (Alt 4R2) deliveries to WCA 2A are reduced compared to the without project condition (IORBL1) for each of the forty individual water years. The average annual water year decrease in WCA 2A inflows is 148 kAF less than IORBL1, decreasing the mean WCA 2A inflow from 438 in the IORBL1 to 290 kAF with Alt 4R2. The WCA 2A water year inflows reductions range between 43 kAF (water year 1990) to

a decrease of 315 kAF (water year 1970). The following analysis compares the hydrological and ecological implications within WCA 2A for the ECB, IORBL1, and Alt 4R2. The comparison indicated little or no difference between ECB, IORBL1, and Alt 4R2.

Comparing ponding depths for a representative wet year of 1995 (**Figure B-28**), there is no significant difference between the ECB and Alt 4R2. There is however, deeper water, on average, in the northwestern region of WCA 2A with the IORBL1. This additional water during a wet year is not ecologically valuable as it may confound restoring the ghost tree islands that remain.

On-the-other-hand, ponding depths during a representative dry year of 1989 (**Figure B-29**) indicate a very different pattern than seen during the wet year example. Here, Alt 4R2 is similar to the IORBL1 rather than the ECB. Both the IORBL1 and Alt 4R2 do a better job of protecting the northwestern region of WCA 2A from soil oxidation and peat loss than the ECB.

During average and wet years, difference maps (Alt 4R2 minus IORBL1 or Alt 4R2 minus ECB) for stage and hydroperiods indicated no significant differences for WCA 2A. Stage and hydroperiod differences between the ECB, IORBL1, and Alt 4R2 were best seen during dry years. For example, the spatial distribution of hydroperiods in 1989 showed three slightly different patterns (**Figure B-30**). The ECB had two cells with a hydroperiod of 0-60 days and a relatively large number of cells with hydroperiods of only 60-120 days, indicating a high potential for soil oxidation and peat fires for 1989 hydrologic conditions. Alt 4R2 improves upon the ECB performance by reducing the areal extent of regions with hydroperiods less than 120 days and increasing the areal extent of regions with hydroperiods of more than 330 days (especially in the NW region of WCA 2A). The IORBL1 performed better than Alt 4R2 for preventing soil oxidation because 95 percent of the WCA had a hydroperiod greater than 120 days.

Surface water flow vectors between Alt 4R2 and the IORBL1 were not found to be significantly different. However, differences in surface water flow vectors between Alt 4R2 and the ECB are apparent, but only for dry years (**Figure B-31**). The 1989 Alt 4R2 and IORBL1 surface water flow vector maps indicate a general northwest-to-southeast flow directionality and movement of water into WCA 2B. The 1989 ECB flow map indicates a general north-to-south flow directionality, no flow in a large area along the eastern boundary of WCA 2A, and little movement of water into WCA 2B. In conclusion, Alt 4R2 is an improvement over the ECB because it does a better job of moving water through to WCA 2B and WCA-3A, while preventing soil oxidation during dry years. Alt 4R2 is similar and likely not different from the IORBL1 in terms of moving water through to WCA 2B and WCA-3A and preventing soil oxidation during dry years.

In addition, Alt 4R2 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 FDEP permit were applied during CEPP plan formulation and were maintained despite the L-6 diversion operations.

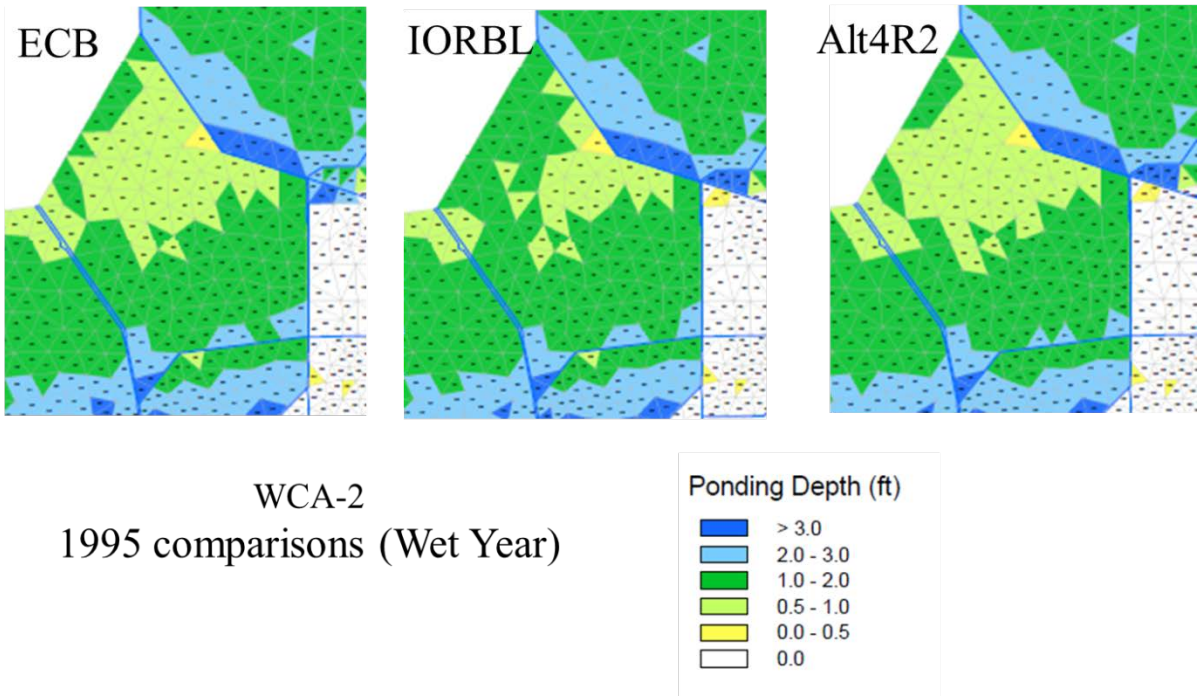

Figure B-28. Wet Year (1995) Ponding Depth Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

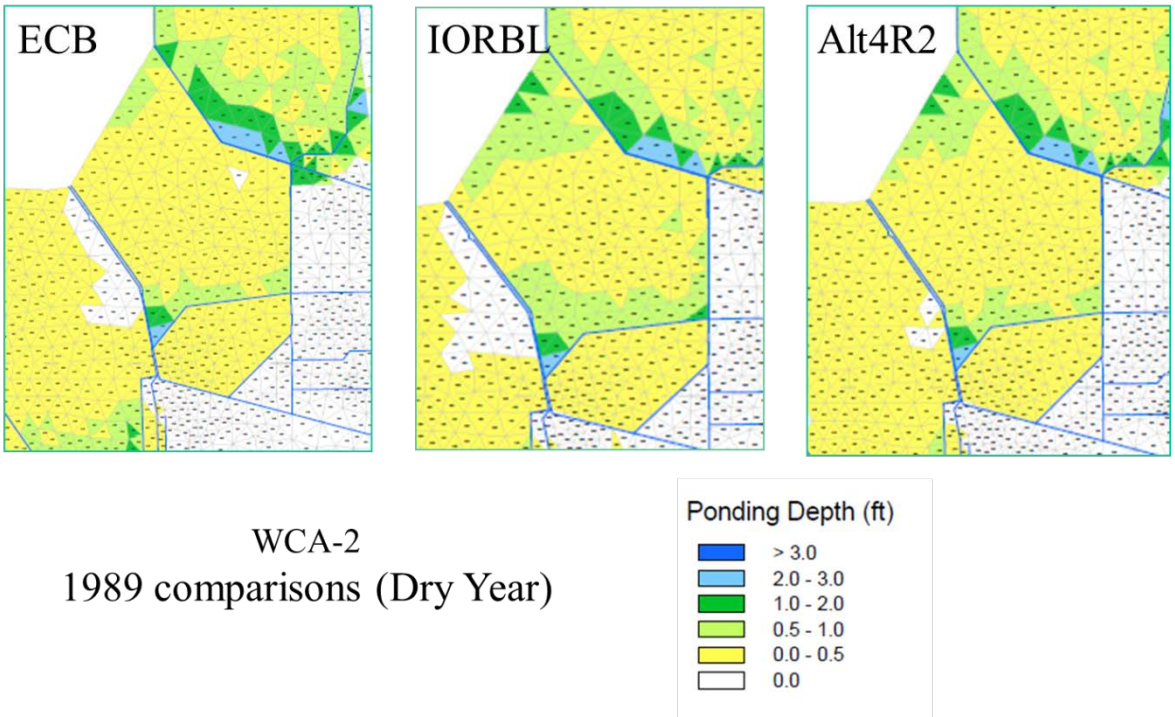

Figure B-29. Dry Year (1989) Ponding Depth Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

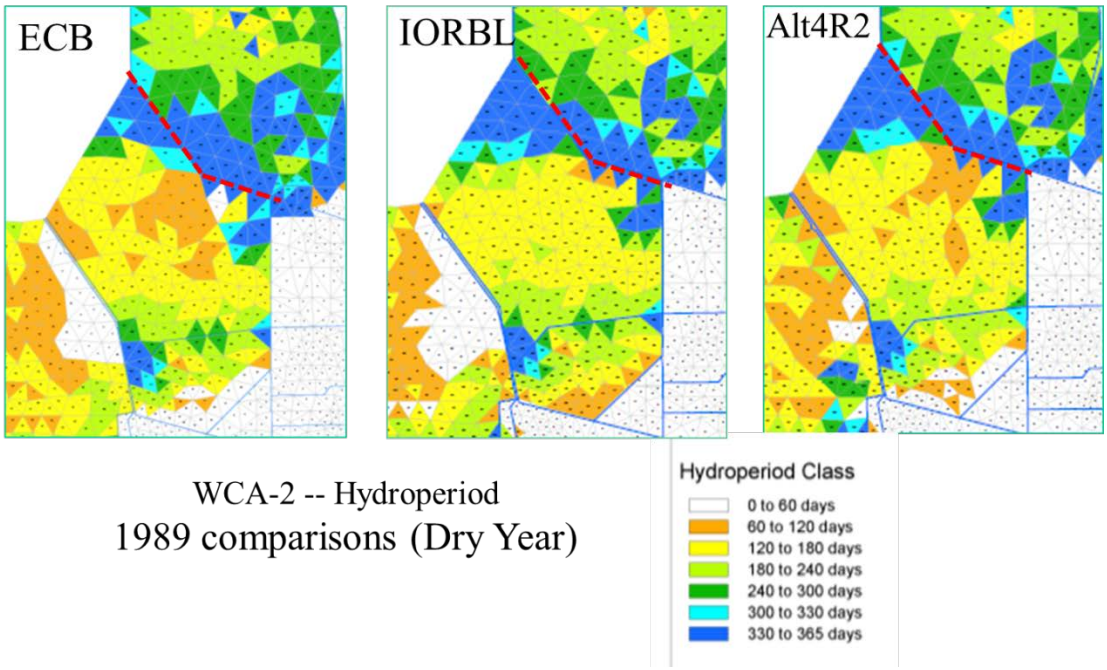

Figure B-30. Dry Year (1989) Hydroperiod Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

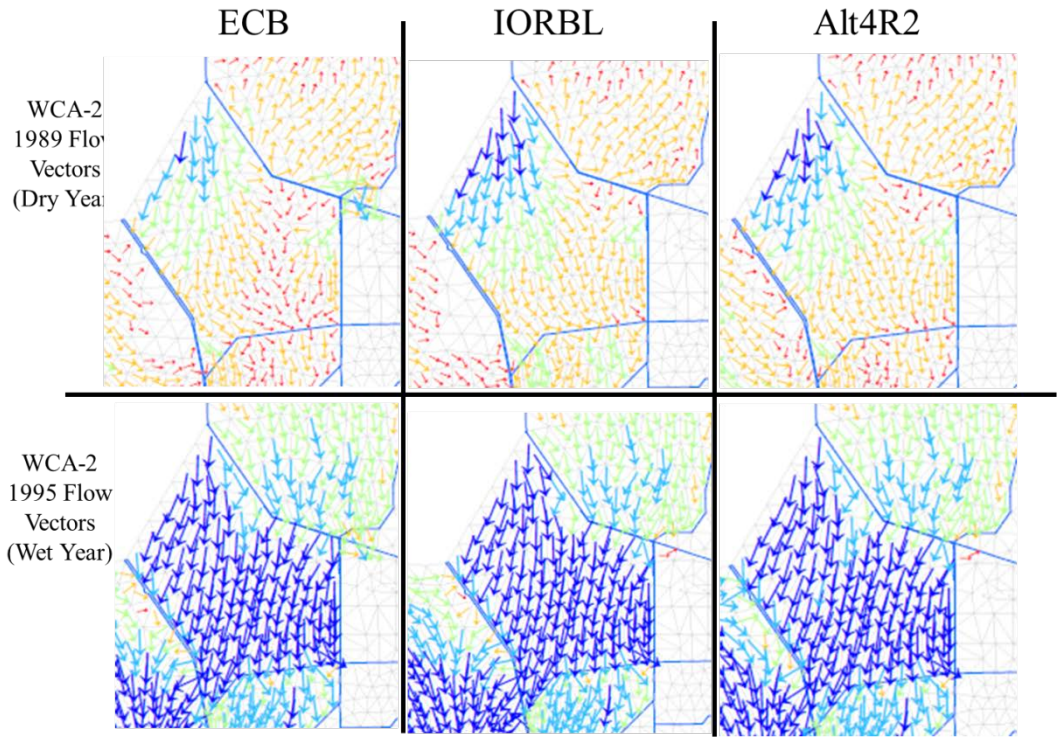

Figure B-31. Surface Water Flow Vector Comparisons for WCA 2A for ECB, IORBL1 and Alt 4R2

WCA 3A

For WCA 3A, water deliveries into WCA 3A are displayed in **Figure B-32**. This probability exceedance plot displays the average annual water year delivery for the 41 year period of simulation. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alt 4R2, 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/STA-6 outflows to WCA 3A. Compared to the existing condition (ECB/2012EC), inflows to WCA 3A are reduced in the future without condition (IORBL1) due to the increased utilization of STA-2 associated with the IORBL1 assumed implementation of STA-2 Compartment B and the SFWMD Restoration Strategies project; STA-2 discharges to WCA 2A, resulting in a corresponding reduction to WCA 3A inflows. The with project condition (Alt 4R2) deliveries exceed the without project condition (IORBL1) for each of the forty total individual water years. The average annual water year increase in WCA 3A inflows is 362 kAF greater than IORBL1, increasing the mean WCA 3A inflow from 538 in the IORBL1 to 900 kAF with Alt 4R2. The WCA 3A water year inflow increases range between 35 kAF (water year 1990) to an additional 924 kAF (water year 1996).

The following quantification for the change in combined inflows to WCA 2A and WCA 3A (the CEPP formulation redline) is provided for consistency with the quantification of additional redline flows provided in the PIR main report. The average annual Alt4R2 water year increase for combined WCA 2A and WCA 3A inflows is 214 kAF greater than IORBL1 (210 kAF greater than the FWO), with the mean combined WCA 2A and WCA 3A inflow increased from 976 in the IORBL1 to 1190 kAF with Alt 4R2. Eight of the forty total individual water years (1972, 1973, 1977, 1978, 1982, 1986, 1990, and 1991) indicate slight reductions of 8 to 43 kAF for combined WCA 2A and WCA 3A inflows, while water years 1987 and 2002 indicate larger reductions of 123 kAF and 86 kAF, respectively; the remaining 30 water years indicate increased combined inflows to WCA 2A and WCA 3A.

Based on comparison of the existing conditions, 2012EC and ECB, the with project Alt 4R2 inflows to WCA 3A are greater at all times except at the most extreme dry time, the 98th percentile.

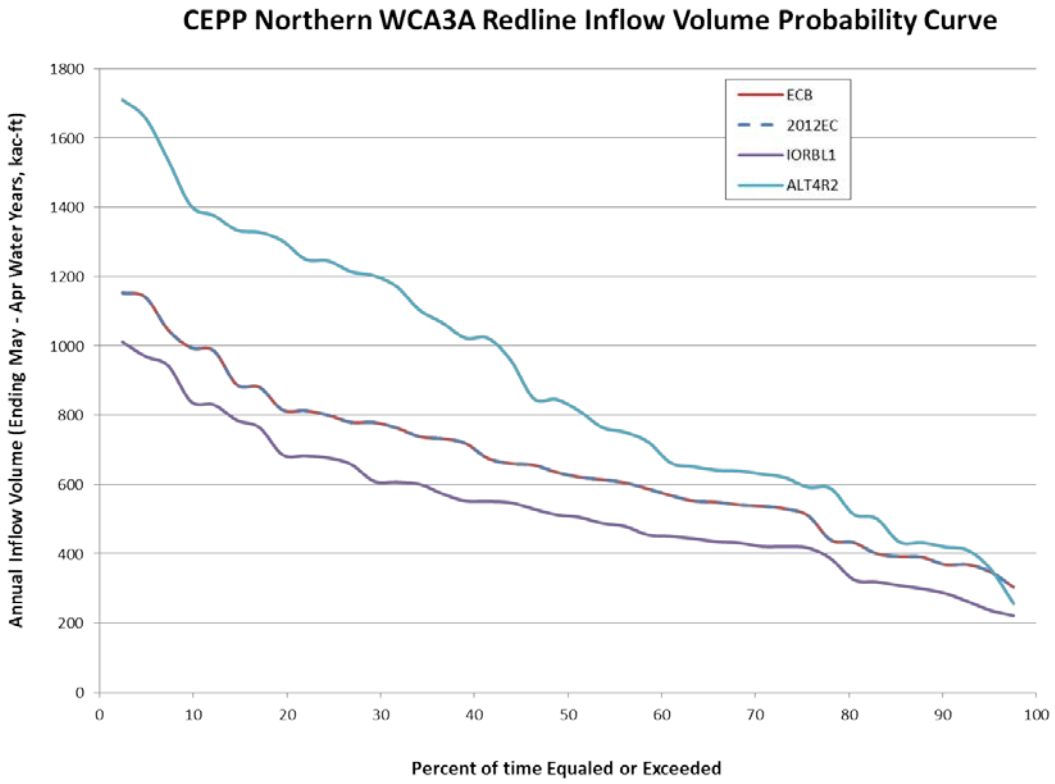

Figure B-32. CEPP Northern WCA 3A Redline Inflow Volume Probability Curve

Biscayne Bay

For the Savings Clause evaluation, surface water flows through multiple structures are evaluated. The structures are summed across all of Biscayne Bay and grouped by spatial sub-regions as well. Comparison of the sum of mean annual structure flows in the with project condition (Alt 4R2) to the without-project condition (IORBL1) indicates the total inflows are slightly increased with Alt 4R2 (839 kAF for IORBL1; 865 kAF for Alt 4R2). Each of the sub-regions is unchanged, with the exception of the South-Central sub-region (**Table B-7**).

The with project condition (Alt 4R2) was also compared to the existing condition baselines (2012EC and ECB). The total mean flows are slightly increased for Alt 4R2, with a slight reduction observed for the Central sub-region.

The South-Central sub-region flows were also compared to the target flows identified in the Biscayne Bay Water Reservation Rule recently adopted by the SFWMD (518,759 AF/yr). The with project condition (Alt 4R2) quantity and timing of flows performs similar to the without-project condition (IORBL1) (**Figure B-33**).

Table B-7. Mean Annual Structure Flows to Biscayne Bay for Each Condition

Sub-region: Structures	Mean Annual Structure Flows to Biscayne Bay (kAF)			
	ECB	2012EC	IORBL1	Alt 4R2
North: S29, S28, S27	334	333	356	356
Central: S26, S25B, S25, G93, S22	274	276	259	259
South-Central: S123, S21, S21A, S20G, S20F	214	218	220	246
South: S20	4	4	4	4
Total	826	831	839	865

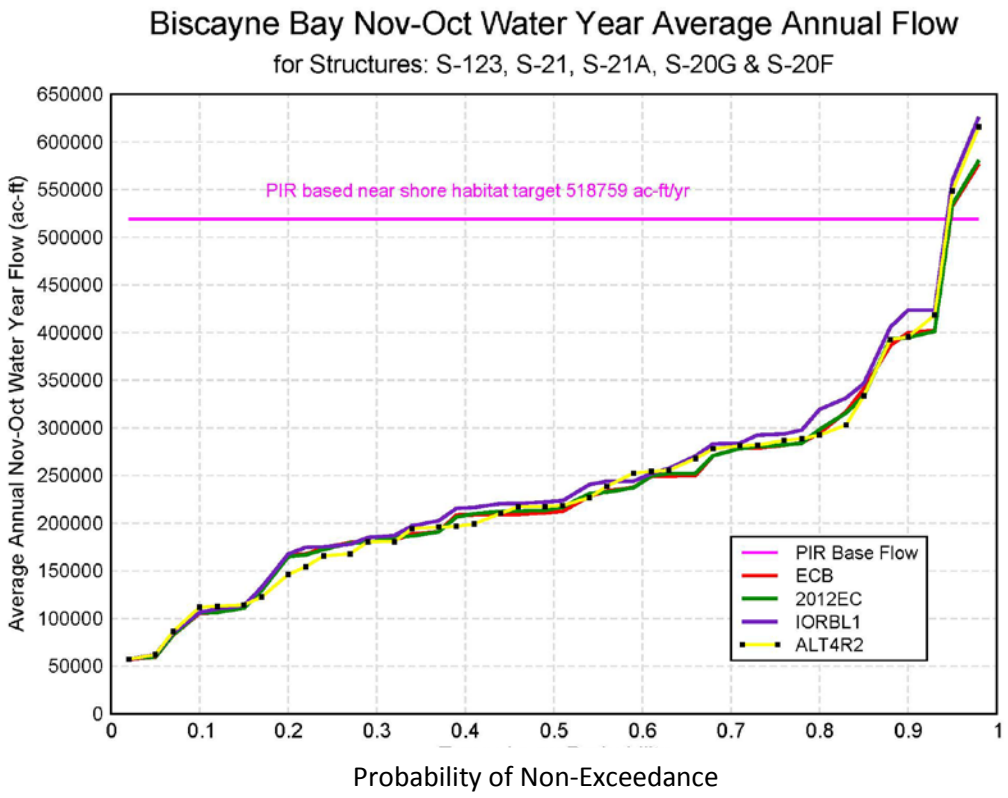

Figure B-33. Biscayne Bay November–October Water Year Average Annual Flow

Manatee Bay – S-197

The S-197 gated culvert structure, at the southern end of the C-111 canal, is the terminal structure of the SDCS. The S-197 is operated with the primary purpose of flood control and prevention of saltwater intrusion and strongly influences hydrologic conditions in the southeastern Everglades, the Model Lands, and developed areas of southern Miami-Dade County. Discharges passing through the structure's four rectangular box culverts flow into Manatee Bay, which is directly connected to Barnes Sound. These water bodies are the most southerly portion of the Biscayne Bay system, but also have a relatively small exchange of water with eastern Florida Bay through culverts under U.S. Highway 1 and the highway's bridges.

An objective of the C-111 South Dade Project and CERP's C-111 Spreader Canal Western Project has been to minimize pulse flood control releases from S-197 and maximize sheetflow of water toward and within Everglades National Park (ENP), including Taylor Slough and the ENP panhandle marshes that receive water overflowing the southern bank of the lower C-111 Canal. Pulse releases from S-197 can rapidly and harmfully decrease local salinity in downstream estuaries and also create water column density stratification, which increases the risk of hypoxia at the bay bottom. Such problems were observed following Hurricane Katrina in 2005. However, it is notable that salinity conditions in Manatee Bay and Barnes Sound are currently much higher than before drainage of the Everglades in the early twentieth century and construction of the SDCS in the 1970s; salinity levels tend to be close to that of ocean water. While water supply to estuaries via canals is unnatural and generally undesirable, the watershed of Manatee Bay and Barnes Sound is isolated by highways and canals flowing east toward Biscayne Bay proper. Given this isolation from fresh water flow, Manatee Bay and Barnes Sound can gain some benefits from modest C-111 discharges via S-197.

CEPP modeling of S-197 discharges showed that mean annual discharges from S-197 were much higher under ECB than under the IORBL1 or any of the evaluated CEPP restoration alternatives, including Alt 4R2 (**Table B-8**). This is likely because the C-111 Spreader Canal Western PIR Project operations were included in all scenarios other than ECB and this project's features (including pump stations S199 and S200, as well as the associated Frog Pond Detention Area) effectively minimizes flood control discharges from S-197, while providing resultant sheetflow benefits to ENP wetlands and Florida Bay. Only slightly more water is discharged into Manatee Bay through S-197 with Alt 4R2 than with IORBL. The overall shape of the discharge rate – frequency curves shown in **Figure B-34** remained similar for all alternatives, but for any given discharge rate, the frequency with ECB was roughly double that of any other with project alternative.

In conclusion, CEPP can be expected to have little effect on S-197 discharges and consequently not alter its current effects, whether negative or positive, on Manatee Bay and Barnes Sound. Restoration of these downstream estuaries will require further CERP progress, with implementation of the second phase of the CERP C-111 Spreader Canal Western Project.

Table B-8. Mean Annual Discharges from S-197

Mean annual discharges from S-197 (ac-ft)	
ECB	16.5
IORBL1	6.7
Alt 4R2	8.2

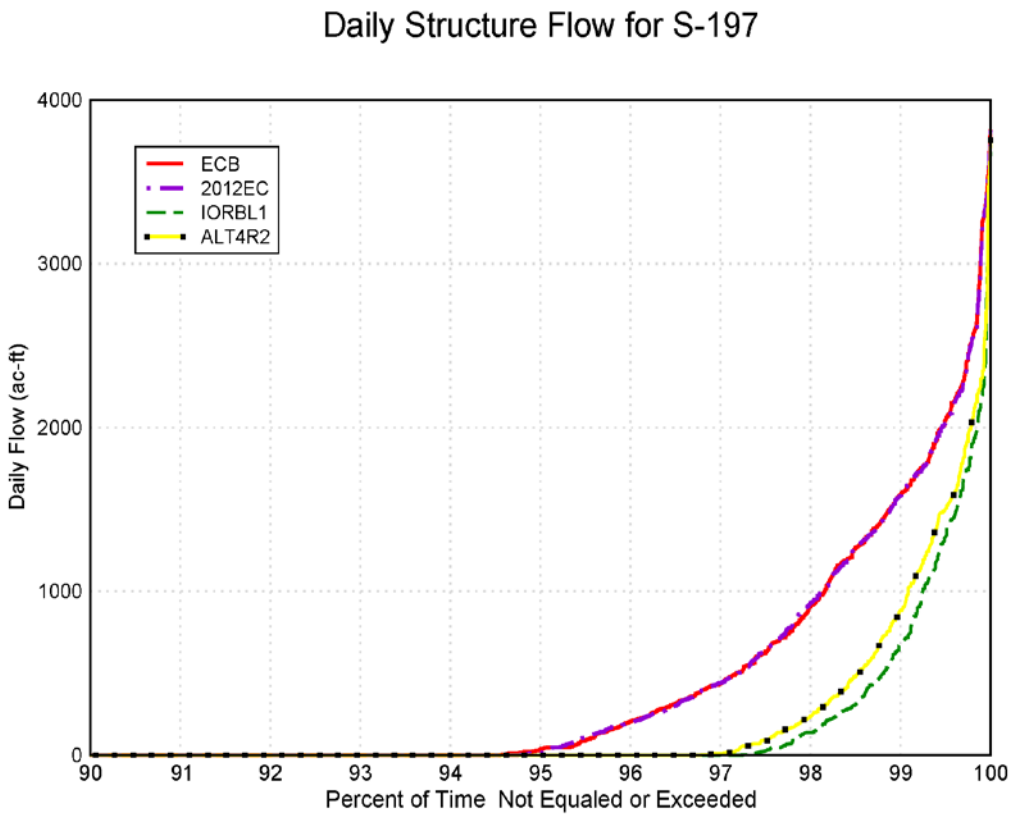

Figure B-34. Exceedance Probability of Daily Structure Flow for S-197

Florida Bay

For the Savings Clause evaluation, overland flows towards Florida Bay at two different locations are evaluated. Specifically, the volume probability curves for the average annual water year flows for the 41 year period of simulation for Transect 23 and Transect 27 are evaluated. For Transect 23, the with project condition (Alt 4R2) deliveries exceed or are similar to the without project condition (IORBL1) for most rank-sorted probabilities. Although the volume probability curves increase from 90 to 50 to 10 for both conditions they do not necessarily progress in the same way across the distribution (**Figure B-35**). At four of the rank-sorted probabilities, the without project condition exceeds the with project condition by between less than 1 kAF to less than 6 kAF. To place this volume in perspective, 6 kAF represents 2.6 percent of the mean annual flows (the 50th percentile). For Transect 27, the with project condition (Alt 4R2) deliveries exceed or are similar to the without project condition (IORBL1) for each probability (**Figure B-36**).

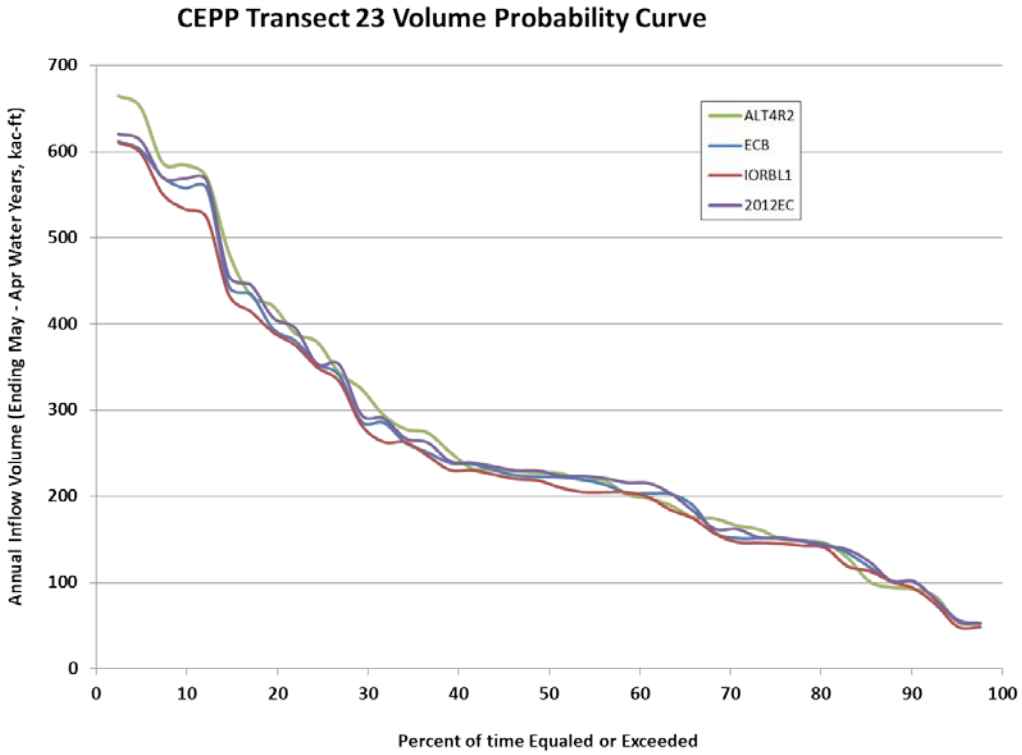

Figure B-35. CEPP Transect 23 Volume Probability Curve

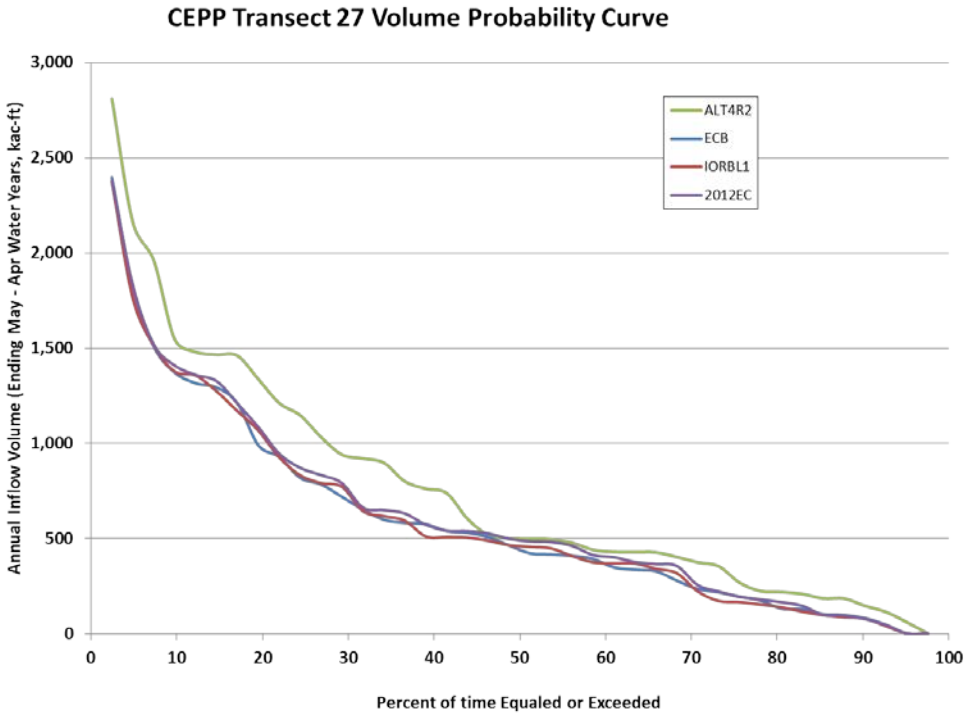

Figure B-36. CEPP Transect 27 Volume Probability Curve

B.3.2 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 FEB 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 3.2.6** and **Section 3.2.7**, respectively.

B.3.2.1 Lake Okeechobee Herbert Hoover Dike

CEPP 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 FEB to send the full 210,000 ac-ft/yr of new water available in CEPP south to the Everglades, while maintaining compliance with Savings Clause requirements for water supply and flood control performance levels.

The hydrologic modeling conducted for all CEPP alternatives to optimize system-wide performance incorporated the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the CEPP alternatives included proposed revisions to the 2008 LORS flowchart 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 CEPP 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 to optimize system-wide performance and ensure compliance with Savings Clause requirements. However, these class limit changes represent a change in the flowchart guidance that extends beyond the inherent flexibility in the current 2008 LORS. As detailed in Section 6.7.2.1, the CEPP recommended plan operations also expand on the 2008 LORS backflow operations to Lake Okeechobee through the following operational changes: 1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and 2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule to provide an additional source of backflow water to Lake Okeechobee. Additional information and documentation of the CEPP Recommended Plan modeling assumptions for Lake Okeechobee operations are found in Section A.8.3.2.3.3 of Appendix A (Engineering) of the CEPP PIR.

Independent of CEPP 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 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 "Band 1" projects, as described in Section 6.1.3.2, or 2) completion of sufficient HHD remediation for reaches 1, 2 and 3 and associated culvert improvements, as described in Section 2.5.1. 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 CEPP Recommended Plan. The future Lake Okeechobee Regulation Schedule, 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-CEPP actions and that these actions will occur earlier than implementation of CEPP. Therefore, the CEPP PIR will not be the mechanism to propose or conduct the required NEPA evaluation of modifications to the Lake Okeechobee Regulation Schedule. However, depending on the ultimate outcome of these future Lake Okeechobee Regulation Schedule revisions, including the level of inherent operational flexibility provided with these revisions, CEPP implementation may still require further Lake Okeechobee Regulation Schedule 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 ECB/2012EC (2008 LORS; note that plot lines overlap), IORBL1 (2008 LORS, plus additional CERP and non-CERP projects), and Alternatives 4R2 (LORS 2008, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as **Figure B-37** (note: upper 25% of the stage duration curve is displayed). Peak stages for the CEPP Savings Clause baselines and Alt 4R2 are summarized as follows: 17.54 feet NGVD for the 2012EC; 17.52 feet NGVD for the IORBL1; and 17.66 feet NGVD for Alt 4R2. The baselines and the Recommended Plan Alt 4R2 all show simulated stages above 17.25 feet NGVD: 18 days for the 2012EC; 9 days for the IORBL1; and 29 days for Alt 4R2 (note: 14,975 days in the RSM-BN 41-year period of simulation). 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 assumed modified Lake Okeechobee operations with the CEPP alternatives (including Alt 4R2) do not cause significant increases in the frequency, duration, and magnitude of Lake Okeechobee peak stages (compared to the IORBL1), despite the assumed completion of HHD remediation measures, because the adverse ecological effects associated with increased lake stages and the associated increases in high volume releases to the estuaries were effectively balanced during the CEPP preliminary screening (for additional discussion of screening metrics, refer to **Section 3** of the PIR main report). Following completion of the HHD remediation of Reaches 1, 2, and 3, 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 project).

Given recognition of the DSMR uncertainty and the continued utilization of the 2008 LORS Lake Okeechobee Regulation Schedule for CEPP, the USACE assessment of the Lake Okeechobee high water performance with CEPP indicated consistency with the HHD formulation assumptions established for the CEPP future without project condition (FWO/IORBL1), 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 stage duration curve trends for increased high water conditions appear reasonable based on the USACE current best available information and current expectations for the HHD remediation.

Extreme high lake stages have also been documented to adversely impact the plant and animal communities, through processes which include the following: physical uprooting of emergent and submerged plants; reduced light levels in the water column due to increased suspended sediment; and littoral zone exposure to increased nutrient levels from the water column. 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-38**. Lake Okeechobee stages between 16.0 and 17.25 feet NGVD correspond to the seasonal range of the top zone of the 2008 LORS Regulation Schedule, and this performance metric was considered by the USACE during the LORS Regulation Schedule study. Refer to **Section 5** of the main PIR report and Appendices C.2.1 and C.2.2 for the environmental effects evaluations for Lake Okeechobee, which were determined to be approximately equivalent across the CEPP future with project alternatives. As documented in **Section 4** of the main PIR report, habitat units were not calculated for Lake Okeechobee since the performance of these areas were considered a constraint during formulation.

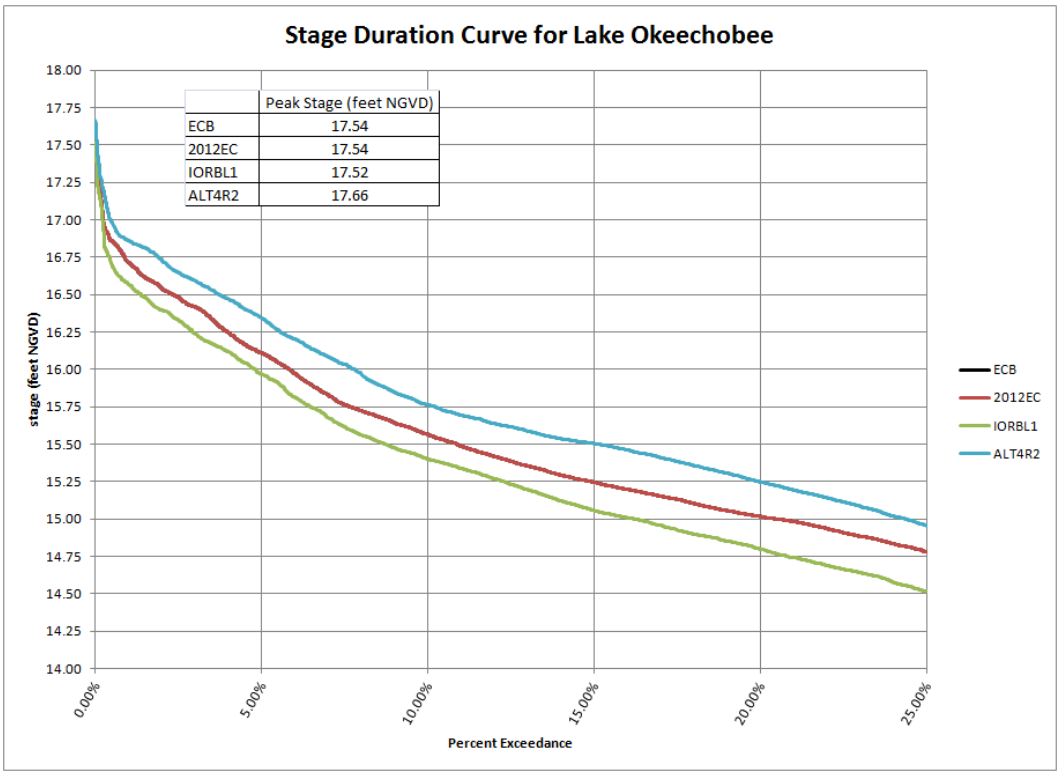

Figure B-37. Lake Okeechobee Stage Duration Curve

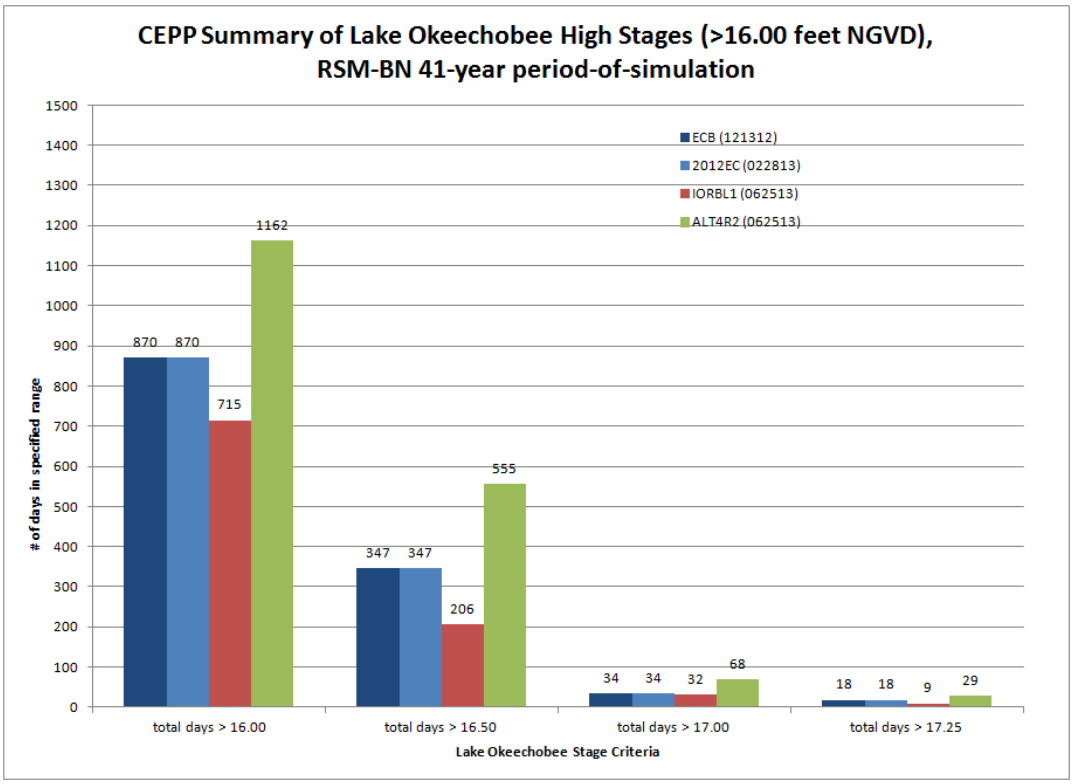

Figure B-38. Occurrence Frequency of Lake Okeechobee High Stages

B.3.2.2 FEB located in the EAA

Stage duration curves for the combined CEPP A-1 and A-2 FEB are shown in **Figure B-39** for the IORBL1 (14k acre A-1 FEB only) and Alt 4R2. Ground surface elevations within the FEB were assumed at 9.63 feet NGVD for the RSM-BN modeling. Minor changes to groundwater levels are expected adjacent to the CEPP A-2 FEB (14,000 acres), compared to the future without project condition (IORBL1) which includes the SFWMD Restoration Strategies A-1 FEB.

The A-2 FEB design includes perimeter seepage collection canals and associated seepage pumps to limit potential impacts. The FEB at this time carries a low 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 following criteria (USACE Engineer Regulations (ER) 1110-8-2(FR), ER-1110-2-1156, DCM-2, and risk). The FEB perimeter levee elevation is established at 20.3 feet NGVD, three feet above the maximum surcharge pool elevation. As described in further detail in the Engineering Appendix accompanying the CEPP PIR (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 CEPP FEB, per DCM-2; b. the 50 percent 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. An orifice-type spillway will provide uncontrolled discharge from the A-2 FEB during extreme events, when FEB discharges are required to protect the embankment integrity. The spillway will include a 265 foot long weir with crest elevation set at 13.50 ft NGVD. The spillway will discharge into the adjacent seepage canal along the northern portions of the A-1 and A-2 FEBs. The spillway will be located in line with the northern extent of the eastern perimeter levee, adjacent to structure S-628.

Within the RSM-BN simulated period of record (1965–2005), the maximum simulated stage in the A-1/A-2 FEB is 13.54 feet NGVD for the CEPP Recommended Plan. Based on the assumed ground surface elevation of 9.63 feet NGVD used in the RSM-BN model, the peak depth is 3.91 feet over the period of record. The FEB emergency overflow spillway (S-627) was designed with a crest elevation of 13.50 feet NGVD, based on the average assumed ground surface elevation of 9.00 feet NGVD used for the preliminary (pre-PED survey) hydraulic design, as described in Appendix A of the PIR; based on this design, the FEB emergency overflow spillway would only discharge if the FEB depth exceeds 4.5 feet. As the FEB stages over the simulated period of record do not overtop the FEB emergency spillway (simulated peak depth condition of 3.91 feet), the FEB emergency spillway preliminary design details, including discharge location, did not warrant further analysis for the CEPP Savings Clause evaluation of Alt 4R2. During CEPP 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 PIR.

Detailed CEPP assessments within the EAA were not conducted because the RSM-BN does not simulate groundwater within the EAA. Further assessment of potential effects from the A-2 FEB will be deferred to the PED phase of CEPP.

For flood protection in the EAA, the additional storage volume provided by the construction and operation of impoundments is expected to incidentally improve flood protection in the vicinity of the impoundments. For the FEB, available storage in the impoundments will be utilized to maximize flood control and reduce or eliminate discharges to the WCAs or released to tide associated with anticipated heavy rainfall from tropical storms or hurricanes. The control of seepage from project components will

also help to assure that the existing level of service for flood protection is maintained and surrounding lands are not adversely impacted. An emergency overflow spillway for the A-2 FEB will provide protection for project embankments integrity during extreme storm events.

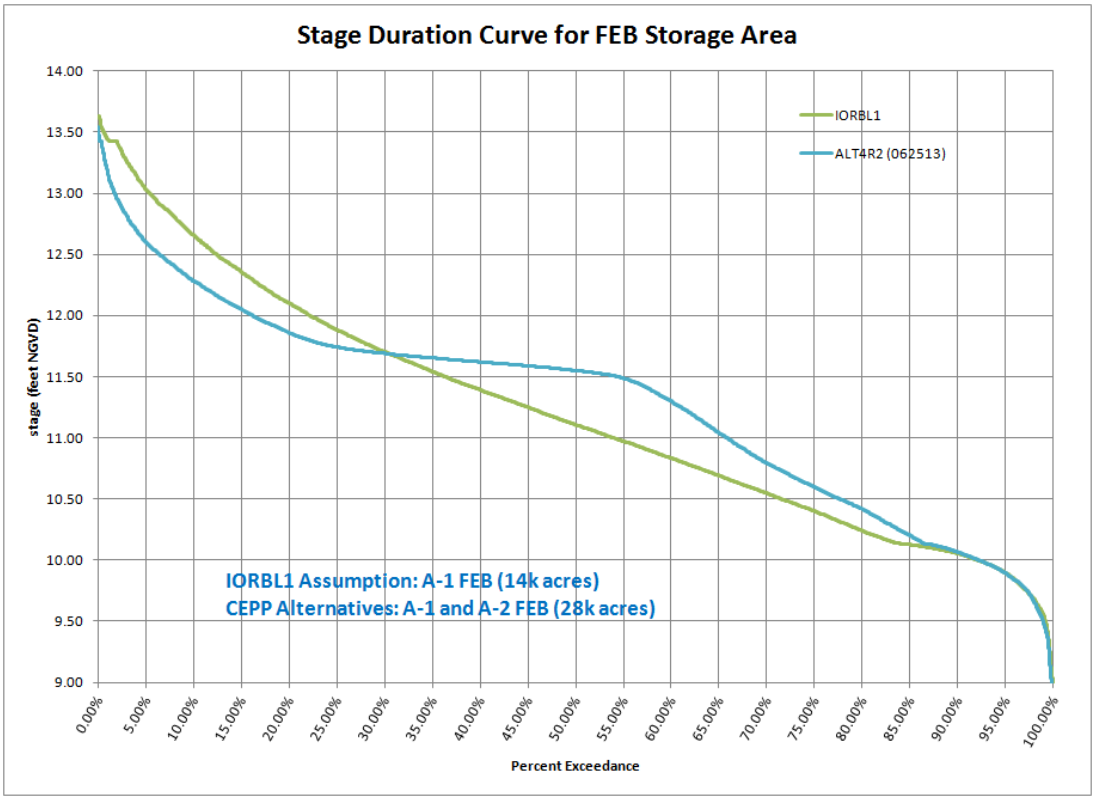

Figure B-39. FEB Stage Duration Curves

B.3.2.3 EAA/Northern WCA 3A – Backfilling of Miami Canal

The CEPP Alt 4R2 proposes to backfill the Miami Canal downstream starting 1 ½ miles south of the S-8 pump station (refer to **Figure B-21** for map) and extending to I-75. Without maintenance of the existing capacity for flood control within the EAA, flood control capability would be diminished. The CEPP plan formulation process assumed that the pre-project flood protection level of service for the EAA would be maintained under CEPP by providing the same total pumping capacity at the S-8 (4170 cfs) and S-7 (2490 cfs) pump stations, which provide drainage for the upstream EAA basin. No new structures are proposed under CEPP to further supplement the G-404 and S-8 pump stations for deliveries from the Everglades Agricultural Area (EAA) to WCA 3A.

CEPP will maintain this existing design capacity for the S-8 complex through a combination of pump station design modifications, a new hydraulic connection from S-8 to the degraded L-4 Levee, utilization of the existing G-404 pump station (570 cfs design capacity), and leaving the 1-2 mile segment of the Miami Canal as available getaway conveyance capacity during peak flow events. S-8 modifications should be completed to permit the diversion of L-6 flows and must maintain flood control operation capability during implementation of S-8 modifications. The Alt 4R2 cost estimate includes placeholder funding for any required modifications of the S-8 outlet works, to address potential increased tailwater conditions with CEPP that may diminish the S-8 pump efficiency. Modifications of the S-8 pump station

complex for CEPP operations will be further analyzed during the PED phase of CEPP, since the RSM-GL model applied for CEPP formulation is inadequate for detailed hydraulic design of the S-8 pump station complex; potential design modifications to be assessed/reassessed in further detail during PED will likely include the following: modifications to S-8 and/or G-404, to address pump efficiency concerns; the proposed S-8A culvert and associated canal connecting the Miami Canal to the L-4 Canal; and the required length of the unmodified Miami Canal to maintain hydraulic getaway conveyance capacity.

No design modifications to S-7 are proposed with Alt 4R2, and the S-621 gated spillway proposed on the STA-3/4 outlet canal has been initially designed at 2500 cfs to maintain the capability to deliver the S-7 design capacity flows from STA-3/4 to the S-7 pump station.

B.3.2.4 WCA 3A and WCA 3B

Compared to the CEPP FWO (final December 2012 release), the CEPP Alt 4R2 stages are lowered by approximately 0.1–0.3 feet in the upper 10 percent of the stage duration curve for the WCA 3A three-gauge average stage, as shown in **Figure B-40** (upper 25 percent of the stage duration curve); the same performance is observed in the IORBL1. In order to consider potential differences during specific years, the EN-W assessment also considered the annual duration of exceedance of the ERTP WCA 3A Zone A stage levels for the complete period of simulation (**Figure B-41**). The annual durations were also displayed and assessed as a frequency curve (**Figure B-42**). The total number of days above Zone A is summarized as follows for the IORBL1 and CEPP alternatives (with percent of total period of simulation, 14975 days, in parentheses): CEPP IORBL1 – 2751 days (18.37%); and Alt 4R2 – 3323 days (22.19%).

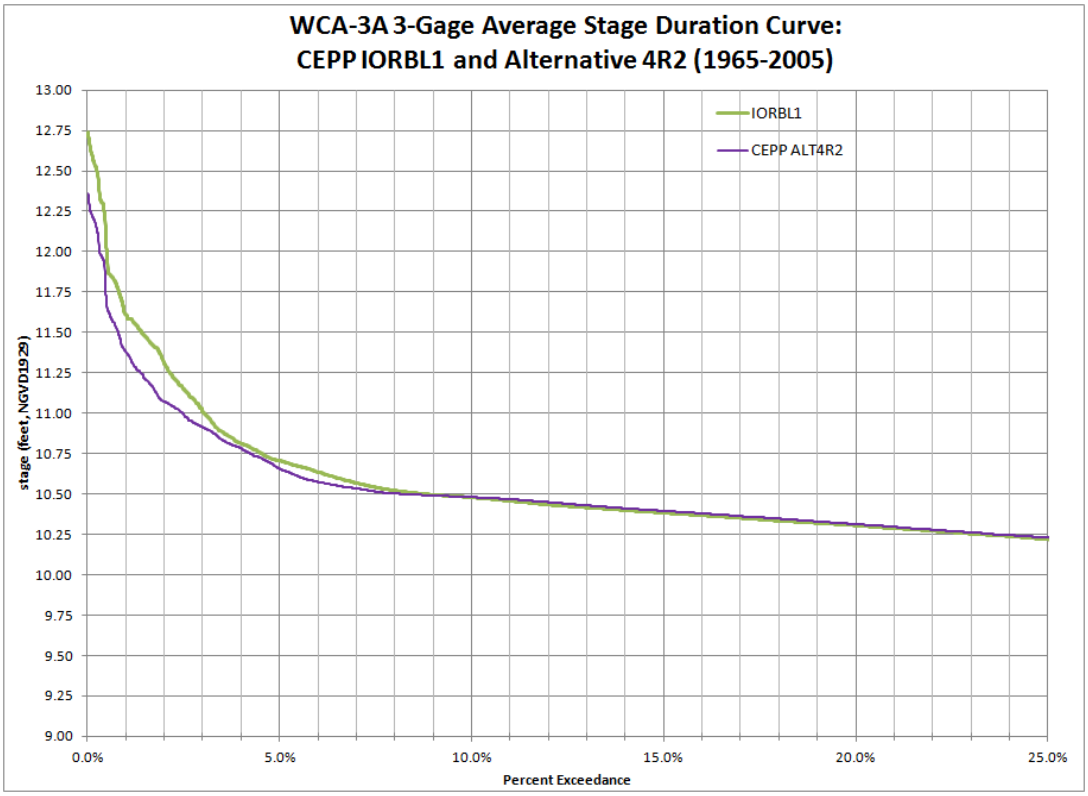

Figure B-40. WCA 3A Three-Gauge Average Stage Duration Curve

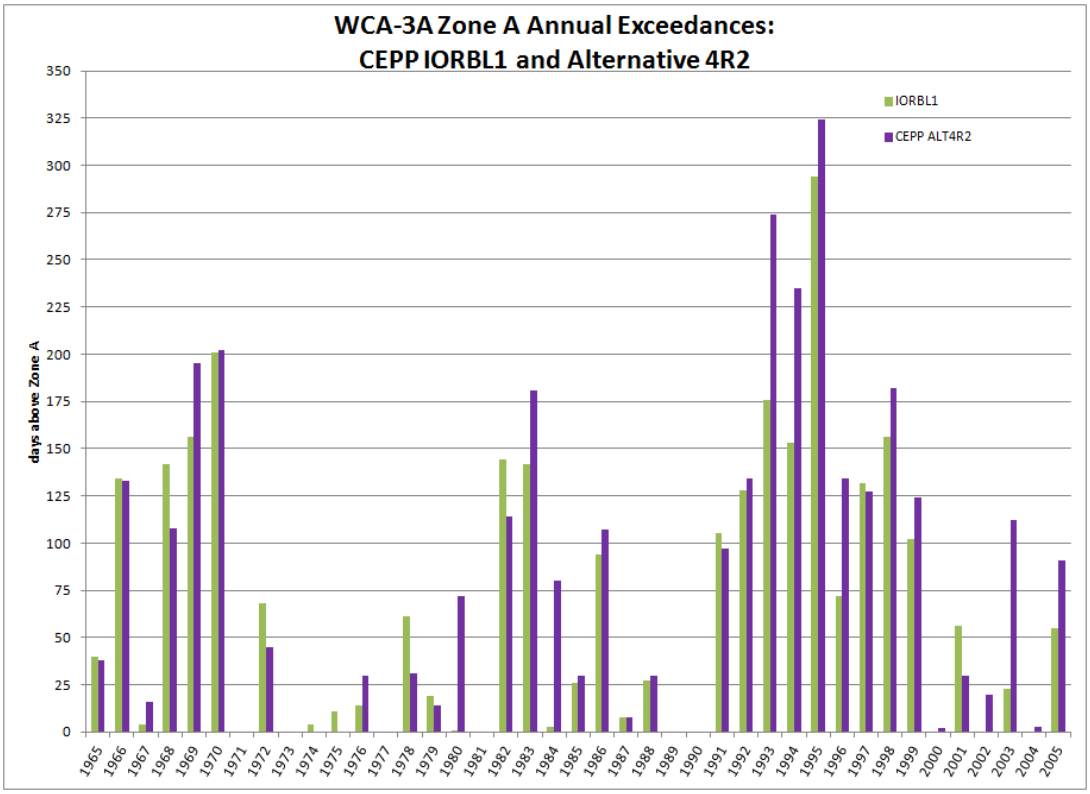

Figure B-41. WCA 3A Three-Gauge Average Annual Zone A Exceedance Summary

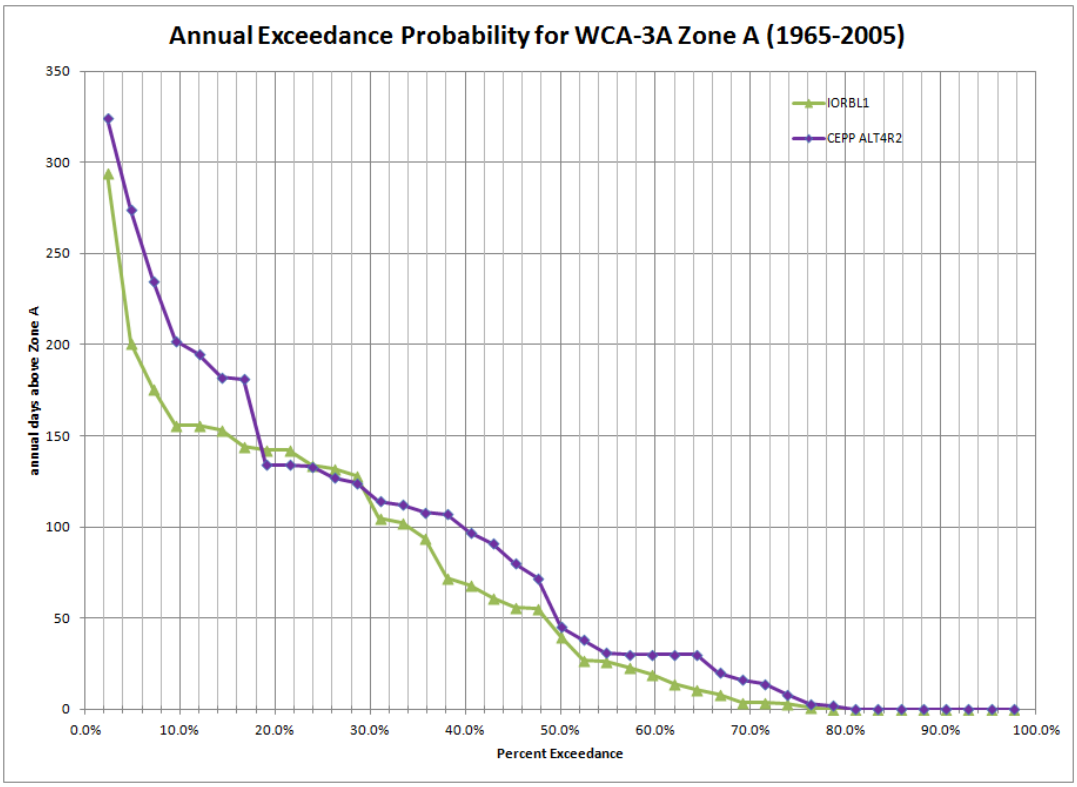

Figure B-42. WCA 3A Three-Gauge Average Probability Exceedance Curve for Annual Zone A Exceedance

The EN-W performance assessment for the final array of alternatives also included review of the WCA 3A stage hydrographs for individual years in which the number of days above Zone A increased by more than 20 percent between the CEPP FWO and any of the CEPP alternatives. Additional summary tables, annual hydrographs, and annual stage hydrograph statistical distribution plots are available in the CEPP PIR Engineering Appendix and the associated Hydrologic Modeling Annex A-2.

The detailed EN-W 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 CEPP FWO (the IORBL1 performance is similar) were, therefore, successfully achieved based on EN-W assessment of the overall performance of the CEPP final array, including the Recommended Plan Alt 4R2.

Concurrent with CEPP alternative formulation and modeling efforts, EN-W conducted 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. Stage duration curves (upper 25%) for the CEPP ECB, CEPP FWO (the IORBL1 performance is similar), and Alt 4R2 are provided in the CEPP PIR 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 CEPP Alt 4R2, peak stages within WCA 3B (outside of the Blue Shanty Flow-way in Alt 4R2) were 9.25 and 9.24 feet NGVD at Site 71 and Shark-1, respectively, or approximately 0.15-0.20 feet greater than the CEPP ECB/FWO baselines (9.05-9.06 feet NGVD) and the IORBL1 (9.08 feet NGVD); however, the WCA 3B peak stages for the CEPP Recommended Plan 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). Based on EN-W assessment of these WCA 3B peak water depths less than 3 feet (2.61-2.63 feet peak depth for Alt 4R2 stages), maximum wind and wave run-up potentials would not be expected to exceed 1-2 feet.

For this preliminary EN-W assessment of WCA 3B (further analysis will be conducted during PED), a presumed worst-case scenario was defined for the CEPP Recommended Plan, with peak Alt 4R2 stages exacerbated by the additional SPF rainfall and maximum wind and wave run-up depths. Under this assumed worst-case scenario (9.25 feet NGVD stage + 1.5 feet SPF rainfall + 2.0 feet run-up potential), the L-29 Section 3 Levee would not be expected to be overtopped at the two lowest elevation points

(with approximately 0.25 feet of remaining freeboard, compared to the minimum L29 Section 3 Levee elevation of 13.0 feet NGVD). Given no predicted L-29 Section 3 Levee overtopping for this conservative assumed combination of events and recognition that CEPP inflows to WCA 3B (both within the Blue Shanty flow-way and eastern WCA 3B) will utilize controllable structures that may be closed in anticipation of extreme rainfall events, the EN-W preliminary assessment of the WCA 3B design criteria concluded that the proposed CEPP water levels of Alt 4R2 would not adversely affect the flood control capability of the unmodified eastern segment of the L-29 Levee (or other perimeter levees, which have higher design elevations) bordering WCA 3B. Within the Blue Shanty flow-way, the peak stage with Alt 4R2 is 9.70 feet NGVD. The proposed L-67D Levee, which has a preliminary design elevation of 12.0 feet NGVD based on engineering design considerations (refer to Appendix A for additional details), would prevent the relatively higher stages within the Blue Shanty flow-way from further raising stages within eastern WCA 3B. The USACE currently anticipates revisiting the WCA 3B SPF stage during PED, pending final authorization of the CEPP and the establishment of operating criteria for WCA 3B water management structures for a System Operating Manual revision for CEPP implementation.

B.3.2.5 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 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 RECOVER performance measure. Of the six RSM-GL cells compared to the 1983–1993 calibration data (**Figure B-2**), the without project condition (IORBL1), and the existing condition baselines (2012EC and ECB), only one cell has stages that warrant detailed attention: cell 4328, located between the C-103 and C-113 Canals and immediately east of the C-111 Canal. For the other five indicator cells (**Figure B-2**), stages in the with project condition (Alt 4R2) are either the same or below the 1983-1993 calibration data, IORBL1, and 2012EC, or groundwater stages are more than two feet below ground at levels that would not affect crops. The stage duration curve for indicator cell 4328 (**Figure B-43**) for the with project condition (Alt 4R2) is essentially the same as the without project condition (IORBL1) during the wettest hydrologic conditions, up to the 20th percentile, with stages approximately 0.5 feet above the calibration values. Stages for cell 4328 are only slightly higher, by approximately 4 inches, between the 5th and 15th percentile when comparing the with project condition (Alt 4R2) to the existing condition baselines (2012EC and ECB). None of the simulated stages for the baselines or Alt 4R2 fall below the calibration data. Closer examination indicates that the stage is correlated to the adjacent C-111 Canal. In the RSM-GL model, final calibration of the Manning's coefficient (a roughness or resistance term) for the C-111 Canal resulted in selection of the maximum value (highest resistance) allowed under the calibration criteria. In general, selecting the extremes in the calibration range tends to lend less confidence in the results of the particular calibration parameter and, in this specific case, it is likely an indication that the C-111 Canal Manning's coefficient parameter was insensitive to conditions observed during the calibration period. Since the model performs well for the existing condition (2012EC) but shows high canal stages in the upstream reaches for the IORBL1 and Alt 4R2, the calibrated roughness coefficient is likely too high and the resulting upstream canal stages (and adjacent groundwater levels) are predicted higher by the RSM-GL than would be truly expected for the future with project conditions. This artifact of the model can only be addressed during model calibration and, in this specific case, should not be evaluated as representative of the predicted project performance.

Comparison of the regional groundwater stage difference maps for the IORBL1 and Alt 4R2 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 CEPP project affected groundwater levels when regional ground water 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 (Alt 4R2) and the without project conditions (IORBL1) were compared. The 1995 regional water levels are generally maintained (grey shading) or flood protection slightly improved (lower levels – white and yellow shading) for LECSA 2 and LECSA 3 (**Figure B-44)**. With project (Alt 4R2) stages are increased by less than 0.25 feet for some areas east of the 8.5 SMA detention cell, the C-111 South Dade North Detention Area, and the C-111 South Detention Area, which are operating at higher stages for Alt 4R2 to manage increased seepage during this period. Localized changes observed in this area may be addressed through further operational refinements for the 8.5 SMA, S-331, and the C-111 detention areas during PED, possibly with some additional water also being routed to Biscayne Bay. The average October groundwater stage difference map for the complete period of simulation (1965–2005) indicates no significant changes within the urbanized LECSA 2 and LECSA3 for Alt 4R2, compared to the IORBL1 (**Figure B-45**). Stage increases of 0.15–0.25 feet are observed within the Pennsuco wetlands, and localized stage increases are indicated along C-1W as additional seepage flows are discharged via S-338 towards Biscayne Bay.

When comparing the with project condition (Alt 4R2) to the existing condition baselines (2012 EC and ECB) (**Figure B-46** and **Figure B-47**), 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 ft. Further south, in the vicinity of the SDCS within LECSA 3, groundwater stages increase between 0.1 and 0.5 ft when comparing Alt 4R2 to the 2012EC/ECB. This is consistent with the simulated higher seepage rates along L31N and L31W (**Table B-9**) and shows the effects of intervening projects assumed for the CEPP future without condition.

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 IORBL1 and the ECB/2012EC, L-30 Canal stages (north of S-335) for Alt 4R2 indicate a moderate reduction of 0.1-0.2 feet to flood control stages within the wettest 10 percent of hydrologic conditions, with no significant change observed for the upper 1 percent of the stage duration curve (**Figure B-48**). The L-31N Canal stages (north of G-211) indicate a significant (up to 1.0 feet) reduction to flood control stages within the wettest 5 percent of hydrologic conditions for Alt 4R2 (**Figure B-49**). C-111 Canal stages between S-176 and S-18C indicate no significant change for the upper 10 percent of the stage duration curve compared to the IORBL1, with a small stage reduction of 0.1 feet observed compared to the ECB (**Figure B-50**).

G-3439, a monitored well located along the C4 Canal, was also evaluated (**Figure B-51**). The with project condition (Alt 4R2) performs the same as the without project condition (IORBL1) during the highest 20 percent of the period of simulation. Comparison of the with project to the existing condition baselines (2012EC and ECB) shows the water stages slightly reduced with Alt 4R2.

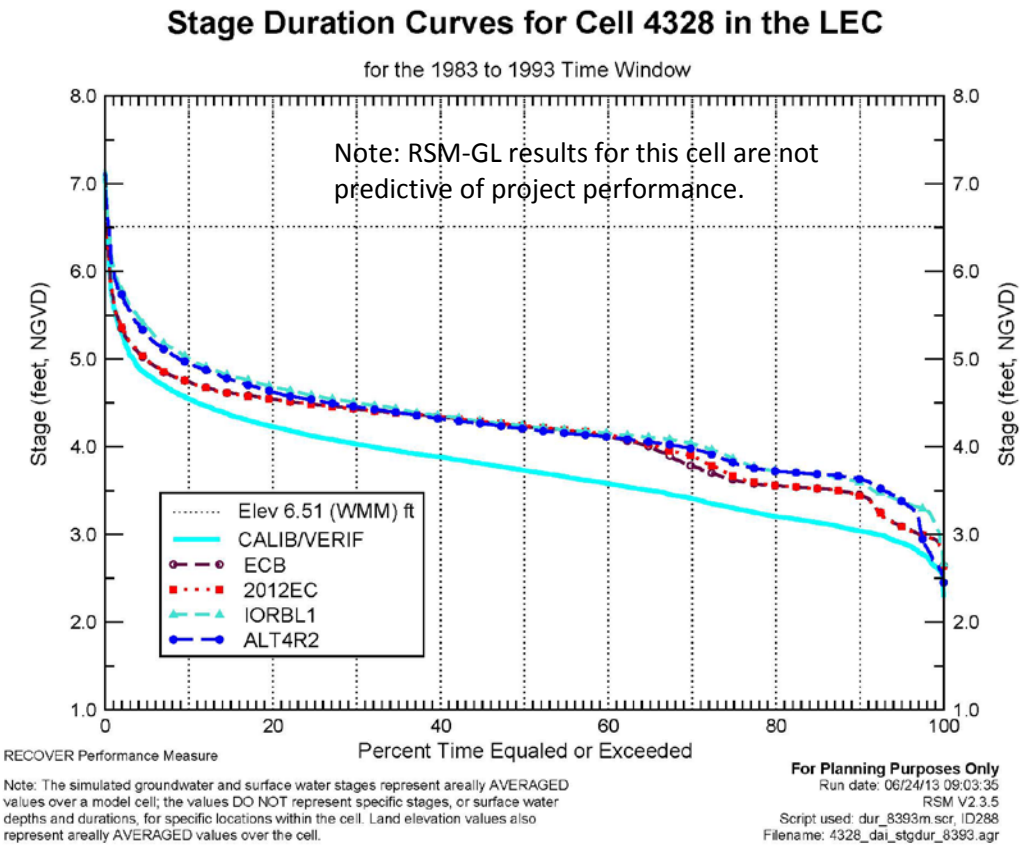

Figure B-43. Stage Duration Curves for Cell 4328 in the LEC showing anomalous results

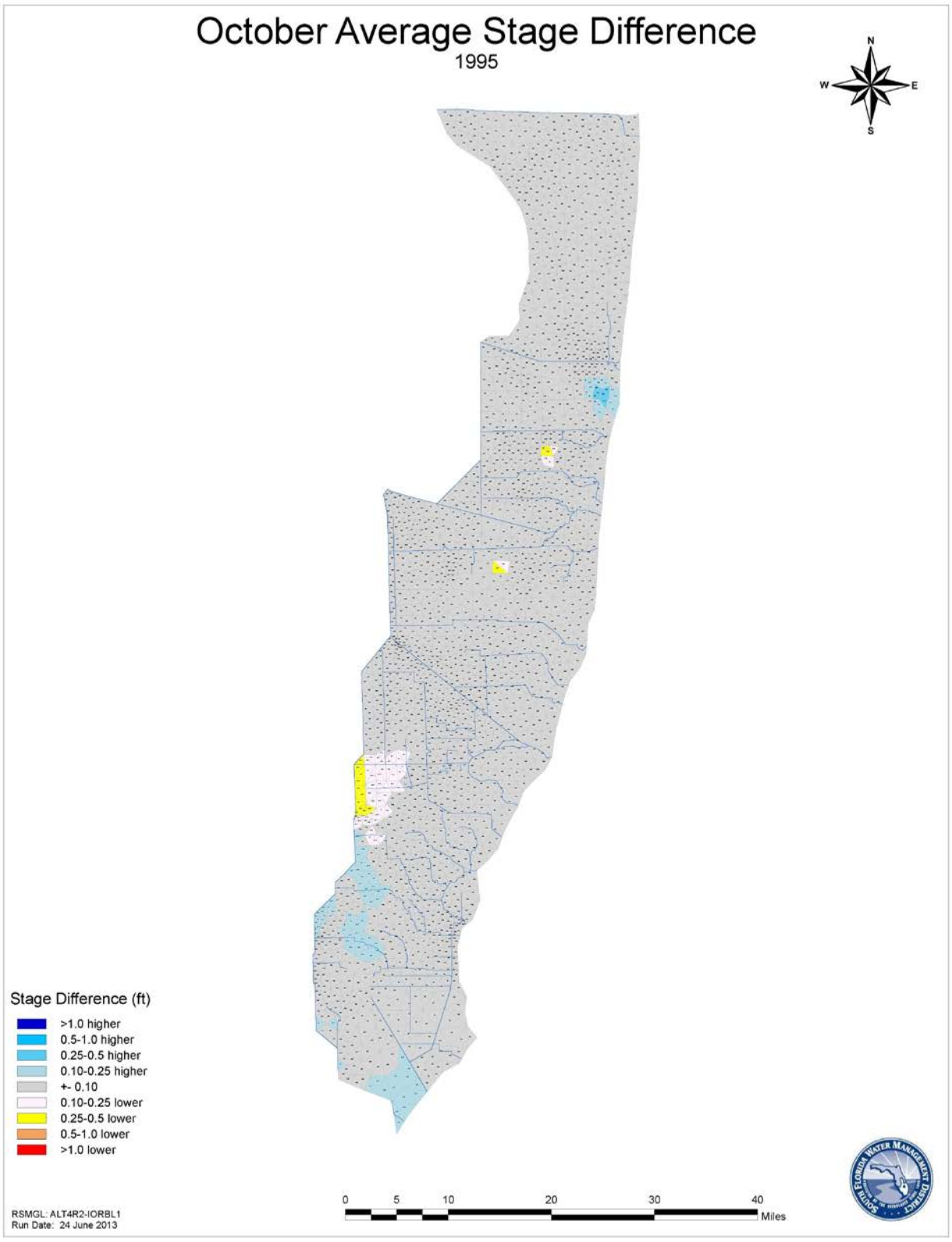

Figure B-44. October 1995 Average Stage Difference between Alt 4R2 and IORBL1

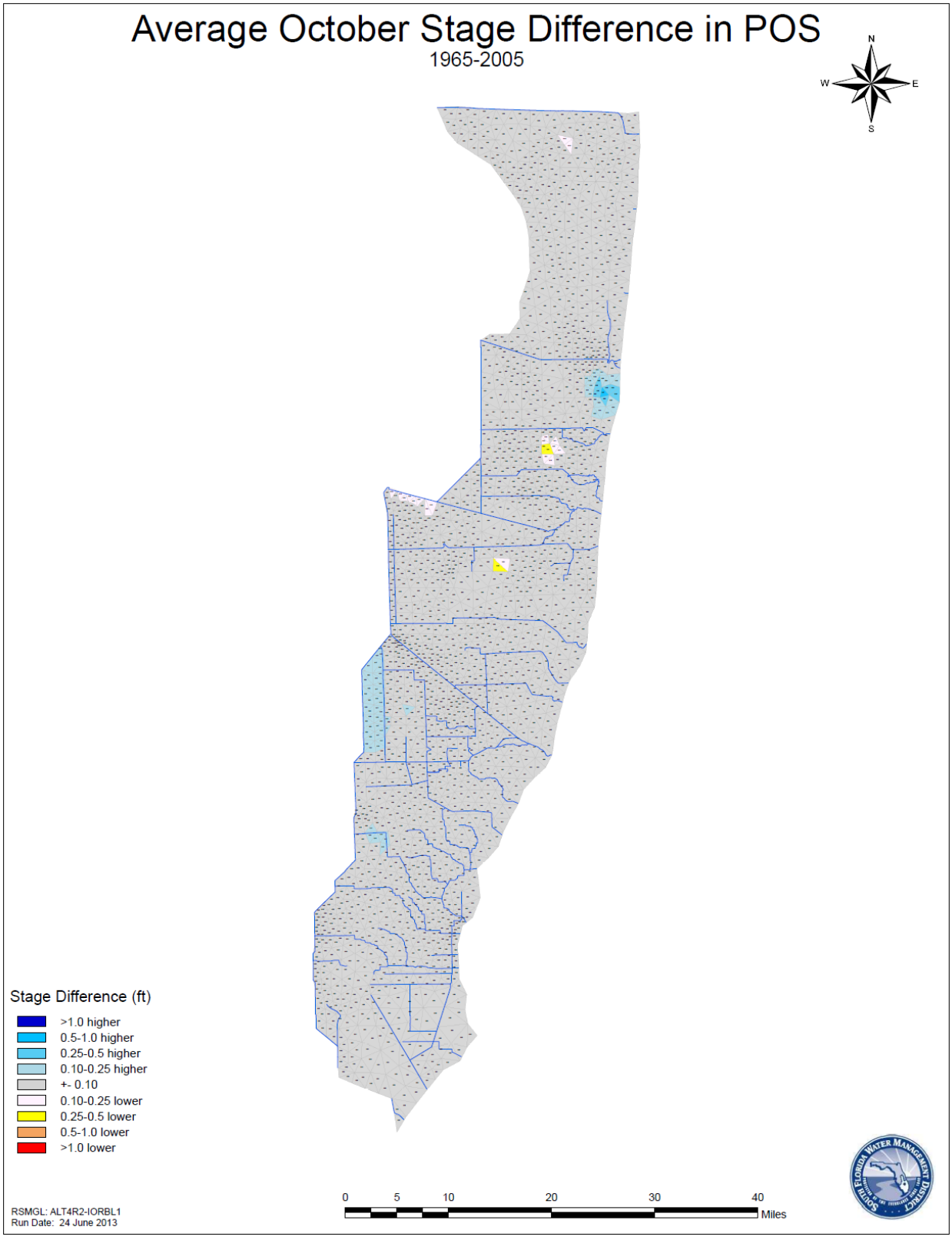

Figure B-45. Average October Stage Difference Map between Alt 4R2 and IORBL1 for 1965–2005

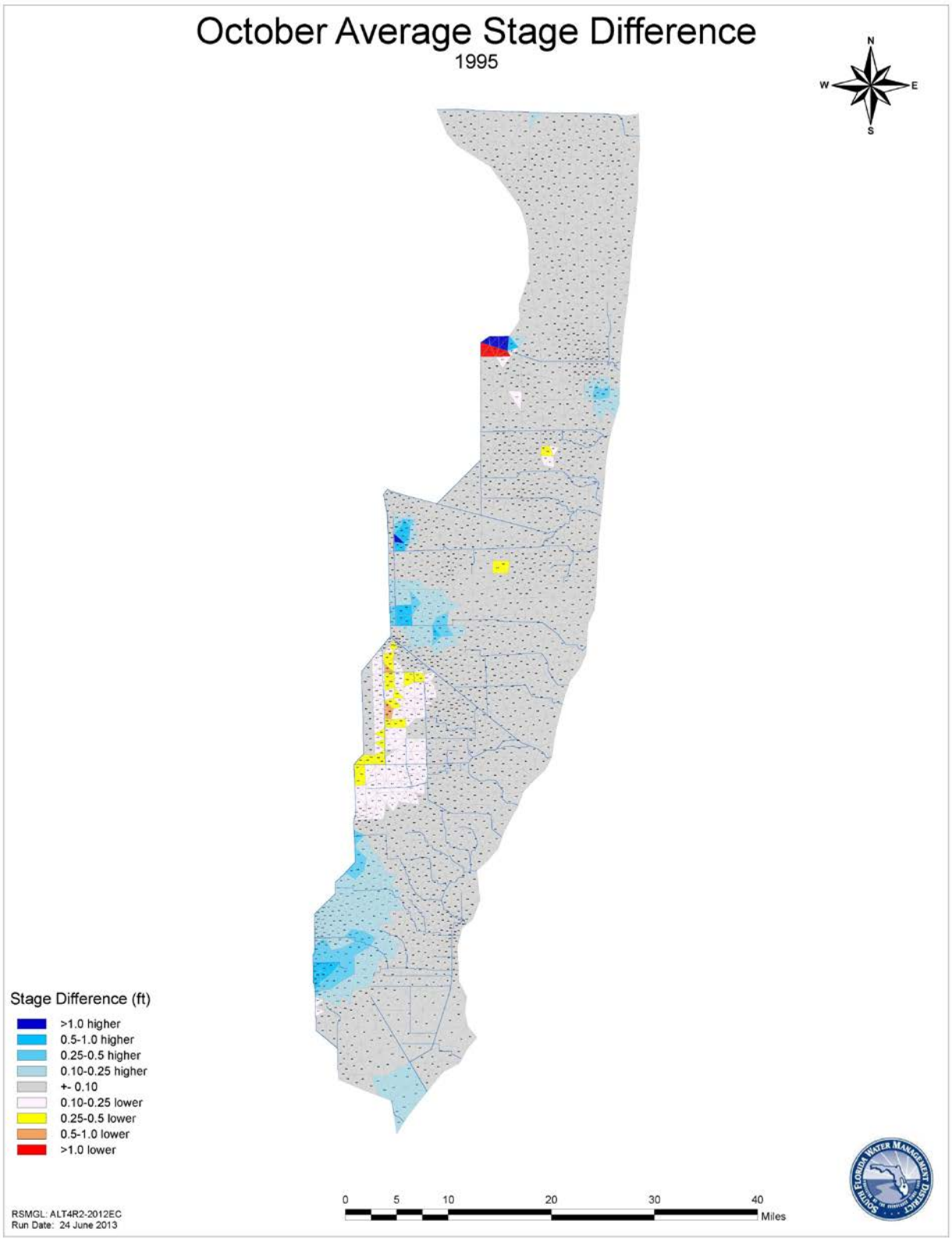

Figure B-46. October 1995 Average Stage Difference Map between Alt 4R2 and 2012EC

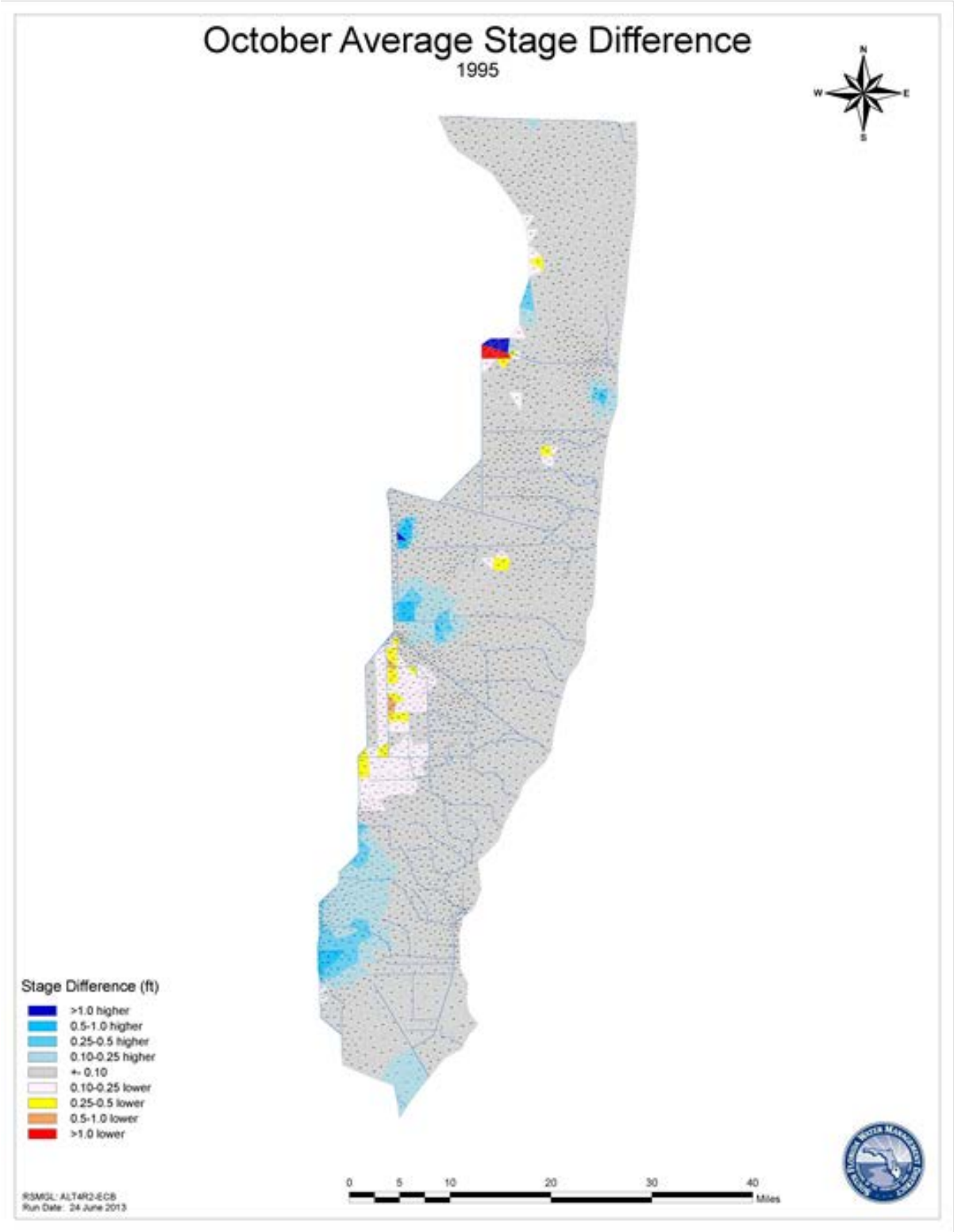

Figure B-47. October 1995 Average Stage Difference Map between Alt 4R2 and ECB

Table B-9. Groundwater Seepage under the East Coast Protective Levee to the LECSA 3

Seepage Direction	Levee Seepage from Marsh Cell (kAF)				
	ECB	2012EC	IORBL1	ALT4R	ALT4R2
L30 north of the bridge	218	215	211	203	201
L30 between S335 and the bridge	111	111	106	141	141
L30 south of S335	92	92	84	98	100
L31N north of G211	149	171	160	211	251
L31N from G211 to S331	29	29	30	28	28
L31N from S331 to S176	209	207	227	329	322
C111 from S176 to S177	98	107	201	217	214
C111 from S177 to S18C	29	30	44	49	47

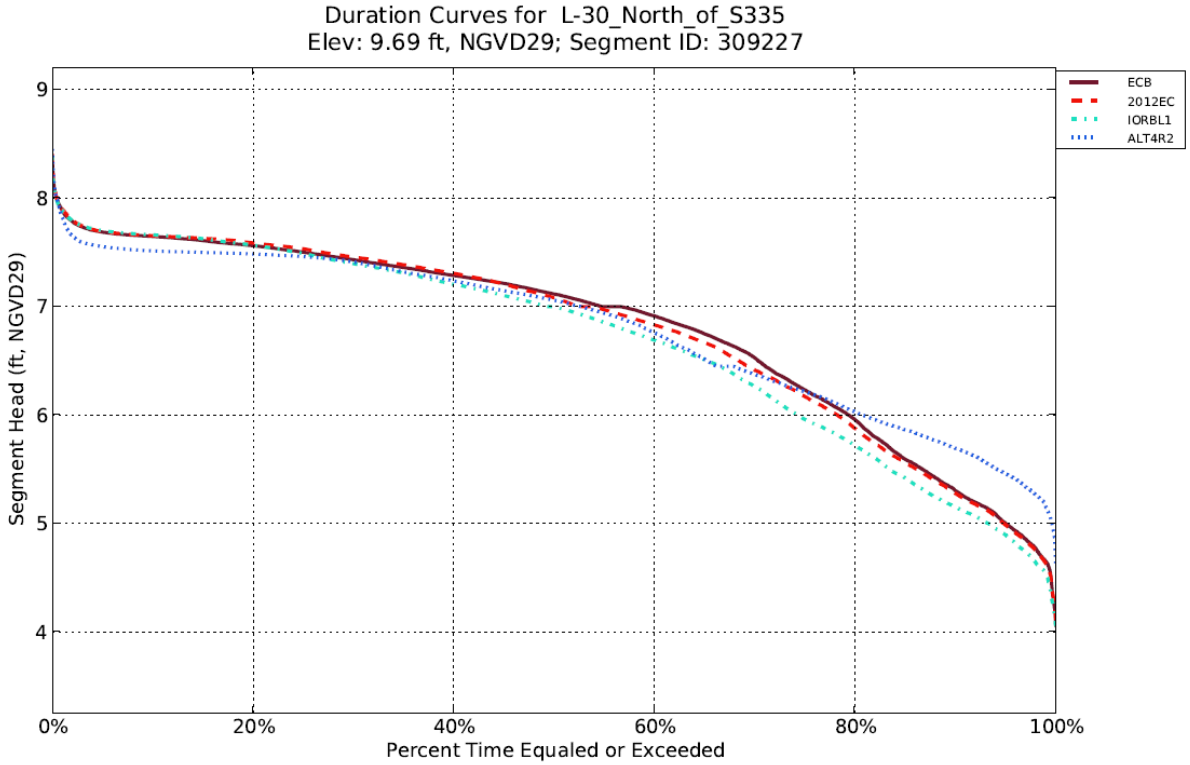

Figure B-48. Duration Curves for L-30 Canal, adjacent to WCA 3B

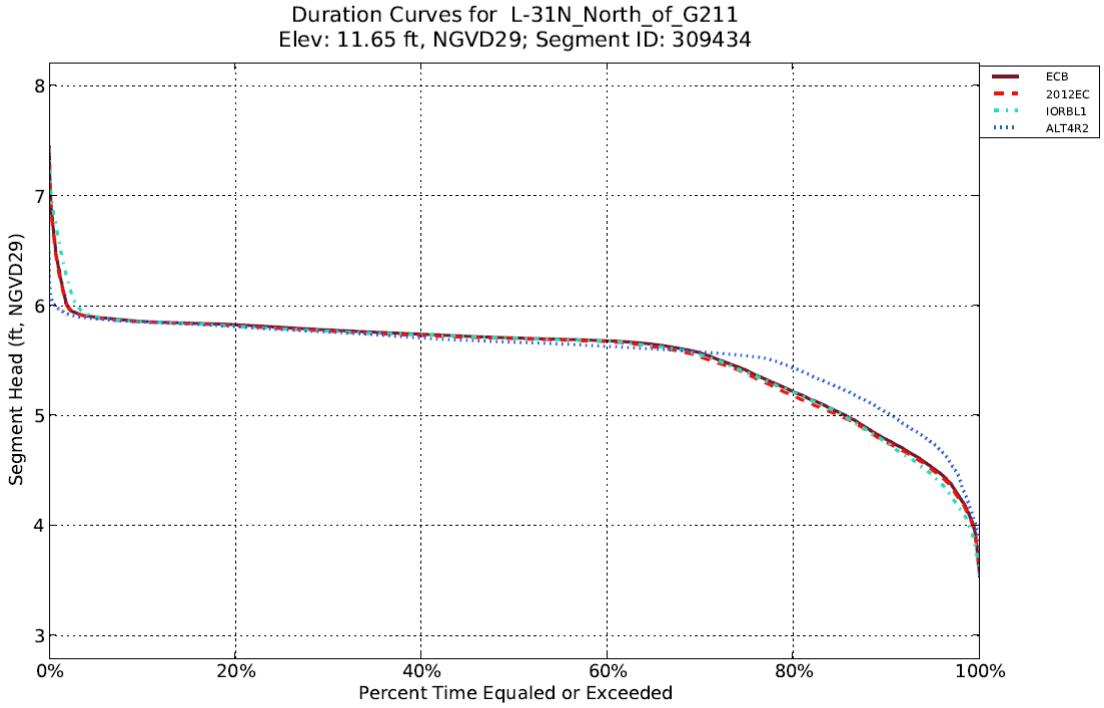

Figure B-49. Duration Curves for L-31 N Canal, Adjacent to Northern ENP

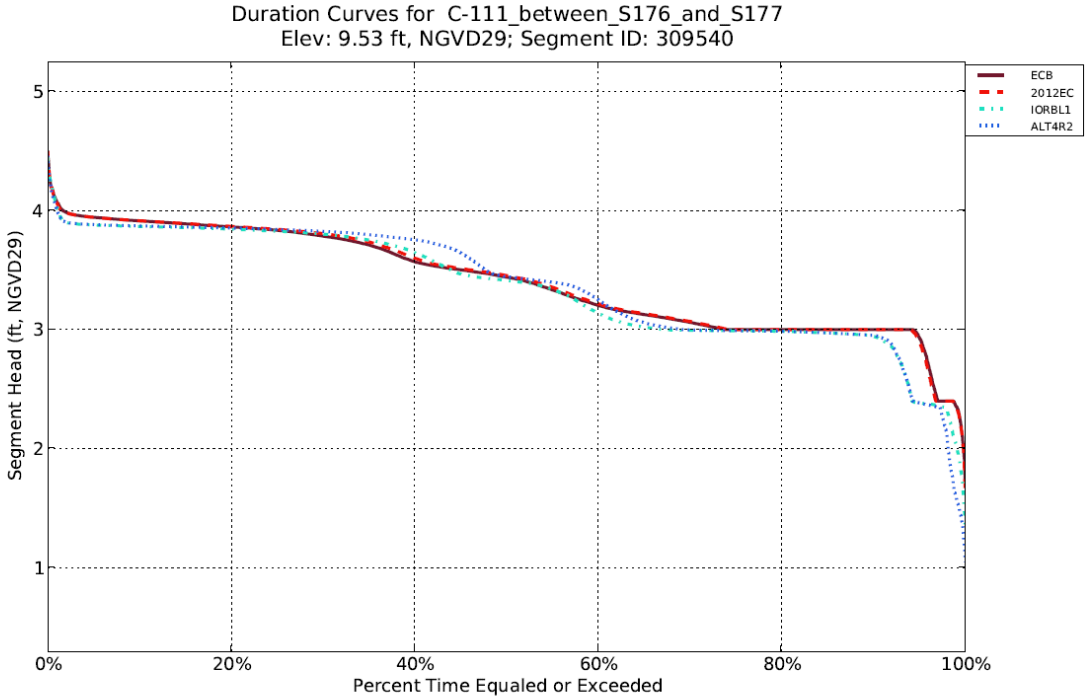

Figure B-50. Duration Curves for C-111 Canal, Adjacent to Southern ENP

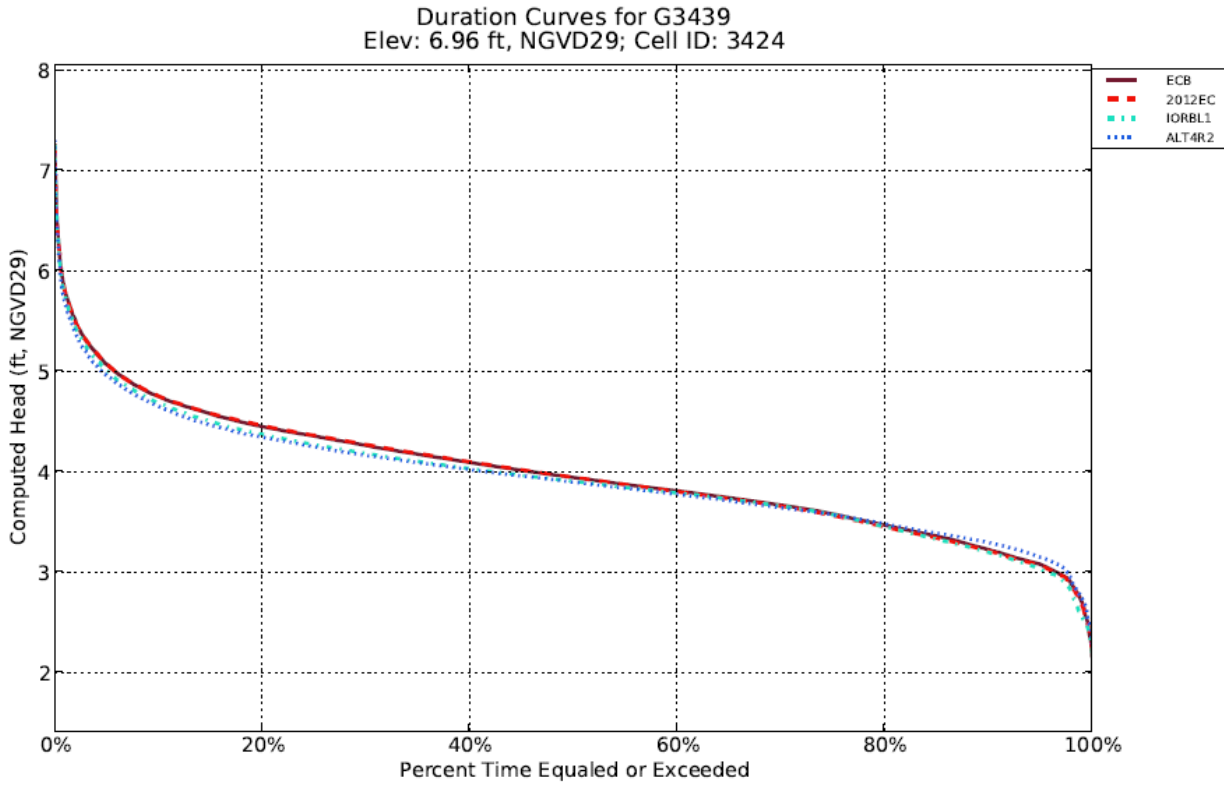

Figure B-51. Stage Duration Curves for G-3439

B.3.2.6 Seminole Tribe of Florida

CEPP 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. As a result of reduced freshwater inflow and drainage by the Miami Canal, northern WCA 3A is currently dominated largely by mono-specific sawgrass stands and lacks the diversity of communities in central and portions of southern WCA 3A. Implementation of any of the CEPP action alternatives is expected to rehydrate much of northern WCA 3A by redistributing treated STA discharges from the L-4 and L-5 Canals north of WCA 3A in a manner that promotes sheetflow and by removing the drainage effects associated with the Miami Canal. Compared to the FWO, Alt 4R and Alt 4R2 stages immediately west of the L-28 Levee are increased by 0.1-0.2 feet under wet to normal hydrologic conditions and increased by 0.2-0.3 feet under normal to dry hydrologic conditions, with no significant change indicated for extreme wet or dry conditions. Stage increases are only observed for the RSM-GL cells located immediately west of the L-28 Levee, which correspond to the areas approximately 1-2 miles west of L-28. Average annual hydroperiods for the southernmost cells within the Seminole Tribe of Florida Big Cypress Reservation are increased by 10 to 60 days with Alt 4R and Alt 4R2 (FWO hydroperiods range from 25-150 days), with no significant hydroperiod changed indicated for the northernmost cells 2-3 miles south of L-4 (FWO hydroperiods range from 0-15 days) .

Resumption of sheetflow and related patterns of hydroperiod extension and increased water depths will significantly 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. Although none of the alternatives would provide the necessary inundation pattern for complete slough vegetation restoration, all alternatives act to rehydrate northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires and promoting transition from upland to wetland vegetation.

B.3.2.7 Miccosukee Tribe of Indians of Florida

All of the CEPP alternatives show marked improvement in hydroperiod and hydropatterns in northwestern WCA 3A. Resumption of sheetflow and related patterns of hydroperiod extension and increased water depths will 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. Although none of the alternatives would provide the necessary inundation pattern for complete slough vegetation restoration, all alternatives act to rehydrate northern WCA 3A, promoting peat accretion, reducing the potential for high intensity fires, and promoting transition from upland to wetland vegetation.

All CEPP alternatives result in similar patterns of rehydration within northern WCA 3A and all significantly decrease the amount of time when this region experiences dryout conditions. Gauge 3A-3 in northeastern WCA 3A, used to track droughts, indicates that with the FWO this area will continue to experience water levels below ground 25–30 percent of the time and that water depths will exceed three feet approximately 1–2 percent of the time. Tree islands are connected to the surrounding peat marshes via the roots of the trees. Although tree roots are still receiving water from wicking within the peat (unless the tree island is rocky), when the water table drops below these roots, the microclimate of these islands gets too dry and they can burn. All CEPP action alternatives create the hydrology necessary to restore tree islands and reduce the potential for devastating fires. Rehydration of northern WCA 3A is expected to prevent further tree island degradation and peat fires, and set in motion trends to restore ridge-slough-island patterns. With all CEPP action alternatives, northern WCA 3A will no longer have extremely short hydroperiods. Instead, this area will have more spatially uniform hydroperiods that vary between 120 and 240 days.

Compared to the FWO, Alt 4R2 stages immediately west of the L-28 Levee (north of I-75) are increased by 0.1-0.2 feet under wet to normal hydrologic conditions and increased by 0.2-0.3 feet under normal to dry hydrologic conditions, with no significant change indicated for extreme wet or dry conditions. Stage increases are only observed for the RSM-GL cells located immediately west of the L-28 Levee, which correspond to the areas approximately 1-2 miles west of L-28. Average annual hydroperiods for these cells within the Miccosukee Indian Reservation, north of Interstate 75, are increased by 10 to 60 days with Alt 4R2 (FWO hydroperiods range from 25-150 days), with no significant hydroperiod changed indicated for the 2-3 miles south of L-4 (FWO hydroperiods range from 0-15 days) .

Although Alt 4R2 does not include modifications to the L-28 Levee or the adjacent canal south of I-75, stages within the L-28 Triangle are slightly increased by 0.1-0.2 feet during nearly all hydrologic conditions, with no stage increases indicated during extreme wet hydrologic conditions, due to groundwater interactions with the down-gradient western WCA 3A marsh. Within central WCA 3A (3A-4), stages are generally increased by 0.1-0.2 feet during average to dry conditions with Alt 4R2, with a slight depth reduction during the wettest 10 percent of conditions and no significant change during extreme dry conditions. Southern WCA 3A (3A-28) stages for Alt 4R2 are decreased by 0.1-0.2 feet

during the wettest 5 percent of conditions and slightly decreased during normal to dry conditions. This information has been provided to representatives of the Tribe through PDT meetings and additional individual meetings with representatives of the Tribe.

For Alt 4R2, WCA 3B stages at Site 71 are increased under all hydrologic conditions, including stage increases of 0.1 feet during the upper 20 percent of the stage duration curve, stage increases of 0.2-0.3 feet for normal to dry conditions, and a slight stage increase during extreme dry conditions. The peak stage within the Blue Shanty flow-way is 9.70 feet NGVD and stages exceed 8.0 feet NGVD for approximately 45 percent of the period of simulation.

Compared to the FWO, Alt 4R2 stages within northwest ENP are generally significantly decreased by 0.1-0.3 feet under both wet and dry hydrologic conditions; stages are slightly increased or unchanged from the FWO for normal hydrologic conditions between approximately 35 percent and 55 percent on the stage duration curve. To the south and west, the NP-205 monitoring gage indicates a potentially significant stage decrease of 0.1-0.2 feet under all hydrologic conditions for all alternatives, compared to the FWO (**Figure B-52**).

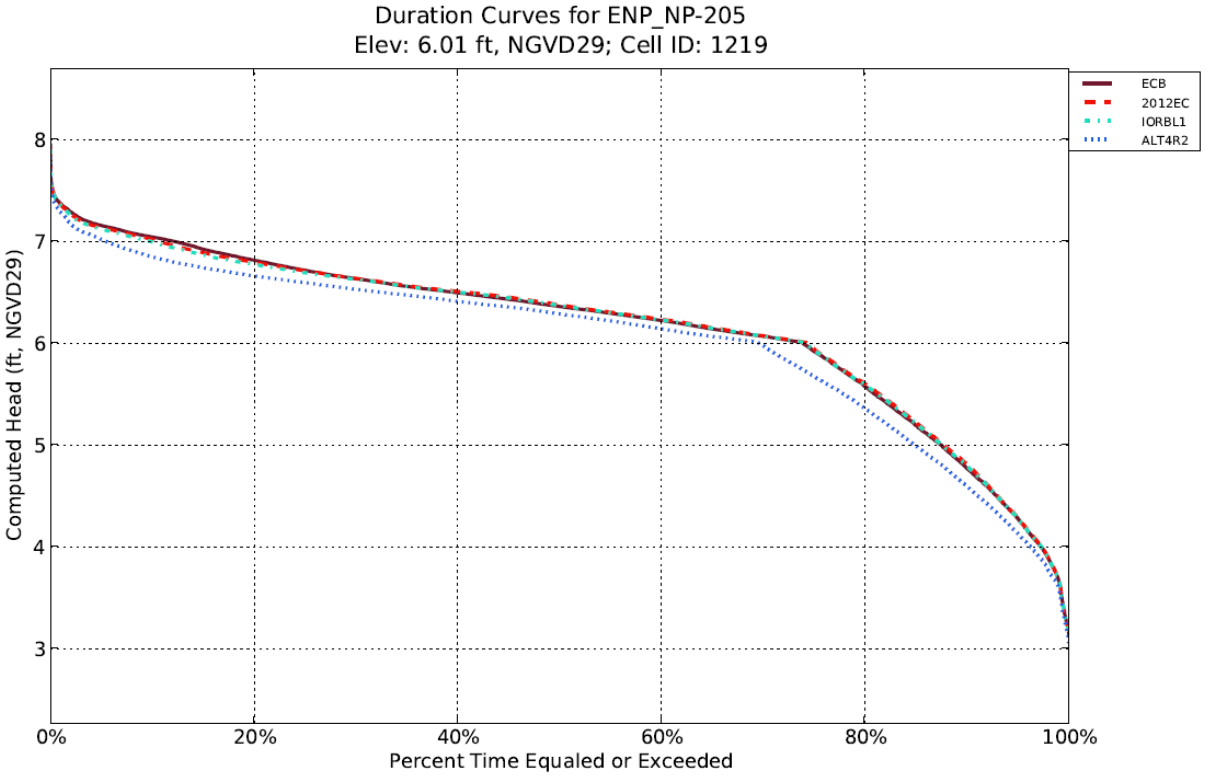

Figure B-52. Stage Duration Curves for ENP NP-205

B.3.3 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, Alt 4R2. The pre-project water expected to be available when the project is operational is represented by IORBL1.

B.3.3.1 Natural System

The total water available for the natural system with the CEPP project is represented by the with project condition, Alt 4R2. The pre-project water in the system, including the other CERP projects assumed in place prior to CEPP implementation, is represented by the IORBL1 model simulation. 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 (Alt 4R2 minus IORBL1). To follow the habitat unit benefits calculated during plan formulation, three spatial locations were selected: the inflows to WCA 3 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. These specified locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the recommended plan. Surface water inflows along the redline to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the ECB, 2012EC, and IORBL1 base conditions; for Alt 4R2, 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/STA-6 outflows to WCA 3A. Quantification of flows into WCA 3 can be found in **Figure B-53**.

Inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G; Alt 4R2 only) and S-356 (Alt 4R2 only). Quantification of flows into ENP can be found in **Figure B-54.** 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) (**Figure B-55** and **Figure B-56**).

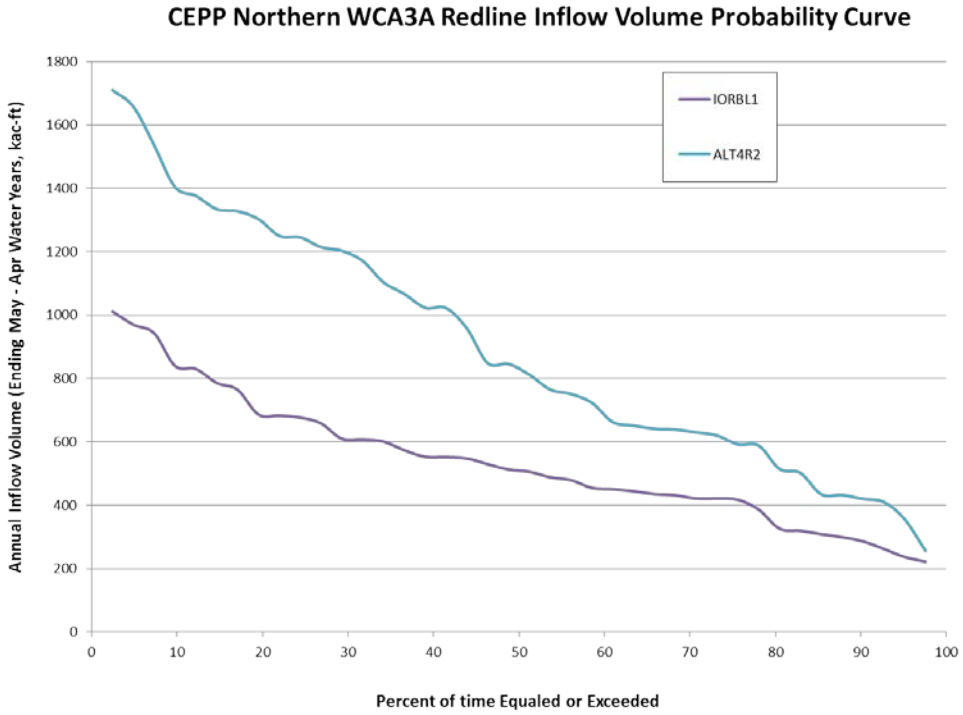

Figure B-53. CEPP Northern WCA 3A Redline Inflow Volume Probability Curve for IORBL1 and Alt 4R2

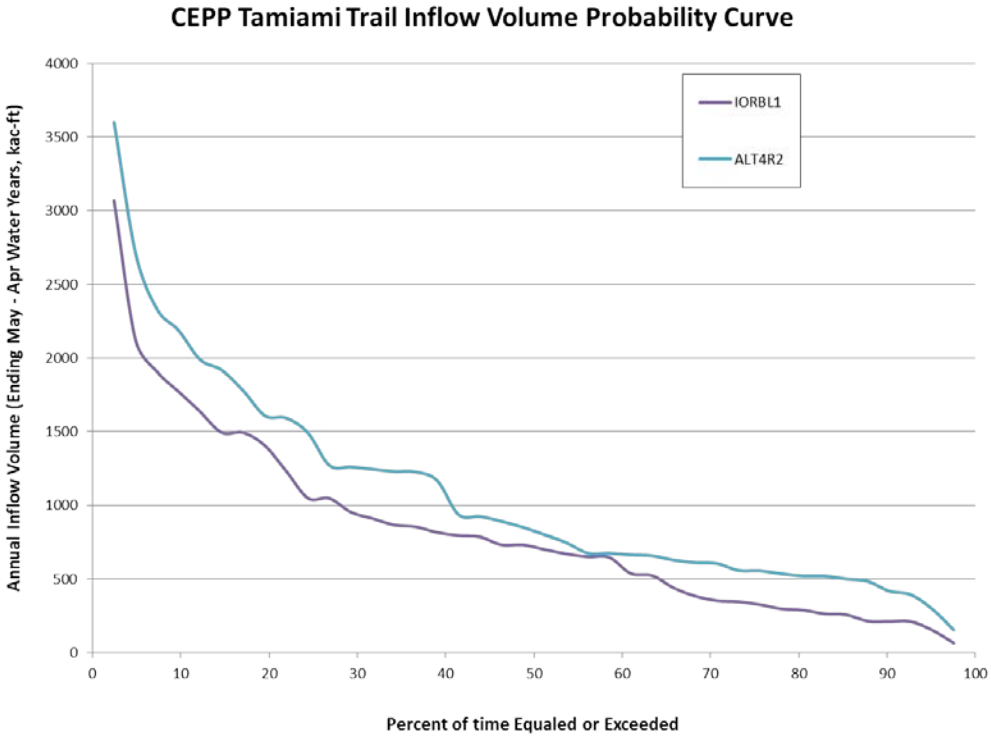

Figure B-54. CEPP Tamiami Trail Inflow Volume Probability Curve for IORBL1 and Alt 4R2

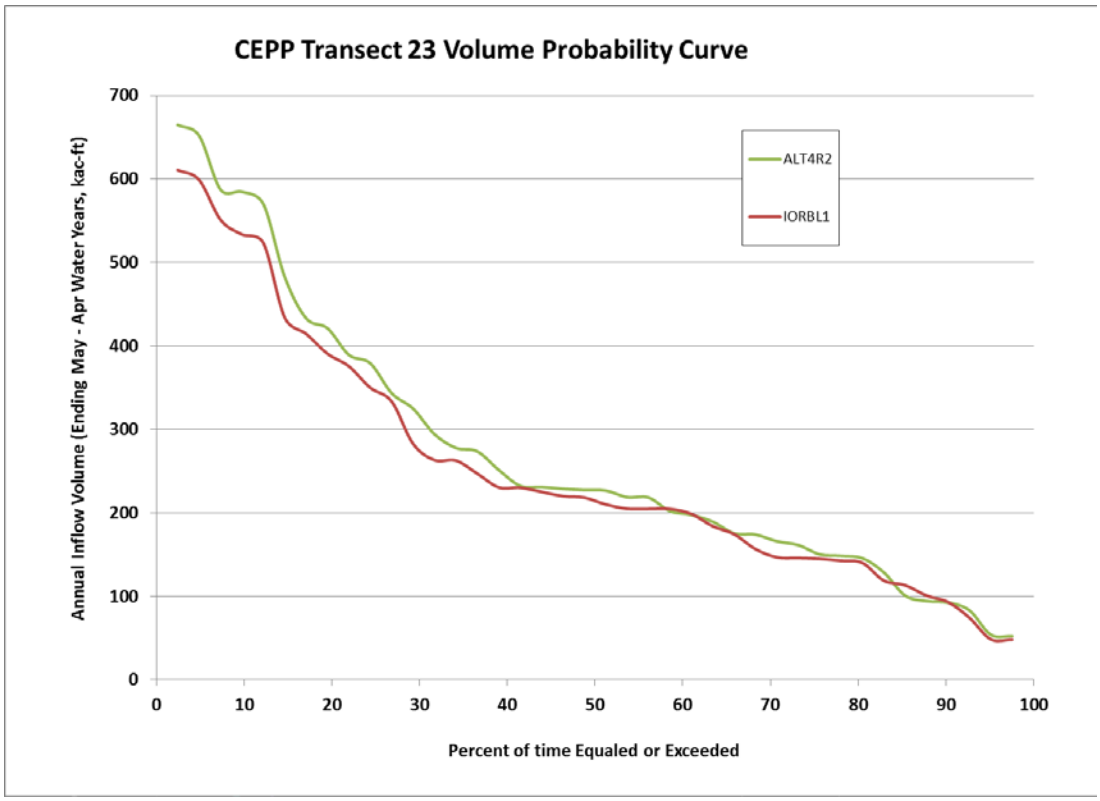

Figure B-55. CEPP Transect 23 Volume Probability Curve

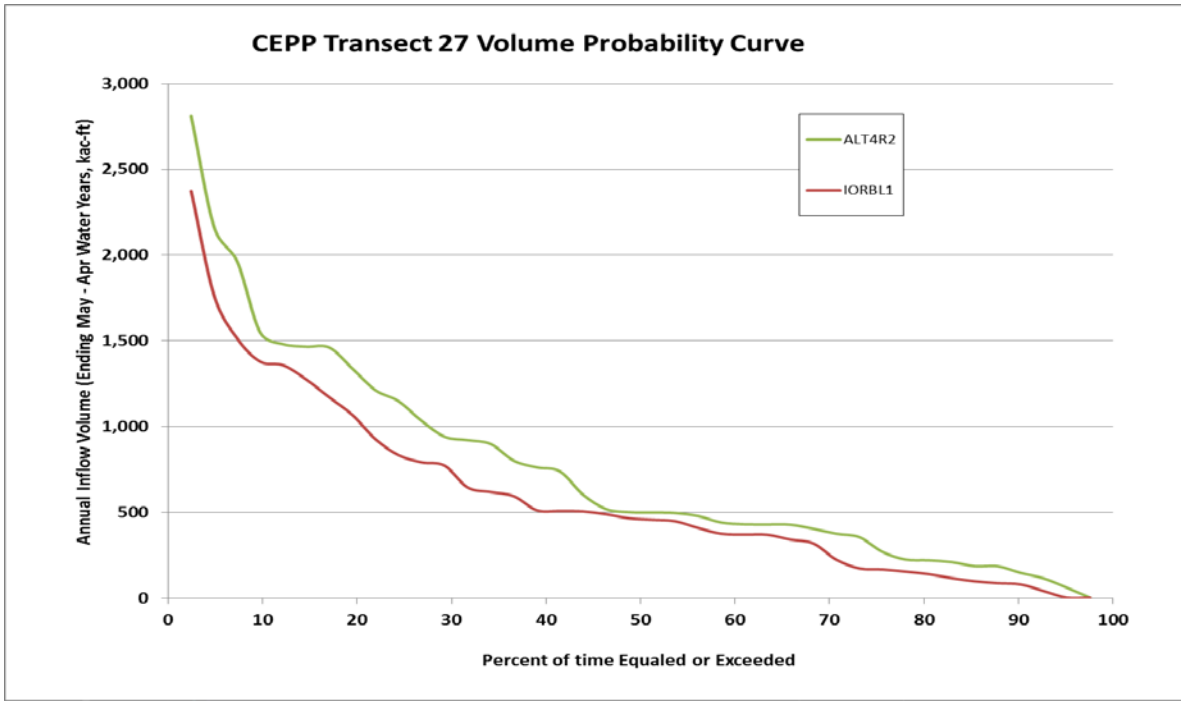

Figure B-56. CEPP Transect 27 Volume Probability Curve

B.3.3.2 Water for Other Water Related Needs

The CEPP components do not directly provide water to meet other water-related needs in LOSA, LECSA 2, or LECSA 3. By virtue of additional water being stored in Lake Okeechobee, additional water may reach water users located in LOSA; however, the level of service for LOSA water supply has not improved, nor has it been degraded by CEPP. Therefore, no water was quantified for other water related needs in the LOSA for this project.

For LECSA, additional water has been made available by the project for municipal, industrial, and agricultural users in the regional system and has been quantified for LECSA 2 and LECSA 3. An increased demand of 12 million gallons per day (MGD) in LECSA 2 and 5 MGD in LECSA 3 was included in Alt 4R2 above the demands in the initial operating regime baseline (IORBL1); the public water supply demands assumed for the IORBL1 are also equivalent to the demands assumed for the ECB and 2012EC existing condition baselines (on average, 277 MGD in LECSA 2 and 412 MGD in LECSA 3). This increase in demands for other water related needs (4 percent for LECSA 2; 1 percent for LECSA 3) could be met without affecting the benefits accrued in the natural system.

B.4 Conclusions

B.4.1 Savings Clause - Elimination or Transfer of Existing Legal Sources of Water

The recommended plan would decrease high volume freshwater discharges from Lake Okeechobee that are currently sent to the Northern Estuaries. Additional water from Lake Okeechobee would be sent southward through the canals of the EAA to the A-2 FEB. The A-2 FEB would provide storage capacity, attenuation of high flows, and limited pre-treatment prior to delivery of the redirected water to existing STAs, which would reduce phosphorus concentrations in the water to meet required 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 recommended plan, sources of water to meet agricultural and urban demand 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. 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); however, these sources will not be affected by the CEPP project. In addition, water supplies to ENP with implementation of the recommended plan exceed future without project and existing condition baseline volumes. Water sources for fish and wildlife located in the Northern Estuaries, WCA 2, WCA 3, Biscayne Bay, and Florida Bay will not be diminished. Therefore, as a result of the CEPP project, there will be no elimination or transfer of existing legal sources of water supply for the following:

- Agricultural or urban water supply in the LECSA
- 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 will be transferred to WCA 3 and further south as a result of the implementation of the recommended plan. This transfer is anticipated to occur after the modification of the Lake Okeechobee Regulation Schedule that will allow full utilization of the CEPP A-2 FEB. The recommended plan has identified an additional source of water of comparable quantity and quality that will be available to replace the water sent south. Instead of discharging all water stored in the reservoir to tide via the S-80 or to meet C-44 Basin agricultural water supply demands, as assumed in the future without project IORBL1 baseline condition operations, the recommended plan retains a portion of the water stored in the CERP IRL-S C-44 Reservoir/STA in the regional system for backflow to Lake Okeechobee via the C-44 Canal and raises the Lake Okeechobee stage criteria to allow increased C-44 Canal backflow. This added operation does not affect existing permitted allocations within the C-44 Basin. The additional C-44 Canal backflow operations to Lake Okeechobee included in the CEPP recommended plan 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. The operations do not benefit agricultural users in the C-23 Basin. The CEPP recommended plan backflow operations capture a portion of releases from the C-44 Reservoir/STA that would otherwise be directed to the Saint Lucie Estuary as excess water.

Specifically, the future without project condition (IORBL1) allows backflow to Lake Okeechobee from the C-44 Canal when S-308 (the Lake Okeechobee discharge structure to the C-44 Canal) is not open for regulatory discharges and when the stage in Lake Okeechobee is 0.25 feet below the base of the 2008 LORS low sub-band (within the baseflow sub-band), which varies between 13.0 and 14.5 feet NGVD seasonally. This operational assumption is consistent with the existing operational protocols of Lake Okeechobee (2008 LORS) and the SFWMD Lake Okeechobee Water Shortage Management (LOWSM) operations. Discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are otherwise limited to environmental deliveries for the St. Lucie Estuary and C-44 Basin agricultural water supply demands during these backflow operations.

The CEPP recommended plan operations expand on the IORBL1 backflow to Lake Okeechobee through the following operational changes: 1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and 2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule (the bottom of this zone varies seasonally between 12.6 and 13.0 feet NGVD) to provide an additional source of backflow water to Lake Okeechobee. Water captured in the C-44 Reservoir/STA, includes excess water conveyed from the C-23 Canal and Basin (approximately 6 kAF on an average annual basis) that is not needed to meet the IRL-S North Fork water reservation target. The recommended plan operational changes result in an average annual increase in C-44 Canal backflow volume to Lake Okeechobee of 57.3 kAF (97.3 kAF in the recommended plan, compared to 40.0 kAF in the IORBL1) and an average annual increase in C-44 Reservoir discharges to the C-44 Canal of 21.3 kAF (37.6 kAF in the recommended plan, compared to 16.3 kAF in the IORBL1).

The transfer of water from Lake Okeechobee to WCA 3 would not be implemented until the CERP C-44 Reservoir/STA, the canal connecting the C-44 Reservoir to both the C-23 Basin and the C-23 Canal, and the CEPP FEB on the EAA A-2 site are operational. If the canal to the C-23 Basin and the C-23 Canal is not operational when the CEPP FEB on the EAA A-2 site is ready to store water, the operations, and ultimately the delivery of water from Lake Okeechobee to the CEPP FEB, may need to be modified to avoid elimination of this portion of the source of water for the LOSA. The water retained in Lake Okeechobee also maintains the level of service for water supply for existing legal users dependent on

Lake Okeechobee and its connected conveyance system. Specifically, this includes the agricultural users in the LOSA and the Seminole Tribe of Florida.

B.4.2 Savings Clause – Flood Protection

Implementation of the project will not reduce the levels of service for flood protection within the areas affected by the project, including LOSA, EAA, LECSA 2, and LECSA 3. However, one area in the South Dade Conveyance System, specifically located adjacent to C-111 Canal (RSM-GL cell 4328), has shown increased stages relative to the existing base conditions simulated in the RSM (refer to Section B.3.2.5 for additional discussion). Since the model performs well for the existing condition (2012EC), but shows high canal stages in the upstream reaches for the IORBL1 and ALT 4R2, the calibrated roughness coefficient is likely too high and the resulting upstream canal stages (and adjacent groundwater levels) are predicted higher than would be truly expected for the future conditions. This artifact of the model can only be addressed during model calibration, and in this specific case should not be evaluated as representative of the predicted project performance.

Implementation of the project will 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 will 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.

The CEPP recommended plan maintains the pre-project flood protection level of service for the EAA by providing the same total pumping capacity at the S-8 (4,170 cfs) and S-7 (2,490 cfs) pump stations, which provide drainage for the upstream EAA basin. CEPP will maintain this existing design capacity for the S-8 complex through a combination of pump station design modifications, a new hydraulic connection from S-8 to the degraded L-4 Levee, utilization of the existing G-404 pump station (570 cfs design capacity), and leaving the 1-2 mile segment of the Miami Canal as available getaway conveyance capacity during peak flow events. Modifications of the S-8 pump station complex for CEPP operations will be further analyzed during the PED phase of CEPP, including further confirmation that CEPP construction and implementation sequences will not adversely impact the pre-project level of service for flood protection within the EAA.

The USACE did not identify opportunities for increased flood protection as part of the CEPP formulation.

B.4.3 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 specified locations in the regional system: inflows to WCA 3 (along the formulation redline), inflows to ENP, and overland flows to Florida Bay. These specified locations represent the inflows to the three basins where ecosystem benefits (habitat units) are expected as a result of implementation of the recommended plan. 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 recommended plan (future with project) conditions. The pre-project available water (IORBL1), the with project total water available (Alt 4R2), and the water made available by the project (differences between Alt 4R2 and IORBL1, which were computed for each water year within the RSM period of simulation) for the natural system can be found in **Table B-10** through **Table B-12**.

The water made available by the project to WCA 3 (quantified at the redline), ENP (quantified at Tamiami Trail), and Florida Bay (quantified for the total combined flows at Transect 23 and Transect 27) is displayed as a volume probability curve in **Figure B-57**. Compared to the without project condition (IORBL1), inflows to WCA 3 are higher for the with project condition (Alt 4R2) during all 40 water years analyzed with the CEPP hydrologic modeling. Similarly, based on the CEPP methodology applied to identify water for the natural system, the with project inflows to ENP are higher than the future without project inflows during 37 of 40 water years (93 percent), and the with project inflows to Florida Bay are higher than or equivalent to the future without project inflows during 36 of 40 water years (90 percent). The total accumulated volume of the net reductions in water year inflows to ENP and Florida Bay during the 3 or 4 water years with net inflow reductions observed for the with project condition compared to the without project condition (water years 1977, 2002, and 2003 for ENP inflows; water years 1977, 1979, 2002, and 2003 for Florida Bay inflows) corresponds to only approximately 1.0 and 2.5 percent, respectively, of the total accumulated volume of net increased inflows to ENP and Florida Bay during all of the other remaining water years which provide a net increase in inflow volumes to these locations.

Table B-10. Pre-Project Volume of Water (kAF/yr) Available for the Natural System

Pre-Project Water Available for the Natural System (IORBL1)			
Location	***Water Available equaled or exceeded 10% of Water Years (kAF)***	***Water Available equaled or exceeded 50% of Water Years (kAF)***	***Water Available equaled or exceeded 90% of Water Years (kAF)***
WCA 3	839	513	286
ENP	1,771	732	212
Florida Bay	1,969	704	218

Table B-11. Total Volume of Water (kAF/yr) Available for the Natural System

Total Water Available for the Natural System (Alt 4R2)			
Location	***Water Available equaled or exceeded 10% of Water Years (kAF)***	***Water Available equaled or exceeded 50% of Water Years (kAF)***	***Water Available equaled or exceeded 90% of Water Years (kAF)***
WCA 3	1,404	846	420
ENP	2,187	850	419
Florida Bay	2,113	729	287

Table B-12. Water Made Available by the Project (kAF/yr) for the Natural System

Water Made Available by the Project (difference between Alt 4R2 and IORBL1)			
Location	***Water Made Available equaled or exceeded 10% of Water Years (kAF)***	***Water Made Available equaled or exceeded 50% of Water Years (kAF)***	***Water Made Available equaled or exceeded 90% of Water Years (kAF)***
WCA 3	647	357	97
ENP	534	256	37
Florida Bay	418	137	-13

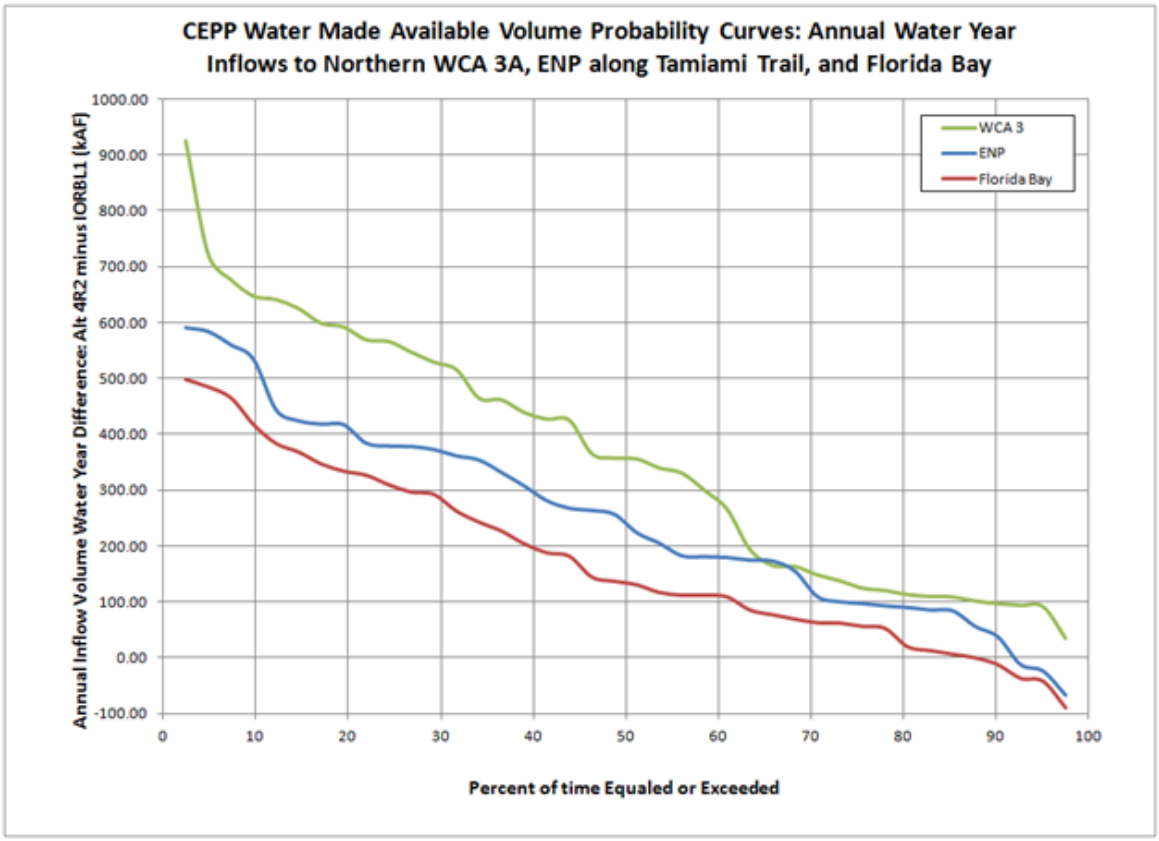

Figure B-57. CEPP Water Made Available Volume Probability Curves for WCA 3, ENP, and Florida Bay

B.4.3.1 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-12**. The SFWMD has protected the pre-project water for the natural system in the Holeyland 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 water bodies. Refer to Section 3.2.1 of the SFWMD's Basis of Review for Water Use Permit Applications (2012) for additional information. The combination of protecting the pre-project water and protecting the water made available by the CEPP project features is necessary for the CEPP to achieve its intended benefits.

The SFWMD will protect the water made available by the CEPP project features using its reservation or allocation authority as required by 373.470, Florida Statutes (F.S.). Protection of water made available by CEPP project features is required in order for the SFWMD and the Department of the Army to enter into one or more Project Partnership Agreements to construct the CEPP project features.

B.4.4 Project Assurances – Identifying Water Made Available for Other Water Related Needs

The ability of the CEPP project features to provide water to meet other water related needs in the LOSA, LECSA 2, and LECSA 3 was analyzed for the recommended plan. Based on the analysis, the level of service for the LOSA water supply has not improved, nor has it been degraded by CEPP (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 Lake Okeechobee, additional water may reach water users located in the LOSA.

Additional water available for allocation to consumptive use permit applicants is expected to be generated by CEPP in LECSA 2 and LECSA 3 for municipal, industrial, and agricultural users. The specific locations, volumes, and/or timing of where this water will be available for withdrawal in LECSA 2 and LECSA 3 will be developed when the following, project-related conditions are met: 1) completion of all CEPP project features and 2) upon a formal determination by the SFWMD's Governing Board that these project features are operational consistent with requirements of the appropriate CEPP PPA. The following steps must be complete prior to this determination: 1) CEPP project authorization by Congress; 2) appropriation of federal and state funding; 3) Project Partnership Agreement(s) for construction of CEPP features; 4) construction of CEPP features; and 5) operational testing and monitoring of CEPP features. Water will be allocated in accordance with the requirements of the SFWMD's consumptive use permitting rules in effect at that time. Other future state or federal initiatives may make additional water available for consumptive use in addition to this CERP increment. Potential consumptive use permit applicants may, at their discretion, evaluate whether or not this additionally available water is a suitable source to meet their needs.

B.4.5 Incremental Analysis during Plan Implementation

The Recommended Plan is composed of implementation phases that include the construction of a recommended plan feature or logical groupings of recommended plan features, agreed upon by the USACE and SFWMD, that maximize benefits to the extent practicable consistent with project dependencies and the Adaptive Management and Monitoring Plan. These implementation phases will achieve incremental hydrologic and environmental benefits. CEPP will be designed and constructed in phases, with each construction phase containing one or more implementation phases as described in **Section 6** of the PIR main report. The approach incorporates the adaptive management process, maximizing the opportunity to realize incremental restoration benefits by initially building features that utilize pre-project available water in the system which meets State water quality standards. The USACE and the SFWMD will select particular implementation phases and the sequence of project features to maximize benefits to the extent practicable and consistent with the Adaptive Management and Monitoring Plan (See Annex D). 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.

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 CEPP recommended plan. 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 PPA 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 implementation period.

B.4.6 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 PartnershipAgreement 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.5 State Compliance Report

CENTRAL AND SOUTHERN FLORIDA PROJECT
COMPREHENSIVE EVERGLADES RESTORATION PLAN

Central Everglades Planning Project

State Compliance Report
Section 373.1501, Florida Statutes

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1 Overview of Section 373.1501, Florida Statutes Requirements

Section 373.1501, Florida Statues (F.S.) requires the Florida Department of Environmental Protection (FDEP) to ensure that the South Florida Water Management District, as local sponsor for the Comprehensive Everglades Restoration Plan (CERP), evaluate whether each CERP project has considered all state water resource issues and is technologically feasible and cost effective. The required evaluations include analysis of water resource issues, project feasibility, consistency with state and federal laws, project assurances, and utility and public infrastructure coordination. This report, along with the additional detail provided in the Project Implementation Report (PIR), provides the information necessary for FDEP to determine that the South Florida Water Management District (SFWMD) has conducted the necessary evaluations as set forth in Subsection 373.1501(5), F.S.

1.1 Introduction

The Central Everglades Planning Project (CEPP) is encompassed in CERP, which was approved by Congress as a framework for the restoration of the natural system under Section 601 of the Water Resources Development Act of 2000 (WRDA 2000). CERP, including CEPP, intends to achieve more natural flows by re-directing flows that are currently discharged to tide, to a more restored flow of water that is distributed throughout the system similar to pre-drainage conditions. A fundamental objective of CERP was to increase water management flexibility to meet water needs of the Everglades. The purpose of CEPP is to improve the quantity, quality, timing, and distribution of water flows to the central Everglades (Water Conservation Area 3 [WCA 3] and Everglades National Park [ENP]).

The CEPP study recommends six components of the CERP:

- 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)

1.1.1 Study Area

The study area for the CEPP encompasses the Northern Estuaries (St. Lucie River and 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 (specifically focused on Florida Bay), and portions of the Lower East Coast (LEC). Adjacent areas were also evaluated. For purposes of this study, the term Greater Everglades is defined as the region encompassing WCA 3 and ENP. A map of the CEPP study area is provided in Figure 1-1 with a description of the study area regions provided in Table 1-1.

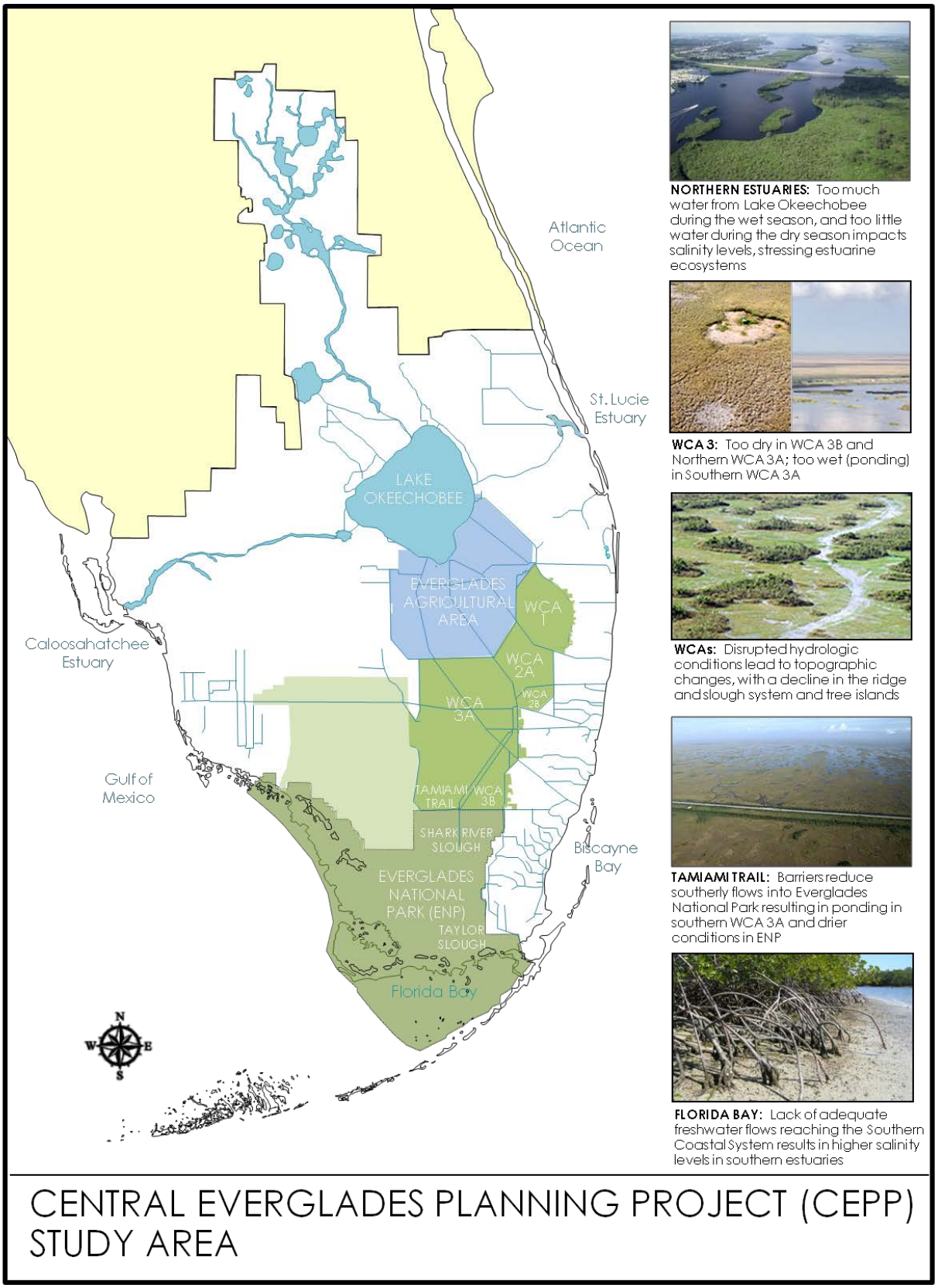

Figure 1-1 - Map of Study Area

Table 1-1 Description of the CEPP Study Area

CEPP 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 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 2 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.
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 2 and, WCA 3 (the largest of the three) are situated southeast of the EAA and are approximately 1,328 square miles. The WCAs extend from EAA to ENP. They provide floodwater retention, 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	The LEC encompasses Palm Beach, Broward, Monroe and Miami-Dade Counties. Water levels in this area are highly controlled by the C&SF 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 is focused on the portions of the LEC adjacent to the natural areas that are susceptible to seepage.

1.1.2 Project Objectives

Section 601(h) of WRDA 2000 states "[*t*]*he 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*". These same objectives apply to the CEPP study efforts (Table 1-2).

Table 1-2 Goals and Objectives of CERP and CEPP

CERP Goal: Enhance Ecological Values	
CERP Objective	**CEPP Objective**
Increase the total spatial extent of natural areas	No corresponding CEPP objective; consider this objective in future increments
Improve habitat and functional quality	Restore 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
	Reduce high volume discharges from Lake Okeechobee to improve the quality of oyster and SAV habitat in the northern estuaries
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
	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
Reduce flood damages (agricultural/urban)	No corresponding CEPP objective; consider this objective in future increments
Provide recreational and navigation opportunities	Provide recreational opportunities
Protect cultural and archeological resources and values	Protect cultural and archeological resources and values

1.1.3 Project Features

The components of the Recommended Plan, Alternative 4R2, are organized into four geographic areas: North of the Redline, South of the Redline, the Green/Blue lines and along the Yellowline (**Figure 1-1**).

North of Redline

- A-2 Flow Equalization Basin (14,000 acres), including exterior and internal levees
  - Seepage Pump Station (500 cubic feet per second [cfs])
  - Water Control Structures (culverts, spillway)
  - Emergency Overflow Weir
  - Canals (inflow, seepage collection, internal collection, and discharge)

South of Redline

- L-6 Canal Flow Diversion
- L-5 Canal Conveyance Improvements
- S-8 Pump Station Complex Modifications
- L-4 Levee Degrade (approximately 2.9 miles) and Pump Station (360 cfs)
- Miami Canal Backfill (approximately 13.5 miles from 1.5 miles south of S-8 to Interstate 75)

Blueline/Greenline

- S-333 Spillway Modification (1,150 cfs gated spillway adjacent to S-333; 2,500 cfs total)
- L-29 Canal Gated Spillway (1,230 cfs)
- L-67A Conveyance Structures (three, 500 cfs)
- L-67C Levee Gap (6,000 feet)
- L-67C Levee Degrade (approximately 8 miles)
- Blue Shanty Levee, WCA-3B (approximately 8.5 miles)
- L-29 Levee Degrade (4.3 mi, within Blue Shanty Flow-way)
- L-67 Extension Levee Degrade and Canal Backfill (approximately 5.5 miles)
- Old Tamiami Trail Removal (~ 6 miles)

Yellowline

- S-356 Pump Station Modifications (increase to 1,000 cfs)
- Seepage Barrier, L-31N Levee (approximately 4.2 miles)
- System-wide Operations Refinements

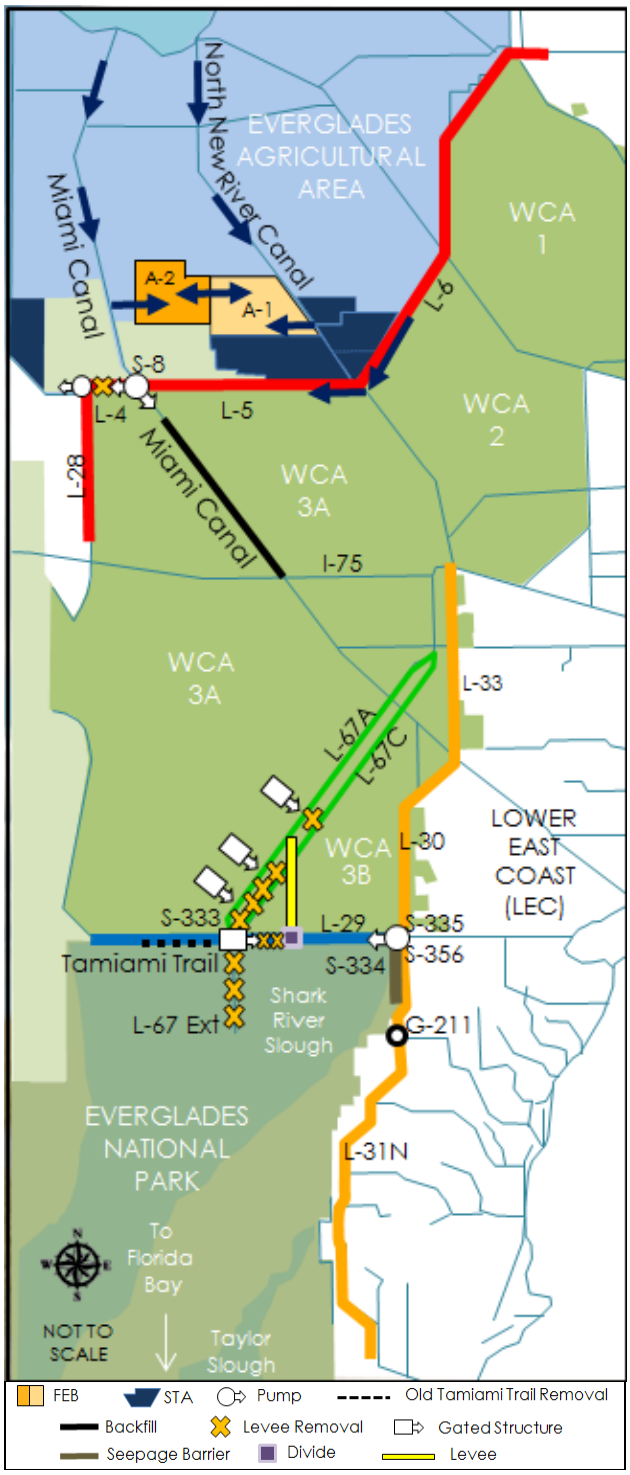

Figure 1-2 - CEPP Project Features

1.2 State Authority for CERP Projects

The Florida Legislature authorized the SFWMD to act as local sponsor for CERP projects. Section 373.1501, F.S. requires the SFWMD, for each CERP project, to analyze and evaluate whether all needs are being met in a comprehensive manner, to consider all applicable state water resource issues and to determine if it is technologically feasible and cost effective. Specifically, SFWMD must evaluate the following:

1. Water Resource Issues - water supply, water quality, flood protection, threatened and endangered species and other natural system and habitat needs (Paragraph 373.1501(5)(a), F.S.)
2. Project Feasibility - determine, with reasonable certainty, project feasibility based upon standard engineering practices, cost effectiveness, consistency with CERP purposes and implementation of other CERP projects, and operations (Paragraph 373.1501(5)(b), F.S.)
3. Consistency with state and federal laws - determine, with reasonable certainty, that each CERP project is consistent with applicable laws and can be permitted and operated as proposed (Paragraph 373.1501(5)(c), F.S.)
4. Project Assurances - Provide reasonable assurances that the quantity of water available to existing legal users shall not be diminished by a CERP 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 practice will continue to adapt to me the needs of the restored natural environment (Paragraph 373.1501(5)(d), F.S.)
5. Utility and Public Infrastructure Coordination - Coordinate with existing utilities and public infrastructure or minimize impacts to the relocation of existing public infrastructure and utilities (Paragraph 373.1501(5)(e), F.S.)

The FDEP has oversight to ensure that SFWMD has conducted these required evaluations (Subsection 373.1501(4), F.S.) and these evaluations are necessary for FDEP to approve each CERP project in order for the project to receive state funds and be submitted to Congress for authorization, Paragraph 373.026(8)(b), F.S. The FDEP is required to approve each CERP project following the formal submittal of the project by the SFWMD to FDEP.

In addition, Paragraph 373.470(3)(c), F.S. requires the SFWMD, in cooperation with the U.S. Army Corps of Engineers (USACE), to complete a Project Implementation Report that identifies the increase in water supplies resulting from each CERP project, which shall be allocated or reserved by SFWMD. FDEP is also required to issue Comprehensive Everglades Restoration Plan Regulation Act permits for construction and operation of each CERP project, Section 373.1502, F.S.

1.3 Relationship to Other USACE/Non-Federal Sponsor Efforts, Studies, Documents and Reports

Listed below are brief descriptions of other key projects related to the Central Everglades Planning Project. Included in the description are the objectives and/or study area.

1.3.1 Restoration Strategies Regional Water Quality Final Plan

In 2012, the State of Florida and the U.S. Environmental Protection Agency reached a consensus on new strategies for improving water quality in America's Everglades. Under these strategies, the South Florida Water Management District is implementing a technical plan to complete several projects that will create more than 6,500 acres of new stormwater treatment areas (STAs) and 116,000 acre-feet of additional water storage through construction of flow equalization basins (FEBs). The *Restoration Strategies Regional Water Quality Final Plan* is required to meet a numeric discharge limit for phosphorus, called a Water Quality Based Effluent Limitation (WQBEL). The WQBEL is contained in the NPDES permit for existing flows and discharges from the stormwater treatment areas (STAs) into the Everglades Protection Area (EPA). The projects have been divided into three flow paths (Eastern, Central and Western), which are delineated by the source basins that are tributary to the existing Everglades STAs. The identified projects primarily consist of flow equalization basins (FEBs), STA expansions, and associated infrastructure and conveyance improvements. The primary purpose of the FEBs are to attenuate peak stormwater flows prior to delivery to STAs and provide dry season benefits, while the primary purpose of STAs is to utilize biological processes to reduce phosphorus concentrations in order to achieve the WQBEL. The Central Flow Path contains STA-2, and STA-3/4. The Central flowpath also includes an FEB with approximately 60 thousand acre-feet kAF of storage that will attenuate peak flows to STA-3/4, and STA-2. Based on the CEPP project objectives, only the Central Flow Path features are included in the CEPP modeling representation of the future without project conditions (FWO). The FEB located within the Central Flow Path will be located on the A-1 Talisman site.

1.3.2 Operations at Southern WCA 3A, ENP and the South Dade Conveyance System

The 2006 Interim Operational Plan for Protection of the Cape Sable seaside sparrow (IOP) was the governing regulation schedule for the project area at the start of the CEPP planning process. The current approved operational plan for southern WCA 3A, ENP, and the South Dade Conveyance System (SDCS) as of October 2012 is known as the Everglades Restoration Transition Plan (ERTP). It superseded the 2006 IOP and is intended to be a transitional plan to be used until completion of the final operational plan that was to be developed as part of the Modified Water Deliveries (MWD) and Canal 111 South Dade Projects. The final operational plan for these two projects has not yet been developed.

1.3.3 Modified Water Deliveries Project

The Modified Water Deliveries Project includes authorized improvements for structural modifications and additions to the existing C&SF Project required to enable water deliveries for the restoration of more natural hydrologic conditions in ENP. Together, these improvements would enable the re-establishment of the historic Shark River Slough flow-way from WCA 3A through WCA 3B to ENP.

1.3.4 Tamiami Trail Modifications: Next Steps Project

The Department of the Interior, through the National Park Service and Everglades National Park, completed a study to restore more natural water flow that would be in addition to the

MWD project. The Tamiami Trail Modifications Next Steps (TTMNS) approved plan called for 5.5 miles of bridging, which would be in addition to the 1-mile bridge authorized by MWD and completed in March 2013. The remaining unbridged roadway would be elevated to allow a design high water stage of 9.7 feet NGVD in the L-29 borrow canal. This road height would allow all predicted future stage increases envisioned by CERP without damage to the road.

1.3.5 Partial Seepage Barrier Near the L-31N Levee

As mitigation for a Section 404 permit, the Miami-Dade Limestone Products Association (Association) constructed a 1,000 foot long, 18 foot deep slurry wall to reduce seepage between ENP and rock mine properties to the east of ENP. In July 2012, the Association completed construction of a 2 mile long, 35 foot deep seepage wall in this same location south of Tamiami Trail. Although results appear promising, further analysis for CEPP is necessary to determine the extent to which the 2 mile long, 35 foot deep seepage wall will reduce seepage to the east, or whether the Association will construct an additional wall if tests determine the current wall is ineffective. The association also may construct an additional 5 miles of seepage wall south of the 2-mile seepage wall if permitted. Since the capability of the seepage wall to mitigate seepage losses is under ongoing analysis, CEPP will not include any length and depth of seepage wall in the FWO project condition. The CEPP alternative plans will have to identify and develop the total amount and types of seepage management needed for the volume and distribution of water that the plans would deliver from WCA 3B and/or ENP. It is unknown at this time whether the slurry wall will effectively reduce seepage to the east, or whether the Association will need to do additional work in the area to manage seepage.

1.3.6 Biscayne Bay Costal Wetlands Project

The CERP Biscayne Bay Coastal Wetlands Project provides the restoration, protection, and preservation of the water resources of central and south Biscayne Bay. The project consists of three integrated sub-components: Deering Estate, Cutler Flow-way, and L-31 East. The purpose of the Biscayne Bay Coastal Wetlands project is to restore the natural hydrology and ecosystem in an area that has been degraded by regional drainage and land development practices.

1.3.7 C-111 Spreader Canal Western Project

The CERP C-111 Spreader Canal Western Project is intended to improve the delivery of flow to Florida Bay via Taylor Slough, improve hydroperiods within the Southern Glades and Model Lands, and re-establish sheetflow and hydrologic connectivity between natural areas, resulting in improved hydropatterns. The project area is within the Central Everglades Planning Project area.

1.3.8 C-111 South Dade Project

The *C-111 South Dade County 1994 Integrated General Reevaluation Report and Environmental Impact Statement (EIS)* was published in May 1994). This report described a conceptual plan for five pump stations and levee-bounded retention/detention areas to be built west of the L-31N Canal, between the S-332B and S-332D pump stations, to control seepage out of ENP while providing flood mitigation to agricultural lands east of C-111 Canal. The original and current

configuration of these structural features is further discussed in the description of IOP Alternative 7R, within the *2006 IOP Final Supplemental EIS*. Operational guidance for the new S-332DX1 structure was included in the *Everglades Restoration Transition Plan Final EIS*.

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 recommended plan 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. In addition to redistributing existing treated water in a more natural sheetflow pattern, the recommended plan provides an average of approximately 210,000 acre-feet per year of additional clean freshwater flowing into the central portion of the Everglades. This increase in freshwater flow to the Everglades is approximately two-thirds of the additional flow estimated to be provided by the CERP.

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 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 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 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 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 (existing or future) and two different conditions (with and without the project [selected plan]) as depicted in **Table 2-1**. In addition, the existing condition is also described by Existing Condition Baseline (ECB), which is similar to scenario 2012EC except it includes the previous regulatory schedule for WCA 3A known as IOP. ECB was only used during plan formulation. The model assumption tables for all base conditions and alternatives analyzed in the PIR main report are provided in Reference 2 of the Hydrologic Modeling Annex (A-2) to the Engineering Appendix A.

Table 2-1 - Key Assumptions based on Summary Tables from EN Appendix and H&H Annex

Condition	Intent	Equivalent for CEPP	Model Scenario
Pre-CERP Baseline	Conditions on the date of enactment of WRDA 2000 (December 2000), to provide a baseline to compare effects of project	Includes conditions in 2010 and most closely represents the Pre-CERP Baseline for LECSA 3, WCA 3 and ENP. Significant changed assumptions from the Pre-CERP Baseline include the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) and the Interim Operating Plan (IOP) for WCA 3A and the South Dade Conveyance System (SDCS) in the existing conditions baseline (ECB). A Pre-CERP Baseline is not available with the RSM.	**ECB**
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.	The existing 2012 conditions with only the projects and operations approved and in effect. Includes 2008 LORS and the Everglades Restoration Transition Plan (ERTP) for WCA 3A and the SDCS. Permitted demands are included.	**2012EC**
Initial Operating Regime Baseline	Future conditions at the time the recommended plan is operational including land use, operations, and demands. It does not include the Recommended Plan. 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 associated operations, aka future without project condition. Includes LORS 2008 and ERTP. Permitted demands are included.	**IORBL1**

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 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 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 sorted, 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 CEPP 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

The purpose of the Central Everglades Planning Project is to restore or improve the Everglades ecosystem (including wetlands, uplands, and associated estuaries), water quality, water supply, and maintain or improve recreation while protecting cultural and archeological resources and values. The recommended plan would achieve these benefits by reducing the large pulses of regulatory flood control releases sent from Lake Okeechobee by redirecting approximately 210,000 acre-feet of additional water on an annual basis to the historical southerly flow path.

An existing legal use of water is defined in 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 in operation.

2.3.1 Lake Okeechobee Service Area

Due to the reduction in irrigated land with the inclusion of the FEB on the EAA A-2 site, the demand for supplemental irrigation is reduced from an annual average of 339 kAF in the future without project condition (IORBL1) to 328 kAF in Alt 4R2. The volume of demand not met for the LOSA during the eight years with the largest water shortage cutbacks in the period of simulation is the same or slightly improved when comparing the with project condition, Alt 4R2, and the without project condition, IORBL1. In six of these years, the volume of demand not met is reduced (improved water supply performance) by approximately 1 to 7 percent. In the two remaining years where the volume of demand not met increases compared to the without project condition (1981 and 1982), the increase is 1 percent or less (**Figure 2-1**). Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 6 kAF (1%) in the with project condition compared to the without-project condition

(Alt 4R2 and IORBL1 average 29 kAF and 35 kAF of cutbacks for EAA and Other LOSA combined, respectively) (**Figure 2-2**).

An additional analysis compares the 2012EC and ECB to Alt 4R2. The water supply demands met improve slightly. Of the eight years with the largest water shortage cutbacks, seven years indicate reduced cutbacks ranging between less than 1 to 6 percent for the with project condition (Alt 4R2), compared to the existing condition (2012EC and ECB). In one year, 1989, the cutback percentage is increased by approximately 1 percent. Over the entire period of simulation, the average annual volume of demand not met during water shortages declines by 4 kAF (<1%) in the with project condition compared to the existing baselines (Alt 4R2 averages 29 kAF of cutbacks, and 2012EC/ECB average 33 kAF of cutbacks for EAA and Other LOSA combined).

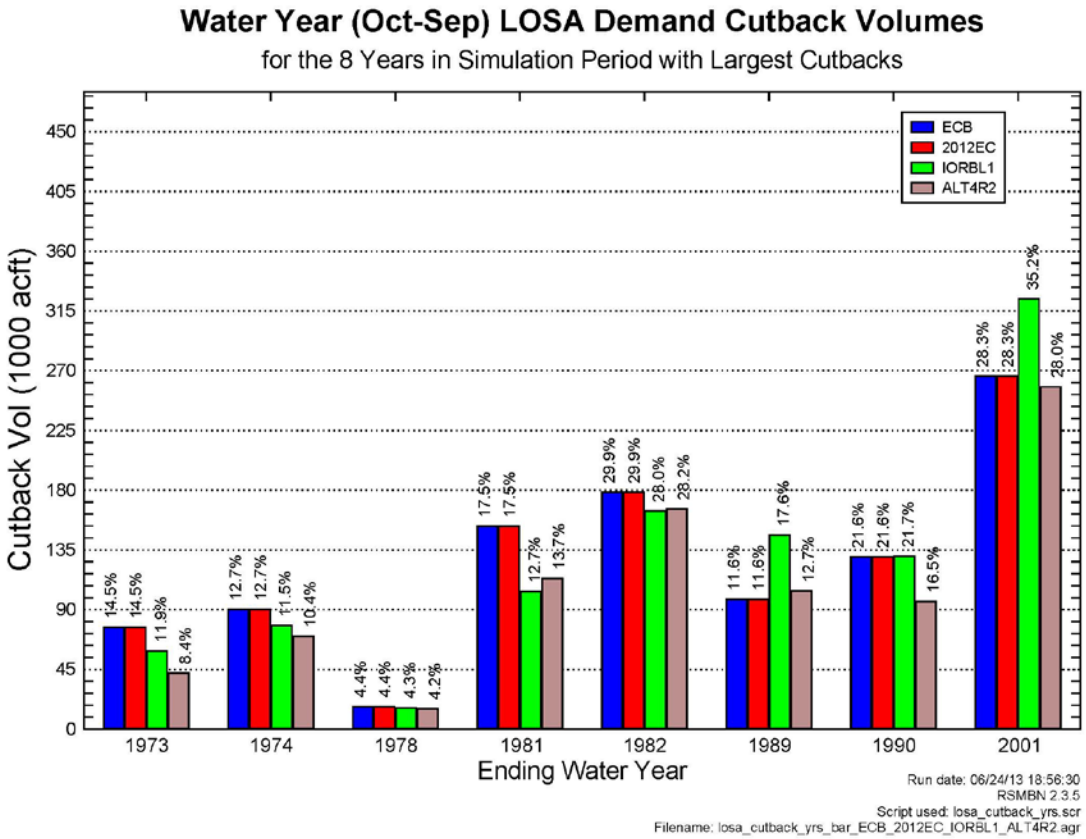

Figure 2-1 - LOSA Demand Cutback Volumes for the 8 Years with the Largest Cutbacks

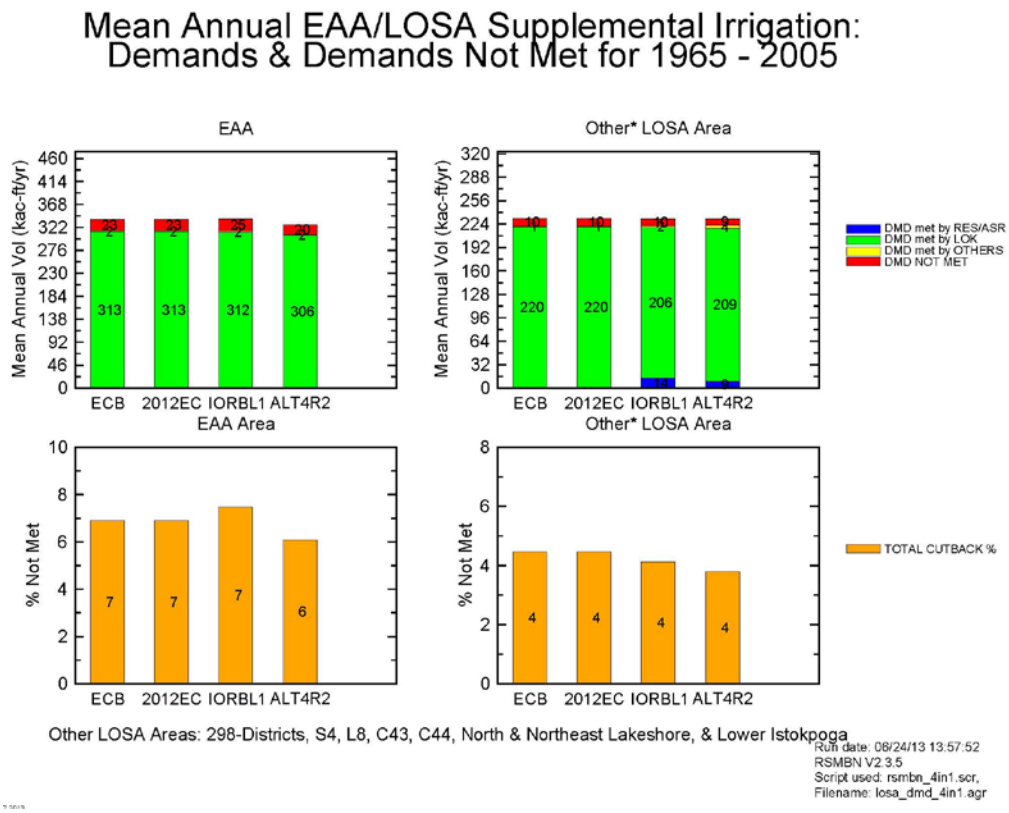

Figure 2-2 - Mean Annual EAA/LOSA Supplemental Irrigation: Demands and Demands Not Met for 1965–2005

Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee will be transferred to WCA 3 and further south as a result of the implementation of the recommended plan. This transfer is anticipated to occur after the modification of the Lake Okeechobee Regulation Schedule that will allow full utilization of the CEPP A-2 FEB. The recommended plan has identified an additional source of water of comparable quantity and quality that will be available to replace the water sent south. Instead of discharging all water stored in the reservoir to tide via the S-80 or to meet C-44 Basin agricultural water supply demands, as assumed in the future without project IORBL1 baseline condition operations, the recommended plan retains a portion of the water stored in the CERP Indian River Lagoon-South (IRL-S) C-44 Reservoir/STA in the regional system for backflow to Lake Okeechobee via the C-44 Canal and raises the Lake Okeechobee stage criteria to allow increased C-44 Canal backflow. This added operation does not affect existing permitted allocations within the C-44 Basin. The additional C-44 Canal backflow operations to Lake Okeechobee included in the CEPP recommended plan 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. The operations do not benefit agricultural users in the C-23 Basin. The CEPP recommended plan backflow operations capture a portion of releases from the C-44 Reservoir/STA that would otherwise be directed to the Saint Lucie Estuary as excess water.

Specifically, the future without project condition (IORBL1) allows backflow to Lake Okeechobee from the C-44 Canal when S-308 (the Lake Okeechobee discharge structure to the C-44 Canal) is not open for regulatory discharges and when the stage in Lake Okeechobee is 0.25 feet below the base of the 2008 Lake Okeechobee Regulation Schedule (LORS) low sub-band (within the baseflow sub-band), which varies between 13.0 and 14.5 feet NGVD seasonally. This operational assumption is consistent with the existing operational protocols of Lake Okeechobee (2008 LORS) and the SFWMD Lake Okeechobee Water Shortage Management (LOWSM) operations. Discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are otherwise limited to environmental deliveries for the St. Lucie Estuary and C-44 Basin agricultural water supply demands during these backflow operations.

The CEPP recommended plan operations expand on the IORBL1 backflow to Lake Okeechobee through the following operational changes: (1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and (2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule (the bottom of this zone varies seasonally between 12.6 and 13.0 feet NGVD) to provide an additional source of backflow water to Lake Okeechobee. Water captured in the C-44 Reservoir/STA, includes excess water conveyed from the C-23 Canal and Basin (approximately 6 kAF on an average annual basis) that is not needed to meet the IRL-S North Fork water reservation target. The recommended plan operational changes result in an average annual increase in C-44 Canal backflow volume to Lake Okeechobee of 57.3 kAF (97.3 kAF in the recommended plan, compared to 40.0 kAF in the IORBL1) and an average annual increase in C-44 Reservoir discharges to the C-44 Canal of 21.3 kAF (37.6 kAF in the recommended plan, compared to 16.3 kAF in the IORBL1).

The transfer of water from Lake Okeechobee to WCA 3 will not be implemented until the CERP C-44 Reservoir/STA, the canal connecting the C-44 Reservoir to both the C-23 Basin and the C-23 Canal, and the CEPP FEB on the EAA A-2 site are operational. If the canal to the C-23 Basin and the C-23 Canal is not operational when the CEPP FEB on the EAA A-2 site is ready to store water, the operations, and ultimately the delivery of water from Lake Okeechobee to the CEPP FEB, may need to be modified to avoid elimination of this portion of the source of water for the LOSA. The water retained in Lake Okeechobee also maintains the level of service for water supply for existing legal users dependent on Lake Okeechobee and its connected conveyance system. Specifically, this includes the agricultural users in the LOSA and the Seminole Tribe of Florida.

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. CEPP Alt 4R2 project 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 the CEPP project 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 CEPP is implemented. The ability to continue to meet urban and agricultural demands with CEPP 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 (Alt 4R2) 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. If the local groundwater levels trigger increased water shortage cutbacks, the trigger may either be the result of changed local groundwater conditions resulting directly from the CEPP project or more locally triggered cutback events becoming apparent as the lake triggered cutback events decline in frequency with the moderate to significant increase to Lake Okeechobee stages with Alt 4R2. In the case of the CEPP, increased LECSA water shortage cutbacks triggered by local groundwater stages are the result of the increased stages in Lake Okeechobee.

In the with project condition (Alt 4R2), 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. For the future without condition (IORBL1), the number of water years with lake triggered cutbacks is 16 events and groundwater triggered cutbacks is 16 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 significant change for water supply performance within LECSA 2. For LECSA 3, there are no locally triggered groundwater cutbacks events indicated in the Alt 4R2 or IORBL1 modeling simulations. The number and frequency of water years with cutback events declines since the lake triggered cutback events decline from 16 with the IORBL1 to 13 with Alt 4R2 due to the rise in lake stages with the inclusion of the project (**Figure 2-5** and **Figure 2-6**), indicating a small water supply improvement within LECSA 3. CEPP implementation will provide increased stages and extended hydroperiods within WCA 3B and Northeast Shark River Slough, resulting in a net increase in average annual groundwater seepage flows from these natural areas to the adjacent LECSA 3. The increased seepage flows may slightly alter the water quality composition within the LECSA 3 surficial aquifer, through the relative increased contribution of groundwater seepage flows to the surficial aquifer recharge compared to the contribution from regional C&SF canal flows. These changes should result in either no significant change or a potential minor improvement to the water quality of withdrawals from the proximate public water supply wellfields within LECSA 3.

Comparisons to the existing condition base conditions (2012EC and ECB) indicate one additional water year cutback event with the existing condition compared to Alt 4R2 in LECSA2 (33 cutback events compared to 32 events). For LECSA 3, there are no locally triggered groundwater cutbacks events. The total number and frequency of lake triggered cutback events are the same for Alt 4R2 and the 2012EC/ECB, at 13 events (**Figure 2-7** through **Figure 2-10** and **Table 2-2**).

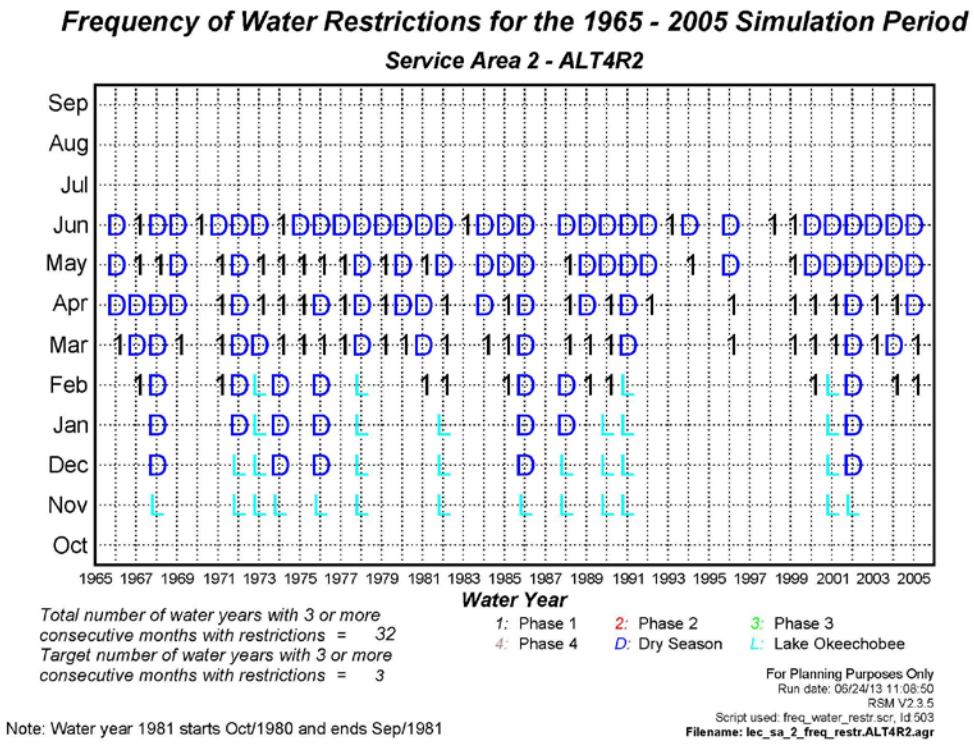

Figure 2-3 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 Alt 4R2 Scenario

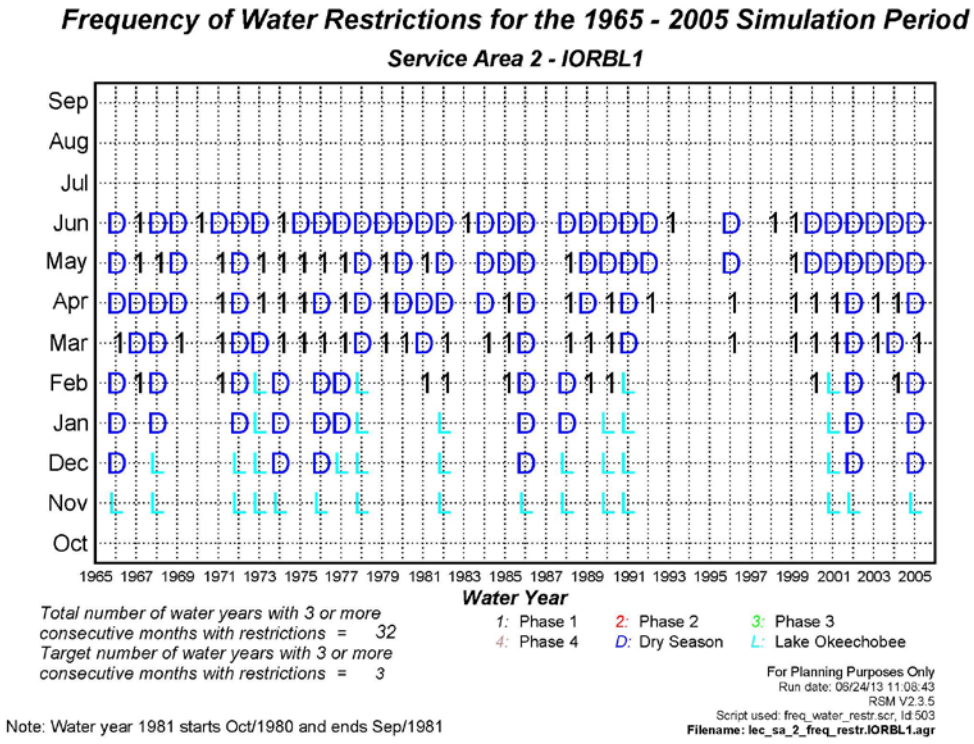

Figure 2-4 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for the LECSA 2 IORBL1 Scenario

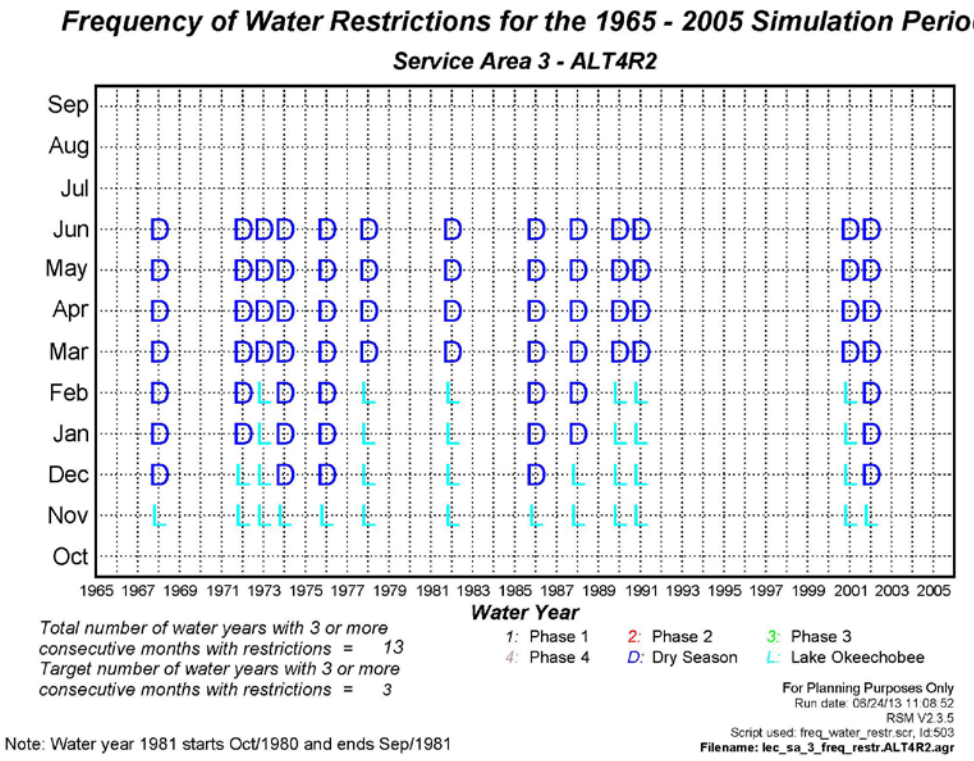

Figure 2-5 - Frequency of Water Restrictions for the 1965-2005 Simulation Period for the LECSA 3 Alt 4R2 Scenario

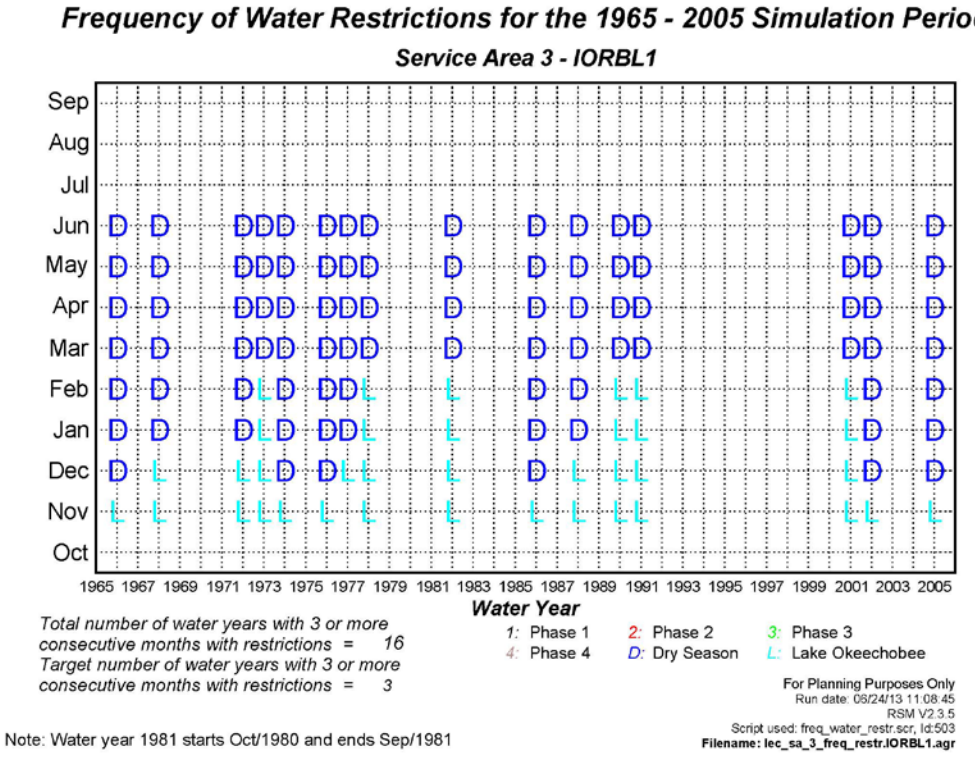

Figure 2-6 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 IORBL1 Scenario

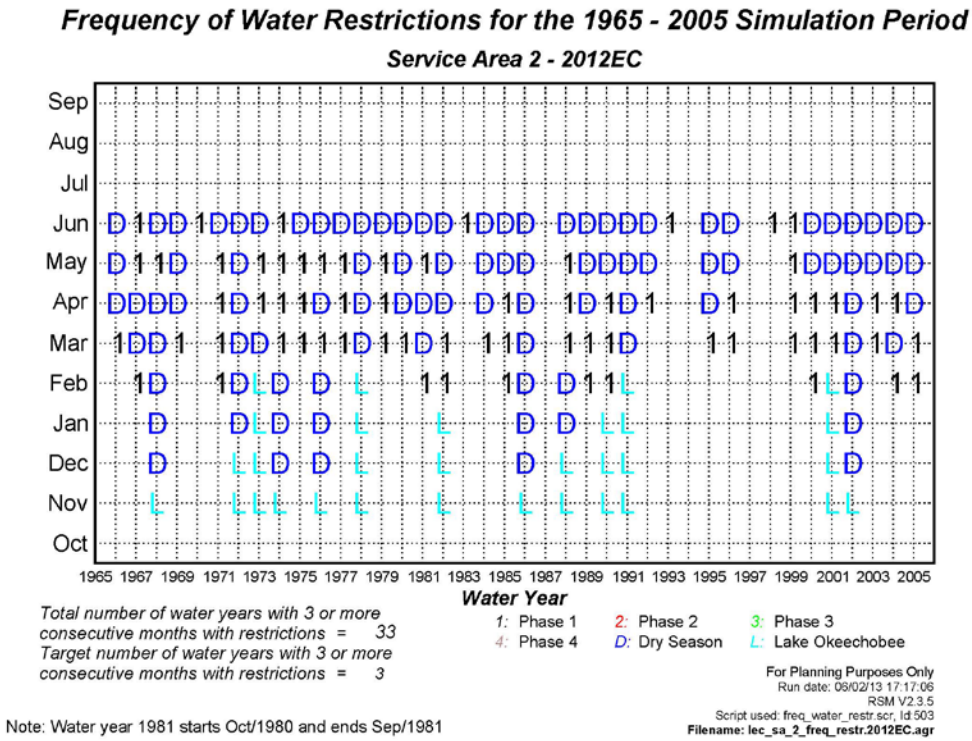

Figure 2-7 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 2012EC Scenario

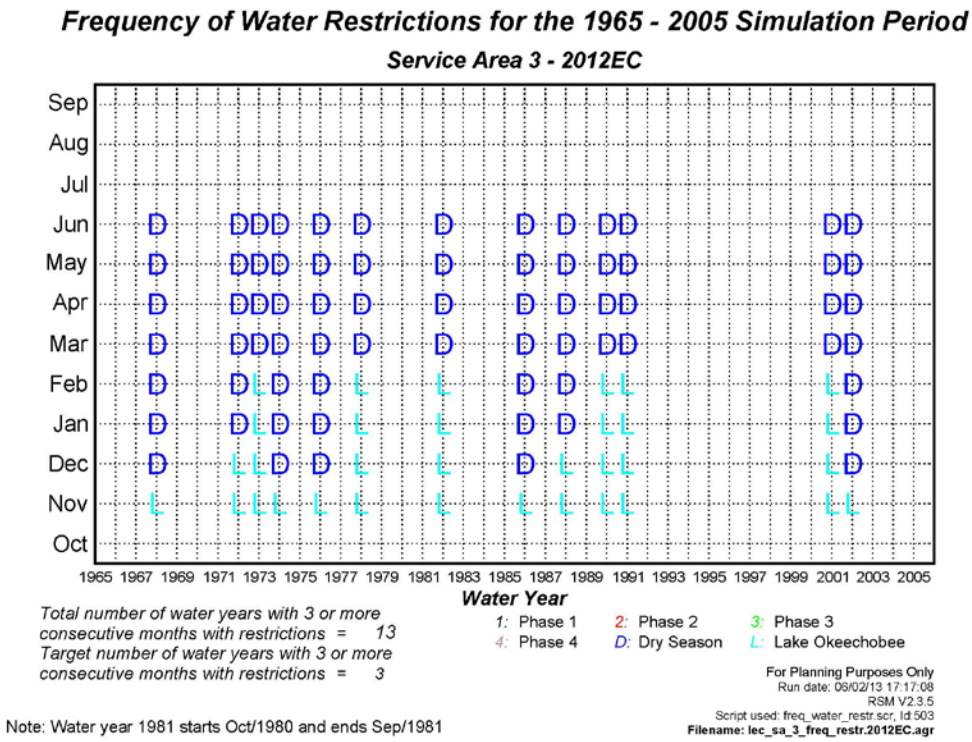

Figure 2-8 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 2012EC Scenario

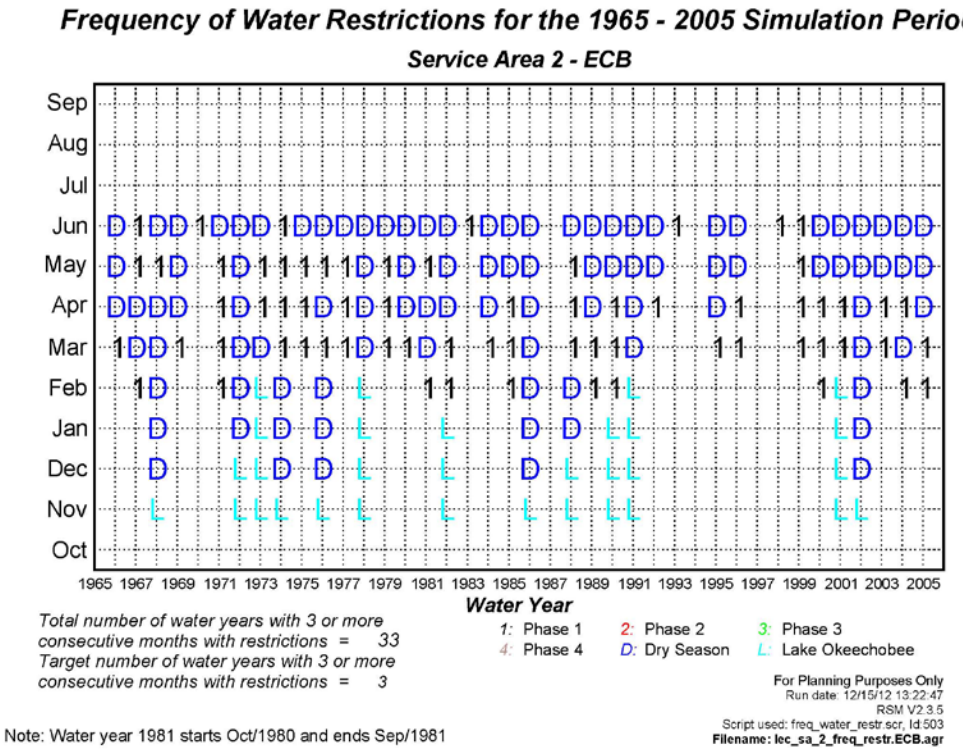

Figure 2-9 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 2 ECB Scenario

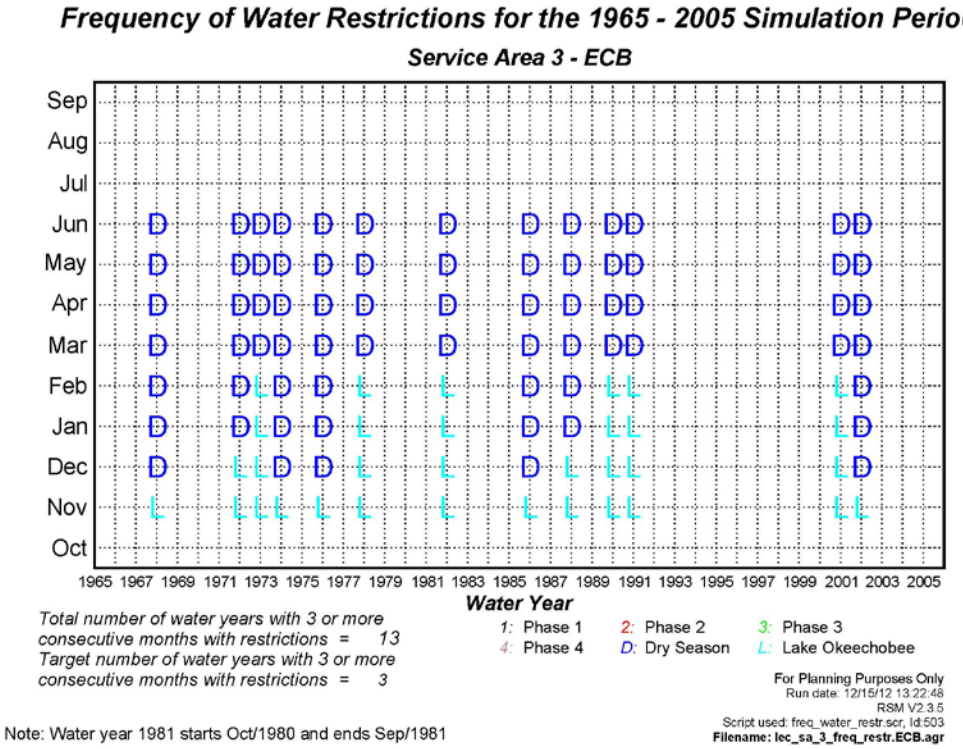

Figure 2-10 - Frequency of Water Restrictions for the 1965–2005 Simulation Period for LECSA 3 ECB Scenario

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			
	2012EC Lake/Local/Total	**IORBL1 Lake/Local/Total**	**Alt4R Lake/Local/Total**
Lower East Coast Service Area 2	13/20/33	16/16/32	13/19/32
Lower East Coast Service Area 3	13/0/13	16/0/16	13/0/13

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

Additional information on the requirements of the WRDA 2000's Savings Clause and its analysis can be found in Annex B of the Final PIR.

2.4 Water Quality

2.4.1 Compliance with State Water Quality Standards for Total Phosphorous

The Central Everglades Planning Project is projected to send approximately 210 kAF of additional water on an annual basis to the Everglades historical southerly flow path. This additional water must meet state water quality standards contained in Chapter 62-302, Florida Administrative Code (F.A.C.), notably for total phosphorous. Nutrients such as phosphorous and nitrogen compounds are a concern in the WCAs, ENP, and Lake Okeechobee since they 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. CEPP depends on water quality treatment facilities owned and operated by the SFWMD (STA-2 and STA-3/4) and is integrated with the yet-to-be constructed A-1 Flow Equalization Basin included in SFWMD's "Restoration Strategies" project (*Restoration Strategies Regional Water Quality Plan* by SFWMD, April 27, 2012) to achieve state water quality standards. To achieve restoration objectives for WCA 3A, CEPP involves discharges from these STAs to previously unimpacted areas. Concerns were expressed about the effects of the new discharges on water quality and native flora and fauna in Everglades areas. Flows into WCA 3A must meet state water quality standards before discharges to the Everglades occurs. To ensure that the recommended plan meets state water quality standards, discharge permits with associated effluent limits will govern discharges from STA-2 and STA-3/4. The A-1 FEB is designed to assist STA-2 and STA-3/4 in achieving their effluent limits, but the effluent limits do not apply to the discharges from the FEB.

CEPP both increases flows and modifies the distribution of 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 and state water quality standards are currently determined through a methodology which establishes an inverse relationship between flow and concentration. 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. 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 CEPP implementation. In order to move forward with CEPP, 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.

CEPP project features cannot proceed unless/until it is determined through the Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permitting process that construction and/or operation of the feature[(1)]:

1. Will not cause or contribute to a violation of state water quality standards
2. Will not cause or contribute to a violation of any applicable water quality permit discharge limits or specific permit conditions
3. Reasonable assurances exist that demonstrate adverse impacts on flora and fauna in the area influenced by the Project features will not occur

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.

> *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*

[1] Note there are permitting criteria contained in 373.1502, F.S. that need to be addressed in addition to water quality requirements

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 concurrent with the final review by USACE headquarters and prior to the PIR being transmitted to Congress. The SFWMD and Department are preceding 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 pursuant to 373.026(8)(b).

2.4.2 Other Water Quality Considerations

Implementation of the recommended plan, ALT4R2, is likely to improve water column TP concentrations within most areas of WCA 3 primarily due to the use of state-owned water

quality treatment facilities, increased upstream storage capacity provided by the A-2 FEB, backfilling of the Miami Canal and redistributing flows into the northwestern corner of WCA 3A. These improvements should allow for uptake of TP within this marsh and over, the long-term, it is likely that the project will beneficially affect WCA 3. However, there may be temporally and spatially limited impacts to TP conditions within the marsh until more stabilized conditions are established. Sequencing of projects to ensure that water quality benefits are optimized is critical to moving CEPP forward as part of restoring the Everglades. There is risk that the changes in flow distributions proposed under CEPP will impact compliance with Appendix A of the 1991 Settlement Agreement; however, this risk will be managed through additional analysis in the detailed project planning and design phase and the permitting process.

The CEPP is not expected to significantly affect Lake Okeechobee water quality; however increased backflow into the lake at the S-308 structure will result in a relatively small increase in lake phosphorus load. Specifically, increased backflow into the lake at the S-308 structure will result in a relatively small increase in lake phosphorus load (currently estimated at less than 2 percent of the phosphorus TMDL target for Lake Okeechobee of 140 metric tons/yr). FDEP is in the process of developing a Basin Management Action Plan (BMAP) for Lake Okeechobee pursuant to Section 403.067, Florida Statutes. This BMAP will be an iterative effort to address water quality issues in Lake Okeechobee. Potential water quality issues associated with S-308 loads will be addressed as part of future phases of the BMAP.

The Northern Estuaries should see slight improvements to water quality that result from reduced high flow events associated with Lake Okeechobee operations. The construction and operation of the A-2 FEB will slightly decrease EAA basin phosphorus loads to WCA 3. The northern estuaries should see slight improvements to water quality that result from reduced high flow events associated with Lake Okeechobee operations. The construction and operation of the A-2 FEB will slightly decrease EAA basin phosphorus loads; however, the risk that the 2012 WQBEL for discharges from the EAA to the water conservation areas will not be met is low.

2.4.3 Salinity in the Northern Estuaries and Florida Bay

The CEPP is anticipated to improve the number of low and high salinity events for the Caloosahatchee Estuary as well as the number of high flow events for the St. Lucie Estuary. Improvement in nutrient and dissolved oxygen conditions should also result from the reduced high flow events from Lake Okeechobee. The CEPP is also anticipated to improve water quality conditions for Florida Bay with salinity moving closer to the salinity target for the bay, with a 2 practical salinity unit (psu) decrease in the bay's central zone and an average salinity decrease of 1.5 psu amongst all bay zones for wet and dry seasons.

2.4.4 Hazardous, Toxic and Radioactive Waste (HTRW)

The HTRW evaluation for the CEPP 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 FEB 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 14,521 acre A-2 site that is proposed for a FEB 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 site is currently under cultivation, close out environmental audits and sampling will be performed again prior to certification of the lands. The HTRW Appendix C.1.1.15 and Annex H of the PIR 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 recommended plan design features will maintain the existing levels of flood protection. A combination of modeling tools (Annex B of the Final PIR) 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 RSM-BN/RSM-GL simulation period and therefore included in the CEPP 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 Herbert Hoover Dike (HHD) due to changes in the Lake Okeechobee stages, (2) the FEB 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.

2.5.1 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 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 USACE Major Rehabilitation Report (MRR) from 2000 divided the 143 mile dike into eight reaches with the initial focus on Reach 1. The current approved and planned remediation measures will address the highest points of potential failure in the system based on known areas of concern. These USACE efforts are intended to lower the DSAC rating from Level 1. The CEPP future without project condition assumes the planned remediation of HHD will lower the DSAC risk rating and be completed by 2022. These remediation measures will not resolve all issues with the HHD dam, nor will all current design criteria be met. To assess other issues and address future modifications with HHD, a comprehensive potential failure mode analysis and risk assessment is being performed and will be included in the ongoing USACE Dam Safety Modification Report (DSMR). This report is scheduled for completion/approval in 2015.

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.

CEPP 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 FEB to send the full 210 kAF/yr of new water available in the CEPP south to the Everglades, while maintaining compliance with Savings Clause requirements for water supply and flood control performance levels.

The hydrologic modeling conducted for all the CEPP alternatives to optimize system-wide performance incorporated the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the CEPP 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 CEPP 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 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. As detailed in Section 6.7.2.1 of the main PIR report, the CEPP recommended plan operations also expand on the 2008 LORS backflow operations to Lake Okeechobee through the following operational changes: (1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and (2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule to provide an additional source of backflow water to Lake Okeechobee. Additional information and documentation of the CEPP Recommended Plan modeling assumptions for Lake Okeechobee operations are found in Section A.8.3.2.3.3 of Appendix A (Engineering) of the CEPP PIR.

Independent of the CEPP 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 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 “Band 1” projects, as described in Section 6.1.3.2, or (2) completion of sufficient HHD remediation for reaches 1, 2 and 3 and associated culvert improvements, as described in Section 2.5.1. 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 CEPP Recommended Plan. The future Lake Okeechobee Regulation Schedule 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-CEPP actions and that these actions will occur earlier than implementation of the CEPP. Therefore, the CEPP PIR will not be the mechanism to propose or conduct the required NEPA evaluation of modifications to the Lake Okeechobee Regulation Schedule. However, depending

on the ultimate outcome of these future Lake Okeechobee Regulation Schedule revisions, including the level of inherent operational flexibility provided with these revisions, the CEPP implementation may still require further Lake Okeechobee Regulation Schedule 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 ECB/2012EC (2008 LORS; note that plot lines overlap), IORBL1 (2008 LORS, plus additional CERP and non-CERP projects), and Alternatives 4R2 (LORS 2008, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as **Figure 2-11** (note: upper 25% of the stage duration curve is displayed). Peak stages for the CEPP Savings Clause baselines and Alt 4R2 are summarized as follows: 17.54 feet NGVD for the 2012EC; 17.52 feet NGVD for the IORBL1; and 17.66 feet NGVD for Alt 4R2. The baselines and the Recommended Plan Alt 4R2 all show simulated stages above 17.25 feet NGVD: 18 days for the 2012EC; 9 days for the IORBL1; and 29 days for Alt 4R2 (note: 14,975 days in the RSM-BN 41-year period of simulation). The USACE 2008 LORS Environmental Impact Statement 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 assumed modified Lake Okeechobee operations with the CEPP alternatives (including Alt 4R2) do not cause significant increases in the frequency, duration, and magnitude of Lake Okeechobee peak stages (compared to the IORBL1), despite the assumed completion of HHD remediation measures, because the adverse ecological effects associated with increased lake stages and the associated increases in high volume releases to the estuaries were effectively balanced during the CEPP preliminary screening (for additional discussion of screening metrics, refer to **Section 3** of the PIR main report). Following completion of the HHD remediation of Reaches 1, 2, and 3, 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 project).

Given recognition of the DSMR uncertainty and the continued utilization of the 2008 LORS Lake Okeechobee Regulation Schedule for CEPP, the USACE assessment of the Lake Okeechobee high water performance with CEPP indicated consistency with the HHD formulation assumptions established for the CEPP future without project condition (FWO/IORBL1), 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 stage duration curve trends for increased high water conditions appear reasonable based on the USACE current best available information and current expectations for the HHD remediation.

Extreme high lake stages have also been documented to adversely impact the plant and animal communities, through processes which include the following: physical uprooting of emergent and submerged plants; reduced light levels in the water column due to increased suspended sediment; and littoral zone exposure to increased nutrient levels from the water column. 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 2-12**. Lake Okeechobee stages between 16.0 and 17.25 feet NGVD

correspond to the seasonal range of the top zone of the 2008 LORS Regulation Schedule, and this performance metric was considered by the USACE during the LORS Regulation Schedule study. Refer to **Section 5** of the main PIR report and Appendices C.2.1 and C.2.2 for the environmental effects evaluations for Lake Okeechobee, which were determined to be approximately equivalent across the CEPP future with project alternatives. As documented in **Section 4** of the main PIR report, habitat units were not calculated for Lake Okeechobee since the performance of these areas were considered a constraint during formulation.

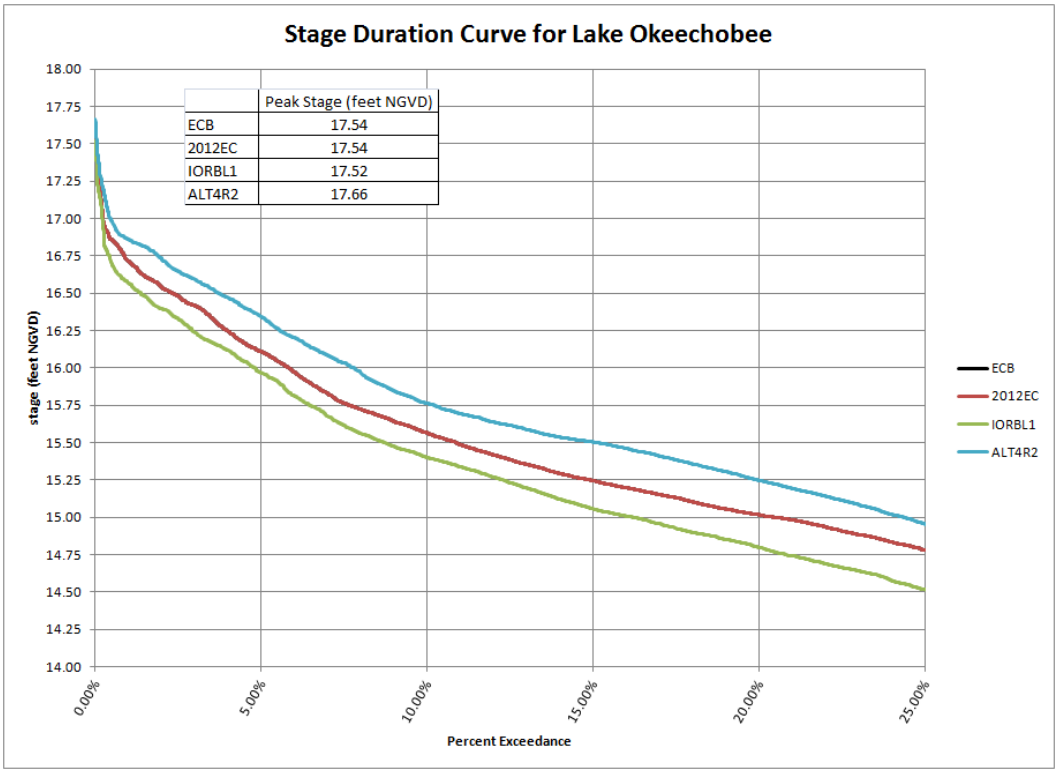

Figure 2-11 - Lake Okeechobee Stage Duration Curve

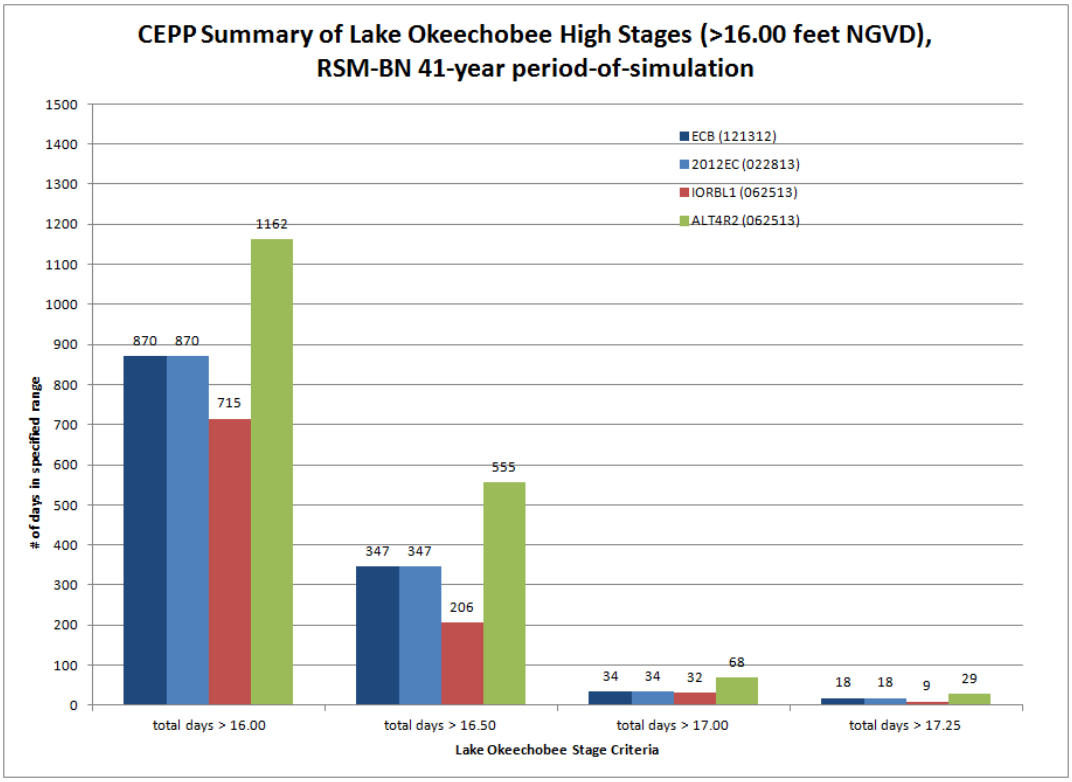

Figure 2-12 - Occurrence Frequency of Lake Okeechobee High Stages

2.5.2 FEB Located in the EAA

Consistent with the CEPP modeling assumptions for the action alternatives, operational stages for the EAA FEB storage feature were typically managed between 1 and 3 feet depth, with no additional structural inflows from Lake Okeechobee allowed when the FEB depth exceeded 3.8 feet. Structural inflows to the FEB would be discontinued when depths exceed 4 feet, although additional rainfall may further increase stages. Hydraulic design of the FEB perimeter levee system included consideration of the stage variability for FEB operations. Within the RSM-BN modeling conducted to support the CEPP preliminary screening and alternative evaluations, the SFWMD Restoration Strategies FEB located on the EAA A-1 parcel and the CEPP FEB on the EAA A-2 parcel are represented as a single storage feature. Consistent with the evaluation approach identified in Draft Guidance Memoranda 3, the FEB 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, and the assessment does not further consider specific design flood targets such as the 10-year or 100-yr flood event.

Detailed CEPP assessments within the EAA were not conducted because the RSM-BN does not simulate groundwater within the EAA. Although not anticipated, based on the CEPP plan formulation modeling, it could not be determined whether the A-2 FEB meets the Savings Clause requirements to maintain the pre-existing levels of flood protection. Further assessment of potential effects from the A-2 FEB will be deferred to the preconstruction engineering and design phase (PED), and the A-2 FEB will be designed to specifications that

meet applicable flood protection requirements. Information regarding the FEB design considerations for flood protection is included in Section B.3.2.2.

Stage duration curves for the combined CEPP A-1 and A-2 FEB are shown in **Figure 2-13** for the IORBL1 (14,000 acres A-1 FEB only) and Alt 4R2. Ground surface elevations within the FEB were assumed at 9.63 feet NGVD for the RSM-BN modeling. Minor changes to groundwater levels are expected adjacent to the CEPP A-2 FEB (14,000 acres), compared to the future without project condition (IORBL1) which includes the SFWMD Restoration Strategies A-1 FEB.

The A-2 FEB design includes perimeter seepage collection canals and associated seepage pumps to limit potential impacts. The FEB at this time carries a low 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 following criteria: USACE Engineer Regulations (ER) 1110-8-2(FR), ER-1110-2-1156, DCM-2, and risk. The FEB perimeter levee elevation is established at 20.3 feet NGVD, 3 feet above the maximum surcharge pool elevation. As described in further detail in the Engineering Appendix accompanying the CEPP PIR (Appendix A), the maximum surcharge pool elevation is based on the greatest elevation resulting from the following storm routings: (1) The Inflow Design Flood (IDF), which is identified as the 100-yr 24-hr storm event for the CEPP FEB, per DCM-2; (2) the 50 percent 72-hr probably maximum precipitation per ER-1110-8-2(FR); and (3) wind setup and wave run-up analysis on critical fetch lengths with the impoundment at full pool. An orifice-type spillway will provide uncontrolled discharge from the A-2 FEB during extreme events, when FEB discharges are required to protect the embankment integrity. The spillway will include a 265 foot long weir with crest elevation set at 13.50 ft NGVD. The spillway will discharge into the adjacent seepage canal along the northern portions of the A-1 and A-2 FEBs. The spillway will be located in line with the northern extent of the eastern perimeter levee, adjacent to structure S-628.

Within the RSM-BN simulated period of record (1965-2005), the maximum simulated stage in the A-1/A-2 FEB is 13.54 feet NGVD for the CEPP Recommended Plan. Based on the assumed ground surface elevation of 9.63 feet NGVD used in the RSM-BN model, the peak depth is 3.91 feet over the period of record. The FEB emergency overflow spillway (S-627) was designed with a crest elevation of 13.50 feet NGVD, based on the average assumed ground surface elevation of 9.00 feet NGVD used for the preliminary (pre-PED survey) hydraulic design, as described in Appendix A of the PIR; based on this design, the FEB emergency overflow spillway would only discharge if the FEB depth exceeds 4.5 feet. As the FEB stages over the simulated period of record do not overtop the FEB emergency spillway (simulated peak depth condition of 3.91 feet), the FEB emergency spillway preliminary design details, including discharge location, did not warrant further analysis for the CEPP Savings Clause evaluation of Alt 4R2. During CEPP 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 PIR.

Detailed CEPP assessments within the EAA were not conducted because the RSM-BN does not simulate groundwater within the EAA. Further assessment of potential effects from the A-2 FEB will be deferred to the PED phase of CEPP.

For flood protection in the EAA, the additional storage volume provided by the construction and operation of impoundments is expected to incidentally improve flood protection in the vicinity of the impoundments. For the FEB, available storage in the impoundments will be utilized to maximize flood control and reduce or eliminate discharges to the WCAs or released to tide associated with anticipated heavy rainfall from tropical storms or hurricanes. The control of seepage from project components will also help to assure that the existing level of service for flood protection is maintained and surrounding lands are not adversely impacted. An emergency overflow spillway for the A-2 FEB will provide protection for project embankments integrity during extreme storm events.

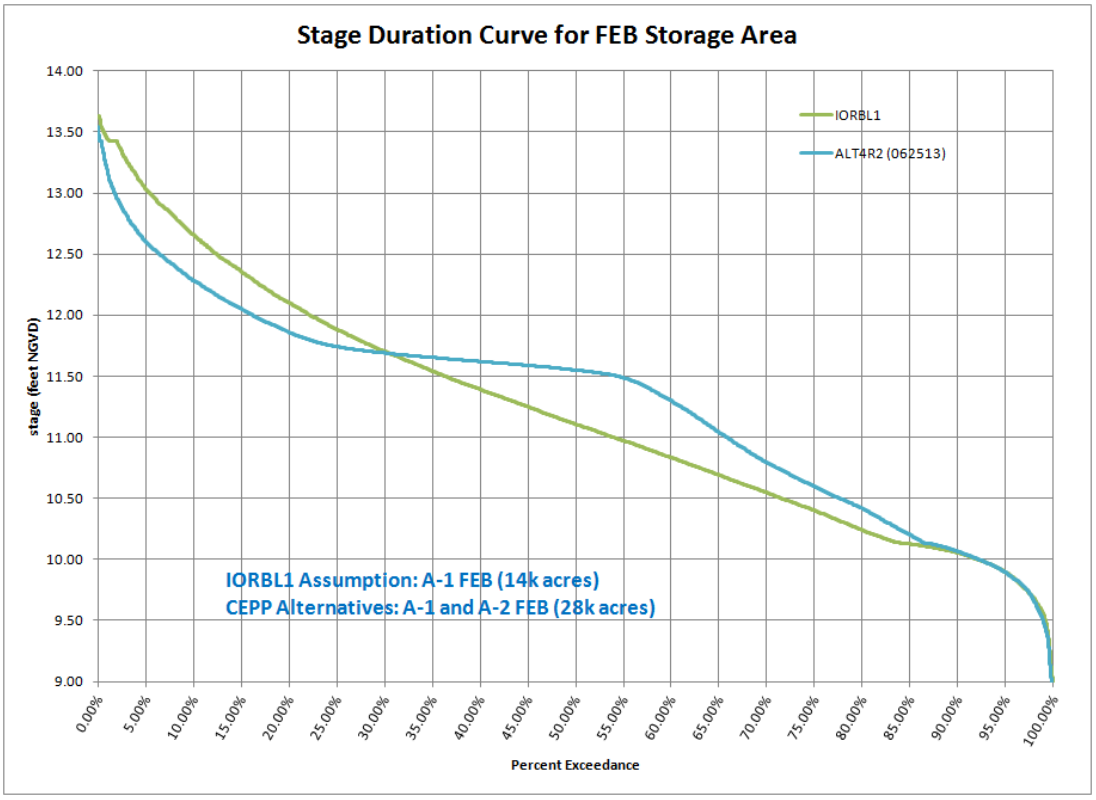

Figure 2-13 - FEB Stage Duration Curves

2.5.3 EAA/Northern WCA 3A – Backfilling of Miami Canal

The CEPP Alt 4R2 proposes to backfill the Miami Canal downstream starting 1-½ miles south of the S-8 pump station (refer to **Figure 1-2** for map) and extending to I-75. Without maintenance of the existing capacity for flood control within the EAA, flood control capability would be diminished. The CEPP plan formulation process assumed that the pre-project flood protection level of service for the EAA would be maintained under CEPP by providing the same total pumping capacity at the S-8 (4170 cfs) and S-7 (2490 cfs) pump stations, which provide drainage for the upstream EAA basin. No new structures are proposed under CEPP to further supplement the G-404 and S-8 pump stations for deliveries from the EAA to WCA 3A.

CEPP will maintain this existing design capacity for the S-8 complex through a combination of pump station design modifications, a new hydraulic connection from S-8 to the degraded L-4 Levee, utilization of the existing G-404 pump station (570 cfs design capacity), and leaving the 1-2 mile segment of the Miami Canal as available getaway conveyance capacity during peak flow events. S-8 modifications should be completed to permit the diversion of L-6 flows and must maintain flood control operation capability during implementation of S-8 modifications. The Alt 4R2 cost estimate includes placeholder funding for any required modifications of the S-8 outlet works, to address potential increased tailwater conditions with CEPP that may diminish the S-8 pump efficiency. Modifications of the S-8 pump station complex for CEPP operations will be further analyzed during the PED phase of CEPP, since the RSM-GL model applied for CEPP formulation is inadequate for detailed hydraulic design of the S-8 pump station complex; potential design modifications to be assessed/reassessed in further detail during PED will likely include the following: modifications to S-8 and/or G-404, to address pump efficiency concerns; the proposed S-8A culvert and associated canal connecting the Miami Canal to the L-4 Canal; and the required length of the unmodified Miami Canal to maintain hydraulic getaway conveyance capacity.

No design modifications to S-7 are proposed with Alt 4R2, and the S-621 gated spillway proposed on the STA-3/4 outlet canal has been initially designed at 2500 cfs to maintain the capability to deliver the S-7 design capacity flows from STA-3/4 to the S-7 pump station.

2.5.4 WCA 3A and WCA 3B

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).

The information on which the USACE relied on to require the ERTP WCA 3A Zone A as an interim risk reduction measure for WCA 3A high water levels did not change prior to CEPP formulation, and no new information was available compared to the July 2010 assessment included as Appendix A-5 of the ERTP Final EIS. Throughout CEPP formulation, the USACE advocated that CEPP formulation efforts attempt to maintain the frequency, duration, and peak stages of high water levels within WCA 3A consistent with the CEPP Future Without Project condition used during formulation, which includes ERTP, given recognition of the WCA 3A high water concerns identified with ERTP; prior to CEPP formulation, the USACE explicitly recognized that 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 developed for CEPP (IORBL1) and the with-project condition (Alt 4R2); comparisons to the existing condition baseline (ECB and/or EC2012) are not provided since these comparisons were not utilized by USACE EN-W, as the ECB used during CEPP formulation included the IOP operations that were identified during ERTP as being no longer viable for water management within WCA 3A. EN-W also indicated that it would continue to rely on the WCA 3A three-gauge average stages for assessment of WCA 3A high water frequency, durations, and peak stages, 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). It was further noted that if CEPP can provide operational assurances of additional WCA 3A outlet capacity under high water conditions, including adequate consideration of potential WCA 3B seepage management and/or ecological operational limitations, the EN-W may be able to further consider proportional relaxation of the WCA 3A future without project high water duration and frequency targets.

Compared to the CEPP FWO (final December 2012 release), the CEPP Alt 4R2 stages are lowered by approximately 0.1-0.3 feet in the upper 10 percent of the stage duration curve for the WCA 3A three-gauge average stage, as shown in **Figure 2-14** (upper 25 percent of the stage duration curve); the same performance is observed in the IORBL1. In order to consider potential differences during specific years, the EN-W assessment also considered the annual duration of exceedance of the ERTP WCA 3A Zone A stage levels for the complete period of simulation (**Figure 2-15**). The annual durations were also displayed and assessed as a frequency curve (**Figure 2-16**). The total number of days above Zone A is summarized as follows for the IORBL1 and CEPP alternatives (with percent of total period of simulation, 14975 days, in parentheses): CEPP IORBL1 – 2751 days (18.37%); and Alt 4R2 – 3323 days (22.19%).

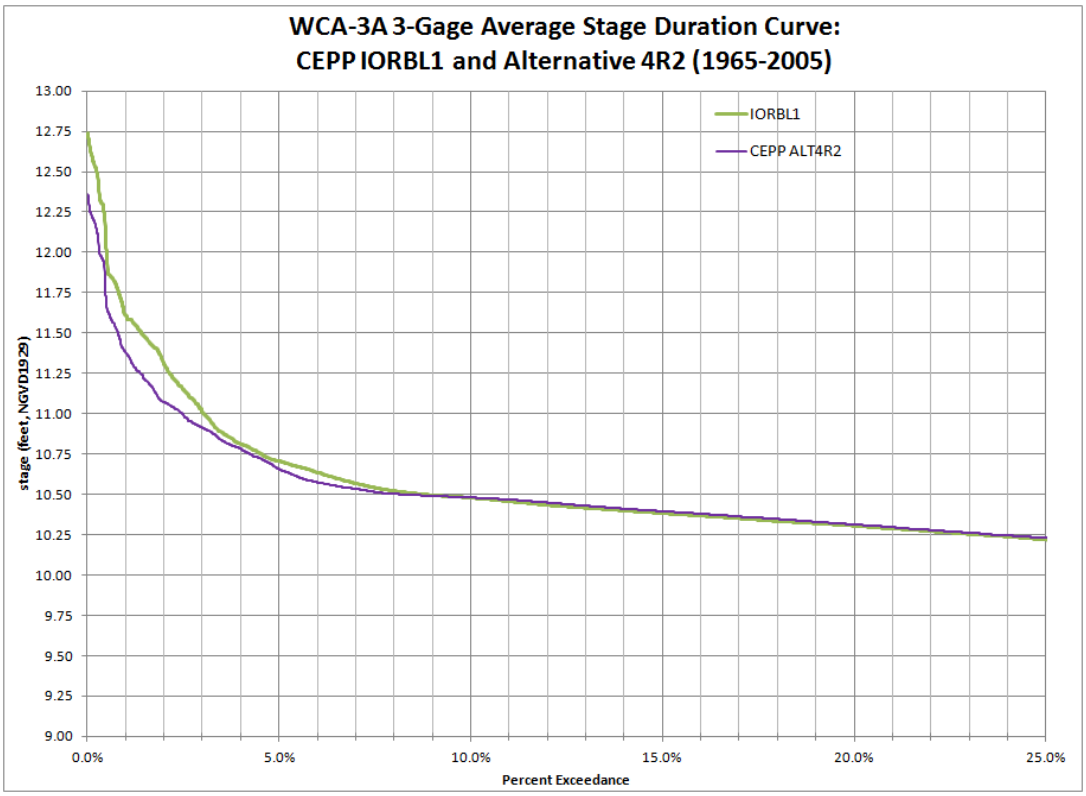

Figure 2-14 - WCA 3A Three-Gauge Average Stage Duration Curve

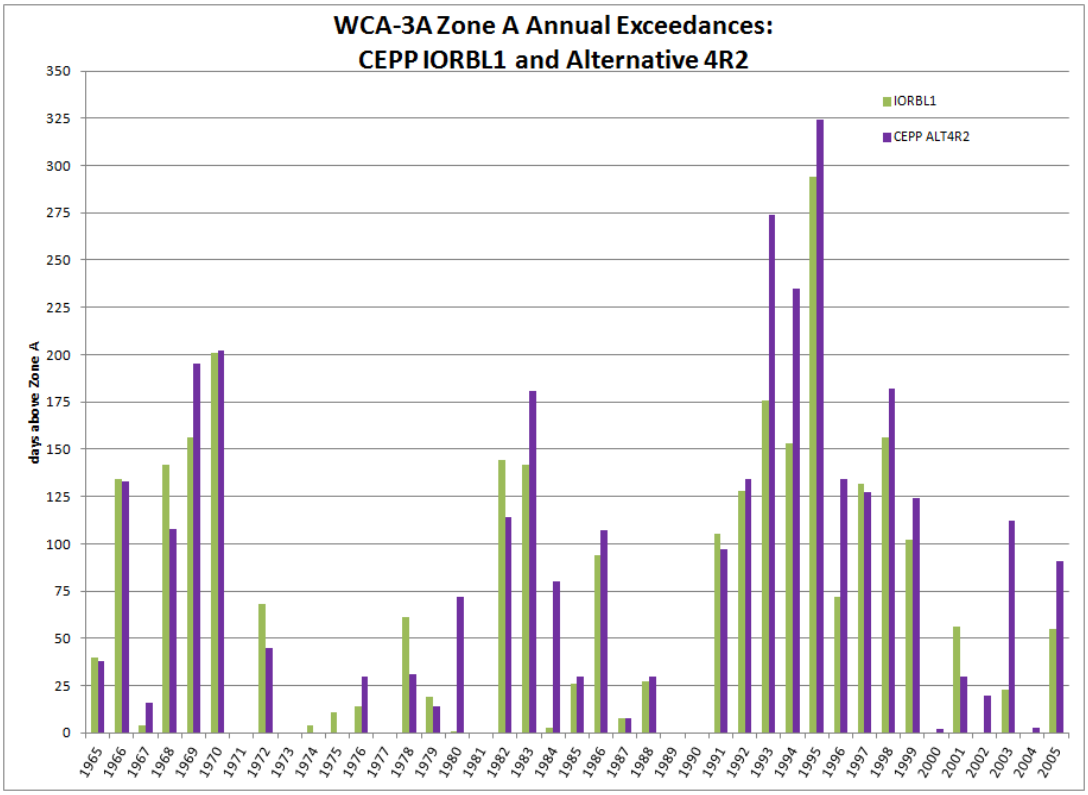

Figure 2-15 - WCA 3A Three-Gauge Average Annual Zone A Exceedance Summary

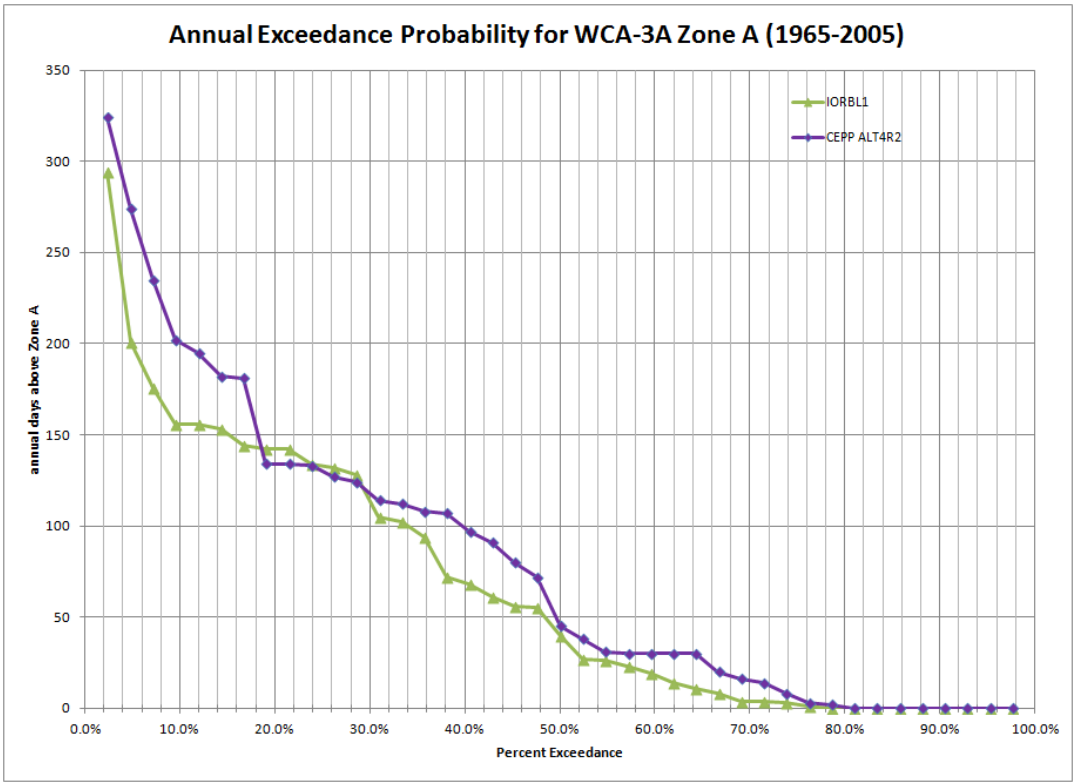

Figure 2-16 - WCA 3A Three-Gauge Average Probability Exceedance Curve for Annual Zone A Exceedance

The EN-W performance assessment for the final array of alternatives also included review of the WCA 3A stage hydrographs for individual years in which the number of days above Zone A increased by more than 20 percent between the CEPP FWO and any of the CEPP alternatives. Additional summary tables, annual hydrographs, and annual stage hydrograph statistical distribution plots are available in the CEPP PIR Engineering Appendix and the associated Hydrologic Modeling Annex A-2.

The detailed EN-W 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 CEPP FWO (the IORBL1 performance is similar) were, therefore, successfully achieved based on EN-W assessment of the overall performance of the CEPP final array, including the Recommended Plan Alt 4R2.

Concurrent with CEPP alternative formulation and modeling efforts, EN-W conducted 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. Stage duration curves (upper 25%) for the CEPP ECB, CEPP FWO (the IORBL1 performance is similar), and Alt 4R2 are provided in the CEPP PIR Engineering Appendix for the two RSM-GL monitoring gauge 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 CEPP Alt 4R2, peak stages within WCA 3B (outside of the Blue Shanty Flow-way in Alt 4R2) were 9.25 and 9.24 feet NGVD at Site 71 and Shark-1, respectively, or approximately 0.15-0.20 feet greater than the CEPP ECB/FWO baselines (9.05-9.06 feet NGVD) and the IORBL1 (9.08 feet NGVD); however, the WCA 3B peak stages for the CEPP Recommended Plan 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). Based on EN-W assessment of these WCA 3B peak water depths less than 3 feet (2.61-2.63 feet peak depth for Alt 4R2 stages), maximum wind and wave run-up potentials would not be expected to exceed 1-2 feet.

For this preliminary EN-W assessment of WCA 3B (further analysis will be conducted during PED), a presumed worst-case scenario was defined for the CEPP Recommended Plan, with peak Alt 4R2 stages exacerbated by the additional SPF rainfall and maximum wind and wave run-up depths. Under this assumed worst-case scenario (9.25 feet NGVD stage + 1.5 feet SPF rainfall + 2.0 feet run-up potential), the L-29 Section 3 Levee would not be expected to be overtopped at the two lowest elevation points (with approximately 0.25 feet of remaining freeboard, compared to the minimum L29 Section 3 Levee elevation of 13.0 feet NGVD). Given no predicted L-29 Section 3 Levee overtopping for this conservative assumed combination of events and recognition that CEPP inflows to WCA 3B (both within the Blue Shanty flow-way and eastern WCA 3B) will utilize controllable structures that may be closed in anticipation of extreme rainfall events, the EN-W preliminary assessment of the WCA 3B design criteria concluded that the proposed CEPP water levels of Alt 4R2 would not adversely affect the flood control capability of the unmodified eastern segment of the L-29 Levee (or other perimeter levees, which have higher design elevations) bordering WCA 3B. Within the Blue Shanty flow-way, the peak stage with Alt 4R2 is 9.70 feet NGVD. The proposed L-67D Levee, which has a preliminary design elevation of 12.0 feet NGVD based on engineering design considerations (refer to Appendix A for additional details), would prevent the relatively higher stages within the Blue Shanty flow-way from further raising stages within eastern WCA 3B. The USACE currently anticipates revisiting the WCA 3B SPF stage during PED, pending final authorization of

the CEPP and the establishment of operating criteria for WCA 3B water management structures for a System Operating Manual revision for CEPP implementation.

2.5.5 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 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 2-17**). 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 2-18**). 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 percent 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 2012EC and IORBL1 baselines in the SDCS, which include the same water control plan for this part of the system, ERTP.

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 10 percentile, which were assumed as a representative indicator of potential increased flood protection risk.

Of the six RSM-GL cells compared to the 1983–1993 calibration data (**Figure 2-17**), the without project condition (IORBL1) and the existing condition baselines (2012EC and ECB), only one cell

has stages that warrant detailed attention: cell 4328, located between the C-103 and C-113 Canals and immediately east of the C-111 Canal. For the other five indicator cells (**Figure 2-17**), stages in the with project condition (Alt 4R2) are either the same or below the 1983-1993 calibration data, IORBL1, and 2012EC, or groundwater stages are more than 2 feet below ground at levels that would not affect crops (**Figure 2-19** to **Figure 2-24**). The stage duration curve for indicator cell 4328 (**Figure 2-19**) for the with project condition (Alt 4R2) is essentially the same as the without project condition (IORBL1) during the wettest hydrologic conditions, up to the 20th percentile, with stages approximately 0.5 feet above the calibration values. Stages for cell 4328 are only slightly higher, by approximately 4 inches, between the 5th and 15th percentile when comparing the with project condition (Alt 4R2) to the existing condition baselines (2012EC and ECB). None of the simulated stages for the baselines or Alt 4R2 fall below the calibration data. Closer examination indicates that the stage is correlated to the adjacent C-111 Canal. In the RSM-GL model, final calibration of the Manning's coefficient (a roughness or resistance term) for the C-111 Canal resulted in selection of the maximum value (highest resistance) allowed under the calibration criteria. In general, selecting the extremes in the calibration range tends to lend less confidence in the results of the particular calibration parameter and, in this specific case, it is likely an indication that the C-111 Canal Manning's coefficient parameter was insensitive to conditions observed during the calibration period. Since the model performs well for the existing condition (2012EC) but shows high canal stages in the upstream reaches for the IORBL1 and Alt 4R2, the calibrated roughness coefficient is likely too high and the resulting upstream canal stages (and adjacent groundwater levels) are predicted higher by the RSM-GL than would be truly expected for the future with project conditions. This artifact of the model can only be addressed during model calibration and, in this specific case, should not be evaluated as representative of the predicted project performance.

G-3439, a monitored well located along the C4 Canal, was also evaluated (**Figure 2-25**). The with project condition (Alt 4R2) performs the same as the without project condition (IORBL1) during the highest 20 percent of the period of simulation. Comparison of the with project to the existing condition baselines (2012EC and ECB) shows the water stages slightly reduced with Alt 4R2.

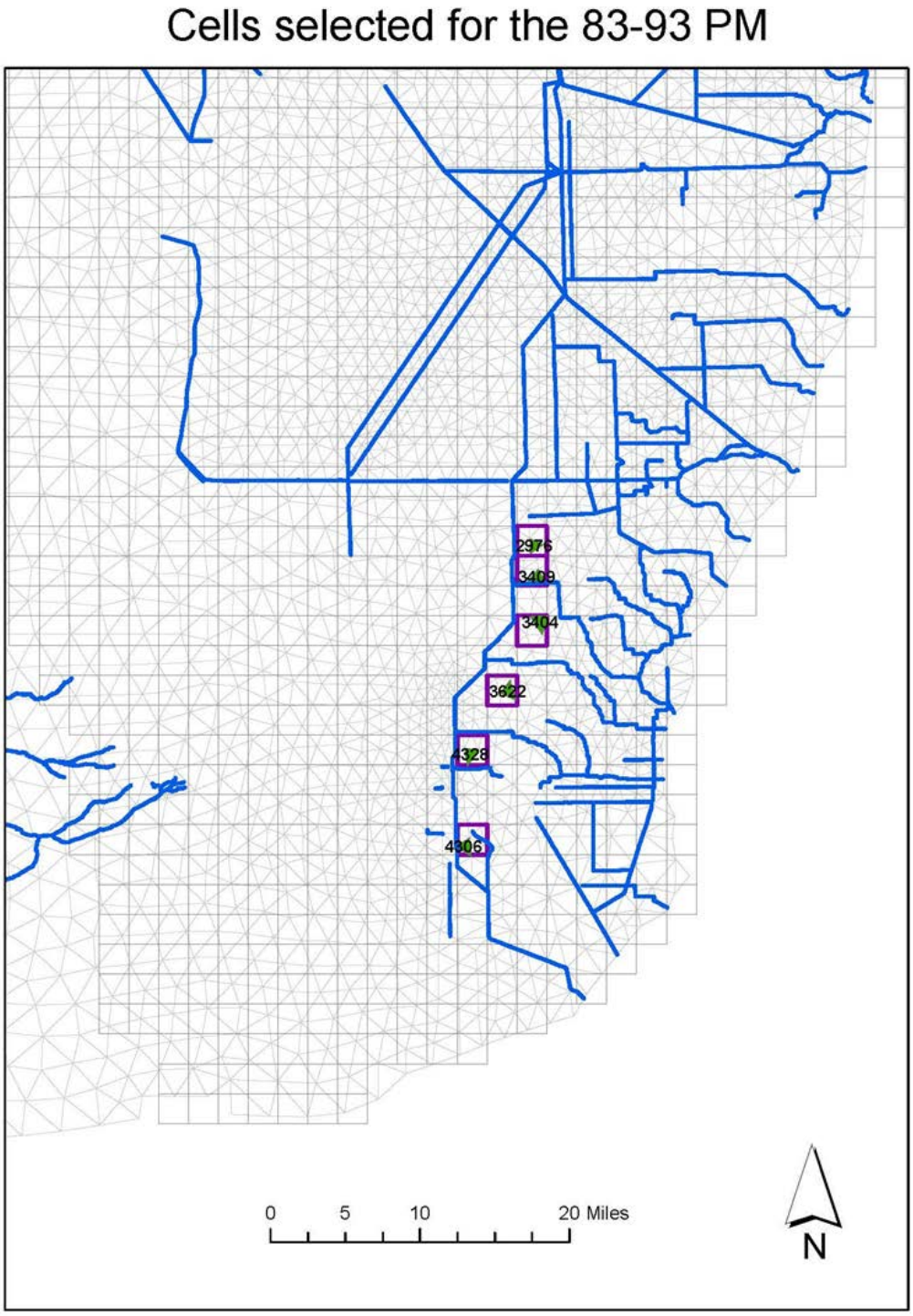

Figure 2-17 - Location of Cells Evaluation for Potential Effects to Agriculture in South Miami-Dade County

Figure 2-18 - Location of G-3439 (red dot) Relative to the Neighborhoods

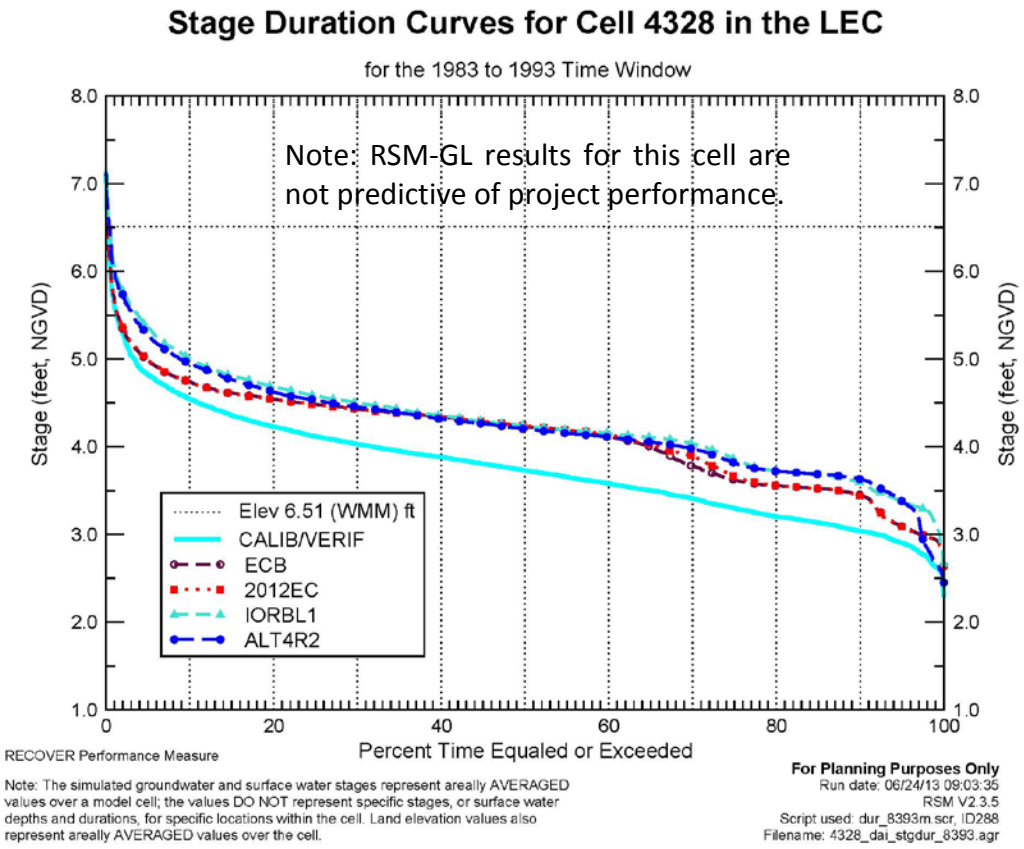

Figure 2-19 - Stage Duration Curves for Cell 4328 in the LEC Showing Anomalous Results

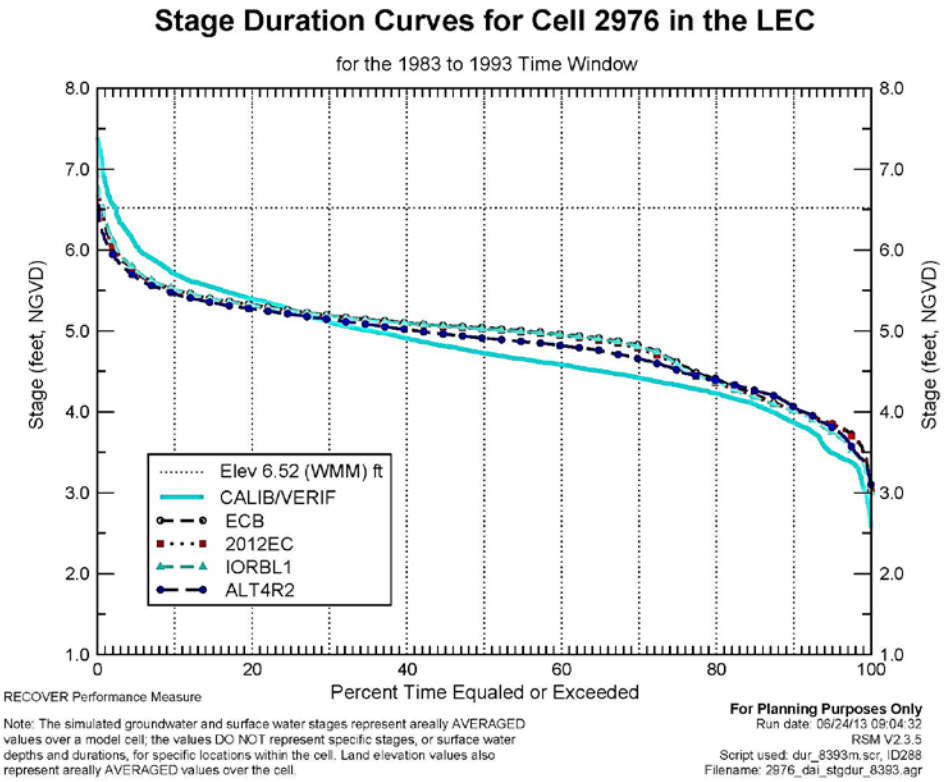

Figure 2-20 - Stage Duration Curves for Cell 2976 in the LEC Service Area

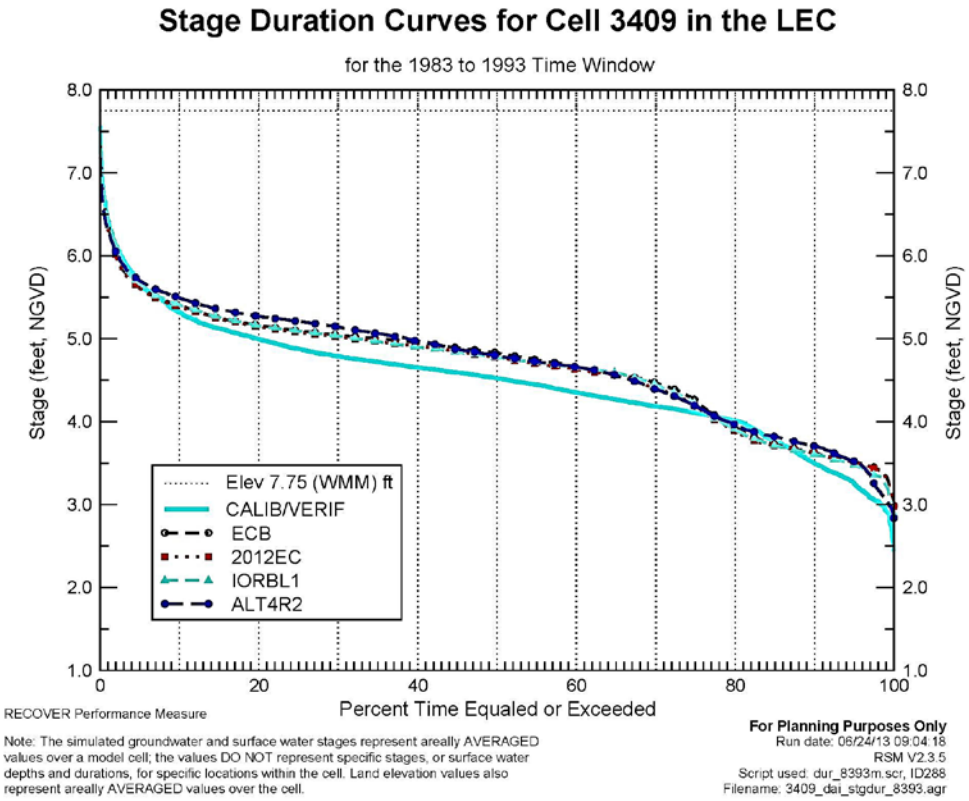

Figure 2-21 - Stage Duration Curves for Cell 3409 in the LEC Service Area

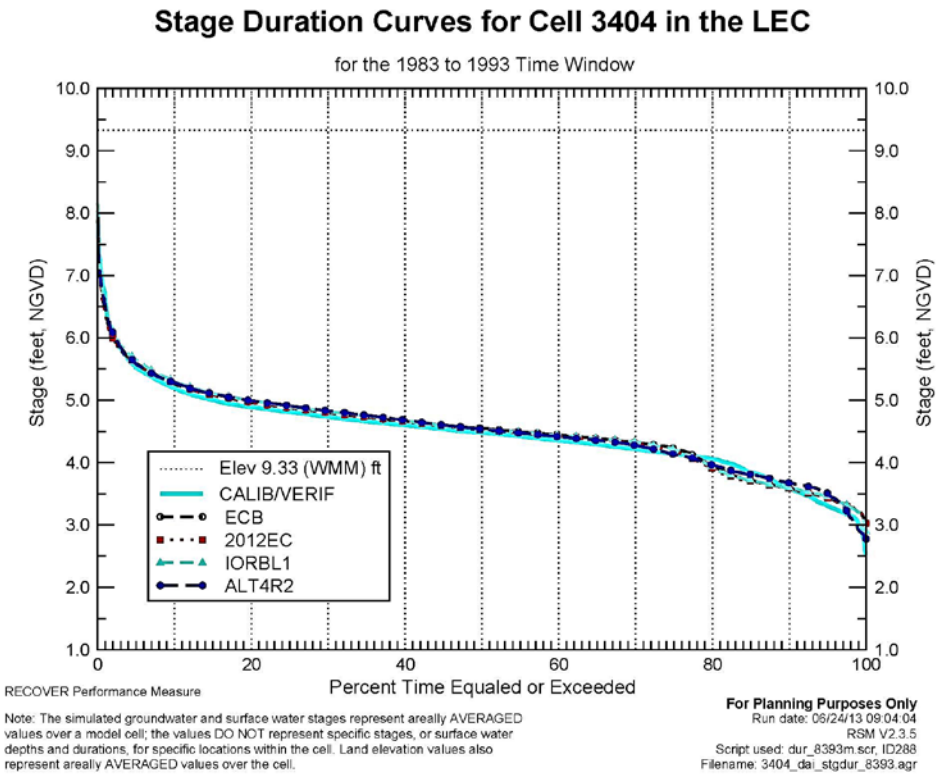

Figure 2-22 - Stage Duration Curves for Cell 3404 in the LEC Service Area

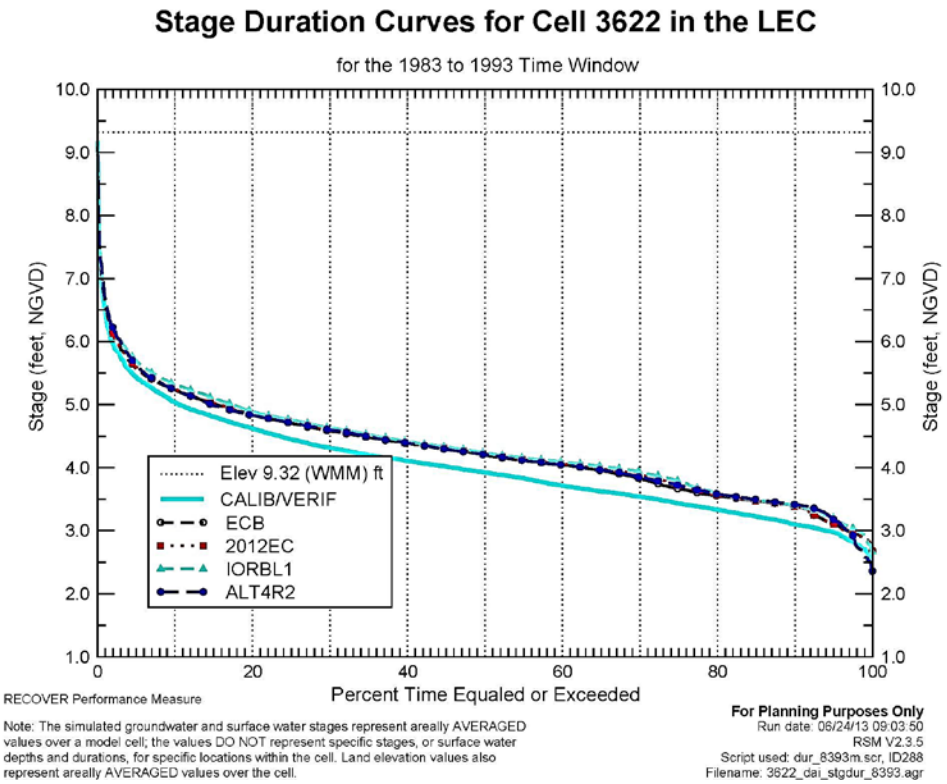

Figure 2-23 - Stage Duration Curves for Cell 3622 in the LEC Service Area

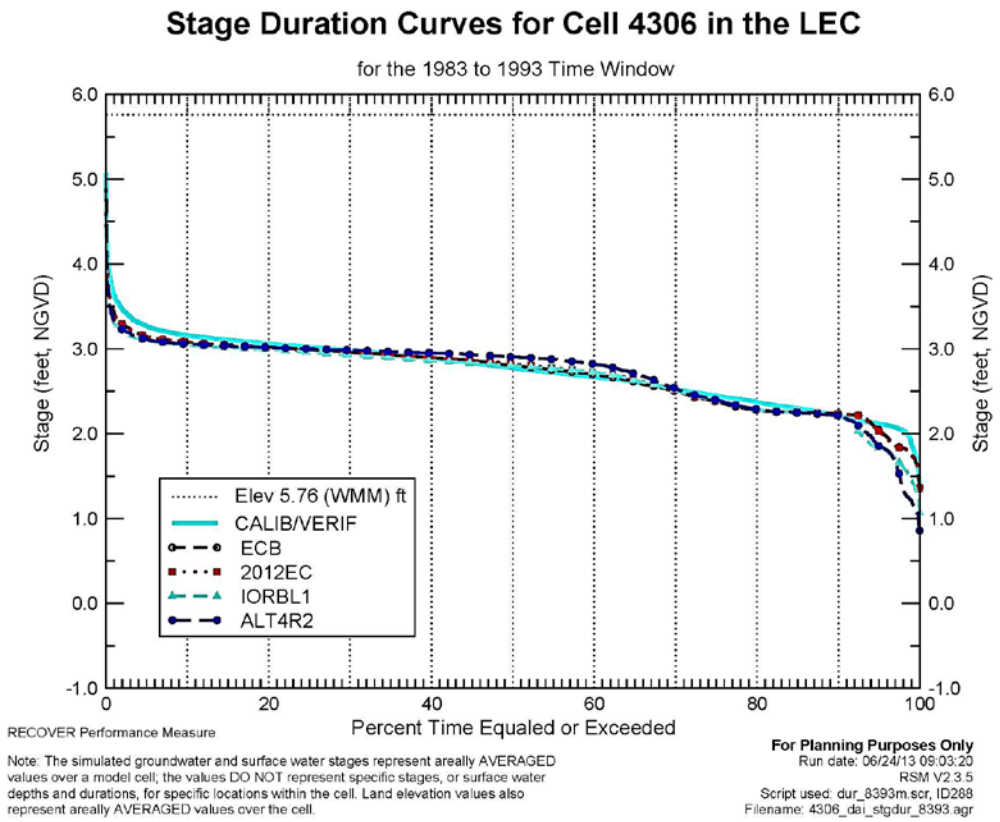

Figure 2-24 - Stage Duration Curves for Cell 4306 in the LEC Service Area

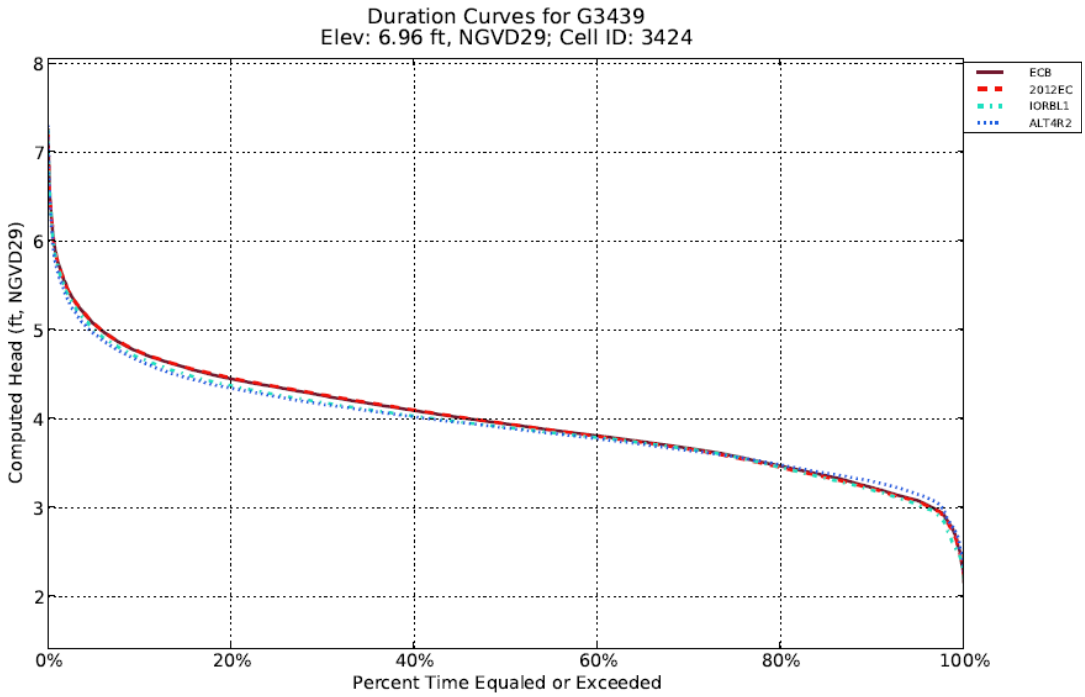

Figure 2-25 - Stage Duration Curves for Well G-3439

Additional information can be found in Annex B of the Final PIR

2.6 Threatened and Endangered Species

The project area of the CEPP is large and serves as refuge to a multitude of flora and fauna. The fauna of the area is dependent on wetlands as a source of food and refuge. Representatives from the U.S. Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife Conservation Commission (FWC) have been active members of the project team and have provided guidance on potential impacts the CEPP may have on federally listed threatened and endangered species that live within the project area. The FWC completed an environmental resource analysis utilizing GIS with multiple data sets to produce an initial list of potentially occurring state listed species. This list was evaluated and reviewed with published literature and survey data by a team of FWC's habitat, wildlife, and fisheries experts to define and provide a final determination of potential effects on state listed species.

Forty federally listed threatened and endangered species are either known to exist or potentially exist within the project area and, subsequently, may be affected by the proposed project. Many of these species have been previously affected by habitat impacts resulting from wetland drainage, alteration of hydroperiod, wildfire, and water quality degradation. The USACE has coordinated the existence of federally listed species with USFWS and with National Marine Fisheries Service (NMFS), as appropriate. Specifically, coordination with NMFS includes listed fish, whales, and sea turtles at sea. Coordination with USFWS included other plants and animals.

Federally threatened, endangered, and candidate species that may occur within the study area include Florida panther (*Puma concolor coryi*), Florida population of West Indian Manatee (Florida manatee) (*Trichechus manatus*), Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), Everglade snail kite (*Rostrhamus sociablis plumbeus*), 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*), Eastern indigo snake (*Drymarchon corais couperi*), Miami black-headed snake (*Tantilla oolitica*), 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*), Stock Island tree snail (*Orthalicus reses* [not incl. *nesodryas*]), crenulate lead-plant (*Amorpha crenulata*), Cape Sable thoroughwort (*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*), smalltooth sawfish (*Pristis pectinata*) and its critical habitat, Gulf sturgeon (*Acipenser oxyrinchus desotoi*) and its critical habitat, blue whale (*Balaenoptera musculus*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*), green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), Johnson's

seagrass (*Halophila johnsonii*) and its critical habitat, elkhorn coral (*Acropora palmata*) and its critical habitat, and staghorn coral (*Acropora cervicornis*) and its critical habitat.

To achieve restoration objectives, the recommended plan increases the amount of water delivered into areas inhabited by endangered species, including the critically-endangered Cape Sable seaside sparrow. The USFWS supports the recommended plan and is developing measures to improve the number and distribution of sparrows, but has expressed concerns about operations during nesting periods and effects on sparrow habitat. The USFWS has provided recommendations in their Programmatic Biological Opinion (BO), provided under the requirements of the Endangered Species Act, to avoid and minimize harmful effects on endangered species potentially affected by the project.

The CEPP project area contains habitat suitable for the presence, nesting, and/or foraging of 16 state-listed threatened and endangered species and 18 species of special concern. Threatened and endangered state-listed animal species include the Big Cypress fox squirrel (*Sciurus niger avicennia*), Florida mastiff bat (*Eumops glaucinus floridanus*), Florida black bear (*Ursus americanus floridanus*), 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*), and Miami black-headed snake (*Tantilla oolitica*). Species of special concern include the Florida mouse (*Podomys floridanus*), Shermans fox squirrel (*Sciurus niger shermani*), American oystercatcher (*Haematopus palliates*), brown pelican (*Pelecanus occidentalis*), black skimmer (*Rynchops niger*), burrowing owl (*Athene cunicularia*), limpkin (*Aramus guarauna*), reddish egret (*Egretta rufescens*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), white ibis (*Eudocimus albus*), roseate spoonbill (*Platalea ajaja*), osprey (*Pandion haliaetus*), mangrove rivulus (*Kryptolebias marmoratus*), mangrove gambusia (*Gambusia rhizophorae*), gopher tortoise (*Gopherus polyphemus*), and the Florida tree snail (*Liguus fasciatus*). While small foraging or nesting areas utilized by many of these animal species may be affected by this project, no adverse impacts are anticipated to state listed species as a result of this project.

State-listed threatened and endangered plant species include the pine-pink orchid, which frequents the edges of the farm roads just above wetland elevation; the lattice-vein fern, which is found occasionally in the forested wetlands; Eaton's spikemoss, and Wright's flowering fern, both found in the Frog Pond natural area; along with the Mexican vanilla plant and Schizaea tropical fern located on tree islands in the upper Southern Glades region.

The FWC supports CEPP as part of the global greater south Florida ecosystem restoration effort. However, the FWC have raised concerns that guidelines currently being considered for management of water in and through this ecosystem would result in high and low water conditions that negatively impact fish and wildlife populations, habitat, and diversity, particularly certain state and federally listed species. In particular, they are concerned that water levels and durations may affect terrestrial species and endangered species such as the panther, wood stork and Cape Sable seaside sparrow. It is the position of the FWC that water levels in the Central Everglades should be managed in a manner that sustains and restores native fish and wildlife populations, habitat, and diversity. The FWC intends to actively

participate in the implementation phase and adaptive management process for the Central Everglades Planning Project to help ensure maximum benefits to fish and wildlife resources.

The recommended plan provides roughly 210 kAF of additional flow south from Lake Okeechobee and improves the current distribution of water into WCA 3A and throughout the Greater Everglades into Northeast Shark River Slough (SRS). The improved distribution of water deliveries through SRS is anticipated to increase foraging opportunities for wading birds and snail kites as well as improve conditions for alligators and other wetland species inhabiting the partially restored landscapes of northern WCA 3A, WCA 3B, and Northeast SRS. Also expected are improved conditions in southern WCA 3A, by reducing the frequency and duration of high water events, which erode the ridge and slough landscape and result in tree island flooding. Vegetation shifts are expected in marshes and on tree islands throughout northern WCA 3A, WCA 3B and SRS. The CEPP will also provide restoration benefits to ENP and Florida Bay. For example, re-establishing sheetflow and hydropattern will restore ridge and slough habitat beneficial to all natural resources within ENP. In Florida Bay, the CEPP will lower salinities resulting in measureable improvements in habitat for juvenile American crocodiles, juvenile spotted seatrout, pink shrimp, and seagrasses. Additional information can be found in Annex A and Appendix C.2.2 of the Final PIR.

2.7 Other Natural System Habitat Needs

The recommended plan 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. Based on the methodology that was used to quantify ecosystem benefits (i.e. Habitat Units [HU]), the recommended plan would provide 969,271 HUs, an improvement of 285,689 HUs in comparison to the future without project condition. The recommended plan would decrease high volume freshwater discharges from Lake Okeechobee that are currently sent to the Northern Estuaries. Additional water from Lake Okeechobee would be sent southward through canals of the EAA to the A-2 FEB. The A-2 FEB would provide storage capacity, attenuation of high flows, and limited pre-treatment prior to delivery of the redirected water to existing STAs, which would reduce phosphorus concentrations in the water to meet required 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. Several existing levees, canals, culverts, and pump stations would be constructed, modified, or removed to improve the flow of water through the system and provide for other water related needs.

The recommended plan addresses the need to restore ecosystem function in the Caloosahatchee and St. Lucie Estuaries by reducing the number and severity of events where harmful amounts of freshwater from Lake Okeechobee are discharged into the estuaries. Currently, many oyster and seagrass beds are stressed and have been reduced or eliminated from their former areas by extreme salinity fluctuations, increased turbidity and sedimentation, dredging, damage from boats, and nutrient enrichment, which causes algal blooms that in turn restrict light penetration. A reduction in the number of high volume freshwater discharges to the estuaries would help to reduce turbidity, sedimentation, and moderate unnatural changes in salinity that are extremely detrimental to estuarine communities. Reductions in turbidity and

sedimentation would allow greater light penetration, promoting the growth of seagrass beds and would help lessen the problem of flushing oyster spat into outer areas of the estuaries that currently experience high salinity levels during the dry season resulting in increased predation and disease in the oyster population.

The recommended plan provides a significant increase in the quantity of fresh water (approximately 210 kAF/yr, annual average) flowing into the Everglades. This additional freshwater flow to the Central Everglades is essential to Everglades restoration. In the pre-drainage system, the inundation pattern supported an expansive system of freshwater marshes including longer hydroperiods sawgrass "ridges" interspersed with open-water "sloughs", higher elevation marl prairies on either side of Shark River Slough, and forested wetlands in the Big Cypress Marsh. The original C&SF Project has compartmentalized and fragmented the Everglades landscape, reduced flows through the sloughs, and altered hydroperiod and depths. The result has been substantially altered plant community structures, reduced abundance and diversity of animals, and spread of nuisance and exotic vegetation. The recommended plan would provide for resumption of sheetflow and related patterns of hydroperiods and water depth that would significantly help to restore and sustain the microtopography, directionality, and spatial extent of ridges and sloughs, and improve the health of tree islands within the landscape. Additional water flowing into the Everglades would also result in beneficial shifts in habitat for desired wildlife species. Implementation of the recommended plan features and additional flow would provide greater project benefits to those areas located in northern WCA 3A and ENP. **Figure 2-26** and **Figure 2-27** depict the differences in hydroperiod between the TSP and the FWO project condition in WCA 3 and ENP as modeled by the RSM-GL (version 2.3.2). The years 1989 and 1995 are depicted, which are representative of a dry and wet year in the 41-year period of simulation (1965-2005).

In northern WCA 3A, the Miami Canal functions as a major, unnatural drainage for WCA 3A. In combination with the northern levees of WCA 3A (L-4 and L-5), the Miami Canal has substantially impacted historical sheetflow and natural wetland hydroperiods. As a result, the natural capability of northern WCA 3A to store water is lost and the Miami Canal effectively over-drains the area. These hydrologic changes have increased the frequency of severe peat fires and have also resulted in the loss of ridge and slough topography that was once characteristic of the area. Most of WCA 3A north of Interstate 75 has experienced some form of fire and in more recent years those fires have moved farther south into the western portion of WCA 3A. Today, the northern WCA 3A is largely dominated by sawgrass, cattail, and scattered shrubs and lacks the structural diversity of plant communities seen in central and western WCA 3A. The recommended plan is expected to rehydrate much of northern WCA 3A by providing a means for redistributing treated STA discharges from the L-4 and L-5 Canals in a manner that promotes sheetflow and by removing the drainage effects associated with the Miami Canal. This would promote the reversal of soil loss and would help in the restoration of organic soil accretion.

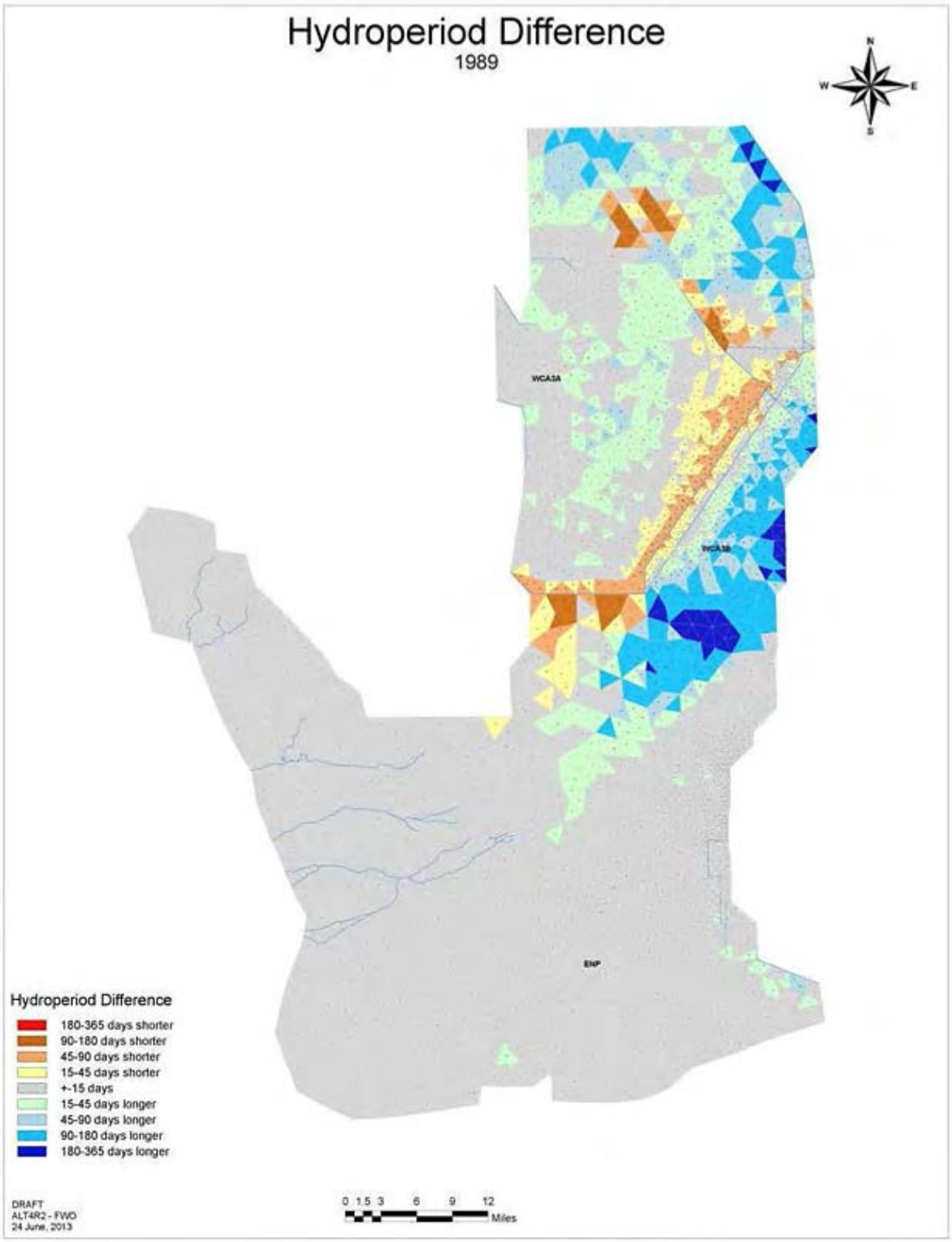

Figure 2-26 - Differences in Hydroperiod Distribution within WCA 3 and ENP between the FWO Project Condition and the TSP for a Representative Dry (1989) Year in the Period of Record (1965-2005)

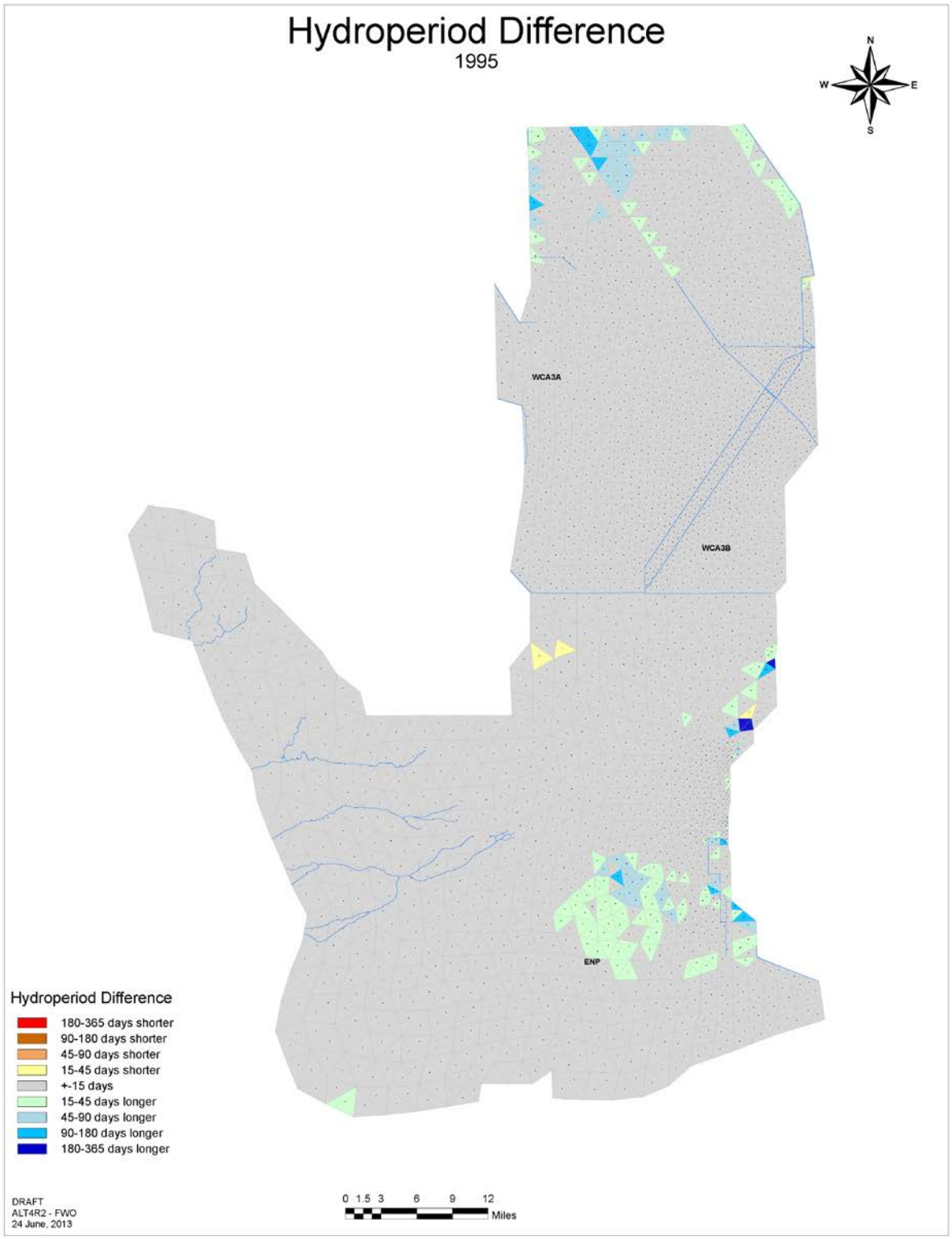

Figure 2-27 - Differences in Hydroperiod Distribution within WCA 3 and ENP between the FWO Project Condition and the TSP for a Representative Wet (1995) Year in the Period of Record (1965-2005)

Central WCA 3A is considered to be fairly well conserved ridge and slough habitat. Vegetation and patterning in the central portion of WCA 3A resembles the pre-drainage conditions most closely and represents some of the best examples of Everglades habitat left in south Florida. This region of the Everglades appears to have changed little since the 1950s (which was already post-drainage) and contains a mosaic of tree islands, wet prairies, sawgrass stands, sawgrass ridges, and aquatic sloughs. Increases in depth within central WCA 3A were not as significant as increases in observed depths in northern WCA 3A; however, maintenance of existing conditions within this region of the project area is desirable as ridge and slough habitat is well conserved.

The southern portion of WCA 3A is primarily affected by long durations of high water and a lack of seasonal variability in water depths created by impoundment structures (i.e., L-67 and L-29 Levees). The increased duration of high water events within southern WCA 3A has negatively impacted tree islands and caused fragmentation of the sawgrass ridges, again resulting in the loss of historic landscape patterning. Southern WCA 3A would remain largely unaffected by the recommended plan. The recommended plan would not result in significant benefits to southern WCA 3A through reduction in high water levels or durations.

Within WCA 3B, the ridge and slough landscape has been severely compromised by the virtual elimination of overland sheetflow since the construction of the L-67A/C Canal and Levee system. WCA 3B has become primarily a rain-fed compartment, experiencing very little overland flow and has largely turned into a sawgrass monoculture where relatively few sloughs or tree islands remain. Loss of sheetflow to WCA 3B has also accelerated soil loss reducing elevations of the remaining tree islands in WCA 3B, making them vulnerable to high water stages. The recommended plan would begin to re-establish hydrologic connectivity of WCA 3A, WCA 3B, and ENP. Increases in stages and hydroperiods would promote wetland vegetation transition, through contraction of sawgrass marshes and expansion of wet prairies and sloughs.

Flows through SRS under current water management practices, including the existing WCA 3A Regulation Schedule and the current limited capacity to redirect Lake Okeechobee water south to the Everglades, are much reduced when compared with pre-drainage conditions. The result has been lower wet season depths and more frequent and severe dry outs in the sloughs and reduction in the extent of the important shallow water “edges”. Where infrequent dryouts allow marsh fishes and other aquatic animals to reach a relative abundance necessary to support upper trophic level reproduction, drydowns that are too frequent and severe hinder the ability of aquatic animal populations to rebound. Over-drainage in the peripheral wetlands along the eastern flank of Northeast SRS has resulted in shifts in community composition, invasion by exotic woody species, and increased susceptibility to fire. The recommended plan is expected to rehydrate much of Northeast SRS by providing a means for redistributing flows from WCA 3A through WCA 3B to ENP. Restoration of flow volumes will significantly improve hydroperiods and water depths while reducing the frequency and severity of drydowns.

Changes in hydrology of the freshwater systems have led to effects on the estuarine and marine environments of Florida Bay. Florida Bay is the main receiving water body of the Greater Everglades system and is heavily influenced by changes in the timing, distribution, and quantity of freshwater flows. Alterations in seasonal inflow deliveries to Florida Bay have resulted in extreme salinity fluctuations. Water management actions that result from the recommended

plan have the potential to reduce the intensity, frequency, duration and spatial extent of hypersaline events in Florida Bay and establish a persistent and resilient estuarine zone that extends further into the bay than currently exists. CEPP does not reconnect Shark River Slough to Taylor Slough or Florida Bay as it was historically, but it does allow additional surface water to flow southeastward around Mahogany Hammock towards West Lake, the Lungs, and Garfield Bight helping to negate the harmful buildup of hypersalinity. This is expected to help restore the bay to more natural conditions and increase biomass and diversity of bay flora and fauna including ecologically and economically important pink shrimp and spotted sea trout, and desired seagrass species.

Further information pertaining to the evaluation of the recommended plan is described in Section 5 of the Final PIR and Appendix C.2.2.

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

The CEPP will be implemented in accordance with selected plan – Alternative 4R2. The components are:

3.1.1.1 Storage and Treatment - North of Redline (Figure 3-1)

The project features of the Storage and Treatment component include:

- Construction of A-2 FEB and integration with A-1 FEB operations
- Lake Okeechobee operational refinements

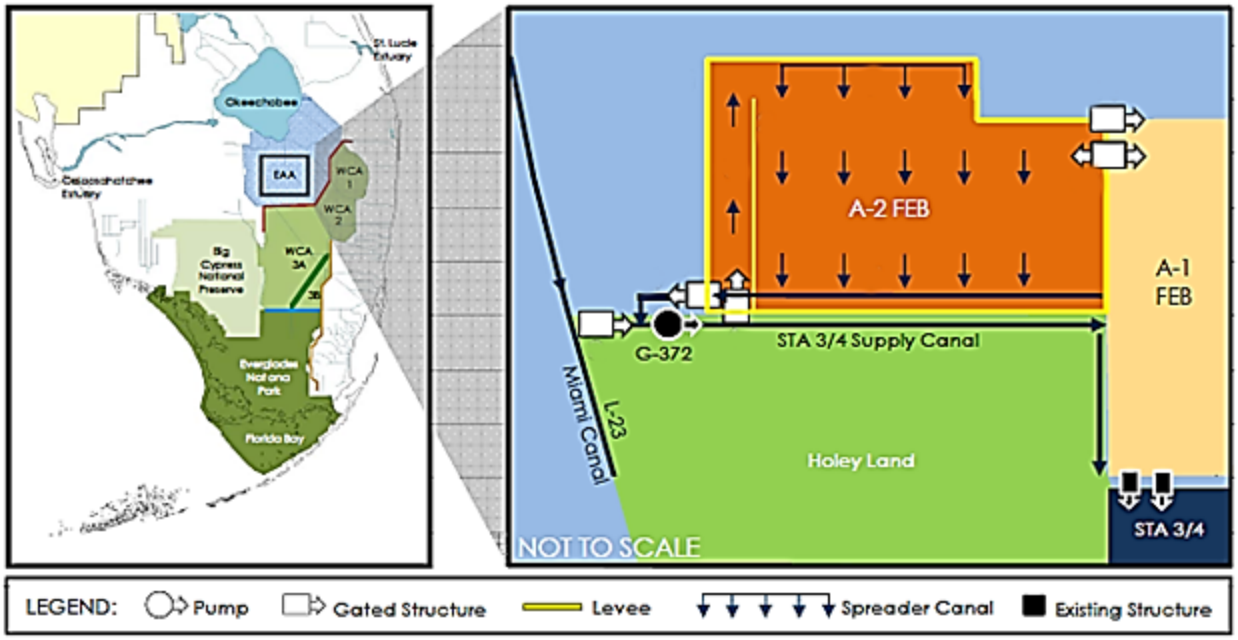

Figure 3-1 **- Recommended Plan Treatment and Storage Features and Location**

3.1.1.2 Distribution and Conveyance – South of Redline (Figure 3-2 & Figure 3-3)

The project features of the Distribution and Conveyance component include:

- Diversion of L-6 flows, infrastructure, and L-5 canal improvements
- Remove western ~2.9 miles of L-4 levee west of S-8 (3,000 cfs capacity)
- Construct 360 cfs pump station at western terminus of L-4 levee removal

- Backfill Miami Canal and Spoil Mound Removal from ~1.5 miles south of S-8 to I-75

3.1.1.3 Distribution and Conveyance – Greenline/Blueline (Figure 3-2 & Figure 3-3)

The project features of the Distribution and Conveyance component also include:

- Increase S-333 capacity to 2,500 cfs
- One 500 cfs gated structure north of Blue Shanty levee and 6,000-ft gap in L-67C levee
- Two 500 cfs gated structures in L-67A; 0.5 mile spoil removal west of L-67A canal north and south of structures
- Remove ~8 miles of L-67C levee in Blue Shanty flowway (no canal back fill)
- Construct ~8.5 mile levee (Blue Shanty levee) in WCA 3B, connecting L-67A to L-29
- Remove ~4.3 miles of L-29 levee in Blue Shanty flowway; divide structure east of Blue Shanty levee at terminus of Tamiami Trail Next Steps western bridge
- Remove entire 5.5 miles L-67 Extension levee; backfill L-67 Extension canal
- Remove ~6 miles of Old Tamiami Trail road (south of L-29 western levee, fromL-67 Ext to ENP Tram Rd)

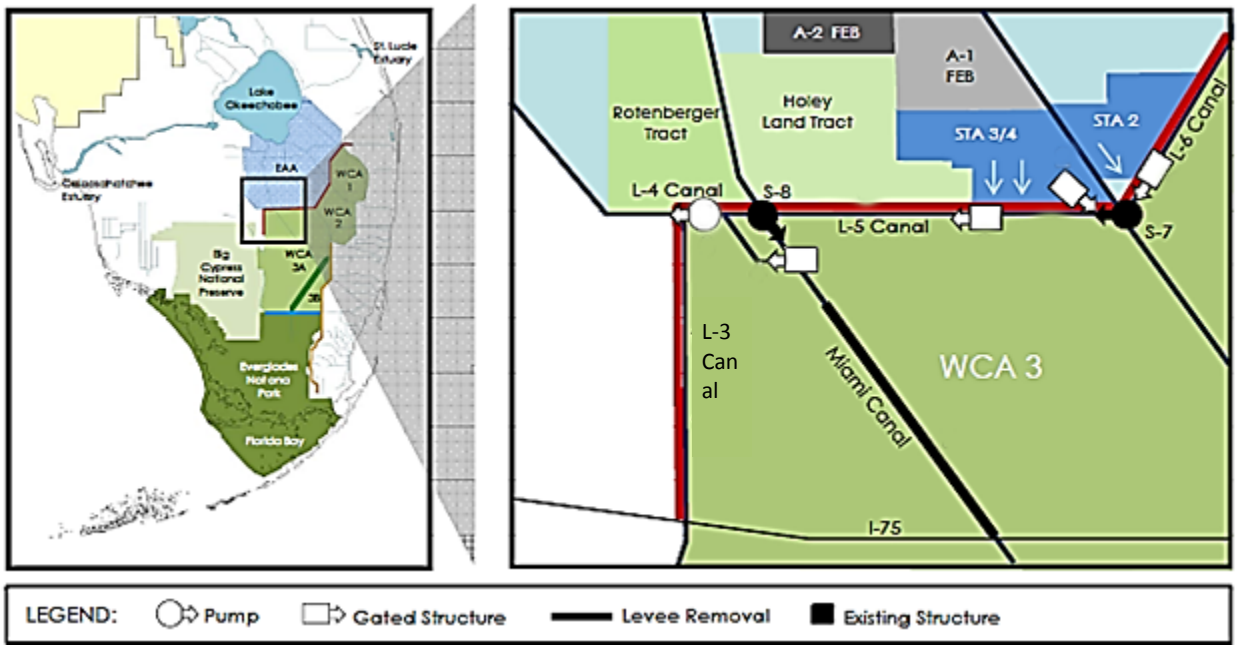

Figure 3-2 - Recommended Plan Northern Conveyance and Distribution Features and Location

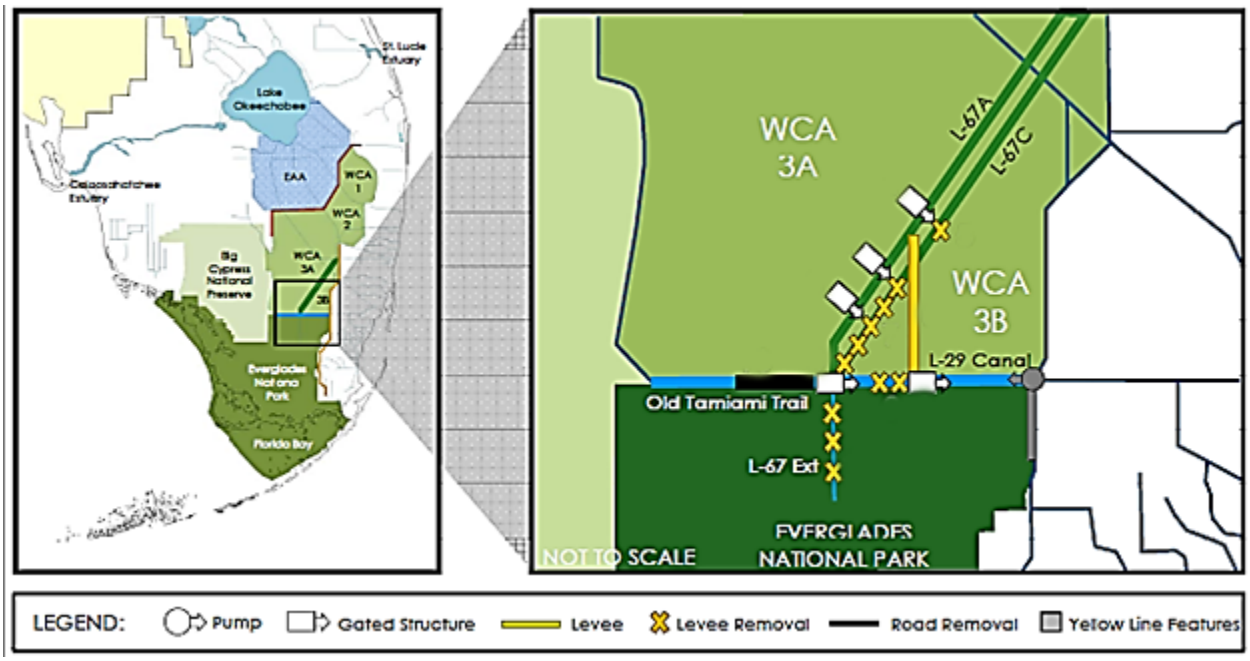

Figure 3-3 - Recommended Plan Southern Conveyance and Distribution Features and Location

3.1.1.4 Seepage Management - Yellowline (Figure 3-4)

The project features of the Seepage Management component include:

- New S-356 pump station with ~1,000 cfs capacity
- Construct 4.2 mile partial depth seepage barrier south of Tamiami Trail (along L-31N)
- G-211 operational refinements; use coastal canals to convey seepage

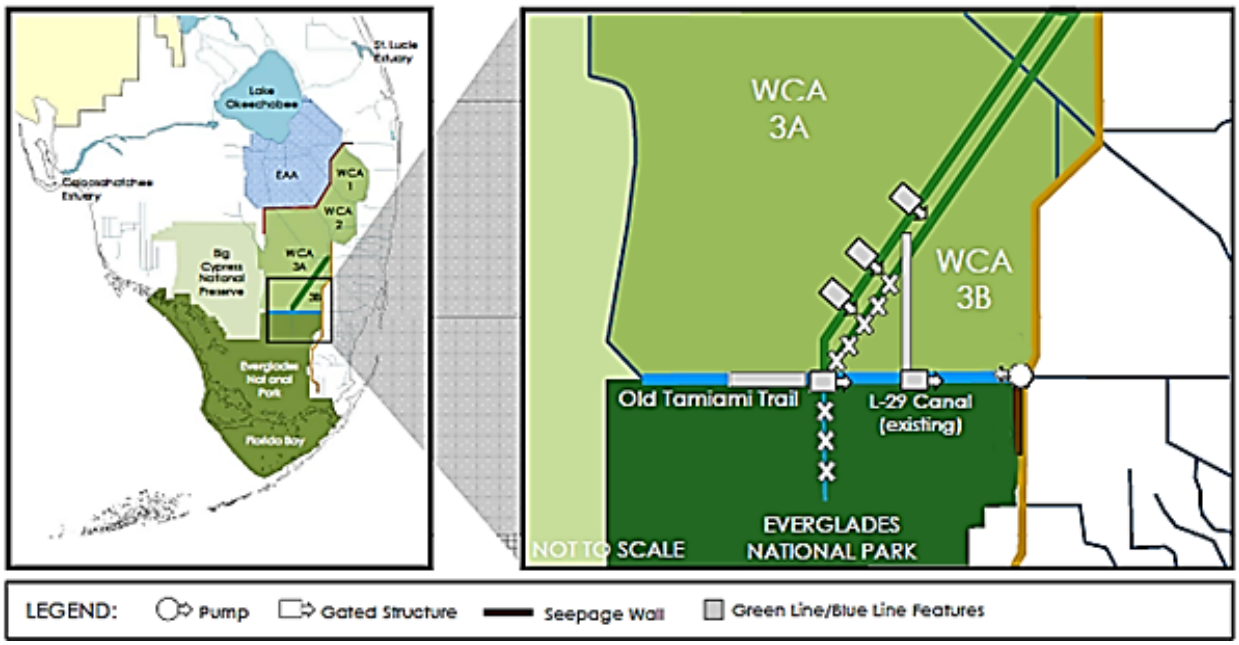

Figure 3-4 - Recommended Plan Seepage Management Features and Location

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 CEPP PIR provides a limited level of design, and includes documentation of all engineering assumptions and conceptual designs. Preconstruction Engineering and Design (PED) for recommended plan features could begin after Congressional authorization and upon SFWMD's concurrence consistent with the implementation phases and cost sharing. USACE 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 PIR** for limited design details and conceptual design plates.

3.2 Efficiency and Cost Effectiveness

The CEPP recommended plan is justified by the environmental benefits derived by the south Florida ecosystem; however, a comparison of the benefits and costs of alternative plans is also conducted to ensure that a selected alternative is efficiently producing the environmental benefits. The measurement of efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the nation's environment. Cost-effectiveness/incremental cost analysis (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 national ecosystem restoration (NER) plan. 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?”, that is, are the additional outputs worth the costs incurred to achieve them?

The CE/ICA analysis is consistent with the PIR and follows guidance from the USACE, ER 1105-2-100. Costs are based initially on a planning level estimate and benefits are based on the habitat unit evaluation. As per this guidance, CE/ICA analysis compares the alternative plans’ average annual costs against the appropriate average annual habitat unit estimates. The average annual outputs are calculated as the difference between with-plan and without-plan conditions over the period of analysis (through year 2072).

3.2.1 Costs of Final 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, NED costs (National Economic Development costs, as defined by federal and USACE policy) are expressed in 2014 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, relocation (LERR), preconstruction engineering and design (PED), construction management, and operations, maintenance, repair, rehabilitation and replacement (OMRR&R), and was developed through engineering design and cost estimation, and real estate appraisal efforts.

3.2.1.1 Overview of Real Estate Costs

A detailed analysis of the real estate requirements of the final array was completed. Each parcel required for construction or restoration activities was identified, characterized, and a value estimate was calculated. The real estate was valued in fee, however, lesser estates and interests in land could be considered. All of the alternatives had the same land requirements for the storage and treatment features. 14,521 acres in the A-2 Compartment were valued at SFWMD actual acquisition costs since these lands were purchased with both federal Farm Bill funds and SFWMD funds. 145.5 acres (90.93 acres owned by the State of Florida and 54.57 acres owned by SFWMD) were required for the new feeder canal leading from the Miami Canal on the west running east to the A-2 Compartment. These lands were valued at an estimated fair market value.

Alternative 1 included a feature at the L28 triangle which required additional lands, and accounts for the real estate difference between Alt 1 and the other alternatives. Lands were required for construction of pump stations, and other structures within Water Conservation Areas 3A and 3B. These lands were not assigned a value as they were provided for the prior Central and Southern Florida Flood Control Project.

3.2.1.2 Average Annual Costs

The timing of a plan’s costs is important. Construction and other initial 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 3.5% 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.

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

	SUMMARY OF COSTS FOR CEPP ALTERNATIVE PLANS*			
	Alt 1	Alt 2	Alt 3	Alt 4
Cost Component				
Construction Features	**$1,855,000,000**	**$2,174,000,000**	**$2,282,000,000**	**$2,147,000,000**
Lands	**$41,000,000**	**$39,000,000**	**$39,000,000**	**$39,000,000**
Total First Cost	**$1,896,000,000**	**$2,213,000,000**	**$2,321,000,000**	**$2,186,000,000**
Interest During Construction				
Construction	$141,000,000	$165,000,000	$174,000,000	$163,000,000
Lands	$4,000,000	$4,000,000	$4,000,000	$4,000,000
Total Interest During Construction	**$145,000,000**	**$169,000,000**	**$178,000,000**	**$167,000,000**
Total Project Investment	**$2,041,000,000**	**$2,382,000,000**	**$2,499,000,000**	**$2,353,000,000**
Average Annual Cost				
Interest & Amortization	$87,000,000	$101,600,000	$106,500,000	$100,300,000
Operation, Maintenance, Repair, Rehabilitation, and Replacement	$5,500,000	$6,400,000	$6,900,000	$6,500,000
Average Annual Cost	**$92,500,000**	**$108,000,000**	**$113,400,000**	**$106,800,000**

*NER 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 recommended plan presented in other sections of the report.
* Computation of the detailed estimate for the recommended plan is based on additional engineering and design.
* Contingency used in planning level costs was 82% 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 Indian River Lagoon and the Caloosahatchee River and Estuary, WCAs 3A and 3B, ENP, and Florida Bay. Habitat units were not calculated for Lake Okeechobee or Biscayne Bay, since the performance of these areas were considered a constraint during formulation. The CEPP planning model is a Microsoft Excel spreadsheet that utilizes project performance measures to derive a Habitat Unit (HU) score that represents the ecological performance achieved by each alternative. The complete description of the model and further information pertaining to the alternative evaluation is described in **Appendix G**.

The CEPP planning model was used to aggregate the results of project performance measures. 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 2005a, 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. 2005b). These CEMs have been extensively peer reviewed and provide the framework for the planning and assessment of the CERP.

Table 3-2 - Performance Measures Used to Quantify National Ecosystem Restoration Plan Benefits

Region	Performance Measure	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 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.

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.

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 3-5** through **Figure 3-8**) to produce habitat units.

Habitat unit results for the existing conditions baseline (ECB), the future without project condition (FWO) and the alternatives are displayed in **Table 3-6.**

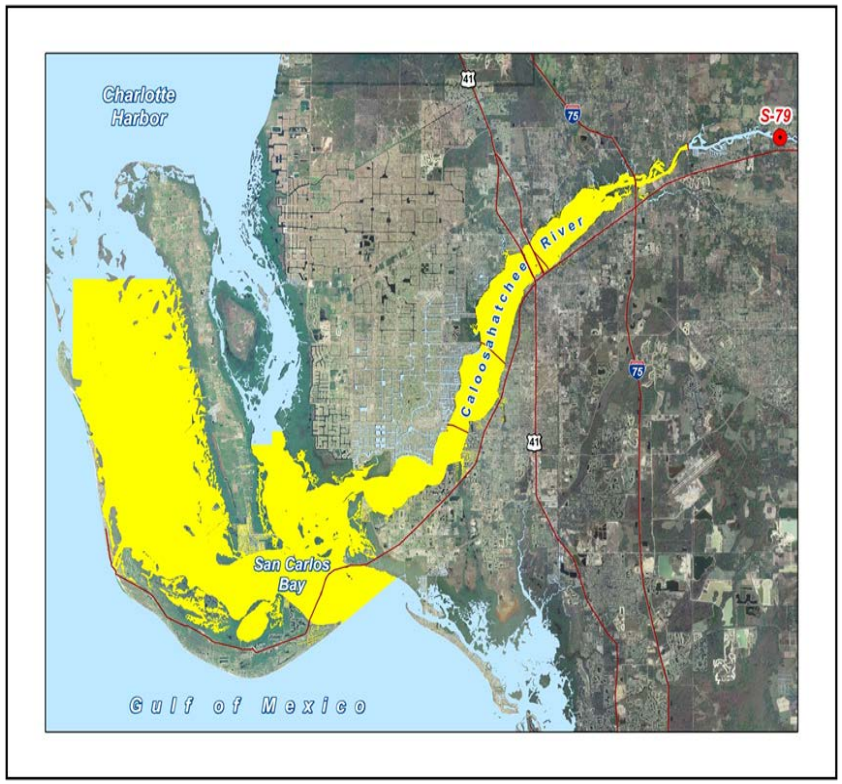

Figure 3-5 - Zones for Habitat Suitability within the Caloosahatchee Estuary

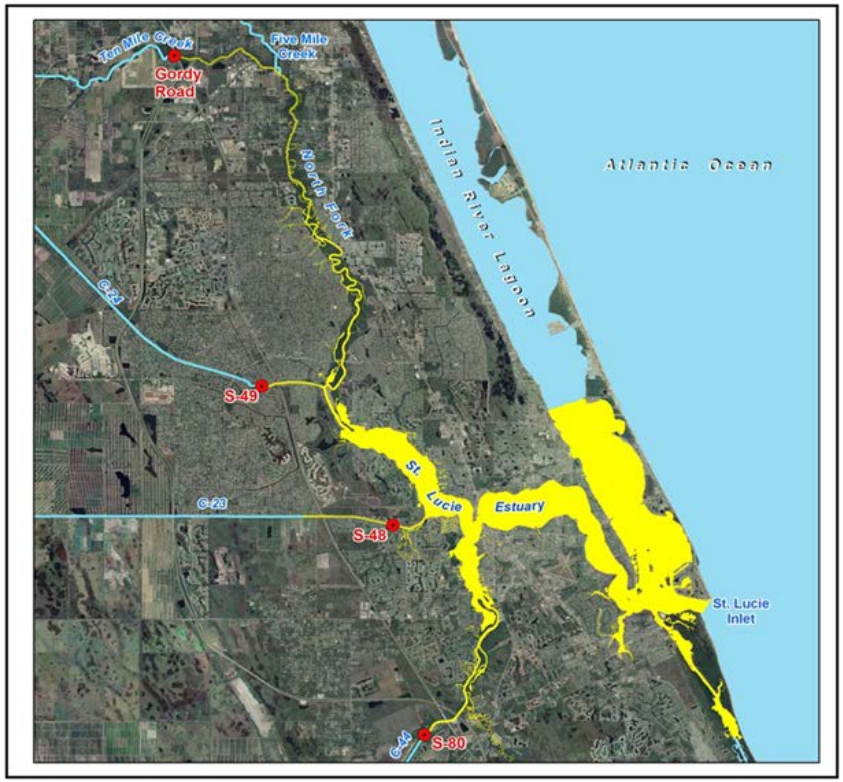

Figure 3-6 - Zones for Habitat Suitability within the St. Lucie Estuary

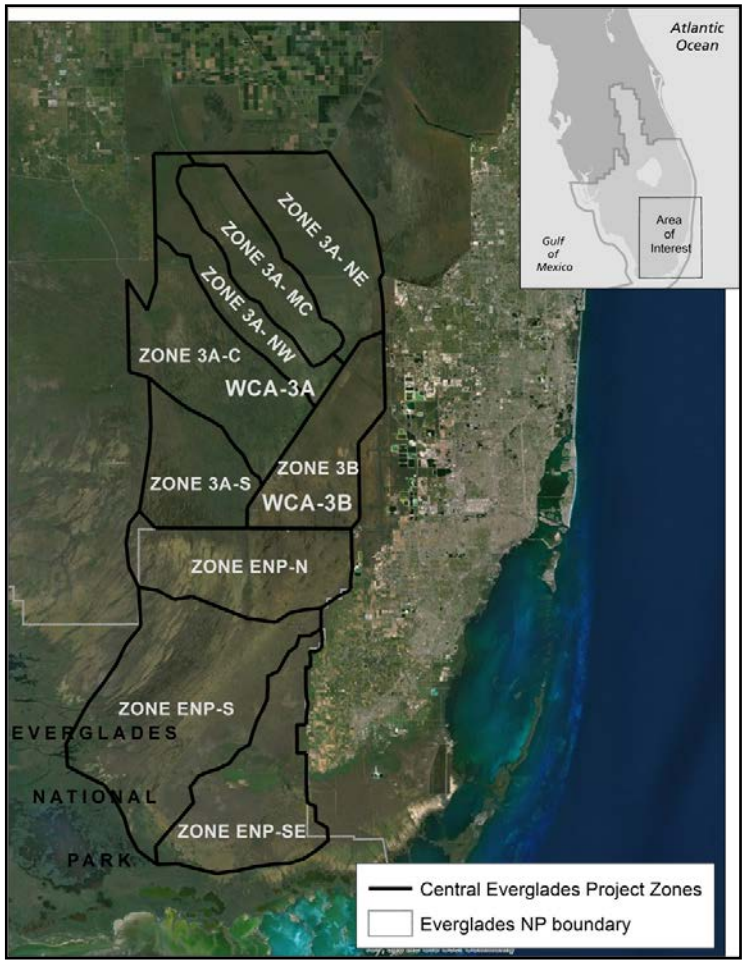

Figure 3-7 - Zones for Habitat Suitability within WCA 3 and ENP

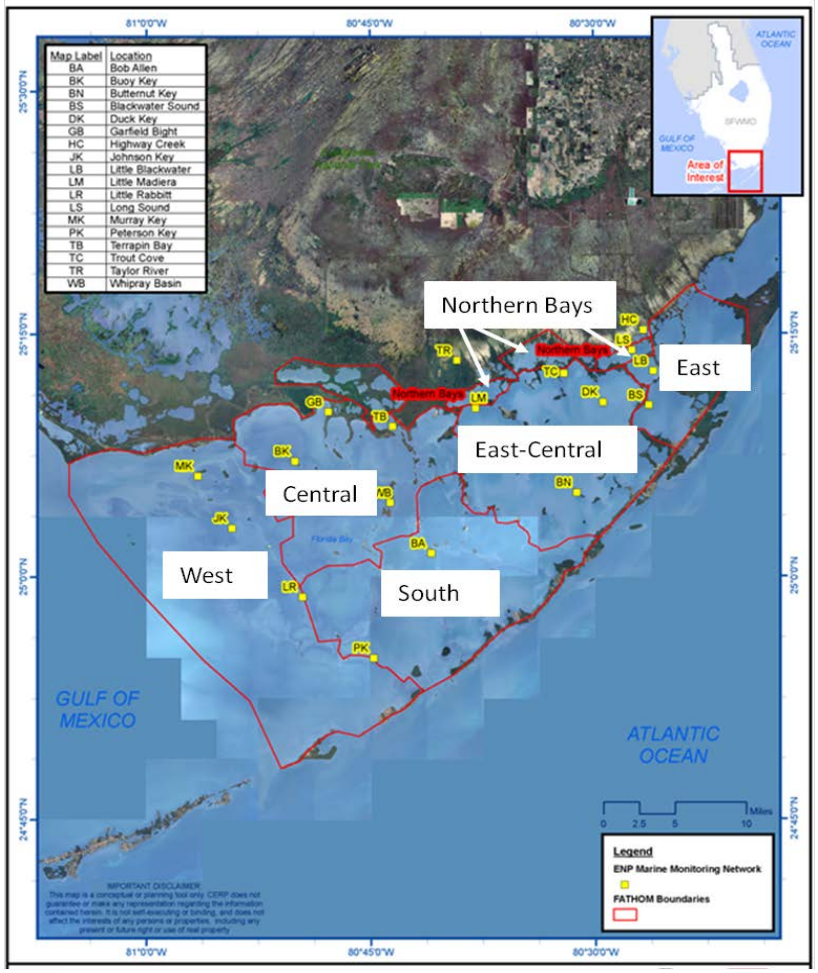

Figure 3-8 - Zones for Habitat Suitability within Florida Bay

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

Project Region (Zone)	ECB*	FWO**	Alt 1**	Alt 2**	Alt 3**	Alt 4**
Caloosahatchee Estuary (CE-1)	2,839	34,070	39,038	39,038	39,038	39,038
St Lucie Estuary (SE-1)	2,099	2,399	4,798	4,798	4,798	4,798
Total Northern Estuaries	**4,938**	**36,469**	**43,836**	**43,836**	**43,836**	**43,836**
Northeast WCA 3A (3A-NE)	44,451	29,634	96,311	96,311	96,311	96,311
WCA 3A Miami Canal (3A-MC)	32,847	27,373	57,874	57,092	56,310	57,092
Northwest WCA 3A (3A-NW)	30,970	30,266	54,902	53,494	53,494	53,494
Central WCA 3A (3A-C)	108,414	105,669	109,786	109,786	109,786	109,786
Southern WCA 3A (3A-S)	69,247	68,423	68,423	67,598	67,598	68,423
WCA 3B (3B)	55,697	48,842	58,268	59,125	57,411	54,840
Northern ENP (ENP-N)	57,557	55,054	102,601	101,350	103,852	102,601
Southern ENP (ENP-S)	124,068	126,454	169,400	169,400	176,558	188,488
Southeast ENP (ENP-SE)	79,711	81,062	82,413	82,413	82,413	83,764
Total Greater Everglades (WCA 3 and ENP)	**602,962**	**572,777**	**799,978**	**796,569**	**803,733**	**814,799**
Florida Bay West (FB-W)	23,693	20,534	42,647	42,647	47,386	52,124
Florida Bay Central (FB-C)	9,025	8,205	15,589	14,769	17,230	17,230
Florida Bay South (FB-S)	16,614	14,659	30,296	29,318	33,228	35,182
Florida Bay East Central (FB-EC)	21,984	20,225	36,933	36,933	42,209	46,606
Florida Bay North Bay (FB-NB)	2,154	2,028	2,661	2,661	2,788	2,915
Florida Bay East (FB-E)	9,440	8,685	10,573	10,573	10,950	10,950
Total Florida Bay	**82,910**	**74,336**	**138,699**	**136,901**	**153,791**	**165,007**
Total All Regions	**690,810**	**683,582**	**982,513**	**977,306**	**1,001,360**	**1,023,642**

* HU values for the ECB represent those calculated in the year 2010.

** HU values for the FWO and Alts 1 through 4 represent those calculated in the year 2072.

There are substantial benefits within the Blue Shanty Flow-way in WCA 3B that are not captured in the HU calculations. The CEPP planning model uses an indicator region that falls outside the Blue Shanty Flow-way; however, the hydrology within the flow-way would more closely resemble southern WCA 3A, potentially leading to an underrepresentation of benefits for Alt 4.

3.2.2.1 Average Annual Habitat Units

The average annual outputs were calculated as the difference between the with-plan and without plan conditions over the period of analysis (through year 2072). The base year for the period of economic analysis for CEPP is the year 2022. The average annual habitat unit lift is calculated as subtracting the future without project habitat units from the future with project habitat units 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 benefits accrue over various time intervals, depending on the region, were 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 future without and future with project conditions.

3.2.2.2 Greater Everglades (WCA 3 and ENP)

An ecological response time for the Greater Everglades was estimated based on the ability of CEPP to improve conditions for aquatic and herbaceous vegetation communities, periphyton, piscivorous fish, aquatic prey base organisms, and hydroecological reshaping of ridges and tree islands. The ecological response time 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**.

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

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

Figure 3-9 graphically displays the ecological response time in the greater Everglades for each alternative condition. As previously discussed the period of analysis for CEPP extends 50 years out from the base year (2022) and consequently a greater degree of the full impact of the CEPP alternatives is captured by extending the period of analysis past the traditional CERP 2050 end year.

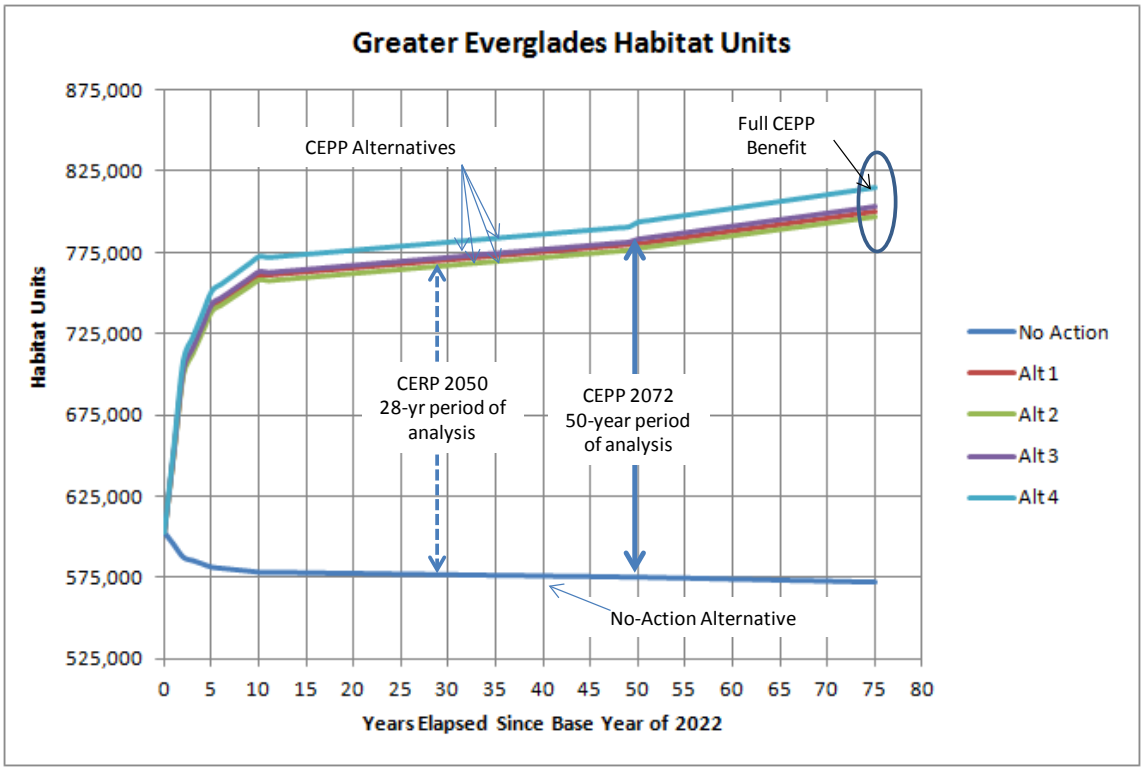

Figure 3-9 - Habitat Units through Time for Alternative Conditions in Reaction to Ecological Response Times

3.2.2.3 Florida Bay

An ecological response time for Florida Bay was estimated based on the ability of CEPP 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

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

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. The ecological response time was estimated to be approximately 6 years until full impact would be realized. **Table 3-6 i**ncludes 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

	No Action	Alt 1	Alt 2	Alt 3	Alt 4
St Lucie					
Average Annual Habitat Units	2,378	4,612	4,612	4,612	4,612
Average Annual Habitat Unit Lift		2,234	2,234	2,234	2,234
Caloosahatchee					
Average Annual Habitat Units	31,918	36,543	36,543	36,543	36,543
Average Annual Habitat Unit Lift		4,625	4,625	4,625	4,625
Greater Everglades (WCA 3 and ENP)					
Average Annual Habitat Units	578,991	759,417	756,087	761,503	769,866
Average Annual Habitat Unit Lift		180,426	177,096	182,512	190,875
Florida Bay					
Average Annual Habitat Units	75,047	133,510	131,877	147,218	157,406
Average Annual Habitat Unit Lift		58,463	56,830	72,171	82,359
Total Average Annual Habitat Unit Lift		245,748	240,785	261,542	280,093

3.2.3 Cost Effective Analysis/Incremental Cost Analysis

Sometimes it is difficult to summarize the results of CE/ICA when the analyses are performed separately on HUs for distinct species, communities, or geographic areas. This phenomenon often occurs simply because different management measures or alternative plans have different functions, provide different types of output, and provide benefits to different biological communities. This is the case for the CEPP plans, in which certain features or alternatives provide greater benefits to Florida Bay and Everglades National Park, while other alternatives provide greater benefits for Northern WCA 3A and WCA 3B.

Costs and benefits for each geographic area (Northern Estuaries, Greater Everglades [WCA 3A and ENP] and Florida Bay) were examined both independently and combined. However, a combined HU score summing all geographic areas of the study area, while not appropriately representing the significance of each geographic area, provides a valuable cumulative analysis for determining the plan that best meets the needs of the entire watershed; for this reason, the combined HU were used to ensure a cost effective solution is identified.

For the incremental cost analysis, only the cost effective plans are arrayed by increasing output to show changes in cost (marginal cost) and changes in output (marginal output) of each cost effective alternative plan compared to the without plan condition. The plan with the lowest incremental costs per unit of output of all plans is the first best buy plan. All larger cost effective plans are compared to the first best buy plan in terms of increases in cost and increases in output. The alternative plan with the lowest incremental cost per unit of output for all cost effective plans larger than the first best buy plan is the second best buy plan. In

summary, CE/ICA was performed using the following four spatial metrics to represent various ecosystem outputs of the CEPP alternatives:

1. System-Wide HU Score
2. Northern Estuaries alone
3. Greater Everglades (WCA 3A and ENP) alone
4. Florida Bay alone

3.2.3.1 CE/ICA Analysis – Total System-Wide Outputs

As can be seen in **Table 3-7**, both Alts 1 and 4 are identified as being cost effective for the aggregated system-wide habitat units. Alts 2 and 3 are both more costly than Alt 4 and provide fewer overall habitat units, and these alternatives are not cost effective for the production of system-wide habitat units.

Table 3-8 shows that there are two best buy plans for the combined system-wide HU production, Alts 1 and 4. Alt 1 has the lowest cost per unit of output of any of the alternatives ($376 per combined habitat unit produced). The next best alternative in terms of average cost per combined habitat unit is Alt 4 ($381). Alt 4 provides an increment of 34,346 additional average annual habitat units produced over Alt 1 at an incremental cost of over $14,300,000 (incremental cost of $416 per habitat unit). Alt 4 provides approximately 14 percent greater benefits for a cost increase of 15 percent.

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

	Alt 1	Alt 2	Alt 3	Alt 4
Average Annual Cost (AAC)	**$92,500,000**	**$108,000,000**	**$113,400,000**	**$106,800,000**
Northern Estuaries	6,859	6,859	6,859	6,859
Greater Everglades (WCA 3 and ENP)	180,426	177,096	182,512	190,875
Florida Bay	58,463	56,830	72,171	82,359
Average Annual System Wide HUs (AAHU)	245,748	240,785	261,542	280,094
AAC/AAHU	$376	$449	$434	$381
Cost Effective	YES			YES

Notes: Values for alternatives are differences between "Without" plan and "With" plan on an average annual basis. Alternatives are arranged by increasing costs.

Table 3-8 - Results of Incremental Cost Analysis

	Average Annual Cost	Average Annual Habitat Units	Cost Per AAHU	Incremental Average Annual Cost Increase	Incremental AAHU Increase	Incremental AAC/AAHU
Alt 1	$92,500,000	245,748	$376	$92,500,000	245,748	$376
Alt 4	$106,800,000	280,093	$381	$14,300,000	34,345	$416

3.3 Consistency with Restudy Purpose

The plan formulation process for the Central Everglades Planning Project used a Project Delivery Team (PDT) consisting of those individuals designated by the USACE and the SFWMD, the implementing agencies, and representatives designated by other governmental agencies. Interagency participation is encouraged to take advantage of technical skills and knowledge of other agencies. Several federal, tribal, and state agencies are active members of the PDT.

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 re-directing 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 purpose of the CEPP is consistent with CERP to improve the quantity, quality, timing and distribution of water flows to the Northern Estuaries, central Everglades (Water Conservation Area 3 [WCA 3] and Everglades National Park [ENP]), and Florida Bay while increasing water supply for municipal, industrial and agricultural users. 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 already degraded state of the Everglades will continue to worsen in the absence of increased water deliveries, improved water timing and restored distribution. Redirecting a portion of the approximately 1.7 billion gallons of water per day on average that is discharged to the Atlantic Ocean and the Gulf of Mexico is essential to meeting the quantity, quality, timing and distribution of water required to realize a portion of the benefits envisioned in CERP.

Since CERP, twelve years of updated science, new information, improved hydrologic modeling tools and varying water treatment assumptions have led to the differences in CERP components and the CEPP recommended plan. There are six CERP (Yellowbook) components which have features or increments included within the components in the CEPP recommended plan: (1) Everglades Agricultural Area Reservoirs; (2) Flow to Northwest and Central WCA 3A; (3) WCA 3 Decompartmentalization and Sheetflow Enhancement; (4) S-356 Pump Station Modifications; (5) L-31 Levee Seepage Management; and (6) System-wide Operational Changes-Everglades Rain Driven Operations. These six CERP components were built upon (additional components of CERP added) as CEPP progressed through the scoping period. Some of the components considered during scoping and detailed analysis were not retained in the recommended plan. A comparison of the CERP/CEPP feature functions, elements and costs was completed for inclusion in the CEPP PIR and can be found in Section 6 of the Final PIR.

3.4 Implementation of Project Components

Implementation of CEPP will occur over many years and include many actions by USACE and SFWMD. This subsection discusses the major implementation phases that are expected to occur after Congressional authorization and appropriation of funding for project construction. Multiple Project Partnership Agreements (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, agreed upon by the USACE and SFWMD, that maximize benefits to the extent practicable consistent with project dependencies (**Table 3-9**) and the Adaptive Management and Monitoring Plans (see **Annex D** of CEPP PIR).

A multiple PPA approach incorporates the adaptive management process, per the guidance of the Programmatic Regulations for the Comprehensive Everglades Restoration Plan (2003) and the Water Resources Development Act 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 that meets state water quality standards, while providing assurances of sound financial investments.

Upon identification of a recommended plan for CEPP, the next step is to consider how CEPP features will be implemented (sequencing scenarios) when considering internal and external project dependencies. Development of sequencing for CEPP features considers that a number of CERP and non-CERP projects (**Table 3-9**) must be in place before implementing most CEPP features to avoid unintended consequences. Additionally, several basic principles considered in development of an implementation plan for CEPP features include the following:

1. All features of the state's Restoration Strategies must be completed and meet state water quality standards prior to initiating construction of most CEPP project features.
2. Construction of CEPP features cannot proceed until it is determined that construction and operation of the feature:
    a. Will not cause or contribute to a violation of state water quality standards; and
    b. Will not cause or contribute to a violation of any applicable water quality permit discharge limits or specific permit conditions; and

c. Reasonable assurances exist that demonstrate adverse impacts on flora and fauna in the area influenced by the Project features will not occur.

3. Appendix A water quality compliance must be addressed for new project water entering ENP.

4. The operation of State facilities is required to ensure that new water made available by CEPP meets water quality standards and to ensure achievement of CEPP project benefits. If after construction and operation of CEPP project features State water quality standards are not being met, the Federal and State partners agree per paragraph 8.3 of Section 8 of this PIR/EIS to meet to determine the most appropriate course of action in accordance with existing law and policy. In such an event, an evaluation of CEPP benefits, including the possibility of reduced benefits, will be included in the assessment of any suggested resolution. It is recognized that the operation of the State facilities has a primary permitted purpose of achieving water quality compliance for existing flows.

5. Sequencing takes into account the earliest opportunity to realize benefits, including the features that can provide benefits that utilize existing water meeting state water quality standards.

6. Additional outlet capacity from the south end of WCA 3A must be provided before new project water from Lake Okeechobee is released into WCA 2A and WCA 3A.

7. The sources of material needed for Miami Canal backfilling and the Blue Shanty Levee were considered to minimize costs associated with double handling and stockpiling of materials.

8. Where possible sequencing should include steps and timing to test concepts, as described in the CEPP Adaptive Management Plan.

9. Recreation features will be constructed in conjunction with corresponding CEPP project plan features.

Specific project features cannot be constructed until other CERP and non-CERP projects are constructed and operational. **Table 3-9** provides a complete list of which CEPP features are dependent on other projects and their operation in order to operate CEPP and obtain the full benefits envisioned.

In addition to the project feature dependency considerations listed in **Table 3-9**, other factors influencing implementation include funding availability, maintaining cost-share balance between the federal and non-federal sponsor, and the integration of projects that are to be constructed by other agencies. The USACE and SFWMD will undertake integration of the CEPP recommended plan and the other CERP projects awaiting authorization into the CERP programs' Integrated Delivery Schedule (IDS), which contains the Master Implementation Sequencing Plan (MISP), through a robust public process.

Project features were grouped into three separate PPAs based upon the spatial distribution of the recommended plan features and the locations within the CEPP study area where separable hydrologic and environmental benefits would accrue (**Table 3-10**). These groupings include a PPA of project features in northern WCA 3A (PPA North), a PPA of project features in southern

WCA 3A, 3B and ENP (PPA South), and a final PPA that provides the new water and required seepage management that benefits the entirety of the study area (PPA New Water).

Table 3-9 - Project Dependencies

Project	CEPP Feature Dependencies
A-1 FEB State Restoration Strategies	Required prior to implementation of northern WCA 3A distribution features (L-4 degrade, new pump station, S-8 Modifications, L-5 and L-6 improvements, Miami Canal Backfilling) to ensure adequate water quality treatment of inflows
8.5 Square Mile Area (SMA) and Existing S-356	Construction of the C-358 seepage collector canal and structure S-357N within the 8.5 SMA must be completed to allow full utilization of the 8.5 SMA features to provide seepage mitigation for increasing flows into Northeast Shark River Slough; operation of the existing S-356 pump station (500 cfs) is required prior to significantly increasing flows to Northeast SRS, to provide seepage management
C-111 South Dade	Extension of the detention area levees to connect with 8.5 SMA required prior to significantly increasing flows to Northeast SRS to enable operation of S-357 pump station to provide seepage management to 8.5 SMA
MWD 1-Mile Bridge & Road Raising	The MWD project will be complete and operational prior to implementation of WCA 3B inflow structures along the L-67A&C levees or increasing flows through existing S-333 to Northeast SRS to ensure adequate road protection to allow for increased stages in L-29 canal
BCWPA C-11 Impoundment	Required prior to increasing flow through S-333 or implementation of WCA 3B inflow structures along the L-67A&C levees to ensure adequate water quality of inflows to WCA 3B and Northeast SRS
Tamiami Trail Next Steps Bridging and Road Raising	Required prior to increasing capacities of S-333 and S-356 and implementation of WCA 3B inflow structures along the L-67A levee, gaps in L-67C levee and Blue Shanty flow-way (L-67C removal, L-29 levee removal)
C-44 Reservoir (IRL-S) and connection to C-23 Canal	Required prior to re-directing the maximum amount of water from Lake Okeechobee south to the FEB to meet environmental performance, to avoid reduction in low flows to the St. Lucie Estuary and low Lake Okeechobee water levels that affect the LOSA.
Modification of the Lake Okeechobee Regulation Schedule	Anticipated prior to full utilization of the A-2 FEB in order to achieve the complete ecological benefits envisioned through re-directing the full 210 kAF/yr south and to avoid low lake levels that would affect the LOSA

Table 3-10 - Project Features by PPA.

PPA North	
Project Features	**Construction Contract**
L-6 Diversion	Contract 1
S-8 Pump Modifications	Contract 1
L-4 Levee Degrade and Pump Station	Contract 1
L-5 Canal Improvements	Contract 2
Miami Canal Backfill	Contract 2
PPA South	
Project Features	**Construction Contract**
L-67 A Structure North	Contract 3
One L-67 C Gap (6,000 ft)	Contract 3
Increase S-356 to 1,000 cfs	Contract 4
Increase S-333	Contract 4a
L-29 Gated Spillway	Contract 4b
L-67 A Structures 2 and 3 South	Contract 5
L-67 A Spoil Mound Removal	Contracts 3 & 5
Remove L-67 C Levee Segment	Contract 6
Remove L-67 Extension Levee (No Backfill)	Contract 6
8.5 Mile Blue Shanty Levee	Contract 6
Remove L-29 Levee Segment	Contract 7
Backfill L-67 Canal Extension	Contract 7
Remove Old Tamiami Trail*	Contract X*
PPA New Water	
Project Features	**Construction Contract**
Seepage Barrier L-31 N	Contract 8
A-2 FEB	Contract 9

*Contract X - Old Tamiami Trail can be completed at any time during implementation, but must precede backfilling of L-67 Extension Canal.

A phased benefits analysis was done (see section 6.7.1.3 of PIR) to help demonstrate that PPA North and PPA South can be executed regardless of the status of the other two PPAs. While not providing full benefits to the region, each would provide a reasonable level of benefits commensurate with its cost, as demonstrated during the screening of options that made up the complete alternatives. PPA New Water is not cost effective as an independent separable element, and additional outlet capacity from WCA 3A (a PPA South component) must be provided before new project water from Lake Okeechobee is released into the system. As a construction element following construction of PPA North and PPA South, PPA New Water is a cost effective element.

Two potential implementation sequencing scenarios are possible with the three PPAs identified:

- **Scenario 1** – PPA North --> PPA South --> PPA New Water
- **Scenario 2** – PPA South --> PPA North --> PPA New Water

Additional information in **Table G-39** of **Appendix G of the PIR** shows four sets of cost and benefit information, one for each of the proposed three PPAs as stand-alone elements, and one with the costs and benefits gained from implementation of PPA New Water subsequent to the completion of features included in PPA North and PPA South. The information should not be used to justify the exclusion of individual PPAs from the recommended plan, since only regional benefits will be realized if the connectivity and timing of water deliveries through the system is not restored. A cost effective comparison between PPAs is inappropriate due to aforementioned project dependencies and the difference in ecosystem regions. Instead, each PPA is justified on the significance of the resource being restored, and the cost effectiveness of the features within an individual PPA has been conducted to ensure that features within PPAs are cost effective regardless of the status of the other PPAs.

Additional information in **Table G-39** of **Appendix G of the PIR** presents multiple estimates of performance associated with implementation of each PPA. Performance expectations for each PPA are described consistent with each of the Conceptual Ecological Models (Northern Estuaries, Greater Everglades Ridge and Slough, and Florida Bay) for the CEPP study area by stressors, ecological effects, and attributes. Project zones (See **Appendix G of the PIR**) and associated acreages estimated to benefit from implementation of each PPA were identified. Acreages shown do not reflect the magnitude or degree to which each acre is improved. The entire acreage associated with each project zone was assumed to benefit since detailed modeling for each PPA was not conducted. Features of the recommended plan identified in each PPA were not separately modeled using the RSM-GL and RSM-BN regional models; as such, a quantification of Habitat Units with the CEPP Planning Model was also not performed for individual PPAs. Modeling of each PPA would require development of an optimized operations plan to meet project constraints while providing benefits.

4 Determination of Project Consistency with Applicable Laws and Regulations

4.1 Pre-Application Conferences

In accordance with Section 373.1501(5)(c), F.S., a pre-application conference was held on September 5, 2013, at the SFWMD B-1 2-B Bridge Conference Room in West Palm Beach, Florida and via webinar. Representatives from the following agencies attended the conference:

- SFWMD
- FDEP
- USACE
- Miami-Dade County
- Broward County
- FDACS
- SHPO
- FDOT
- FWC
- USEPA

The meeting summary can be found at the end of this report. Information gained at the pre-application conference was considered by the SFWMD in preparing the Final PIR/EIS.

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 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 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 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 would reduce the availability of water to existing legal users or reduce the level of service for flood protection.

Following identification of the recommended plan in June 2013, the CEPP base condition assumptions established for plan formulation were subsequently revisited and updated to represent the most current information for the analysis of 373.1501, 373.470 and WRDA 2000 requirements. Specifically, the Existing Condition Baseline (ECB) was updated to 2012EC and the future without project baseline (FWO) was updated utilizing new information for the Initial Operating Regime Baseline (IORBL1). In **Annex B of the Final PIR**, the potential effects of CEPP are analyzed through comparison of the with project condition (Alt 4R2) to the without project condition (IORBL1). This comparison segregates the effects of the intervening non-CERP and intervening CERP projects.

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, less than 1 percent

of the LOSA demands will be met by backflowing water from the C-44 Reservoir to Lake Okeechobee upon completion of the project. Therefore, all existing legal users will continue to have their needs met during implementation and once the project is operation.

Some of the water utilized by agricultural users in the LOSA from Lake Okeechobee will be transferred to WCA 3 and further south as a result of the implementation of the recommended plan. This transfer is anticipated to occur after the modification of the Lake Okeechobee Regulation Schedule that will allow full utilization of the A-2 FEB. The recommended plan has identified an additional source of water of comparable quantity and quality that will be available to replace the water sent south. Instead of discharging all water stored in the reservoir to tide via the S-80 or to meet C-44 Basin agricultural water supply demands, as assumed in the future without project IORBL1 baseline condition operations, the recommended plan retains a portion of the water stored in the CERP IRL-S C-44 Reservoir/STA in the regional system for backflow to Lake Okeechobee via the C-44 Canal and raises the Lake Okeechobee stage criteria to allow increased C-44 Canal backflow. This added operation does not affect existing permitted allocations within the C-44 Basin. The additional C-44 Canal backflow operations to Lake Okeechobee included in the CEPP recommended plan 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. The operations do not benefit agricultural users in the C-23 Basin. The CEPP recommended plan backflow operations capture a portion of releases from the C-44 Reservoir/STA that would otherwise be directed to the Saint Lucie Estuary as excess water.

Specifically, the future without project condition (IORBL1) allows backflow to Lake Okeechobee from the C-44 Canal when S-308 (the Lake Okeechobee discharge structure to the C-44 Canal) is not open for regulatory discharges and when the stage in Lake Okeechobee is 0.25 feet below the base of the 2008 LORS low sub-band (within the baseflow sub-band), which varies between 13.0 and 14.5 feet NGVD seasonally. This operational assumption is consistent with the existing operational protocols of Lake Okeechobee (2008 LORS) and the SFWMD Lake Okeechobee Water Shortage Management (LOWSM) operations. Discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are otherwise limited to environmental deliveries for the St. Lucie Estuary and C-44 Basin agricultural water supply demands during these backflow operations.

The CEPP recommended plan operations expand on the IORBL1 backflow to Lake Okeechobee through the following operational changes: (1) backflow to Lake Okeechobee from the C-44 Canal is allowed when S-308 is not open for regulatory discharge and the stage in Lake Okeechobee is below 14.5 feet NGVD (no seasonal variability); and (2) discharges from the IRL-S project C-44 Reservoir to the C-44 Canal are made when the stage in Lake Okeechobee is below the baseflow zone of the 2008 LORS schedule (the bottom of this zone varies seasonally between 12.6 and 13.0 feet NGVD) to provide an additional source of backflow water to Lake Okeechobee. Water captured in the C-44 Reservoir/STA, includes excess water conveyed from the C-23 Canal and Basin (approximately 6 kAF on an average annual basis) that is not needed to meet the IRL-S North Fork water reservation target. The recommended plan operational changes result in an average annual increase in C-44 Canal backflow volume to Lake Okeechobee of 57.3 kAF (97.3 kAF in the recommended plan, compared to 40.0 kAF in the

IORBL1) and an average annual increase in C-44 Reservoir discharges to the C-44 Canal of 21.3 kAF (37.6 kAF in the recommended plan, compared to 16.3 kAF in the IORBL1).

The transfer of water from Lake Okeechobee to WCA 3 would not be implemented until the CERP C-44 Reservoir/STA, the canal connecting the C-44 Reservoir to both the C-23 Basin and the C-23 Canal, and the CEPP FEB on the EAA A-2 site are operational. If the canal to the C-23 Basin and the C-23 Canal is not operational when the CEPP FEB on the EAA A-2 site is ready to store water, the operations, and ultimately the delivery of water from Lake Okeechobee to the CEPP FEB, may need to be modified to avoid elimination of this portion of the source of water for the LOSA. The water retained in Lake Okeechobee also maintains the level of service for water supply for existing legal users dependent on Lake Okeechobee and its connected conveyance system. Specifically, this includes the agricultural users in the LOSA and the Seminole Tribe of Florida.

Sources of water to meet agricultural and urban demand 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. Sources of water for the Seminole Tribe of Florida and Miccosukee Tribe of Indians of Florida are also influenced by the regional water management system (C&SF Project, including Lake Okeechobee); however, these sources will not be affected by the CEPP project. In addition, water supplies to ENP with implementation of the recommended plan exceed future without project and existing condition baseline volumes. Water sources for fish and wildlife located in the Northern Estuaries, WCA 2, WCA 3, Biscayne Bay, and Florida Bay will not be diminished. Therefore, there will be no elimination or transfer as a result of the recommended plan on existing legal sources of water supply.

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 recommended plan 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

The CEPP Adaptive Management (AM) and Monitoring Plans (**Annex D of final PIR**) identifies the monitoring information needed to inform CEPP implementation and to document restoration progress to agencies, the public, and Congress. The overall objective of the AM and

Monitoring Plan is to focus resources on refinement of CEPP to fine-tune performance due to inevitable uncertainties, based on existing knowledge and knowledge that will be gained through monitoring and assessment.

The CEPP AM and Monitoring Plans contain descriptions of monitoring that should address specific uncertainties identified during CEPP planning, required parameters such as water quality and water levels, and ecological features that track CEPP's progress toward success. The monitoring data will indicate CEPP's progress toward the objectives of CEPP, and CEPP's conformance to applicable legal requirements. The monitoring descriptions are found in detail in the CEPP PIR **Annex D Part 1 Sections D.1.3 – D.1.4** (pages 13 – 91) and in **Annex D Parts 2, 3, 4**. For each region of south Florida in the CEPP study area, the monitoring parameters, their value to CEPP, 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** through **D.1.9**. Monitoring durations, which are specified in Annex D, 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 phases of CEPP construction. See CEPP PIR **Annex D Part 1 Section 1.5**, "Implementation of CEPP Adaptive Management" for a description of the rolling implementation of the monitoring and the feedback that the data will provide to inform management decisions. The implementation is summarized in **Annex D Part 1 Section D.1.5**, in **Figures D.1.11** through **D.1.17**, and in **Tables D.1.10** through **D.1.15**.

In addition to the AM Plan, **Annex D** or the CEPP PIR contains the Water Quality Monitoring Plan (Part 2), Hydrometeorological Monitoring Plan (Part 3), and the Ecological Monitoring Plan (Part 4). These include regulatory monitoring associated with water quality and the USFWS Programmatic Biological Opinion, as well as hydrometeorological monitoring to inform system operations, and ecological success monitoring directly related to project objectives. The CEPP AM Plan and Monitoring Plans have been designed to inform each other as much as possible and the Plans will support achievement of CERP and CEPP goals and objectives and remain within constraints by providing the data necessary to detect changes expected due to CEPP.

The methods, locations, timing, and funding requirements for conducting adaptive management and monitoring are also included in **Annex D**. The CEPP monitoring plan was designed to provide the monitoring required addressing CEPP-specific needs while being integrated with other Everglades monitoring to take advantage of existing monitoring efforts, knowledge, and information. The CEPP Adaptive Management and Monitoring Plan leverage several existing programs to avoid redundancies and insure cost-effectiveness. Since CEPP relies on existing physical instrumentation, stations, locations, servicing, and analysis efforts funded by RECOVER, CERP sponsors, and partner agencies, the monitoring requirements described in the CEPP plan are limited to the additional increase in monitoring resources and analysis efforts needed to address CEPP-specific questions.

The CEPP monitoring plan assumes these other monitoring efforts will continue into the future at least for the period required by CEPP.

5.4 Phased Implementation

It is recognized that prior to implementation of each phase, additional detailed information pertaining to that phase of implementation will be developed. In recognition of this, the SFWMD agrees to provide additional information gained through detailed project planning and work collaboratively with the Florida Department of Agriculture and Consumer Services (FDACS) and the FDEP to resolve any outstanding issue(s) prior to the implementation of each phase. Subsequent to this coordination, FDEP will consider input from both SFWMD and FDACS when determining consistency with state law. If additional information is necessary to determine that reasonable assurances exist with regard to the maintenance of existing flood protection and water supply, this information will be provided to FDEP prior to the execution of a project partnership agreement.

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

During the planning process for the CEPP, there have been extensive coordination efforts with utilities and other entities responsible for public infrastructure in the CEPP project area in order to avoid and minimize impact to utilities and roads in the project area.

The expedited planning process for the CEPP study required extensive coordination with the public and federal, Tribal, state, and local resource management and regulatory agencies. An interagency project team was formed and met regularly throughout the study, providing federal, tribal, state, and local agencies opportunities to comment on planning assumptions, evaluation tools and methods, and alternative plans. The South Florida Ecosystem Task Force's Working Group sponsored 18 public workshops throughout the study (November 2011 through February 2013) providing opportunities for the public to provide input to the Task Force, which in turn informed the study team. Formal consultation with the Task Force also occurred throughout the study, including presentations of the final array of alternatives (December 2012) and the recommended plan (July 2013). The SFWMD's Governing Board and Water Resources Advisory Commission also met monthly throughout the study, providing opportunities for information to be provided to elected and appointed officials and the public. The CEPP study project team also hosted public meetings (November-December 2012) summarizing alternative plans and effects.

Annex D (Real Estate) of the Final PIR describes the utilities that are included within the CEPP project footprint as well as some of the actions that may need to be taken to implement the project. Some of the utilities affected include Florida Power and Light (FPL) and Quest Communications both of whom have transmission, power, or communication lines along Old Tamiami Trail.

In addition, the SFWMD closely coordinated with the Florida Department of Transportation (FDOT) during the project formulation and planning processes to ensure that changes made to the Miami Canal would not affect FDOT roadways, in particular, I-75. Due to the large project area and its proximity to the urban boundary, coordination with water utilities has been extensive. As part of the Project Delivery Team (PDT), Miami-Dade, Broward, and Palm Beach Counties have been active participants in the planning process and have ensured that the needs of local municipalities, flood control and water supply will be met in this 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 Palm Beach, Broward, and Miami-Dade counties 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 complete a Project Implementation Report that identifies 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 recommended plan provides a significant increase in the quantity of fresh water (approximately 210 kAF/yr, annual average) flowing into the Everglades. This additional freshwater flow to the Central Everglades is essential to Everglades Restoration. In the pre-drainage system, the inundation pattern supported an expansive system of freshwater marshes including longer hydroperiods sawgrass “ridges” interspersed with open-water “sloughs”, higher elevation marl prairies on either side of Shark River Slough, and forested wetlands in the Big Cypress Marsh. The original C&SF Project has compartmentalized and fragmented the Everglades landscape, reduced flows through the sloughs, and altered hydroperiod and depths. The result has been substantially altered plant community structures, reduced abundance and diversity of animals, and spread of nuisance and exotic vegetation. The recommended plan would provide for resumption of sheetflow and related patterns of hydroperiods and water depth that would significantly help to restore and sustain the microtopography, directionality, and spatial extent of ridges and sloughs, and improve the health of tree islands within the landscape. Additional water flowing into the Everglades would also result in beneficial shifts in habitat for desired wildlife species.

Implementation of the recommended plan features and additional flow would provide greater project benefits to those areas located in northern WCA 3A and ENP. **Figure 7-1** and **Figure 7-2** depict the differences in hydroperiods and stage between the TSP and the FWO project condition in WCA 3 and ENP as modeled by the Regional Simulation Model for the Glades and Lower East Coast Service Areas (RSM-GL) (version 2.3.2). The years 1989 and 1995 are depicted which are representative of a dry and wet year in the 41 year period of simulation (1965-2005). However, quantifying flows distributed spatially, and temporally can be difficult especially for a project covering most of south Florida.

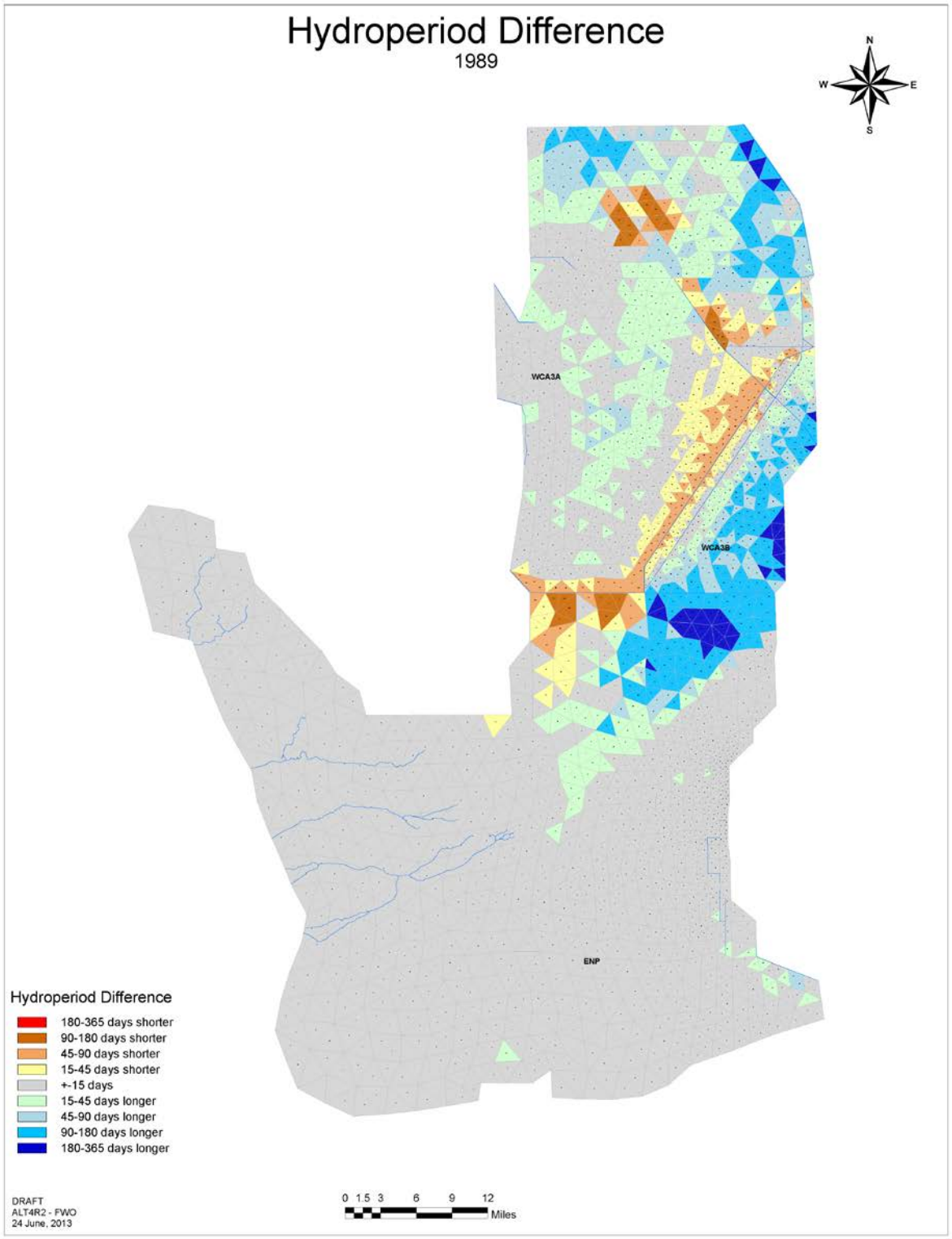

Figure 7-1 - Differences in Hydroperiod Distribution within WCA 3 and ENP between the FWO Project Condition and the TSP for a Representative Dry (1989) Year in the Period of Record (1965-2005)

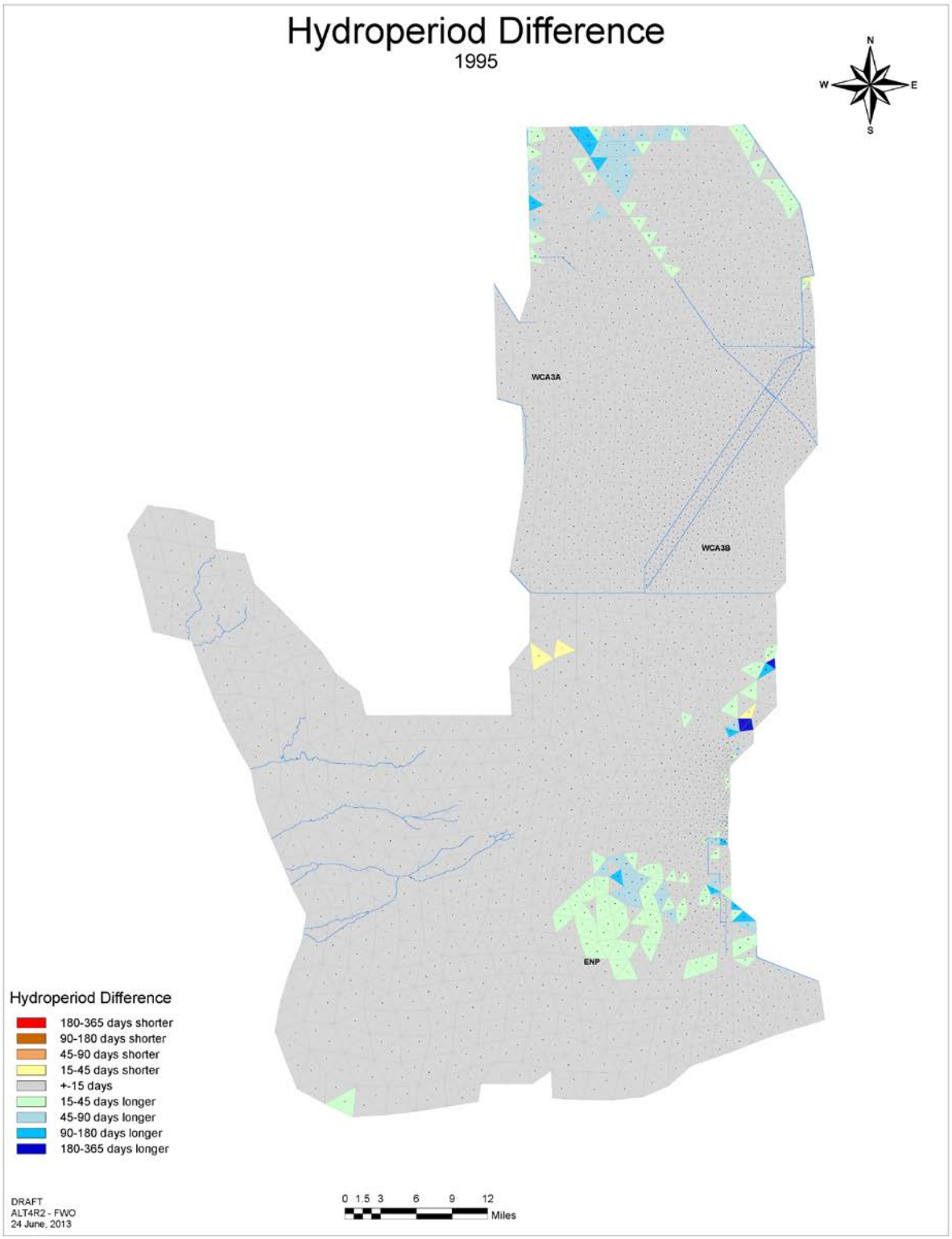

Figure 7-2 - Differences in Hydroperiod Distribution within WCA 3 and ENP between the FWO Project Condition and the TSP for a Representative Wet (1995) Year in the Period of Record (1965-2005)

Habitat unit benefits calculated during plan formulation (see **Table 3-3**) provide a means to follow the water reaching the natural system. Like the habitat units, three spatial locations were selected: the inflows to WCA 3 (along the Redline), inflows to ENP (Blueline), and overland flows to Florida Bay. Although habitat units were calculated for the Northern Estuaries, they are based on retaining water in Lake Okeechobee and sending it south to WCA 3A and ENP. Therefore, no quantification of water reaching the Northern Estuaries is needed neither is its protection.

The total water made available by CEPP is represented by the with project condition, Alt4R2. The future water in the system, including the other CERP projects assumed in place prior to CEPP implementation, is represented by the IORBL1 model simulation. The difference between these two conditions represents the water made available by the project (Alt4R2 minus IORBL1).

Surface water inflows along the Redline transect to WCA 3A correspond to the sum of structure inflows from the S-8 pump station to the Miami Canal within WCA 3A, the S-150 gated culvert, and STA-5/STA-6 outflows to northwest WCA 3A for the IORBL1 base condition; for Alternative 4R2, 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/STA-6 outflows to WCA 3A. Inflows to ENP are quantified for the S-12s (A-D), S-333, the S-355s (A&B), S-345 (F&G; Alternative 4R2 only) and S-356 (Alternative 4R2 only). Overland flows to Florida Bay are quantified for RSM-GL as combined Transect 23 (southeast ENP; transects 23-A, 23-B, and 23-C) and Transect 27 (Central Shark River Slough). **Figure 7-3** shows the locations of each transect studied.

The water made available by the project to WCA3, ENP and Florida Bay is displayed as a volume probability curve in **Figure 7-4**. Compared to the without project condition, with project condition inflows to WCA 3 are higher during all 40 water years as analyzed with the CEPP hydrologic modeling. Similarly, project condition inflows to ENP and Florida Bay are higher than or equivalent to the future without project inflows in 36 and 37 years of the 40 water years analyzed. The total accumulated volume of with project condition inflows to WCA3, ENP and Florida Bay provides a significant net increase in inflow volumes to these locations when compared to the future without project condition.

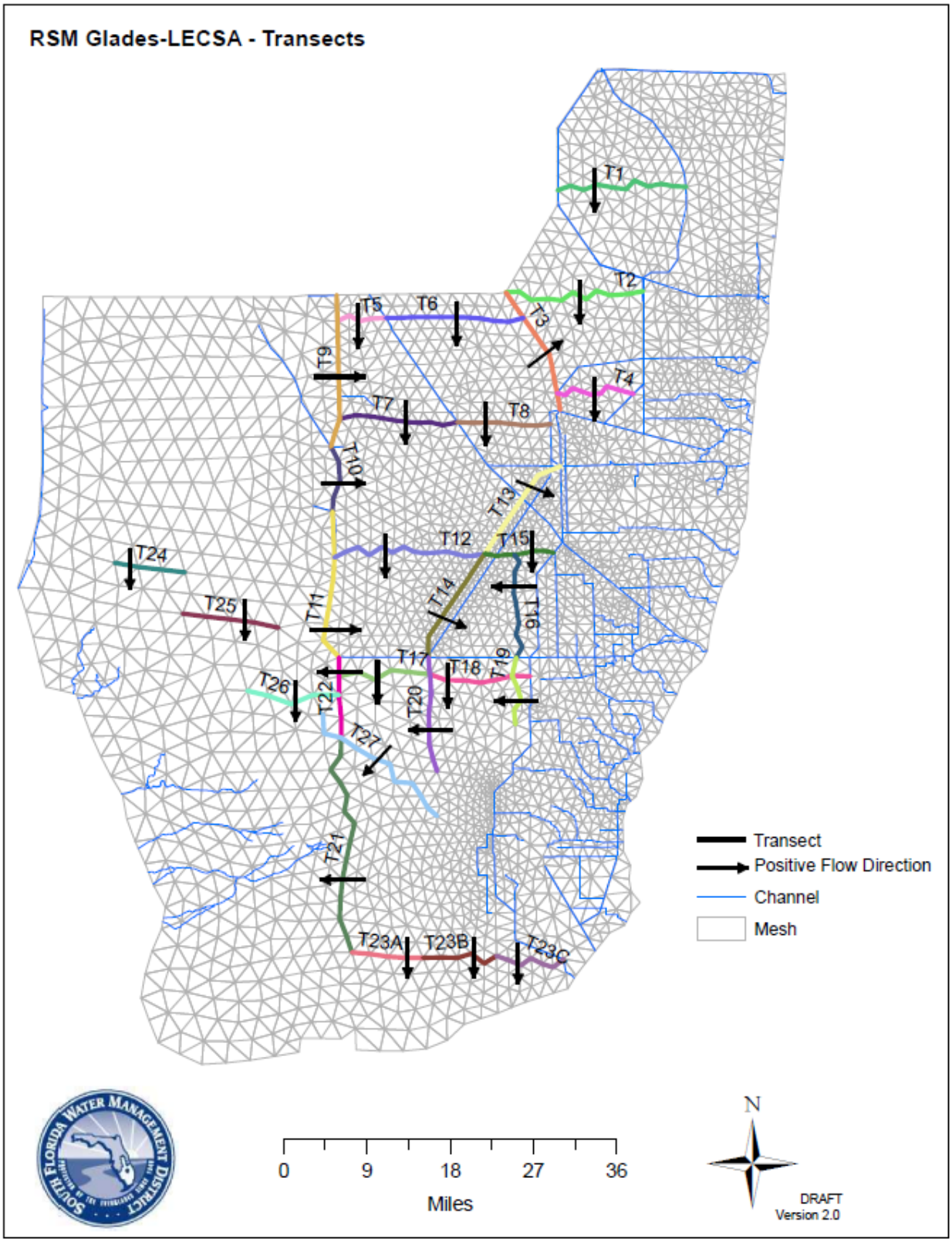

Figure 7-3 - RSM Glades-LECSA Transect Locations

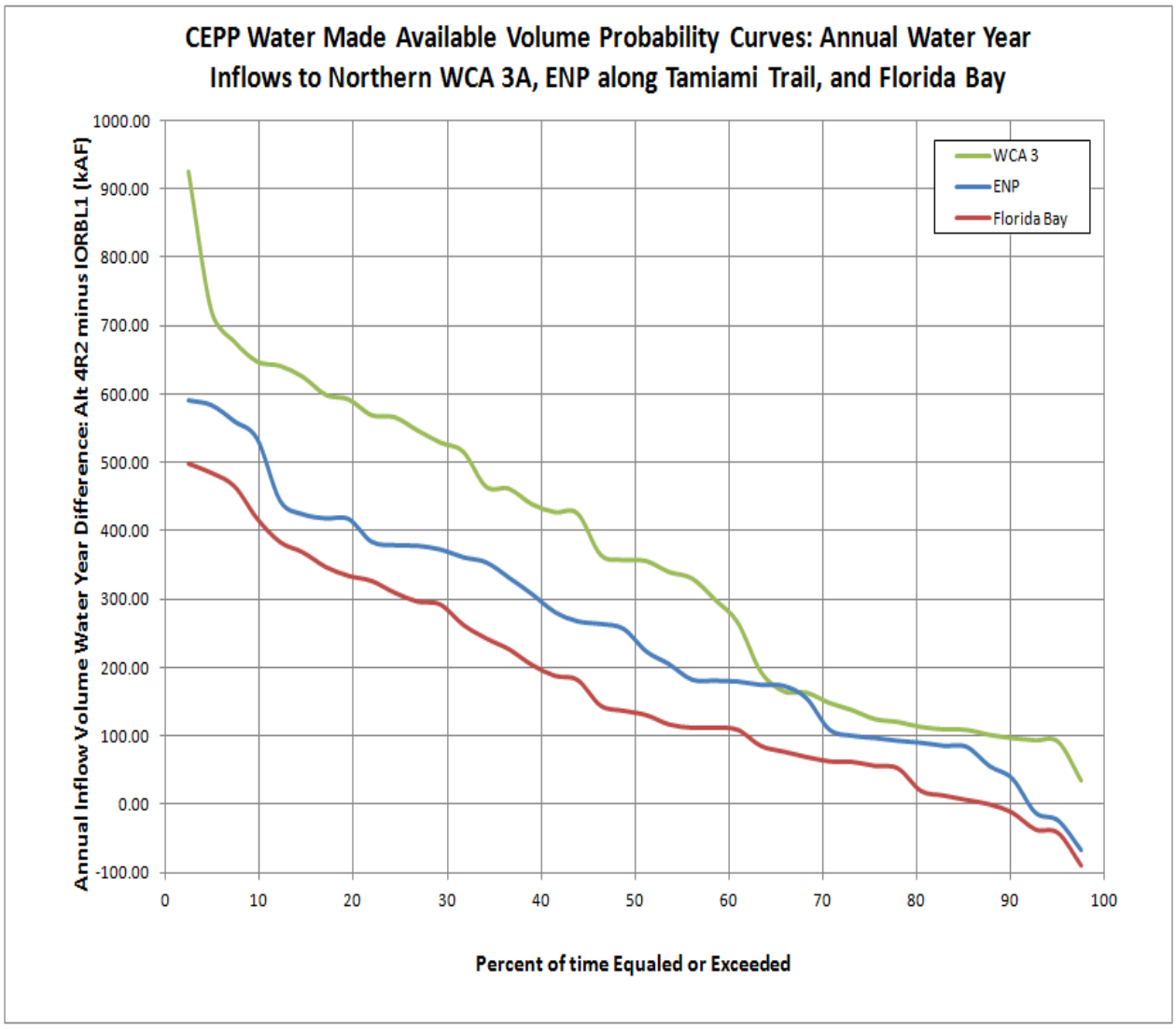

Figure 7-4 - CEPP Water Made Available Volume Probability Curves: Annual Water Year Inflows to Northern WCA 3A, ENP along Tamiami Trail, and Florida Bay.

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 implementation, is represented by the IORBL1 model simulation, the total water available (Alt 4R2), and the water made available by CEPP (differences between Alt 4R2 and IORBL1) for the natural system can be found in **Tables 7-1**, **7-2** and **7-3**.

Table 7-1. Pre-Project Volume of Water (kAF/yr) Available for the Natural System

Pre-project Water Available for the Natural System (IORBL1)			
Location	***Water Available equaled or exceeded 10% of Water Years (kAF)***	***Water Available equaled or exceeded 50% of Water Years (kAF)***	***Water Available equaled or exceeded 90% of Water Years (kAF)***
WCA 3	839	513	286
ENP	1,771	732	212
Florida Bay	1,969	704	218

Table 7-2. Total Volume of Water (kAF/yr) Available for the Natural System

Total Water Available for the Natural System (Alt 4R2)			
Location	***Water Available equaled or exceeded 10% of Water Years (kAF)***	***Water Available equaled or exceeded 50% of Water Years (kAF)***	***Water Available equaled or exceeded 90% of Water Years (kAF)***
WCA3	1,404	846	420
ENP	2,187	850	419
Florida Bay	2,113	729	287

Table 7-3. Water Made Available by the Project (kAF/yr) for the Natural System

Water Made Available by the Project (difference between Alt 4R2 and IORBL1)			
Location	**Water Made Available equaled or exceeded 10% of Water Years (kAF)**	**Water Made Available equaled or exceeded 50% of Water Years (kAF)**	**Water Made Available equaled or exceeded 90% of Water Years (kAF)**
WCA3	647	357	97
ENP	534	256	37
Florida Bay	418	137	-13

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. 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 will continue to rely upon its existing restricted allocation area rules to protect the water made available by the CEPP project features as required by Section 373.470, F.S. Protection of water made available by CEPP project features is required in order for the SFWMD and the Department of the Army to enter into one or more Project Partnership Agreements to construct the CEPP project features. The combination of protecting the existing water and protecting the water made available by the CEPP project features is required for the CEPP to achieve its intended benefits.

7.3 Identifying Water Made Available for Other Water Related Needs

The CEPP components do not directly provide water to meet water supply demands in LOSA, LECSA 2, or LECSA 3. By virtue of additional water being stored in Lake Okeechobee, additional water may reach water users located in LOSA; however, the level of service for LOSA water supply has not improved, nor has it been degraded.

For LECSA, additional water has been made available by the project in the regional system and has been quantified for LECSA 2 and LECSA 3. An increased demand of 12 million gallons per day (MGD) in LECSA 2 and 5 MGD in LECSA 3 was included in Alt 4R2 above the demands in the future baseline (IORBL1); the public water supply demands assumed for the IORBL1 are also equivalent to the demands assumed for the ECB and 2012EC existing condition baselines (on average, 277 MGD in LECSA 2 and 412 MGD in LECSA 3). This increase in demand for other water related needs could be met without affecting the benefits accrued in the natural system.

Additional water available for allocation to consumptive use permit applicants is expected to be generated by this project in LECSA 2 and LECSA 3. The specific locations, volumes, and/or timing of where this water will be available for withdrawal will be developed when the following, project-related conditions are met: (1) completion of all CEPP project features and

(2) upon a formal determination by the SFWMD Governing Board that these project features are operational consistent with requirements of the CEPP PPA. Water will be allocated in accordance with the requirements of the SFWMD's consumptive use permitting rules in effect at that time.

7.4 Incremental Analysis during Plan Implementation

CEPP is composed of features that can be grouped into implementation phases. The USACE and the SFWMD will undertake updated analyses required by Paragraph 373.470(3)(c), F.S. 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.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Central Everglades Planning Project
1501 Pre-Application Meeting

Meeting Summary/Minutes

SFWMD Headquarters
Thursday, September 5, 2013
Time: 10:00 to 12:00 pm

Attendees:

SFWMD	Matt Morrison, Megan Jacoby, Laura Reilly, Brenda Mills, Beth Lewis, John Morgan, Tom Teets
FDEP	Stacey Feken, Inger Hansen, Jerilyn Ashworth, Ernie Marks, Paul Julian, Frank Powell, Ann Lazar, Kristine Morris, Rhapsodie Osborne, Deinna Nicholson
USACE	Kim Taplin, Dan Crawford, Murika Davis, Melissa Nasuti, Gretchen Ehlinger, Leah Oberlin, Donna George
Miami-Dade County	Susan Markley
Broward County	Michael Zygnerski
FWC	Barron Moody
FDACS	Ray Scott, Rebecca Elliot
SHPO	Timothy Parsons
FDOT	Ann Broadwell
USEPA	Eric Hughes

A pre-application meeting was held for the Central Everglades Planning Project, in accordance with Florida Statutes 373.1501 (5)(c)(a), at SFWMD Headquarters in West Palm Beach on September 5, 2013.

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

I. Introductions

Matt Morrison, the Project Manager, welcomed attendees to the meeting. Attendees introduced themselves and noted which agency they were representing.

II. Project Compliance with Florida Statute 373.1501

Mr. Morrison reviewed the purpose for the meeting stating that the District is required, as the local sponsor, to evaluate whether the Central Everglades Planning Project (CEPP) has considered all state water resource issues and is technically feasible and cost effective. Mr. Morrison explained that the legislature had established DEP oversight to ensure that SFWMD conducted the required evaluations for CERP projects. In addition, Mr. Morrison noted that this meeting was vital so the SFWMD could obtain necessary and relevant information to determine consistency with laws and to determine if the project could be permitted and operated as proposed.

Mr. Morrison explained that there were several evaluations done to fulfill the requirements of the 373.1501 State Compliance Report:

a. Water Resource Issues including water supply, water quality, flood protection and threatened and endangered species.
b. Project Feasibility to determine in CEPP features are cost effective, consistent with CERP and can be operated as part of the C&SF system.
c. Consistency with state and federal laws
d. Project Assurances to determine that there are no adverse impacts on existing legal users, no diminishment of existing levels of flood protection and that adaptation of water management practices meet restored natural environment.
e. Coordination between Utilities and Public Infrastructure entities has taken place, thus reducing impacts to relocation of public infrastructure and utilities.

As it was noted in the pre-application meeting invitation, Mr. Moody asked if agencies were required to send a letter of support. SFWMD responded that it was not required to send such a letter, but if an agency felt it appropriate, they could send one to SFWMD. During this conversation, Ms. Feken clarified that the review of and comments on the 1501 Compliance Report was strictly between the FDEP and SFWMD.

III. Project Overview

Mr. Morrison discussed historical versus current flow in the Everglades system, noting that CEPP captured several components of the larger Comprehensive Everglades Restoration Project (CERP), which targets

restoration of flow in the system. Mr. Morrison explained that CEPP was an expedited pilot project with the Corps and as such, a very robust public process was included in this project.

Mr. Morrison stated that the goal of the CEPP was to improve the quality, quantity, timing and distribution of water to the natural system as well as enhance ecological values and social well-being. Mr. Morrison discussed the performance measures used in Plan Formulation and also reviewed the final array of alternatives in detail. The Tentatively Selected Plan (TSP) had several iterations, but following optimization, Alt 4R2 was the final recommended plan.

The recommended plan, Alt 4R2, includes three components or features:

i. Storage and Treatment

i. Construct A-2 FEB and integrate with A-1 FEB operations
ii. Lake Okeechobee operation refinements within LORS

ii. Distribution and Conveyance

i. Diversion of L-6 flows, infrastructure, and L-5 canal improvements
ii. Remove western ~2.9 miles of L-4 levee west of S-8 (3,000 cfs capacity)
iii. Construct 360 cfs pump station at western terminus of L-4 levee removal
iv. Backfill Miami Canal and Spoil Mound Removal from ~1.5 miles south of S-8 to I-75
v. Increase S-333 capacity to 2,500 cfs
vi. One 500 cfs gated structure north of Blue Shanty levee and 6,000-ft gap in L-67C levee
vii. Two 500 cfs gated structures in L-67A; 0.5 mile spoil removal west of L-67A canal north and south of structures
viii. Remove ~8 miles of L-67C levee in Blue Shanty flow-way (no canal back fill)
ix. Construct ~8.5 mile levee (Blue Shanty levee) in WCA 3B, connecting L-67A to L-29
x. Remove ~4.3 miles of L-29 levee in Blue Shanty flow-way; divide structure east of Blue Shanty levee at terminus of Tamiami Trail Next Steps western bridge
xi. Remove entire 5.5 miles L-67 Extension levee; backfill L-67 Extension canal
xii. Remove ~6 miles of Old Tamiami Trail road (south of L-29 western levee, fromL-67 Ext to ENP Tram Rd)

xiii. Seepage Management

i. Increase S-356 pump station to ~1,000 cfs
ii. Construct 4.2 mile partial depth seepage barrier south of Tamiami Trail (along L-31N)
iii. G-211 operational refinements; use coastal canals to convey seepage

Mr. Morrison discussed the cost of the project including construction, non-construction and contingency costs. As it is a large and extensive project with many complexities, implementation and sequencing was discussed at great length. Mr. Morrison noted that implementation of the project has many dependencies such as: C-111 South Dade and Modified Water Deliveries, other CERP projects, the State "Restoration

Strategies" projects, operational revisions and DOI "Tamiami Trail Next Steps" project. Mr. Morrison stated that, due to the complexity of the project and its dependencies, there would be a public process to discuss implementation, and that the PIR recognizes that other scenarios are possible.

Mr. Morrison discussed the water resources issues of the project including water quality, project assurances, project benefits and environmental compliance. Available water to existing legal users will not be diminished nor will flood protection be impacted as part of this project. Mr. Morrison discussed the timeline associated with the Draft PIR and noted that public comments were due to the USACE on or before October 14, 2013.

IV. Agency Discussion

Mr. Morrison opened the meeting up to discussion.

Ms. Markley commented that, while not having read through the entire Draft PIR, Miami-Dade has concerns with utilizing the IORBL in the savings clause analysis and mentioned the need for individual savings clause and project assurances analysis as project components with dependencies are sequenced and implemented. Ms. Lewis mentioned that this has been acknowledged in Chapter 6 of the PIR. Ms. Markley stated she is not in agreement with the summary conclusions and that water supply and flood protection need to be recognized in the savings clause analysis as well. She will be providing detailed comments in writing.

Ms. Elliot commented on the sequencing of the project, specifically the project's dependency on other projects such as the C-44 Reservoir connection to C-23. She wanted to ensure that it was clearly stated and understood that, with certain projects, there wasn't much flexibility about which projects had to happen first and recommended that at the PIR recognize that some sequencing has to be done in order. Mr. Morrison expressed that once the sequencing phase was imminent, there would be a public process to discuss such matters. He also mentioned that the LOSA minimal loss has been noted in Section 6 of the Draft PIR which also discusses these dependencies.

Ms. Elliot questioned I regard to flood protection in South Dade, whether the uncertainties in the modeling were addressed in the Draft PIR. Mr. Morrison stated that the resistant coefficients (model anomalies) in the L-31 Canal would be identified and documented in the Model Documentation report as well as Annex B of the Draft PIR.

Ms. Elliot discussed the upgrade of S-356; questioning the permitability of it given that the current structure is not permitted. Mr. Morrison noted the comment.

Mr. Scott questioned if the 1501 Report would go into dependencies and sequencing of the project. He believes that it would be a critical part of the report. He also questioned whether these dependencies could be hard wired into the PIR. Mr. Morrison explained that as the local sponsor, SFWMD would not compromise on water quality. He also noted that SFWMD would develop and negotiate individual Project Partnership Agreements (PPAs) with the Corps before any project is designed or built. Each increment will meet Savings Clause and Project Assurances. Dependencies and sequencing will be part of the report.

Ms. Markley discussed the fact that as the project moves forward and phases become clearer and more information is complete, the water supply and savings clause analysis will have to be repeated. Mr. Morrison acknowledged that this is true and that such language was in Section 6 and the Executive Summary of the Draft PIR.

Mr. Hughes commented that he was confident that the USEPA would support the document in a letter, but cautioned that the water quality constraint will be drawing a lot of USEPA's attention.

Mr. Moody was concerned, regarding project dependencies, about consistency between projects. Mr. Morrison acknowledged that throughout project implementation, operations would have to be updated, specifically in regard to Lake Okeechobee revisions.

Mr. Zygnerski was confident that, because of prior conversations, Broward County concerns about C-51 had been addressed appropriately.

Ms. Feken commented the 1501 report should contain a level of reasonable certainty that the project is permittable.

Ms. Elliot questioned if the PIR could solidify permitability of the S-356 pump. Ms. Feken noted that there are concerns associated with Appendix A and Settlement Agreement compliance and language has put into the PIR to address those concerns specifically. The language requires all of the involved parties to get together and discuss these issues throughout the lifespan of the project. Mr. Marks added that there is a realization by all the parties that the original intent of Appendix A may not mesh with what happens in the future and that the parties will have to continue to talk about this. It is something that everyone is aware of and it is being worked on under the umbrella of the TOC.

V. Adjourn