LAKE OKEECHOBEE WATERSHED RESTORATION PROJECT
COMPREHENSIVE EVERGLADES RESTORATION PLAN

Lake Okeechobee Watershed Restoration Project

FINAL
State Compliance Report
Section 373.1501, Florida Statutes
February 20, 2020

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List of Acronyms

A	
AAC	Average Annual Cost
AALL	Average Annual Life Loss
ac	Acres
ac-ft	Acre-Feet
AAHU	Average Annual Habitat Unit
ALARP	As Low as Reasonably Practicable
AMMP	Adaptive Management and Monitoring Plan
APF	Annual Probability of Failure
APPZ	Avon Park Permeable Zone
ASR	Aquifer Storage and Recovery
B	
BA	Biological Assessment
BO	Biological Opinion
C	
CAR	Coordination Act Report
CBRS	Coastal Barrier Resources System
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CE/ICA	Cost Evaluation and Incremental Cost Analysis
CEM	Conceptual Ecological Models
CEPP	Central Everglades Planning Project
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CERP	Comprehensive Everglades Restoration Plan
CERPRA	Comprehensive Everglades Restoration Plan Regulation Act
CESAJ	U.S. Army Corps of Engineers, Jacksonville District
CISRERP	Committee on Independent Scientific Review of Everglades Restoration Progress
C&SF	Central and Southern Florida
D	
DSAC	Dam Safety Action Classification
DSMR	Dam Safety Modification Report

DO	Dissolved Oxygen
DOI	Department of Interior
DPOM	Draft Project Operating Manual
E	
EAA	Everglades Agricultural Area
ECB	Existing Conditions Baseline
ECBLOW	Existing Conditions Baseline for LOWRP
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
E.O.	Executive Order
ER	Engineering Regulation
ERA	Ecological Risk Assessment
ERTP	Everglades Restoration Transition Plan
EV	Ecological Value
F	
F.A.C.	Florida Administrative Code
FEB	Flow Equalization Basin
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FLUCCS	Florida Land Use Cover and Forms Classification System
FR	Federal Register
F.S.	Florida Statute
ft	feet
FWC	Florida Fish and Wildlife Conservation Commission
FWO	Future Without Project Condition (or the No Action Alternative under NEPA)
FWOLOW	Future Without Project Condition (or the No Action Alternative under NEPA) LOWRP
FWP	Future With Project
FY	Fiscal Year
G	
GIS	Geographical Information System
H	

HHD	Herbert Hoover Dike
HSI	Habitat Suitability Index
HTRW	Hazardous, Toxic and Radioactive Waste
HU	Habitat Units
I	
IDC	Interest During Construction
INSMP	Invasive and Nuisance Species Management Plan
IOP	Interim Operations Plan
J	
K	
L	
LOK	Lake Okeechobee
LORS	Lake Okeechobee Regulation Schedule
LOSA	Lake Okeechobee Service Area
LOW	Lake Okeechobee Watershed
LOWRP	Lake Okeechobee Watershed Restoration Project
M	
MFL	Minimum Flows and Levels
MGD	Million Gallons per Day
MS	Microsoft
MWD	Modified Water Deliveries
N	
NAPGPRA	Native American Graves Protection and Repatriation Act
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service

O	
OMRR&R	Operations, Maintenance, Repair, Rehabilitation, and Replacement
OPE	Other Program Element
OTMP	Operational Testing and Monitoring Phase
P	
PDT	Project Delivery Team
PED	Preconstruction Engineering and Design
PFM	Potential Failure Mode
PIR	Project Implementation Report
PM	Performance Measure
POM	Project Operating Manual
POR	Period of Record
PPA	Project Partnership Agreement
psu	Practical Salinity Unit
PWS	Public Water Supply
Q	
R	
RAA	Restricted Allocation Area
RECOVER	Restoration Coordination and Verification
RSM	Regional Simulation Model
RSM-BN	Regional Simulation Model for Basins
S	
SAS	Surficial Aquifer System
SAV	Submerged Aquatic Vegetation
SFWMD	South Florida Water Management District
SHPO	State Historic Preservation Office(er)
SQAG	Sediment Quality Assessment Guidelines
SSC	Species of Special Concern
STA	Stormwater Treatment Area
STOF	Seminole Tribe of Florida
SWFWMD	Southwest Florida Water Management District
T	
THPO	Tribal Historic Preservation Officer

TP	Total Phosphorous
TSP	Tentatively Selected Plan
U	
UFA	Upper Floridan Aquifer
UIC	Underground Injection Control
U.S.	United States
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
V	
W	
WAF	Wetland Attenuation Feature
WG	Working Group
WQC	Water Quality Certification
WRDA	Water Resources Development Act
WSE	Water Supply and Environment
WY	Water Year
X	
Y	
Z	

1 Overview of Section 373.1501, Florida Statutes Requirements

Section 373.1501, Florida Statues (F.S.), requires the South Florida Water Management District (SFWMD), in its role as local sponsor for the Comprehensive Everglades Restoration Plan (CERP), to analyze and evaluate all needs to be met in a comprehensive manner, consider all applicable water resource issues, determine with reasonable certainty that all project components are feasible and cost-effective, and determine with reasonable certainty that all project components are consistent with applicable law and regulations, and can be permitted and operated as proposed. Section 373.1501, F.S., also requires SFWMD provide reasonable assurances that the quantity of water available to existing legal users is not diminished by implementation of project components so as to adversely impact existing legal users, that existing levels of service for flood protection are 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. SFWMD must ensure the implementation of project components is coordinated with existing utilities and public infrastructure and that impacts to and relocation of existing utility or public infrastructure are minimized. See Section 373.1501, F.S. This report, along with the additional detail provided in the Project Implementation Report (PIR), provides the information necessary for the Florida Department of Environmental Protection (FDEP) to determine that the SFWMD has conducted the necessary evaluations as set forth in Subsection 373.1501(5), F.S.

1.1 Introduction

The Kissimmee-Okeechobee-Northern Estuaries-Everglades ecosystem is an internationally recognized and valued aquatic ecosystem. Ecosystems within the Lake Okeechobee Watershed Restoration Project (LOWRP) study have been altered from 120 years of highly effective public and private efforts to drain water off the land, in part by a massive federal project known as the Central and Southern Florida (C&SF) Project of the 1900s. The overall effect of the federal C&SF Project on the hydrology of this ecosystem has been a disruption of the natural timing, quantity, quality and distribution of flows entering and leaving Lake Okeechobee, loss of overall water storage, increased stormwater runoff, regulatory discharges to the Northern Estuaries, and a reduced quantity of water available for the Everglades, all affecting nationally significant areas. Water that once flowed from Lake Okeechobee south through the Everglades, down Shark River Slough, and to the southern estuaries has been impounded in the lake and discharged to the northern estuaries via regulatory releases through the C-43 and C-44 canals. Changes in the quantity, timing, and distribution of freshwater entering the northern estuaries often leads to salinity fluctuations, causing subaquatic vegetation stress, loss of benthic organisms and habitat, increased sedimentation and decreased water clarity, and redistribution of salinity-sensitive species including commercially and recreationally important fish. Direct land impacts due to development and farming of natural areas after the drainage made them viable has significantly reduced the spatial extent and storage of wetlands throughout the system.

CERP, as documented in the 1999 *C&SF Project Comprehensive Review Study Final Integrated Feasibility Report and Programmatic Environmental Impact Statement*, consists of 68 different components. The purpose of the CERP is to modify structural and operational components of the Federal 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 LOWRP contains 3 of the 68 CERP components (Components A, GG, and OPE) and has the following purposes:

1. Component A purpose: Detain water in Lake Okeechobee during wet periods for later use during dry periods.

2. Component GG purpose: (1) Provide additional regional storage while reducing both evaporation losses and the amount of land removed from current land use that would normally be associated with construction and operation of above-ground storage features; (2) increase the Lake's water storage capability to better meet regional water supply demands for agriculture, Lower East Coast urban areas, and the Everglades; (3) manage a portion of regulatory releases from the Lake primarily to improve Everglades hydropatterns and to meet supplemental water supply demands of the Lower East Coast; (4) reduce harmful regulatory discharges to the St. Lucie and Caloosahatchee Estuaries; and (5) maintain and enhance the existing level of flood protection.

3. OPE purpose: Attenuate peak flows before flowing into Lake Okeechobee and restore wetlands in the Lake Okeechobee watershed that have been ditched and drained for agricultural water supply and flood control.

Four objectives were developed for the LOWRP study efforts (**Table 1-1**).

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Table 1-1. Goals and Objectives of LOWRP

Goals	
1	Enhance ecological values in the study area's wetlands, Lake Okeechobee, and estuarine ecosystems.
2	Enhance economic values and social well-being.
Objectives	
Note: The timeline for meeting the following planning objectives is as soon as practicable after completion of project construction and throughout a 50-year period of analysis.	
1	Improve quantity, timing, and distribution of flows into Lake Okeechobee to maintain ecologically desired lake stage ranges more often.
2	Improve the timing and volumes of fresh water releases from Lake Okeechobee to improve the salinity regime and the quality of oyster, submerged aquatic vegetation (SAV), and other estuarine community habitats in the northern estuaries.
3	Increase the spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed.
4	Increase availability of the water supply to the existing legal water users of Lake Okeechobee commensurate with improving Lake Okeechobee ecology.

Planning goals for CERP projects include restoring ecological structure and processes while enhancing economic values and social well-being. These goals were considered during the formulation of LOWRP alternative plans and project-specific objectives and constraints were established to evaluate the plans. The LOWRP alternative formulation strategy was conducted in two phases. Phase 1 identified water storage management measures that function to meet the interconnected objectives of improving Lake Okeechobee stage conditions, decreasing regulatory releases to the northern estuaries, and increasing the availability of water supply for existing legal users (Objectives 1, 2, and 4). Phase 2 identified individual wetland restoration management measures to increase the spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed (Objective 3). Phase 1 water storage components and Phase 2 wetland restoration sites were combined to form the final array of alternatives.

1.1.1 CERP Components in the LOWRP

The LOWRP scope includes portions of 3 components of the CERP:

- North of Lake Okeechobee Storage Reservoir (Component A)
- Lake Okeechobee Aquifer Storage and Recovery (Component GG)
- Lake Okeechobee Watershed Water Quality Treatment Facilities (Component OPE)

The LOWRP consists of combinations of aboveground water storage features, Aquifer Storage and Recovery (ASR) wells, and wetland restoration sites north of Lake Okeechobee. Although the CERP components included the below features, some of these components were screened out during the planning process.

- 200,000 acre-feet of reservoir storage
- 200 ASR wells
- 2,500-acre stormwater treatment area (STA)
- 1,775-acre reservoir-assisted STA (RASTA) in Okeechobee County
- 2,600-acre RASTA in Highlands County
- 3,500 acres of wetland restoration throughout the Lake Okeechobee watershed basin

Since the original CERP planning that was completed in 1999, new studies, policy guidance, data collection, pilot projects, and improvements in hydrologic systems modeling capabilities allowed for refining the knowledge base and approach in ecosystem restoration. This refined approach is used to maximize project benefits and reduce costs to achieve the CERP goals. **Table 1-2** compares the LOWRP scope from the authorized Restudy to the current project scope for ecosystem restoration included in this feasibility analysis. Above-ground storage, below-ground storage (ASR wells), and wetland restoration sites have been retained for LOWRP planning purposes. Water quality treatment features like STAs and RASTAs, although proposed in the North of Lake Okeechobee Storage Reservoir (Component A) and Lake Okeechobee Watershed Water Quality Treatment Facilities (OPE), have not been carried forward in the current LOWRP effort. The state of Florida has implemented water quality programs such as the Basin Management Action Plans and established Total Maximum Daily Loads (TMDLs) for Lake Okeechobee. These ongoing programs can be used to meet the intent of water quality improvements originally proposed by CERP components. As a result, water quality features are no longer within the project scope.

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Table 1-2 Original LOWRP scope as envisioned in the CERP authorized plan compared to the current planning effort.

Component as Described in the Restudy	CERP Facility & Description	CERP Facility Purpose	Management Measures Carried Forward for LOWRP Planning
North of Lake Okeechobee Storage Reservoir (CERP component A)	17,500-acre reservoir with total storage capacity of 200,000 acre-feet (average depth 11.5 feet) in Kissimmee River Region and 2,500-acre Stormwater Treatment Area (STA).	Detain water during wet periods for use during dry periods, reduce nutrient loads flowing from the Kissimmee River into Lake Okeechobee, and reduce the duration and frequency of high and low water levels in Lake Okeechobee that contribute to the lake's littoral ecosystems and necessitate large freshwater discharges to the downstream estuaries.	Various above-ground storage configurations were considered during initial screening. STAs are not a management measure in the LOWRP planning effort.
Lake Okeechobee Aquifer Storage and Recovery (ASR) (CERP component GG)	Series of ASR wells adjacent to Lake Okeechobee with a capacity of one billion gallons per day in Glades and Okeechobee counties; assumes 200 wells.	1) Provide regional storage while reducing evapotranspiration and the amount of land removed from land use. 2) Increase water supply for agricultural, urban, and environmental purposes. 3) Improve Everglades' hydropatterns. 4) Reduce quantity, frequency, and duration of Lake Okeechobee releases to the St. Lucie and Caloosahatchee estuaries. 5) Maintain and enhance the existing level of flood protection.	2015 CERP ASR Regional Study refined the amount of ASR wells that could be constructed within the northern Lake Okeechobee Basin on SFWMD-owned lands based on hydrogeologic conditions.
Lake Okeechobee Watershed Water Quality Treatment Facilities (OPE)	• 1,775-acre RASTA in Okeechobee County. • 2,600-acre RASTA in Highlands County. • 3,500-acre wetland restoration throughout the Lake Okeechobee watershed basin.	The purpose of the RASTAs is to attenuate peak flows and reduce phosphorous inflows into Lake Okeechobee. The purpose of wetland restoration is to restore the hydrology of selected isolated and riverine wetlands.	Wetland restoration sites in the Lake Okeechobee watershed basin. RASTAs are not a management measure in the LOWRP planning effort.

1.2 Project and Study Area

The project area covers a portion of the Lake Okeechobee Watershed in Florida. It includes four drainage basins: Fisheating Creek, Indian Prairie, Taylor Creek/Nubbin Slough, and Lower Kissimmee (S-65D and S-65E) totaling approximately 920,000 acres. The project area includes portions of Glades, Highlands, Okeechobee, St. Lucie, and Martin counties, along with the Seminole Tribe of Florida (STOF) Brighton Reservation **Figure 1-1**. The majority of the LOWRP features are located in the Indian Prairie sub-basin, although there are proposed ASR wells located throughout the project area. The study area includes the project area, along with Lake Okeechobee and the Caloosahatchee and St. Lucie Estuaries, totaling approximately 1,450,000 acres. A description of the LOWRP study area is provided in **Table 1-3**.

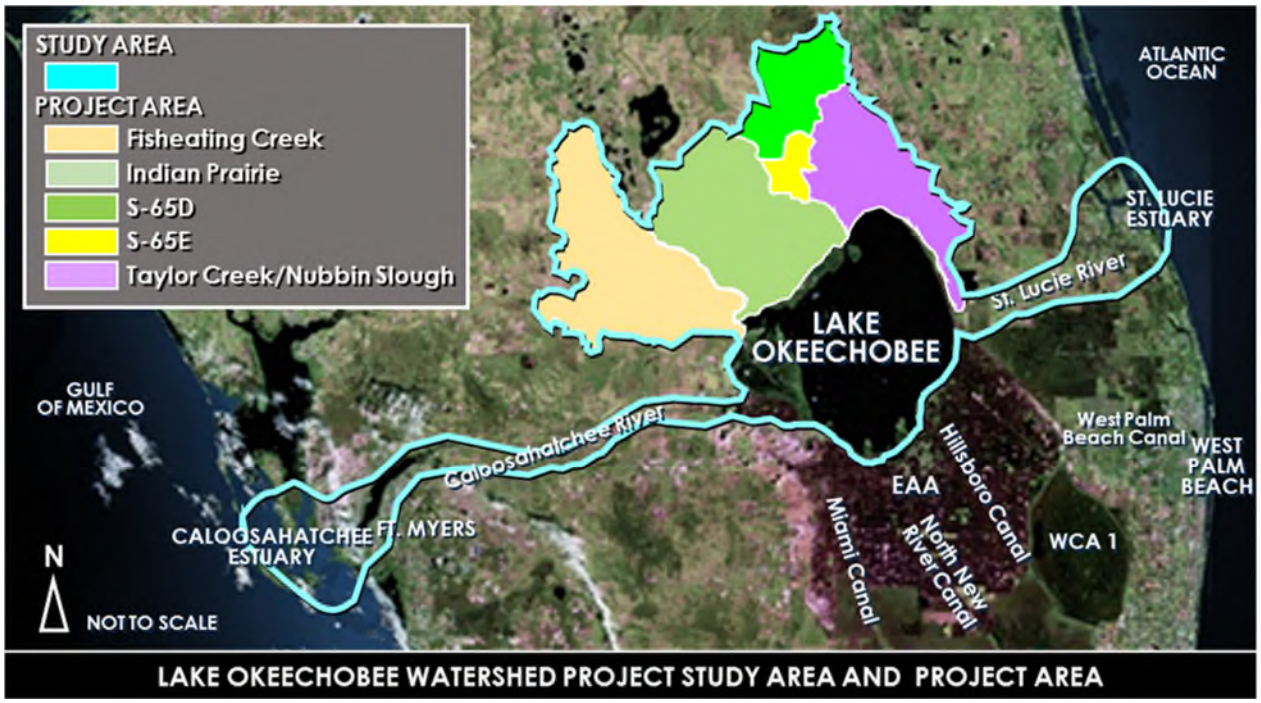

Figure 1-1 – Map of Project Area

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Table 1-3 Description of the LOWRP Study Area

LOWRP Study Area Region	Description of the Study Area Region
Lake Okeechobee Watershed	The major drainage basins, consisting of tributaries flowing into Lake Okeechobee, include Fisheating Creek, the Indian Prairie Basin, the Lower Kissimmee (S-65D and S-65E), and Taylor Creek/Nubbin Slough. The entire area is approximately 920,000 acres. Historically, about 40 percent of this area was comprised of wetland habitat, consisting of cypress and bay tree forests, inland swamps, freshwater marsh, wet prairie, and sawgrass marsh. Today, only 15 percent of the area is wetlands. The current major land uses include agriculture, urban, and natural/open lands and wetlands.
Lake Okeechobee	Lake Okeechobee is a large, shallow lake (surface area approximately 730 square miles) located 30 miles west of the Atlantic coast and 60 miles east of the Gulf of Mexico. The Lake 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 mostly surrounded by the 143-mile long Herbert Hoover Dike (HHD). The Lake has many functions, including flood risk management, urban and agricultural water supply, navigation, recreation, fisheries, and wildlife habitat. It is critical for flood control during wet seasons and water supply during dry seasons. Agriculture in the Lake Okeechobee Service Area (LOSA), including the Everglades Agricultural Area (EAA) immediately south of the Lake, is the predominant user of Lake water. The Lake is a significant economic driver for both the surrounding areas' and south Florida's economy.
Northern Estuaries	In the current modified system, Lake Okeechobee discharges into the two Northern Estuaries (Caloosahatchee and St. Lucie 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 (SAV), estuarine benthic areas (mud and sand), and nearshore reefs.

1.3 Plan Features

The LOWRP Recommended Plan, Alternative 1BWR[1], includes a Wetland Attenuation Feature (WAF), 80 total ASR wells (55 watershed ASR wells, 25 ASR wells co-located with the WAF feature), the Paradise Run and Kissimmee River-Center wetland restoration sites, and various recreational features in the WAF and wetland restoration sites.

1.3.1 Wetland Attenuation Feature

The flow-through WAF is located within the Indian Prairie sub-watershed west of the C-38 Canal, north of State Road 78, east of the STOF Brighton Reservation, and south of the C-41A Canal. The WAF is a shallow aboveground water storage facility used to attenuate peak flows entering Lake Okeechobee. Although a WAF provides aboveground storage like a typical reservoir, water levels may be maintained to keep soils inundated to prevent dry out and reflooding events. Thus, the peak flows from the Kissimmee Basin are the aquatic conditions that a WAF is directly designed to 'attenuate.' The WAF footprint, including the embankments, seepage canal, and other perimeter features, is approximately 13,600 acres with a storage capacity of approximately 46,000 ac-ft (Figure 1-2). The WAF includes a pump station located downstream of the existing S-84 structure on the C-41A canal. The pump draws water downstream of S-65E that is considered water of Lake Okeechobee. The WAF discharges to the C-38 Canal through a gated structure and outlet canal to be constructed in the Paradise Run parcel.

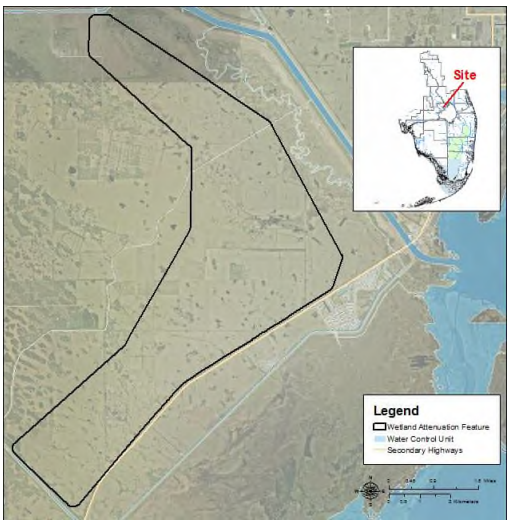

Figure 1-2 - Recommended Plan Wetland Attenuation Feature

[1] The Recommended Plan, ALT1BWR, is the revised ALT1BW described in more detail in **Sections 4** and **5** of the Project Implementation Report. The original TSP footprint was modified based on more detailed design and feedback from stakeholders. The eastern boundary of the WAF was moved to the east to eliminate the unused land between the WAF and Paradise Run. Additionally, Paradise Run was modified to include an approximate 1,000-foot buffer from State Road 78.

1.3.2 Aquifer Storage and Recovery

Eighty (80) ASR wells, with 5 million gallons per day (MGD) capacity each, are proposed in clusters at various locations throughout the Lake Okeechobee watershed and co-located with the WAF (**Figure 1-3**). The well clusters will include a combination of ASR wells that will utilize either the Upper Floridian Aquifer (UFA) or the Avon Park Permeable Zone (APPZ) for storage and recovery. Underlying geology and presence of existing users within the vicinity limit the siting of ASR wells. Proposed cluster locations are based upon the findings of the 2015 CERP ASR Regional Study; however, these locations are conceptual and may be adjusted based on the results of exploratory testing**.** Additionally, due to the uncertainties regarding the scale of the proposed ASR systems, it is recommended that ASR be implemented in a phased systematic approach, conduct studies and monitoring as recommended by the National Research Council of the National Academies of Sciences (NRC), which conducted their review on the CERP ASR Regional Study. Final siting will be determined during the Preconstruction, Engineering and Design (PED) phase.

- **ASR wells co-located with the WAF:** These wells can withdraw water from the WAF when it is full, thus providing additional storage capacity in the WAF.
    - There are 3 well clusters (25 wells) co-located with the WAF.
    - ASR wells will recharge using water from the WAF and discharge into the WAF prior to release into the Kissimmee River.
    - It is anticipated that water recovery from the K-05 WAF ASR wells will support maintenance of wetland habitat during dry periods such that the risk of dry out is minimized.
    - The combination of ASR wells and the WAF provides dynamic above and below ground storage.
- **Watershed ASR wells:** The remaining 55 ASR wells are located throughout the watershed in several clusters.
    - One proposed cluster is located adjacent to the C-44 canal in Port Mayaca. This will discharge out of the C-44 into Lake Okeechobee or to the St. Lucie River Estuary.
    - Three potential cluster areas are located in the S-191 subwatershed. The wells will be adjacent to the L-63N, L-63S, or L-64 canals that can discharge to Lake Okeechobee.
    - Two potential clusters are located adjacent to the C-38 canal downstream of S-65E that discharge back into the C-38 canal.
    - One cluster is located along Taylor Creek, downstream of S-192 and upstream of the S-133 pump station which releases fresh water to Lake Okeechobee.

- There is a well cluster along C-40 canal downstream of S-72 that can discharge to Lake Okeechobee.
- There is a well cluster along C-41 canal downstream of S-71 that can discharge to Lake Okeechobee.
- There is a well cluster along the C-43 canal in Moore Haven that can discharge to Lake Okeechobee or the Caloosahatchee River.

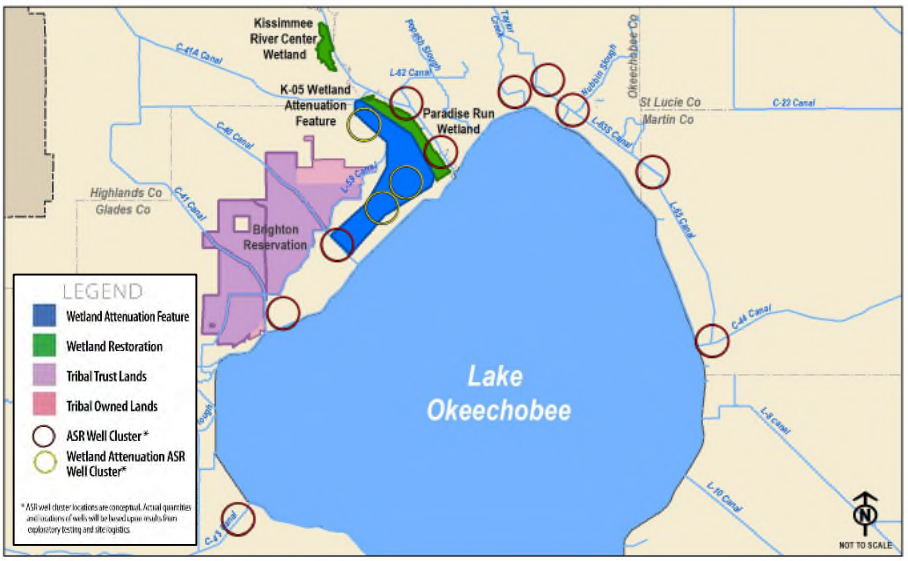

Figure 1-3 - Recommended Plan ASR Clusters and Locations (Depicted by circles)

1.3.3 Wetland Restoration Sites

The purpose of wetland restoration component of the LOWRP is to increase the spatial extent and functionality of aquatic and wildlife habitat within the Lake Okeechobee Watershed by restoring the hydrology of selected isolated and riverine wetlands. The Recommended Plan will restore approximately 4,800 acres of wetlands in the Paradise Run and Kissimmee River-Center locations. The wetland restoration activities include construction of inflow pump stations and channel excavation to convey water within the restoration areas to increase functionality of the wetlands.

The Kissimmee River-Center site (**Figure 1-4**) approximately 1,200 acres, is located on the west bank of the C-38 canal, about halfway between S-65D and S-65E. A pump station would be placed in the C-38 canal at the north end of the site to divert water to the west into a created river channel that mimics the historic Kissimmee River. Approximately 21,500 feet of channel excavation would be performed to create riverine habitat and to rehydrate floodplain wetlands.

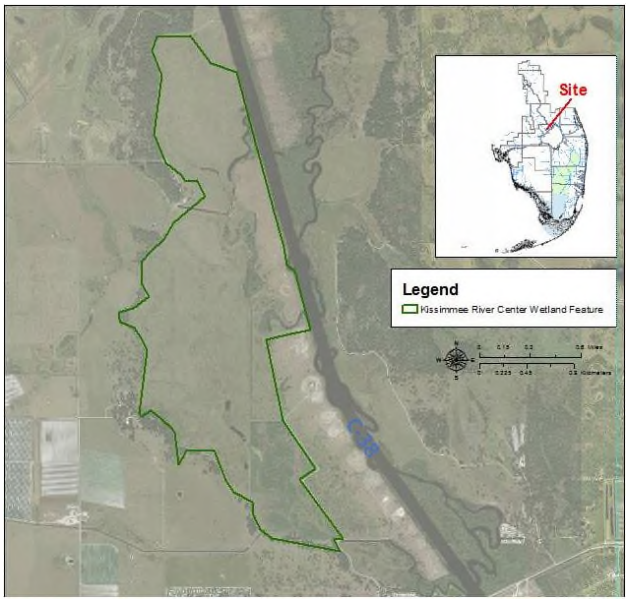

Figure 1-4 – Kissimmee River-Center Wetland Feature

The Paradise Run site, (**Figure 1-5**) is approximately 3,600 acres, contains remnant Kissimmee River channel and floodplain. The site is located downstream of S-65E on the west bank of the C-38 canal, between the C-41A canal and the Buckhead Ridge community. A Paradise Run purpose-specific pump station on the C-41A canal downstream of S-84 serves as the water source to bring water into the historic river channel running through the overdrained Paradise Run site. Approximately about 24,500 linear feet of channel excavation will be performed to restore flow to a portion of the river and rehydrate the floodplain wetlands. The L-59 canal will be plugged to allow overland flow over the former canal. The flow will discharge back into the C-38 canal by way of the WAF outlet canal and a system of culverts through the HHD on the southeast corner of the site.

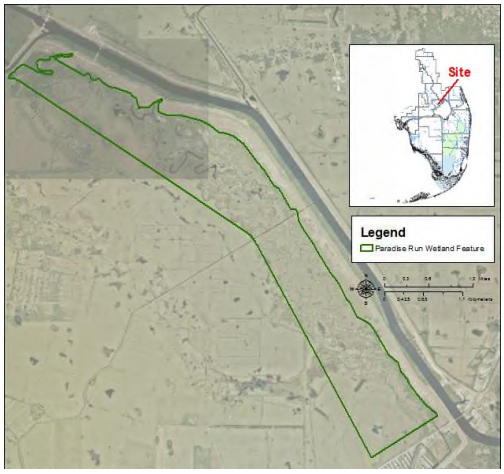

Figure 1-5 – Paradise Run Wetland Feature

1.3.4 Recommended Plan Operational Considerations

The Draft Project Operating Manual (DPOM) in **Annex C** of the PIR includes operating criteria based on the LOWRP hydrologic modeling assumptions and generally discusses the transitions to operations during the construction phase, the operational testing and monitoring period (OTMP), and the long-term Operations, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R) phase. The hydrologic modeling conducted for the Recommended Plan to optimize system-wide performance incorporated the current regulation schedule management bands of the 2008 Lake Okeechobee Regulation Schedule (2008 LORS) with the CEPP modifications for water supply deliveries to the Northern Estuaries and additional optimizations to three parts of the decision tree:

- 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 2008 LORS management bands.
- Stage trends (whether water levels are receding or ascending).

Additional information and documentation of the Recommended Plan modeling assumptions for Lake Okeechobee operations, including water supply deliveries to the Northern Estuaries, is found in **Appendix A** of the PIR. It is important to note that the LORS revisions and environmental water supply deliveries to the Northern Estuaries identified in LOWRP are to inform a future LORS and system-wide operational updates. The LOWRP PIR/Environmental Impact Statement (EIS) is not the mechanism to propose or conduct the required National Environmental Policy Act (NEPA) evaluation of modifications to the LORS and system-wide operational modifications. These actions will be conducted under other authority consistent with the Integrated Delivery Schedule.

The specific feature locations of the Recommended Plan are shown in **Figure 1-6**. Further details of features are available in **Appendix A** of the PIR**.**

Figure 1-6. LOWRP Recommended Plan.

1.4 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 oversees SFWMD to ensure it conducted these required evaluations (Subsection 373.1501(4), F.S.). FDEP needs these evaluations to approve each CERP project. Upon FDEP approval, the project may receive state funds and be submitted to Congress for authorization, Paragraph 373.026(8)(b), F.S.

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 the construction and operation of each CERP project, Section 373.1502, F.S.

2 Water Resource Analysis and Evaluation

Under Paragraph 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 LOWRP Recommended Plan beneficially affects Lake Okeechobee, the Lake Okeechobee Watershed and the St. Lucie and Caloosahatchee Estuaries. The effects of the alternative plans were evaluated based on a comparison of the most likely future conditions with and without those plans in place. To make this comparison, descriptions (or forecasts) must be developed for two different future conditions: the Future Without (FWO) project condition and the Future With Plan (FWP) project condition. Note that the project referred to in the FWP context is any one of the alternative plans that have been considered in the study. The FWP project condition describes what is expected to occur as a result of implementing each alternative plan that is being considered in the study. 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 is the same as the "no action" alternative required by NEPA and implementing regulations. For consistency of the report, the **No Action Alternative** is referred to as the **FWO** for the remainder of the report. The differences between the FWO project condition and the FWP project condition are the effects of the project.

The period of analysis for water resources projects is 50 years as set by USACE policy. Even if project structures last more than 100 years, there is too much inherent uncertainty to reliably forecast conditions and impacts beyond 50 years. The base year for the period of analysis for the LOWRP is 2028. The base year assumes an unconstrained implementation timeline in which LOWRP will be authorized, designed, and constructed. The period of analysis for the proposed project will be 50 years, ending in the year 2078[2].

2.1 Project Objectives and Assumptions Associated with RSM Simulations

The analyses of the Saving Clause and Project Assurance requirements includes considerations of three different sets of assumptions at two different points in time or conditions as depicted in **Table 2-1**; 1) The Existing Condition Baseline (ECB) and 2) the Future Without Project baseline (FWO) and 3) FWP project condition (Recommended Plan). Comparison of the Recommended Plan to these baselines is discussed in **Annex B** of the PIR. The model assumption tables for all base conditions are provided in the Engineering Appendix (**Appendix A**) of the PIR.

[2] CERP Revised Draft Final Guidance Memoranda (GM) dated July 2007 states that the end point for the period of analysis used in a PIR will coincide with the period of analysis end-point in the most current version of the Plan (end point 2050). LOWRP is using 50 years after the period of analysis start date due to the construction schedule of project features, which extends past the GM end point date.

Table 2-1 - Key Assumptions based on model documentation reports from Engineering Appendix (Appendix A, Annex A-3) of the PIR

Condition	Intent	Equivalent for LOWRP	Model Scenario
Existing Conditions	Actual conditions at the time the Recommended Plan is selected, including land use, operations, and demands. Demand can be either permitted or projected, whichever is greater.	2016 conditions with only the projects and operations approved and in effect. Includes 2008 LORS. Permitted demands are included.	**ECBLOW**
Initial Operating Regime Baseline	Future conditions at the time the Recommended Plan 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 non-CERP projects, CERP projects (with completed PIRs), and LOWRP features with associated operations. Includes LORS 2008. Permitted demands are included.	**FWOLOW**

2.2 Water Supply

An existing legal use of water is defined as a water use authorized under a water management district-issued water use permit or existing and exempt from permit requirements. Existing legal users of water, including agricultural, urban, and tribal, in the Lake Okeechobee Service Area (LOSA) and Indian Prairie Basin will continue to be met by their current sources, primarily Lake Okeechobee, surface water in the regional canal network, and the surficial aquifer system. LOSA is more than 1.8 million acres in size. It includes Lake Okeechobee and the integrated conveyance systems that are hydraulically connected to, and receive water from, Lake Okeechobee. Water availability from Lake Okeechobee and its hydraulically connected water bodies is limited due to adoption of specific SFWMD water use permitting criteria developed in response to the 2008 LORS. All existing legal users will continue to have their needs met during construction and operation of the project.

The period of simulation (1965-2005) used for the LOWRP hydrologic modeling encompasses a wide range of historical climatologic and meteorologic conditions that are representative of south Florida hydrology and takes into account the different regulatory schedules for Lake Okeechobee during this time period. This analysis period includes several moderate wet and moderate dry periods, as well as less frequent and potentially more impactful periods of both extreme high rainfall and extreme drought conditions. Based on the period of simulation analysis for the alternative, each alternative in the final array maintain the pre-project levels of service for water supply consistent with the requirements of the WRDA 2000 and Chapter 373.1501.

The ability of the project features to provide water to meet other water related needs in the LOSA, which includes the EAA, was analyzed for the Recommended Plan. 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. Based on the analysis, the existing level of service for existing legal users is maintained or improved with the Recommended Plan (**Table 2-2**). The Recommended Plan also reduces the frequency and/or severity of water shortage occurrences in LOSA when compared to the ECB and FWO project conditions (**Figure 2-1**). However, water from LOWRP alone is not expected to fully restore existing legal water users in LOSA to the level of service available before implementation of 2008 LORS. Additional detailed information on the Savings Clause analysis can be found in **Annex B** of the PIR.

Table 2-2. RECOVER Performance Measure WS-1: Frequency and severity of water restrictions for LOSA.

Simulation	Period of Record (POR)	*Cutback Total (kaf)	Frequency	Severity Score	Number of WYs with at Least 1 Cutback
ECB	1965-2005	857	8	13	8
FWO	1965-2005	688	8	12	8
1BWR	1965-2005	520	6	7	6

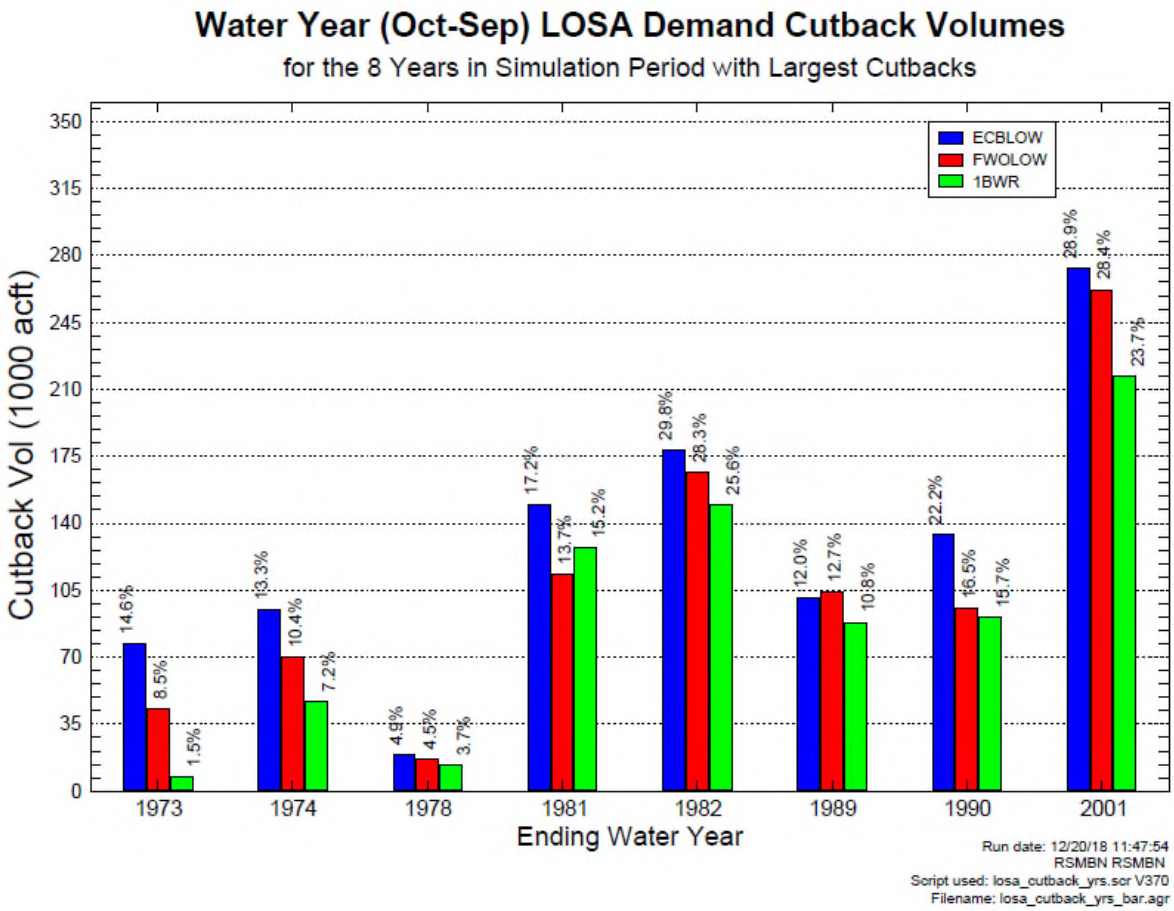

Figure 2-1. LOSA demand cutback volumes for the 8 years with the largest cutbacks

2.2.1 Savings Clause Summary

The Savings Clause analysis is included in the Water Resources Development Act of 2000 (WRDA 2000) to protect legal users of the sources of water supply and to protect the level of service for flood protection that were in place at the time of WRDA's enactment. See Section 601(h)(5) of WRDA 2000. Specifically, the 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 (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 Rights Compact with the State of Florida and SFWMD.

2.2.1.1 Savings Clause: Water Supply from Existing Legal Sources

Sources of water used to meet agricultural and urban demand in the LOSA will continue to be met by their current sources, primarily Lake Okeechobee. The Recommended Plan reduces the frequency and/or duration of water elevations that would warrant declaration of water shortages by the GB and/or the severity of cutbacks ordered. The Recommended Plan would maintain or improve the level of service for water supply for existing legal users in LOSA. With implementation of the Recommended Plan, water deliveries to Seminole Tribe of Florida's Brighton and Big Cypress Reservations are not reduced in comparison to the FWO and ECB. Therefore, there will be no elimination or transfer of existing legal sources of water supply as a result of the Recommended Plan for the following:

- Agricultural or urban water supply in the LOSA
- 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)
- Water supply for fish and wildlife

2.2.2 Lake Okeechobee

Lake Okeechobee is the largest lake in the southeastern United States and is a central part of the south Florida watershed. Lake Okeechobee receives water from a 5,400 square mile watershed that includes, but is not limited to, four sub-watersheds: Kissimmee River Valley, Lake Istokpoga-Indian Prairie/Harney Pond, Fisheating Creek, and Taylor Creek/Nubbin Slough. Lake Okeechobee provides water supply to urban areas, agriculture, and downstream estuarine ecosystems during the dry season (November-May) and is used for flood control during the wet season (June-October).

Lake Okeechobee differs from the historic lake in size, range of water depth and connection with other parts of the regional ecosystem. Connecting Lake Okeechobee to the Caloosahatchee River and construction of the St. Lucie Canal in the early 1900s greatly reduced system-wide water storage and sheetflow to the south during drier periods. Construction of

Herbert Hoover Dike (HHD) around the lake reduced the size of Lake Okeechobee's open-water zone by nearly 30 percent, resulting in considerable reductions in average water levels, and produced a new littoral zone within the dike that is only a fraction of the size of the natural one. Today, the lake has a surface area of 730 square miles and is extremely shallow. The lake has an average depth of 8.6 ft. (average stages 14.11 ft. National Geodetic Vertical Datum; NGVD) based on the period of record from 1972 to 2012).

Currently, Lake Okeechobee stages are managed by the 2008 LORS which determines the timing and quantity of water that is released from the lake when the stage exceeds defined seasonal regulatory levels. Until a new operating schedule is developed, the 2008 LORS with the operational refinements identified to support the Central Everglades Planning Project (CEPP) Recommended Plan is the best estimate for operations in the existing and FWO project conditions. CEPP assumes that the lake stage will be held slightly higher for short durations to optimize flow equalization basin (FEB) use in the CEPP study area. In 2008, in response to the lower lake levels maintained by 2008 LORS which changed Lake Okeechobee from a MFL prevention waterbody to a MFL recovery waterbody, the SFWMD adopted a restricted allocation area (RAA) rule limiting allocations to base condition water uses that occurred from April 1, 2001 to January 1, 2008 due to increased demand. The LOSA RAA serves as a part of the minimum flows and level (MFL) recovery strategy for Lake Okeechobee.

The FWO Lake Okeechobee stage levels will remain similar to current conditions (**Table 2-3**). The FWO project conditions are expected to continue to impair downstream ecosystems and the expansion of invasive and nuisance plant and animal species is expected to continue in the future. The frequency and severity of water restrictions for the LOSA are anticipated to decrease in the FWO condition as compared to the ECB (**Table 2-2**).

Table 2-3 - Existing and Future Without Condition Lake Okeechobee Stage Levels.

Lake Okeechobee Stage Levels		Existing Conditions	Future Without Project Conditions
% TIME >	17.0 ft. NGVD	0.2%	0.4%
% TIME >	16.0 ft. NGVD	5.9%	7.8%
% TIME >	15.5 ft. NGVD	29.6%	29.9%
% TIME <	12.5 ft. NGVD	43.1%	42.4%
% TIME <	10.00 ft. NGVD	3.9%	3.3%
% Time Inside Ecologically Acceptable Stage Envelope		28.3%	27.6%

Note: The ecological condition is measured by the lake stage level, which includes various criteria including the percentage of time that lake levels remain within a scientifically-based ecologically acceptable range or "stage envelope" between elevations of 12.5 to 15.5 feet NGVD and percentage of time that lake levels are in the extreme high (>17 ft NGVD) and extreme low (<10 ft NVGD) ranges. The desired restoration condition avoids frequent or

prolonged departures of lake stage outside of this prescribed envelope and the occurrence of extreme high and low lake stage events will be rare[3].

Note: LOSA water restrictions primarily affect agricultural water users. Economic losses associated with water shortages depend not only on the number of water shortages, but also on the severity and duration of the water restrictions. The longer the restrictions are in place and the more severe the cutbacks, the more likely it is that crop yields will be reduced and the greater the expenses that are required by users to manage the water shortages[4]. The restoration target is to minimize the severity and duration of any water restrictions.

2.2.3 Groundwater Resources

The LOWRP project area is within the SFWMD Lower Kissimmee River Water Supply Planning Area. During this planning effort, the Lower Kissimmee River Basin groundwater model was updated. The Upper Floridan Aquifer (UFA) is the main groundwater supply source in the Lower Kissimmee Basin. Objectives of the updated groundwater flow model include evaluation of UFA groundwater withdrawals in the future (2035), which applies to the FWO condition. A second objective is to evaluate potential impacts to minimum flows and levels in lakes along the Lake Wales Ridge due to UFA groundwater withdrawals within the SFWMD and the Southwest Florida Water Management District (SWFWMD) boundaries. Modest increases in water demand are projected in the basin with public water supply and domestic self-supply sources increased from 4.9 Million Gallons a Day (MGD) to 6.0 MGD; industrial/commercial/institutional self-supply, power generation self-supply, and recreational/landscape self-supply increase from 24.5 MGD to 31 MGD; and agricultural self-supply to remain at 185 MGD in 2035 (Source: 2014 Lower Kissimmee Basin Water Supply Plan). Pumping of the UFA is predicted for agricultural and public water supply in both SFWMD and SWFWMD areas. However, the 2035 simulations suggest that UFA water levels show a rebound or no significant effect beneath minimum flows and lakes levels given projected increases in UFA pumping and model uncertainty.

WAF-assisted ASR wells located proximal to the shallow impoundment are unlikely to affect existing agricultural users to the north in Highlands County, although this will need further investigation during the Underground Injection Control (UIC) permitting process. There are a few existing users of the UFA within the WAF footprint. **Table 2-4** describes the groundwater resources for the Recommended Plan.

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[3] RECOVER Lake Okeechobee Performance Measure: Lake Stage (March 2007)

[4] RECOVER Frequency and Severity of Water Restrictions for Lake Okeechobee Service Area (March 2005)

Table 2-4 Groundwater resources

Aquifer	FWO	Alternative 1BWR
Surficial Aquifer System (SAS)	Total water demand is expected to increase by 15 percent by 2035, mostly due to agricultural demands. Surficial aquifer pumping will meet part of those demands. Extensive pumping of the SAS can potentially affect regional water levels in this unconfined aquifer.	Seepage from the completed K-05 WAF will be managed by a seepage canal and seepage pump stations. Eastward flowing seepage from WAF will hydrate the northern portions of the Paradise Run alluvial plain.
Upper Floridan Aquifer (UFA)	Estimated future demands on UFA groundwater may be limited near the Lake Wales Ridge in order to maintain minimum flows and levels in adjacent lakes. However, sufficient confinement separates Lake Istokpoga and Lake Okeechobee from the UFA, so increased demands are unlikely to affect water levels in these lakes.	Construction of approximately 50 ASR wells will increase regional storage by approximately 280,000 acre-feet per year. Fully implemented ASR systems will reduce discharge to the estuaries and will augment lake levels during drought.
Avon Park Permeable Zone (APPZ)	The APPZ is not a water supply source due to greater salinity compared to the UFA, and greater depth. It is unlikely that the APPZ will provide drinking water or agricultural irrigation supplies in the future.	Approximately 30 ASR wells in the APPZ will be paired with UFA wells, providing approximately 168,000 acre-feet of storage per year.

2.2.3.1 Well Water Supply

Due to the uncertainties regarding the scale of the proposed ASR clusters, it is recommended that ASR be implemented in a phased systematic approach, and studies and monitoring be conducted as recommended by the National Research Council of the National Academies of Sciences.

Drinking water supply is obtained mostly from the surficial aquifer (land surface to 170 ft below land surface) in the project area. The ASR storage zone is 550 ft to 1100 ft below land surface in the project area. The surficial aquifer and ASR storage zone are separated by approximately 330 ft of Hawthorn Group sands and clays, which form the intermediate confining unit. Due to the distance from Floridan aquifer source wells, it is unlikely that the groundwater in the ASR storage zone will impact Floridan aquifer water supply during normal ASR operations. Additionally, the ASR water will be treated as required by the regulatory agencies prior to recharge. Therefore, the Recommended Plan will not affect drinking water and existing uses.

2.2.4 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 2-5,** classified according to the categories identified in WRDA 2000.

Table 2-5 - Existing Legal Sources Evaluated for Elimination and Transfer

WRDA 2000, Section 601(h)(5)	User or Natural System Evaluated in LOWRP
an agricultural or urban water supply;	LOSA, including the EAA
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
the Miccosukee Tribe of Indians of Florida;	N/A
water supply for Everglades National Park; or	N/A
water supply for fish and wildlife.	Caloosahatchee Estuary St. Lucie Estuary

The primary Regional Simulation Model (RSM)-BN results evaluated for effects to agricultural or urban water supply are the volume and/or frequency of cutbacks, which is applicable to the LOSA and the STOF's Brighton and Big Cypress Reservations. The selected metrics provide more direct and higher resolution measures of potential water supply effects for the LOWRP Savings Clause assessment than would be provided through assessment of inflow volume probability curves for these areas.

For the two Northern Estuaries, the Savings Clause 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 occur during time of excess water when water supply scarcity is not a concern.

RECOVER's performance measure for water supply in LOSA (WS-1) quantifies the frequency and severity of water restrictions over the period of simulation. Cutbacks are reduced by the Recommended Plan compared to the FWO condition. A simulated cutback total of 688,000 acre-feet in the FWO is reduced to 520,000 acre-feet by the Recommended Plan (1BWR). Similarly, the severity score is decreased from 12 to 7. The water supply improvements for the

Recommended Plan compared to the FWO project condition, as quantified in RECOVER WS-1, satisfy Savings Clause requirements.

The Recommended Plan reduces the percentage of demands not met in the EAA in comparison to both the ECB and FWO. The Recommended Plan also reduces the percentage of demands not met in the other LOSA Areas which include: 298-Districts, S4, L8, C43, C44, North & Northeast Lakeshore, and Lower Istokpoga (**Figure 2-2**).

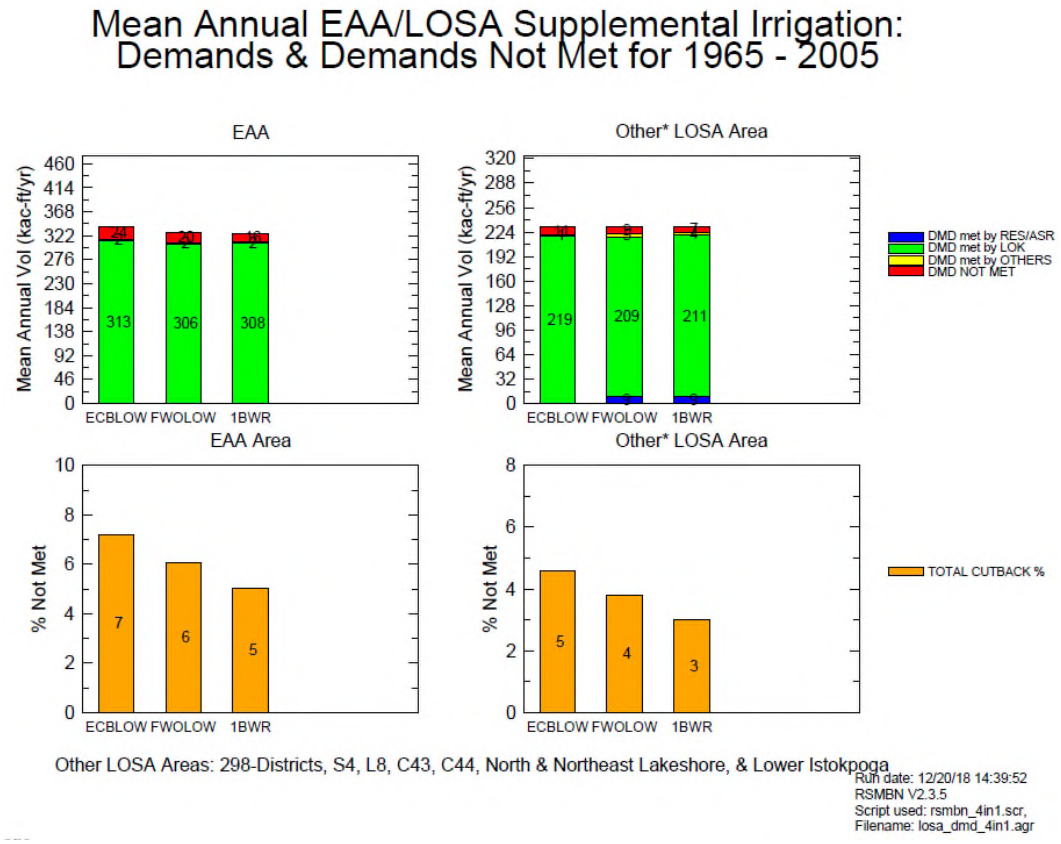

Figure 2-2 – Mean annual EAA/LOSA supplemental irrigation: demands & demands not met for 1965–2005

2.2.5 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 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, water supply performance in the Recommended Plan is similar to the FWO project condition. In the Recommended Plan, the volume and percentage of demand not able to be met are 1,000 ac-ft and 2.6%, respectively; for the FWO project condition, the volume and percentage of demand not able to be met are 1,000 ac-ft and 3.3%, respectively (**Figure 2-3**).

For the Big Cypress Reservation, the volume and percentage of unmet demand are essentially the same for the ECB, FWO, and Recommended Plan. In the Recommended Plan, the volume and percentage of demand not met are 1,000 ac-ft and 3.3%, respectively; for the FWO project condition, the volume and percentage of demand not met are 1,000 ac-ft and 3.7 %, respectively (**Figure 2-4**). The volume of water supplied by the three sources, Lake Okeechobee, STAs and S-190, remains unchanged; therefore, no transfer occurs. Based on this comparison, water supply performance for the STOF Brighton and Big Cypress Reservations is unchanged with LOWRP implementation.

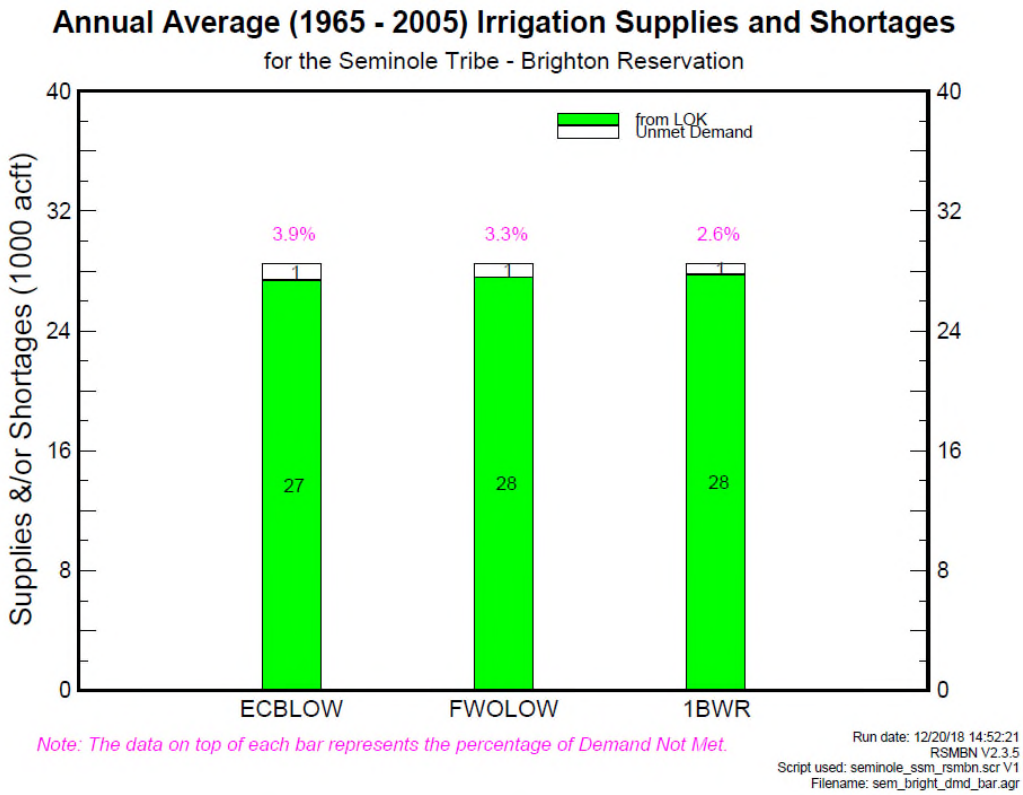

Figure 2-3 – Annual average (1965–2005) irrigation supplies and shortages for the Seminole Tribe of Florida – Brighton Reservation

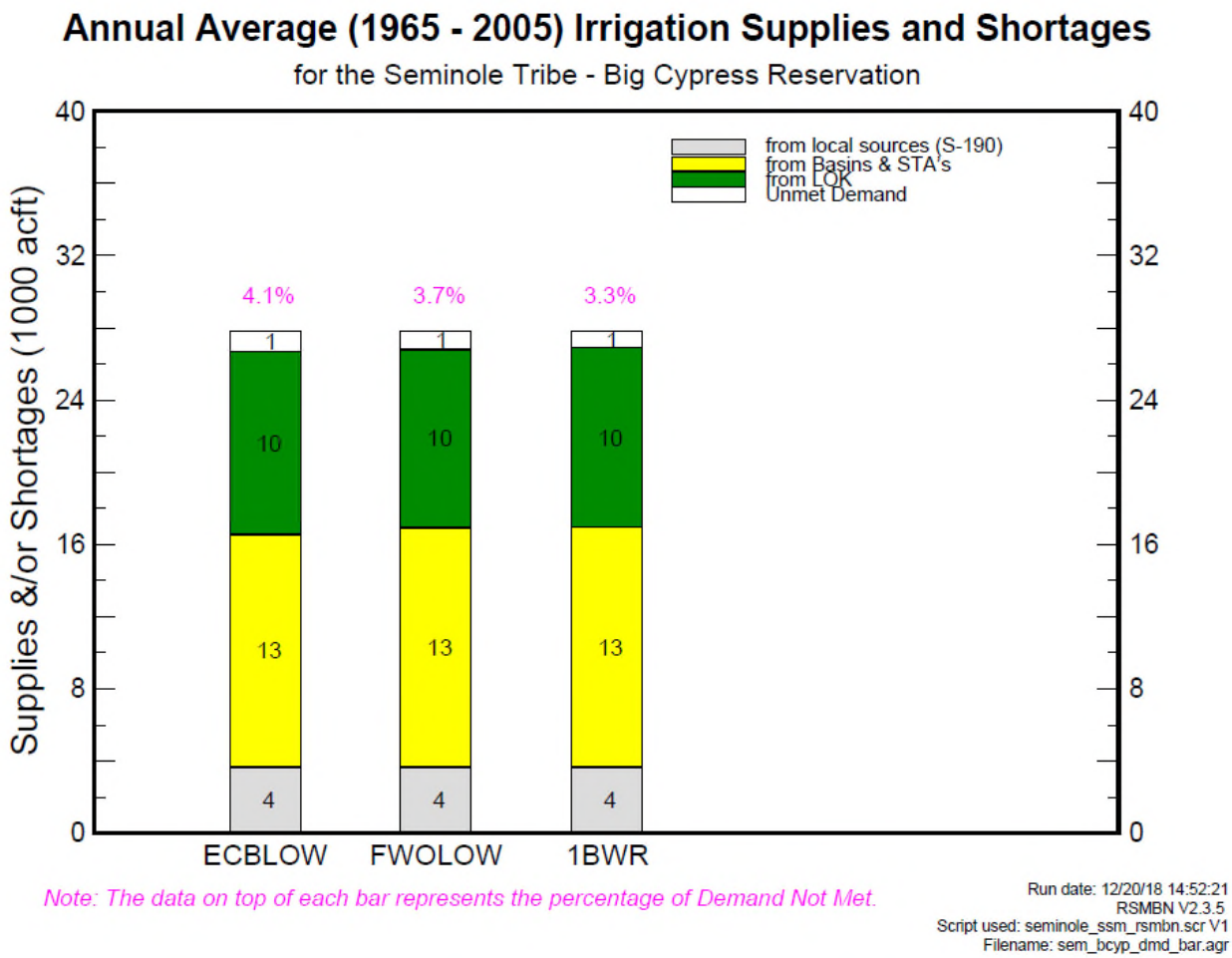

Figure 2-4 – Annual average (1965–2005) irrigation supplies and shortages for the Seminole Tribe of Florida – Big Cypress Reservation.

2.2.6 Water Supply for Fish and Wildlife

The following sections describe the water supply for fish and wildlife.

2.2.6.1 Caloosahatchee Estuary

The low-flow restoration criterion as defined by RECOVER for the Caloosahatchee Estuary is an average monthly flow of less than 450 cfs. In the Caloosahatchee Estuary, the number of months the low-flow criterion is not met is similar in the Recommended Plan and FWO project conditions. The estuary low-flow criterion is not met in 24 months out the 41-year period of simulation in Recommended Plan and 23 months in the FWO. The with-project condition does not significantly change the frequency of achieving the low-flow target.

Comparisons to the existing condition baselines show significant improvement in low-flow performance with Recommended Plan. The ECB show 116 months when average monthly flows are less than 450 cfs, compared to 24 months in Recommended Plan. The ECB does not benefit

from the inclusion of the CERP Caloosahatchee River (C-43) West Basin Reservoir, which is included in the future conditions.

2.2.6.2 St Lucie Estuary

The low-flow restoration criterion defined by RECOVER the St. Lucie Estuary is an average monthly flow of less than 350 cfs. In the St. Lucie Estuary, the number of months the low-flow criterion is not met is the same in the Recommended Plan, compared to the FWO project condition. The low-flow criterion is not met in 83 months out the 41-year period of simulation in Recommended Plan and 83 months in the FWO. The with-project condition does not change the frequency of achieving the low flow target.

Comparisons to the existing condition baselines show a significant improvement in low-flow performance with Recommended Plan. The ECB shows 95 months when average monthly flows are less than 350 cfs, compared to 83 months for Recommended Plan. The existing condition baseline does not benefit from the inclusion of the Indian River Lagoon-South Project's C-44 Basin Reservoir, which is included in the future conditions.

2.3 Water Quality

Although water quality improvement is not a study objective, ancillary water quality improvements are anticipated and were evaluated in the PIR. The water quality analysis demonstrates that the project may provide minor improvements to water quality, primarily through reductions in freshwater releases to Lake Okeechobee. The WAF and ASR wells are not expected to adversely affect tributary or Lake Okeechobee water quality. ASR discharge is typically low in dissolved oxygen (DO) and will be aerated as necessary to be compatible with Lake Okeechobee requirements. The combination of ASR and the WAF is expected to dampen the salinity flux in the estuaries and help incrementally improve achievement of desired salinity envelopes in the estuaries from reduction in high flow events associated with Lake Okeechobee freshwater releases. Additional information on the water quality evaluations and analysis is included in **Section 5** and **Appendix C** of the PIR.

The Recommended Plan is expected to improve Lake Okeechobee water quality primarily through reduced discharge volume to the lake. Results from a simple phosphorus loading analysis showed reduced phosphorous loading from 8% to 11% over the FWO project condition. The Recommended Plan is expected to reduce high-flow events, which may result in some improvement in Northern Estuaries water quality, and in improved salinity conditions. Improved nutrient and dissolved oxygen conditions are expected to result from reduced high-flow events from Lake Okeechobee, improved Lake Okeechobee nutrient levels, and improved estuary basin runoff quality due to implementation of basin management action plan (BMAP) projects.

The Recommended Plan includes 80 ASR wells. These facilities will be operated in compliance with Chapters 62-302 and 62-528, Florida Administrative Code (F.A.C.). Water quality will be monitored as described in the Adaptive Management and Monitoring Plan (**Annex D** of the PIR; hereon **Annex D**).

The wetlands associated with Paradise Run and Kissimmee River-Center features will contain high quality, freshwater wetlands. The wetland restoration components will provide increased hydroperiods and retention times of watershed runoff, and both the wetland features and WAF will result in direct conversion of pasture and upland to wetland and/or WAF in the footprints. This combination of increased wetland quantity and quality may result in minor local improvements to water quality in portions of the watershed.

Water quality associated with the project features (WAF, ASR and wetlands) will be monitored as described in the Adaptive Management and Monitoring Plan (**Annex D**).

2.3.1 Compliance with State Water Quality Standards

The LOWRP is projected to manage water on an annual basis to improve the quantity, timing and distribution of water entering Lake Okeechobee. The water leaving the project must meet the state water quality standards in Chapter 62-302, F.A.C. LOWRP project features cannot proceed unless the Comprehensive Everglades Restoration Plan Regulation Act (CERPRA) permitting process finds that construction and/or operation of the feature[(5)]:

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 WAF and ASR wells are not expected to adversely affect tributary or Lake Okeechobee water quality. ASR discharge is typically low in dissolved oxygen (DO) and will be aerated upon recovery as necessary to comply with the receiving water body requirements. Monitoring systems and operational protocols will be structured to comply with applicable regulatory standards. The combination of ASR and the WAF is expected to dampen the salinity flux and improve desired salinity envelopes in the estuaries by reducing high flow events associated with Lake Okeechobee regulatory releases. Wetland restoration sites north of Lake Okeechobee along the Kissimmee River will not adversely affect water quality. The results indicate that the LOWRP will not cause or contribute to water quality degradation of the future conditions to Lake Okeechobee.

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

2.3.2 Hazardous, Toxic and Radioactive Waste (HTRW)

The HTRW evaluation for the LOWRP 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 United States Fish and Wildlife Service (USFWS). Lands potentially used for this project are very likely to have a past or present agricultural land use. Activities conducted over the past 100 years are likely to have resulted in the presence of some HTRW materials on some of this land. State and Federal databases include information on the known HTRW contamination sites.

Phase I and II environmental site assessments will be used to identify unknown HTRW sites and to test cultivated areas for the presence of residual agricultural chemicals. The lands within the project boundary will be investigated using the *Protocol for Assessment, Remediation and Post-remediation Monitoring for Environmental Contaminants on Everglades Restoration Projects* jointly developed by FDEP, SFWMD, and USFWS. The protocol, commonly referred to as the Ecological Risk Assessment (ERA) Protocol, provides 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. **Annex G** of the PIR contains additional information on the HTRW analysis completed at the time of the PIR/EIS preparation. With the modern facilities proposed and best management practices, the potential risk for release of HTRW from the project is minimal.

2.4 Flood Protection

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." § 373.1501(5)(a), Fla. Stat. (2018). Section 385.37 of the Programmatic Regulations also requires 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). The analysis must demonstrate that the level of service for flood protection will not be reduced by implementation of the project. Where appropriate and consistent with restoration of the natural system, opportunities to provide additional flood protection shall be considered. Flood protection is evaluated by using best professional judgment to interpret model results and engineering analyses.

The three areas potentially affected by an increase in water stages from the project, and analyzed for related flood protection effects, include: 1) the wetland attenuation feature, 2) restored wetlands (Kissimmee River-Center Wetlands and Paradise Run), and 3) Lake Okeechobee HHD. The implementation of the Recommended Plan will not degrade the existing

level of flood protection offered by various components of the C&SF Project for this area. This is accomplished by applying current industry-standard design, engineering, and construction practices and techniques. U.S. Army Corps of Engineers, Engineering Regulation(s) 1110-2-1150 (Engineering and Design for Civil Works Projects) 1110-2-1156 (Engineering and Design Safety of Dams – Policy and Procedures) along with various other site/structure specific regulations will be adhered to prior to and during the PED phase by the agency leading the design. Please refer to **Annex B** of the PIR for additional information.

2.4.1 Wetland Attenuation Feature

The WAF footprint, including the embankments, seepage canal, and other perimeter features, is approximately 13,600 acres (12,150 acres within the embankments) with a storage capacity of approximately 46,000 ac-ft. Although a WAF provides above-ground storage like a typical reservoir, water levels may be maintained to keep soils inundated to prevent dry out and reflooding events. A dam safety evaluation was conducted for the WAF and concluded that a deep reservoir had unacceptably high risk to human health and safety. The District concurs with this finding which resulted in recommending a shallow above ground storage feature that should never be converted to a deep reservoir (See Section 6.8.1 of the PIR). The engineering design and construction of the WAF will follow current industry-standards for design and construction of pertinent features of the plan. U.S. Army Corps of Engineers, ER 1110-2-1150, *Engineering and Design for Civil Works Projects*, and ER 1110-2-1156, *Engineering and Design Safety of Dams – Policy and Procedures*, along with various other site/structure-specific regulations, will be adhered to prior to and during the PED phase.

2.4.2 Restore Wetlands: Kissimmee River Center and Paradise Run

The purpose of the Kissimmee River-Center and Paradise Run wetlands is to increase the spatial extent and functionality of aquatic and wildlife habitat within the Lake Okeechobee Watershed by restoring the hydrology of selected isolated and riverine wetlands. For both wetland restoration sites, pump stations will divert water from the C-38 Canal into a section of the old Kissimmee River channel. Channel excavation will also be performed within both wetland restoration sites. The water will flow through the channel and reenter the C-38 Canal through a culvert at the southern end of the wetland footprints. The water will stage up, filling the entire wetland footprint, when water is available upstream of S-65E (Pool E). The normal water elevation for Pool E is 21 ft-NGVD29.

In Paradise Run, a levee notch will be cut in the plugged section of the L-59 Canal to allow flow from the northern to southern parts of Paradise Run. There will also be stage control at the existing structures G-33 and G-34. The unique characteristics of the Paradise Run's topography enable water to be pumped from the C-41A Canal over HHD into the old Kissimmee River channel. U.S. Army Corps of Engineers, ER 1110-2-1150, *Engineering and Design for Civil Works Projects*, along with various other site/structure-specific regulations, will be adhered to prior to and during the PED phase.

2.4.3 Lake Okeechobee Herbert Hoover Dike (HHD)

Prior to the 2008 LORS, Lake Okeechobee operated under the Water Supply and Environment (WSE) regulation schedule. The WSE regulation schedule held lake stages approximately 1.0 – 1.5 feet higher than the 2008 LORS. Prior to WSE Regulation Schedule, Lake Okeechobee operated under the Run 25 regulation schedule (May 1992 through July 2000). The Run 25 regulation schedule held lake stages approximately 0.1 – 0.3 feet higher than the WSE regulation schedule (**Figure 2-5**), based on previous regional modeling analysis using a period-of-record from 1965-1995. The LORS study, which led to the implementation of 2008 LORS, was initiated because of adverse environmental impacts that WSE Regulation Schedule had on the lake ecology. Dam safety was later added as a performance criterion. Lowering a lake is one of the basic Interim Risk Reduction Measures implemented for deficient dams until appropriate rehabilitation is effectuated.

The Dam Safety Modification Report (DSMR) and corresponding EIS utilized the 2008 LORS for the risk assessment and assumed that, in the absence of Federal risk reduction measures being implemented, the current regulation schedule will continue into the future. The DSMR included a sensitivity analysis to evaluate the variation in Average Annual Life Loss (AALL) and annual probability of failure (APF) that could result from possible future changes in the lake regulation schedule; for this analysis, the DSMR risk assessment evaluated the Run 25 regulation schedule.

The DSMR did not conduct a risk assessment using the WSE Regulation Schedule. Instead, the DSMR assumed that the Run 25 schedule represented the maximum reasonable change (or upper bound) that could be expected from future studies. Considering that the operation schedules are indistinguishable above the 18.0 feet NAVD 88 (19.3 feet NGVD 29) elevation, there was no discernible difference between AALL estimates from the two operation schedules modeled- Run 25 and the 2008 LORS.

The DMSR recommended remediation of the remaining areas of HHD that exhibited intolerable risk. The existing condition risk assessment completed in 2014 identified significant potential failure modes (PFM) that were determined to be intolerable for large portions of the dam. The DSMR addressed those failure modes and identified the mitigation needed to reduce the probability of catastrophic failure of the dam. The primary dam safety risk drivers are internal erosion and storm surge overtopping of isolated areas of embankment. The target for risk reduction was to reduce risk to within USACE tolerable risk guidelines for APF and to AALL, and to consider opportunities to reduce risk to As Low as Reasonably Practicable (ALARP).

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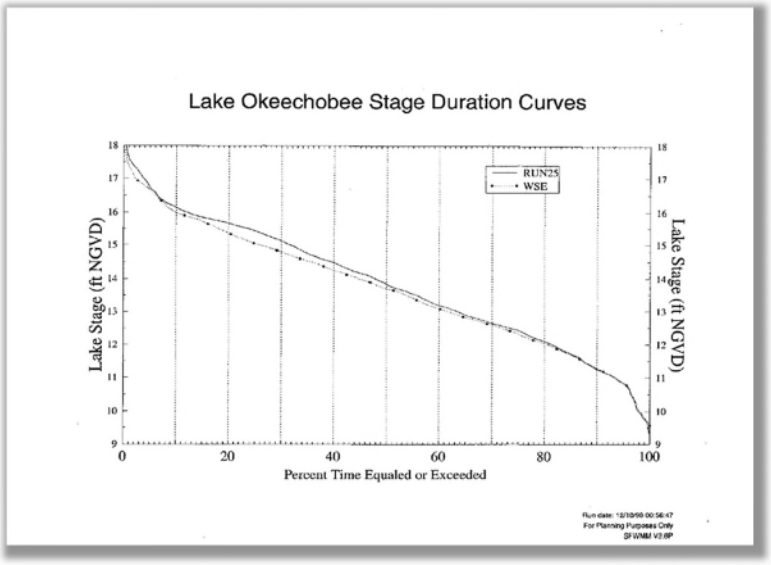

Figure 2-5 – Variation of Lake Okeechobee water stages with Run 25 and WSE Regulation Schedules (USACE, 2016).

2.4.3.1 LOWRP RSM-BN Sensitivity Simulation Water Supply and Environment (WSE) Regulation Schedule comparison with LOWRP Existing Condition Baseline - 2008 LORS

The following performance metrics from LOWRP RSM-BN sensitivity simulation conducted using the WSE Regulation Schedule (2017 Interagency Modeling Center) characterize the performance difference between the 2008 LORS (LOWRP Existing Condition Baseline) and the WSE Regulation Schedule (LOWRP Sensitivity Simulation with WSE Regulation Schedule replaced in the Existing Condition Baseline):

(1) Total number of days in the LOWRP RSM-BN period-of-record with Lake Okeechobee mean daily stage above 18.0 feet NGVD29 increased from 0 days to 29 days (longest duration event is 20 days);

(2) Total number of days in the LOWRP RSM-BN period-of-record (1965-2005; 14,970 total days) with Lake Okeechobee mean daily stage above 17.25 feet NGVD29 increased from 16 days to 537 days;

(3) Total number of days in the LOWRP RSM-BN period-of-record with Lake Okeechobee mean daily stage above the 2008 LORS Zone A (seasonal range from 16.0-17.25 feet NGVD29) increased from 37 days to 830 days;

(4) Total number of days in the LOWRP RSM-BN period-of-record with Lake Okeechobee mean daily stage above 16.0 feet NGVD29 increased from 859 days to 2523 days;

(5) The number of events in the LOWRP RSM-BN period-of-record with Lake Okeechobee mean daily stage above 16.0 feet NGVD29 for longer than 90 consecutive days increased from 3 events to 12 events;

(6) The number of events in the LOWRP RSM-BN period-of-record with Lake Okeechobee mean daily stage above 16.0 feet NGVD29 for longer than 180 consecutive days increased from 1 event to 5 events.

2.4.3.2 LOWRP Existing Condition Baseline compared to the Recommended Plan (1BWR)

The hydrologic modeling of the Recommended Plan optimizes system-wide performance incorporated in the current Regulation Schedule management bands of the 2008 LORS. The hydrologic modeling of the Recommended Plan 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 Recommended Plan modeling lie within the bounds of the operational limits and flexibility available in the 2008 LORS, except for 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 additional water stored in the Lake. This optimized system-wide performance and ensured 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 2008 LORS. Additional information and documentation of the Recommended Plan modeling assumptions for Lake Okeechobee operations are found in **Appendix A, Annex A-3** of the PIR.

Independent of implementation of the Recommended Plan, there is an expectation that revisions to the 2008 LORS will be needed following the implementation of other CERP projects and HHD infrastructure remediation. The USACE expects to operate under the 2008 LORS until there is a need for revisions due to the earlier of either of the following actions: (1) system-wide operating plan updates to accommodate CERP projects, or (2) completion of sufficient HHD remediation and associated culvert improvements. 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 Recommended Plan. The Lake Okeechobee System Operating Manual (LOSOM) study which was developed in response to actions (1) and/or (2) started in 2019 and will be completed in 2022.

Lake Okeechobee stage duration curves for the RSM-BN model representation of the Existing Condition Baseline (ECBLOW) (2008 LORS; note that plot lines overlap), Future without project

(FWOLOW) (2008 LORS, plus additional CERP and non-CERP projects), and the Recommended Plan (2008 LORS, additional CERP and non-CERP projects, and prescribed assumed operational flexibility) are included as **Figure 2-6** . Current peak stages for the LOWRP current Savings Clause baselines and Recommended Plan are summarized as follows: 17.58 feet NGVD for the ECBLOW; 17.65 feet NGVD for the FWOLOW; and 17.56 feet NGVD for the Recommended Plan.

The USACE 2008 LORS EIS assessment recognized that minimizing the frequency of exceedance of the 17.25 feet elevation offers additional protection for public safety and the HHD. 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 2-7**. The baselines and the Recommended Plan all show simulated stages above 17.25 feet NGVD: 16 days for the ECBLOW; 30 days for the FWOLOW; and 42 days for Recommended Plan (note: there are 14,975 days in the RSM-BN 41-year period of simulation).

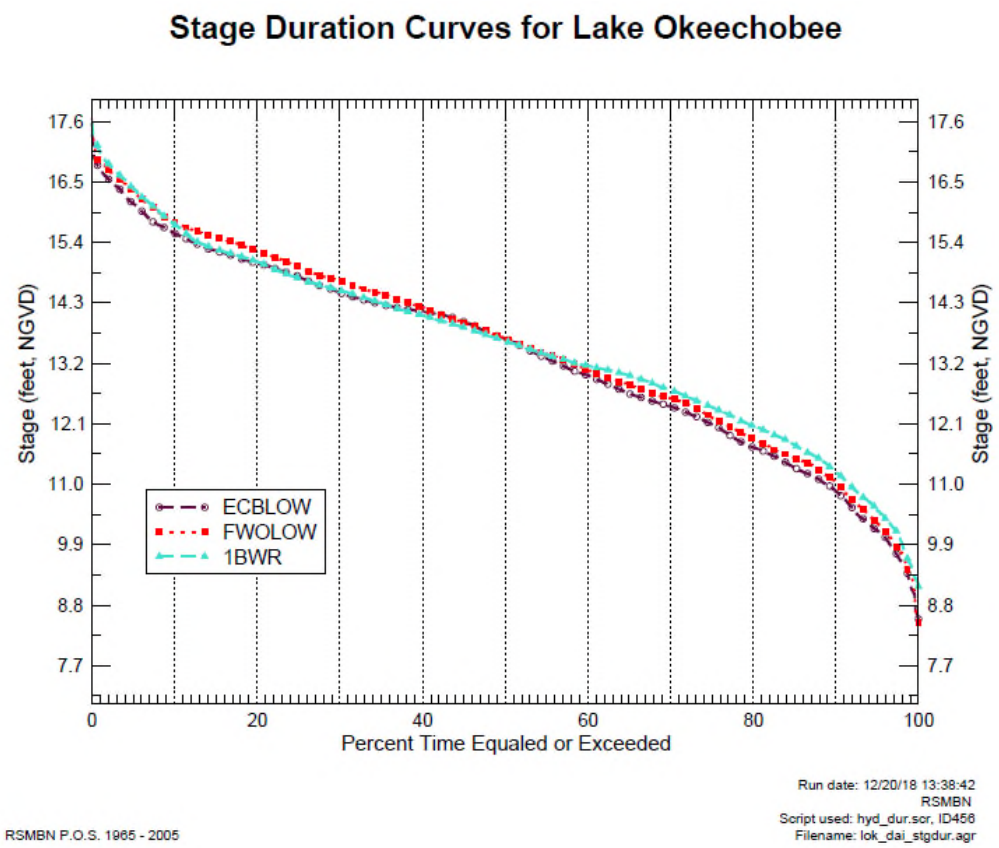

Figure 2-6 Lake Okeechobee Stage Duration Curve

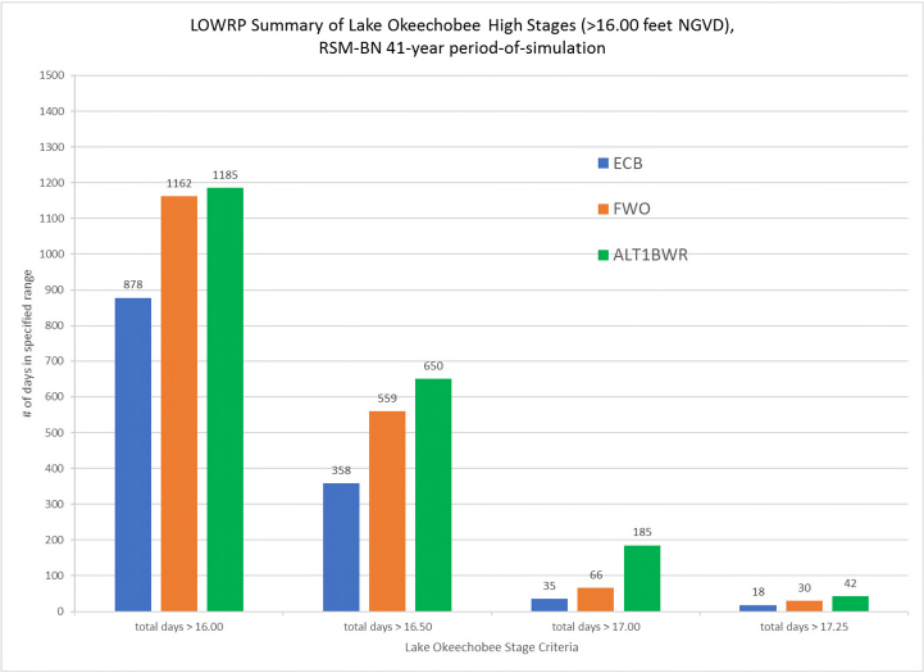

Figure 2-7 Lake Okeechobee extreme high lake stage

2.4.3.3 Recommended Plan comparison with LOWRP RSM-BN Sensitivity Simulation Water Supply and Environment (WSE) Regulation Schedule

The assumed modified Lake Okeechobee operations with the project increases the frequency, duration, and magnitude of Lake Okeechobee peak stages (compared to the FWO) but it does not exceed the LOWRP RSM-BN Sensitivity Simulation WSE Regulation Schedule model run. Therefore, the LOWRP stage duration curve trends for increased high-water conditions appear reasonable based on the current expectations for the HHD remediation. Following completion of the HHD remediation, the degree to which higher maximum lake stages and increased frequency and duration of high lake stages would be accepted, if at all, will be contingent on the LOSOM (note: this process is independent and separate from the LOWRP). Please refer to Section B.2.5.3.4 of Annex B of the PIR for detailed information.

2.5 Threatened and Endangered Species

The project area of the LOWRP is large and serves a great diversity of fish and wildlife species that occur throughout the Lake Okeechobee Watershed, the Northern Estuaries, and Lake Okeechobee. Important fish and wildlife resources in the project area include aquatic macroinvertebrates, small freshwater marsh fishes, larger sport fishes, amphibians and reptiles, birds, including raptors and wading birds, and mammals. Much of the native habitats in the Lake Okeechobee watershed have been replaced by agricultural uses. The creation of ditches, canals, and the flooding of fallow agricultural fields provides some lower quality habitat for fish and wildlife, particularly during the rainy season. In the FWO condition, a further reduction in habitat function is possible, albeit to a lesser rate than in the past. In this event, it would likely

result in a decrease in the abundance and diversity of fish and wildlife resources on non-protected lands. Without the project, desired restoration of historic water fluctuations within Lake Okeechobee would not be accomplished. Lower water levels could provide opportunities for foraging for wading birds and other birds dependent upon aquatic prey species by concentrating prey and exposing additional shallow water habitat; however, without the project, drought conditions would be ecologically worse without additional water storage to offset low lake levels. Fish and wildlife resources inhabiting the Northern Estuaries would continue to be impacted by flood control regulatory releases from Lake Okeechobee. Annual variability in flow from Lake Okeechobee would lead to salinity extremes outside the tolerance ranges of many fish and wildlife resources resulting in decreased species diversity in the Northern Estuaries. Further declines in estuarine habitat (SAV and oysters) would continue to result in additional declines in the species that utilize these habitats.

Representatives from the USFWS and Florida Fish and Wildlife Conservation Commission (FWC) have been active project team members and provided guidance on LOWRP's potential impacts on federally listed threatened and endangered species within the project area. The FWC completed an environmental resource analysis utilizing Geographical Information System (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. These experts defined and provided a final determination of potential effects on state listed species. Additional protected species effects information can be found in **Section 5**, **Annex A** and **Appendix C** of the PIR.

2.5.1 Federally-Listed Species

Federally-listed threatened and endangered species are either known to exist or potentially exist within the project area and, consequently, 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 coordinated the potential impact evaluation of federally-listed species with USFWS and National Marine Fisheries Service (NMFS), as appropriate. Specifically, coordination with NMFS includes listed marine fish, whales, and sea turtles. Coordination with USFWS includes freshwater plants and animals.

Federally threatened, endangered, and candidate species that may occur within the study area include the Florida panther (*Puma concolor coryi*), Florida population of West Indian Manatee and its critical habitat (Florida manatee) (*Trichechus manatus*), Everglade snail kite (*Rostrhamus sociablis plumbeus*) and its critical habitat, northern crested caracara (*Polyborus plancus audubonii*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), red-cockaded woodpecker (*Picoides borealis*), whooping crane (*Grus americana*), wood stork (*Mycteria americana*), Florida bonneted bat (*Eumops floridanus*), eastern indigo snake (*Drymarchon corais couperi*), bluetail mole skink (*Eumeces egregius lividus*), sand skink (*Neoseps reynoldsi*), Okeechobee gourd (*Cucurbita okeechobeensis* ssp. *okeechobeensis*), smalltooth sawfish (*Pristis*

pectinata) and its critical habitat, green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), Johnson's seagrass (*Halophila johnsonii*) and its critical habitat. For more detailed information please refer to **Section 5.2.4** of the PIR.

2.5.2 State Listed Species

The LOWRP project area contains habitat suitable for the presence, nesting, and/or foraging of 12 state-listed threatened and endangered species and 1 species of special concern. Threatened and endangered animal species include the American oystercatcher (*Haematopus palliatus*), black skimmer (*Rynchops niger*), least tern (*Sternula antillarum*), Florida burrowing owl (*Athene cunicularia*), Florida sandhill crane (*Grus canadensis pratensis*), little blue heron (*Egretta caerulea*), roseate spoonbill (*Platalea ajaja*), Southeastern American kestrel (*Falco sparverius paulus*), tricolored heron (*Egretta tricolor*), gopher tortoise (*Gopherus polyphemus*), Florida pine snake (*Pituophis melanoleucus mugitus*) and Big Cypress fox squirrel (*Sciurus niger avicennia*). The species of special concern is Sherman's fox squirrel (*Sciurus niger shermani*).

The Recommended Plan shows a slight performance improvement within the Northern Estuaries as indicated by fewer high-volume flow months, providing a minor beneficial effect to State-listed beach-nesting birds. Implementation of the Recommended Plan is expected to improve conditions for state-listed wading birds throughout much of the project area by restoring 4,800 acres of wetlands along the Kissimmee River floodplain. Florida sandhill cranes may occur within the WAF and wetland restoration footprints, and, as a result of construction, may be displaced from the WAF and to a lesser extent from wetlands. Burrowing owls, Southeastern American kestrels, Florida pine snakes, Big Cypress fox squirrels and Sherman's fox squirrels have a high probability of occurrence within the WAF and wetland restoration footprints and are likely to be displaced. Prior to construction, surveys of these species will be conducted, and the USACE coordinate with the Florida Fish and Wildlife Conservation Commission (FWC) on appropriate impact avoidance, minimization, and/or mitigation measures. For more detailed analysis, please refer to **Appendix C** of the PIR

2.5.3 Threatened and Endangered Species Evaluation

The overall objective of LOWRP is to increase water storage capacity in the watershed, improve the quantity and timing of discharges to the Caloosahatchee and St. Lucie estuaries and restore wetlands. Federally and state listed threatened, endangered, and candidate species may occur within the study area (**Table 2-6**). Species described in the following section were determined by the USACE to potentially be affected by the project. No effect species determinations are described in **Annex A** of the PIR, LOWRP Biological Assessment (BA) and the CERP Programmatic BA for National Oceanic and Atmospheric Administration (NOAA) NMFS. It was determined that a supplemental BA was not needed based on coordination of the

Recommended Plan with the USFWS. Effects determinations on federally listed species in the BA submitted concurrent with the Draft PIR/EIS remained the same. Direct and/or indirect impacts within the action area resulting from the Recommended Plan remained the same.

Table 2-6 - List of threatened, endangered, and candidate species know to occur in Okeechobee, Highlands, Charlotte, Glades, Martin and St. Lucie counties. State listed species of special concern (SSC) are also listed.

Scientific Name	Common Name	Federal Status	State Status	Alternative 1BWR(Recommended Plan)Determinations
Reptiles				
Caretta caretta	Loggerhead sea turtle	Threatened	Threatened	May Affect Not Likely to Adversely Affect
Chelonia mydas	Green sea turtle	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Dermochelys coriacea	Leatherback sea turtle	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Drymarchon couperi	Eastern indigo snake	Threatened	Threatened	May Affect
Eumeces egregius lividus	Bluetail mole skink	Threatened	Threatened	No Effect
Gopherus polyphemus	Gopher tortoise	Not listed	Threatened	May Affect
Lepidochelys kempii	Kemp's Ridley sea turtle	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Neoseps reynoldsi	Sand skink	Threatened	Threatened	No Affect
Pituophis melanoleucus mugitus	Florida pine snake	Not listed	Threatened	May Affect
Birds				
Ammodramus savannarum floridanus	Florida grasshopper sparrow	Endangered	Not Listed	May Affect Not Likely to Adversely Affect
Aphelocoma coerulescens	Florida scrub jay	Threatened	Not Listed	No Effect
Athene cunicularia	Burrowing owl	Not listed	Threatened	May Affect
Egretta caerulea	Little blue heron	Not listed	Threatened	No Effect
Egretta tricolor	Tricolored heron	Not listed	Threatened	No Effect
Falco sparverius paulus	Southeastern American kestrel	Not listed	Threatened	No Effect

Scientific Name	Common Name	Federal Status	State Status	Alternative 1BWR(Recommended Plan)Determinations
Grus Americana	Whooping crane	Experimental Population non-essential	Not Listed	No Effect
Grus canadensis pratensis	Florida sandhill crane	Not listed	Threatened	May Affect
Haematopus palliates	American oystercatcher	Not listed	Threatened	No Effect
Mycteria americana	Wood stork	Endangered	Not Listed	May Affect Not Likely to Adversely Affect
Picoides borealis	Red-cockaded woodpecker	Endangered	Not Listed	No Effect
Platalea ajaja	Roseate spoonbill	Not listed	Threatened	No Effect
Polyborus plancus audubonii	Audubon's crested caracara	Threatened	Not listed	May Affect
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered	Not Listed	May Affect Not Likely to Adversely Affect
Rychops niger	Black skimmer	Not listed	Threatened	No Effect
Sterna antillarum	Least tern	Not Listed	Threatened	No Effect
Mammals				
Eumops floridanus	Florida bonneted bat	Endangered	Not Listed	May Affect
Puma concolor coryi	Florida panther	Endangered	Not Listed	May Affect Not Likely to Adversely Affect
Sciurus niger avicennia	Big Cypress Fox Squirrel	Not Listed	Threatened	May Affect
Sciurus niger shermani	Sherman's Fox Squirrel	Not Listed	Not Listed	May Affect
Trichechus manatus	Florida manatee	Endangered	Not Listed	May Affect Not Likely to Adversely Affect
Plants and Lichens				
Asimina tetramera	Four-petal pawpaw	Endangered	Endangered	No Effect
Cladonia perforata	Florida perforate cladonia	Endangered	Endangered	No Effect
Cucurbita okeechobeensis	Okeechobee gourd	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Dicerandra immaculate	Lakela's mint	Endangered	Endangered	No Effect

Scientific Name	Common Name	Federal Status	State Status	Alternative 1BWR(Recommended Plan)Determinations
Halophila johnsonii	Johnson's seagrass	Threatened	Threatened	No Effect
Jacquemontia reclinata	Beach jacquemontia	Endangered	Endangered	No Effect
Liatrus ohlingerae	Scrub blazing star	Endangered	Endangered	No Effect
Panicum abscissum	Cutthroat grass	Not Listed	Endangered	No Effect
Paronchia chartacea	Papery whitlow-wort	Threatened	Endangered	No Effect
Polygala lewtonii	Lewton's polygala	Endangered	Endangered	No Effect
Polygala smallii	Tiny polygala	Endangered	Endangered	No Effect
Warea carteri	Carter's mustard	Endangered	Endangered	No Effect
Critical Habitat				
Rostrahamus sociabilis plumbeus	Everglade snail kite	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Trichechus manatus	West Indian Manatee	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Chelonia mydas	Green sea turtle	Endangered	Endangered	May Affect Not Likely to Adversely Affect
Halophila johnsonii	Johnson's seagrass	Threatened	Threatened	May Affect Not Likely to Adversely Affect

Information regarding the species evaluation processes can be found in **Sections 2.1.4, 5, and Appendix C** of the PIR.

2.6 Other Natural System Habitat Needs

Historically, the LOWRP area was approximately 40 percent wetlands, consisting of cypress and bay tree forests, inland swamps and lake floodplains, freshwater marsh, wet prairie, and sawgrass marsh (Davis 1943). Wetlands in the watershed have been drastically reduced by land use changes and drainage projects. This substantial reduction in the spatial extent of wetlands is exacerbated by a reduction in the functionality of remaining wetlands, as many of them have lost vital hydrologic and ecological connections to each other and to the greater aquatic system of the Lake and the Everglades. This loss of wetland habitat has resulted in reduced water storage on the landscape, increased stormwater runoff, and flashier hydroperiods in the Lake Okeechobee Watershed.

The conversion of natural areas for urban and agricultural uses and the network of C&SF Project canals has caused complete shifts in vegetative communities, habitat loss for fish and wildlife resources, and smaller and less diverse wildlife populations. The Recommended Plan will restore approximately 4,800 acres of historic Kissimmee River floodplain wetlands. Creating and reconnecting existing wetlands to increase water storage north of Lake Okeechobee is essential for achieving ecological restoration. Restoring portions of the Kissimmee River floodplain will return additional increments of the channelized Kissimmee River to a more natural hydroperiod. The restoration in the region will improve hydrology that is crucial for the State of Florida and the nation, given the significance of the ecosystems north of Lake Okeechobee.

The Caloosahatchee and St. Lucie estuaries (Northern Estuaries) have been subject to watershed runoff and increased freshwater releases from Lake Okeechobee for decades, resulting in successive years of environmental and economic impacts to these regions. Current operations of the C&SF Project and drainage for urban and agricultural development increased the volume and altered the timing of local basin discharges to the rivers and estuaries. Both stormwater runoff and regulatory releases from Lake Okeechobee have changed the quantity, timing, and distribution of freshwater entering the estuaries, which can cause atypical salinity fluctuations.

Low flows to the estuaries also affect the balance and stability of downstream communities. Flows less than 450 cubic feet per second (cfs) at S-79 in the Caloosahatchee River Estuary are considered undesirable because low flows allow saltwater to intrude, raising salinity above the tolerance limits for communities of submerged aquatic plants in the upper estuary. In the St. Lucie Estuary, flows less than 350 cfs at S-80 have this effect, as they result in higher salinities at which oysters are susceptible to increased predation and disease. Both SAV and oyster reefs are important habitats for fish and other organisms and contribute to ecological values.

The Recommended Plan reduces the return frequency, volume, and duration of freshwater releases from Lake Okeechobee that are discharged into the Caloosahatchee and St. Lucie estuaries, thus reducing the turbidity, sedimentation, and moderate unnatural changes in salinity that are detrimental to estuarine communities. Reductions in turbidity and sedimentation would allow greater light penetration, promoting the growth of seagrass beds. These reductions would also help lessen the flushing of 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 reduces the number of times the Caloosahatchee Estuary high discharge criteria is exceeded (mean monthly flow >2800 cfs) by 14% and the extreme high discharge criteria is exceeded (mean monthly flow > 4500 cfs) by 17% over the FWO condition. The Recommended Plan reduces the number of times the St. Lucie Estuary high discharge criteria is exceeded (mean monthly flow between 2,000 to 3,000 cfs) by 19% and the extreme high discharge criteria is exceeded (mean monthly flow > 3,000 cfs) by 12% over the FWO

condition. The Recommended Plan provides a 30% total reduction of undesirable flows when compared to the FWO.

Reducing the duration and return frequency of freshwater releases allows more time for the estuaries to recover and establish resiliency. The implementation of the LOWRP would increase the acres of SAV, oyster, and healthy benthic habitat. The improvement of estuarine conditions will ultimately have a significant beneficial effect to essential fish habitat resources. Submerged aquatic vegetation and algal communities are also common foraging areas for the green sea turtle. Reductions in freshwater releases within the Northern Estuaries reduce stress on SAV and promote increases in seagrass shoots that have the potential to increase foraging opportunities for green sea turtles in this region.

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3 Determination of Project Component Feasibility

Paragraph 373.1501(5)(b), F.S., requires the SFWMD to "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 alternative or combination of alternatives, consistent with Restudy purposes, implementation of project components, and operation of the project." The goal of the Planning Level cost estimates for the LOWRP are to present a Total Project Cost (construction and non-construction costs) for the Recommended Plan, in today's dollars, for project justification/authorization. In addition, the costing efforts are intended to produce a final product (cost estimate) that is reliable and accurate. This estimate was prepared with the project at the primary level and the Civil Works Breakdown Structure (CWBS) feature codes at the secondary level and is supported by labor, equipment, and materials for the majority of the cost items; however, a few cost items are based on parametric tools with historical data. The project team performed a risk analysis to address project uncertainties and set contingencies for selected plan cost items. Guidance for estimating costs, the fully funded (escalated for inflation through project completion) cost estimate and the Total Project Cost Summary, including the risk register, is provided in **Appendix B** of the PIR. **Section 6.4** of the PIR contains additional cost estimate information.

3.1 Standard Engineering Practices and Technologies

The LOWRP will be implemented in accordance with the Recommended Plan – Alternative 1BWR. The project components are described in **Section 1.3** of this State Compliance Report. More information about the project components can be found in **Section 6** of the PIR.

3.1.1 Engineering and Design

Appendix A of the PIR represents a limited level of design but includes documentation of all engineering assumptions and conceptual designs. PED for Recommended Plan features could begin after Congressional authorization and upon SFWMD's concurrence consistent with the implementation phases. 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 reviewed for consistency with the implementation phases as necessary. After completion of 60% plans and specifications for a given project feature, the lead construction agency (USACE or SFWMD) will prepare and submit a CERPRA permit application (§ 373.1502, F.S.) to the FDEP. The FDEP will review the application material to determine if the agency

provided reasonable assurances that the feature will be consistent with existing State water quality standards.

USACE uses the NGVD of 1929 (NGVD 29) system for elevation comparisons with monitoring data, hydrologic modeling and design in Florida. This allows the continuity of years of valuable data to be transitioned during PED to the more accurate NAVD of 1988 (NAVD 88). This report and the PIR continues of the usage of NGVD and NAVD where appropriate in hydrologic modeling and preliminary design of LOWRP features. In PED, the NGVD 29 elevations will be converted to NAVD 88 for design analyses and completion of construction documents (plans and specifications). In some prior instances, the local sponsor has requested both vertical datums to be referenced during PED. There are appropriate conversions based on spatial relevance to maintain design intent changing from the NGVD 29 datum to the NAVD 88 datum.

3.2 Efficiency and Cost Effectiveness

The 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 was conducted to ensure that the selected alternative would efficiently produce the desired environmental benefits as documented in **Section 4** of the PIR. 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.

The Cost Evaluation and Incremental Cost Analysis (CE/ICA) tool 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 "Are the additional outputs worth the costs incurred to achieve them?".

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

over the period of analysis. Additional detailed information on efficiency and cost effectiveness is included in the Evaluation and Comparison of Alternative Plans (**Section 4**) of the PIR.

3.2.1 Cost-effectiveness and Incremental Cost Analysis

Costs and benefits for water storage and wetland restoration components were analyzed both independently and combined. However, a combined Average Annual Habitat Unit (AAHU) 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 AAHU was used to ensure a cost-effective alternative was identified. The Lake Okeechobee and Northern Estuary benefits were calculated as the difference in AAHU between the with-project and FWO over the period of analysis (through year 2078). For sake of comparison, the FWO benefits have been set to 0 to show each action alternative's lift over the FWO, even though the FWO includes ecological improvements associated with the completed projects described in **Section 2.5** of the PIR.

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 FWO condition cost. The plan with the lowest incremental costs per unit of output of all plans is the first best buy plan. Only larger cost-effective plans are compared to the first best buy plan in terms of increases in cost and increases in output. The Phase 1 Water Storage LOWRP CE/ICA for the final array of alternatives is summarized in **Table 3-1**.

Table 3-1 – Phase 1 Water Storage Component CE/ICA Summary

	1BW (STORAGE)	1Bshlw (STORAGE)	2Cr (STORAGE)
Total Implementation Costs*	$1,514,000,000	$1,595,000,000	$2,045,000,000
Annual O&M	$14,407,000	$14,407,000	$12,424,000
Average Annual Cost*	$62,968,000	$65,561,000	$78,172,000
Lake Okeechobee AAHU	2,374	1,884	5,091
Estuary AAHU	3,591	4,194	3,163
Total Storage AAHU	5,965	6,078	8,255
Cost Effective	YES	YES	YES
AAC* per AAHU	$11,818	$12,089	$10,682
1st Best Buy	NO	NO	YES

*Costs are for water storage components with the exception of interest during construction, which includes both storage and wetland interest during construction. Interest during construction is non-separable due to planning

level costs and overlapping schedules. These costs are planning-level for the purposes of comparison of alternatives and will be refined for the recommended plan.

As each storage alternative produces a unique level of total storage AAHU and no alternative provides more output at a lower cost, each is cost effective. The best buy plan identified by the CE/ICA was Alternative 2Cr, which had the highest output but at the highest planning-level cost. Alternatives 1BW and 1Bshlw were also considered as potential National Ecosystem Restoration (NER) plans as smaller-scale, cost-effective plans. The Phase 2 Wetland Restoration Selected Sites are summarized in **Table 3-2**.

Table 3-2 – Phase 2 Wetland Restoration Selected Sites

SITES	TOTAL ACRES	TOTAL FIRST COSTS	AVERAGE ANNUAL HUS	AVERAGE ANNUAL COSTS	AVERAGE ANNUAL COST PER AVERAGE ANNUAL HU
Kissimmee River Center	5,279	$109,000,000	2,750	$4,063,000	$1,480
Paradise Run					

3.2.2 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, National Economic Development (NED) costs (as defined by federal and USACE policy) are expressed in FY2018 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; PED; construction management; and Operation and Maintenance, Repair, Replacement and Rehabilitation (OMRR&R). the cost estimate was developed through engineering design and cost estimation, and real estate appraisal efforts. The costs listed in this section are planning-level for comparison of alternatives. Costs will be refined on the selected plan as more design detail becomes available. For comparison to the action alternatives, the FWO condition cost is set to 0. However, the ecological improvements are associated with the completed projects described in **Section 2.5** of the PIR. Each of these projects has an associated authorized project cost and costs that have already been incurred and cannot be recovered to obtain benefits in the FWO condition.

3.2.2.1 Overview of Real Estate Costs

An analysis of the real estate requirements of the final array was completed. Each parcel required for the project was identified and a planning-level fee simple estimate was calculated for each alternative. More detail on real estate analysis is available in **Appendix D** of the PIR.

3.2.2.2 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 2.75% 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 real estate, construction costs, and PED. IDC for construction and construction management assumed a 120-month unconstrained construction timeline. IDC was computed for the total real estate cost starting from the month prior to construction commencing, amounting to a 121-month period. IDC for planning, engineering and design costs were calculated to reflect a 48-month period. These estimates are based on generalized construction schedules and assume that funding is readily available and land acquisition is completed before construction starts. The total first cost is the sum of construction and other capital costs, such as real estate and pre-construction. **Table 3-3** summarizes the total investment cost and AAC for the focused array of alternatives. Costs calculated below are planning-level for the purposes of comparison of alternatives and will be refined for the Recommended Plan.

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Table 3-3 – Planning Level Total Project Costs of Alternative Plans (FY18 Price Level)

	Summary of Costs for LOWRP Alternative Plans[6]		
	1BW	**1Bshlw**	**2Cr**
Cost Component			
Construction & Construction Management	$1,263,000,000	$1,317,000,000	$1,709,000,000
Lands	$97,000,000	$110,000,000	$95,000,000
Preconstruction Engineering & Design	$60,000,000	$63,000,000	$80,000,000
Total First Cost	**$1,420,000,000**	**$1,490,000,000**	**$1,884,000,000**
Interest During Construction			
Construction & Construction Management	$186,000,000	$194,000,000	$252,000,000
Lands	$14,000,000	$16,000,000	$14,000,000
Preconstruction Engineering & Design	$3,000,000	$3,000,000	$4,000,000
Total Interest During Construction	**$204,000,000**	**$214,000,000**	**$271,000,000**
Total Project Investment	$1,623,000,000	$1,704,000,000	$2,154000,000
Average Annual Cost			
Interest & Amortization	$60,100,000	$63,100,000	$79,800,000
OMRR&R Storage Component	$14,400,000	$14,400,000	$12,400,000
OMRR&R Wetland Component	$1,000,000	$1,000,000	$1,000,000
Average Annual Cost	**$75,500,000**	**$78,500,000**	**$93,200,000**

**Recommended Plan Real Estate Acquisition Costs [1,2]	
WAF	$70,000,000
Paradise Run Wetland	$26,000,000
Kissimmee River Center Wetland	$8,000,000
ASR Wells	$1,000,000
Total Real Estate Acquisition Costs	$114,000,000

1 – contingency of 30% included in real estate acquisition costs
2 – cost rounded to closest $1,000,000

[6] Costs are planning-level for the purposes of comparison of alternatives. Costs will be refined at implementation.

3.2.2.3 Recommended Plan Costs

The project team performed a modification of the TSP (1BW) footprint to become the Recommended Plan (1BWR). The Recommended Plan provides a higher level of planning than did the final array of alternatives. Guidance for estimating costs, the fully funded (escalated for inflation through project completion) cost estimate and the Total Project Cost Summary, including the risk register, is provided in **Appendix B** of the PIR, and additional cost estimate information for the Recommended Plan is included in **Section 6.4** of the PIR.

3.2.3 Ecological Evaluation (Habitat Units) and Environmental Benefits

The PDT developed performance measures and a benefit model to evaluate alternatives within the LOWRP study area. The primary areas evaluated included the Lake Okeechobee watershed, Lake Okeechobee, and the Northern Estuaries. The benefit model used a geographic information system (GIS) tool and a Microsoft Excel spreadsheet that uses project performance measures to derive a HU score that represents the ecological performance achieved by each alternative. **Appendix G**, of the PIR, contains the complete description of the model, equations and calculations, and further information pertaining to the alternative evaluation.

The LOWRP benefit model was used to aggregate the results of project performance measures. Three of the performance measures (Lake Okeechobee Stage Envelope, Lake Okeechobee Ecological Indicator Score, and the Northern Estuaries Salinity Envelope) for the LOWRP planning effort were derived from those approved for use in CERP by RECOVER. An additional wetland restoration performance measure was identified by the LOWRP PDT. Four PMs were developed to measure three restoration objectives for LOWRP within three ecological zones (**Table 3-4**).

- **PM 1 Wetland Restoration** – Measuring potential wetland benefits of managing hydrologic regimes for major plant communities and reconnecting natural areas.
- **PM 2 Lake Okeechobee** - Hydrologic regimes in Lake Okeechobee specific to three criteria (1-Lake stage envelope; 2-Extreme high and low lake stage; 3-Ecological indicators).
- **PM 3 Caloosahatchee Estuary Salinity** - Seasonal flows to manage salinity in the Caloosahatchee Estuary to benefit native flora and fauna.
- **PM 4 St. Lucie Estuary Salinity** - Seasonal flows to manage salinity in the St. Lucie Estuary to benefit native flora and fauna.

The complete RECOVER-approved PM Documentation Sheets are located in **Appendix G** of the PIR.

Table 3-4 – Performance Measures Used to Quantify Plan Benefits

Region	Performance Measure	Description
Lake Okeechobee Watershed	**Wetland Habitat Quality** • Considers optimum quality for each habitat type within the wetland restoration sites	Measure of the acreage of different habitats in the wetland footprints. For each wetland site, a quality factor was assigned for each habitat type within the wetland restoration sites based on land use code (FLUCCS; from the 2015 SFWMD shapefile) using best professional judgment, supplemented by limited field evaluations. Using ArcGIS, the size of each FLUCCS polygon within each potential restoration site was measured and multiplied by its quality factor to arrive at a HU for that polygon. All polygons inside the restoration site were then summed to calculate the total HUs. To calculate the benefits for each wetland site, the HU for the FWO condition are subtracted from the HU in the future with project (FWP) condition.

Lake Okeechobee	**Lake Stage Envelope**
	• Lake stage remains within the desired envelope of 12.5 ft. – 15.5 ft.
	• Lake stage remains below extreme high stage (above 17 ft. NGVD) and above extreme low stage (below 10 ft. NGVD).
	Lake Okeechobee Ecological Indicator Score
	• Correlation between the six ecological indicators and Lake Okeechobee stage
	  o Chara abundance
	  o Cyanobacteria abundance
	  o Epipelon abundance
	  o Epiphyton abundance
	  o Panfish (Bluegill and Redear Sunfish) creel survey abundance
	  o Vascular submerged aquatic vegetation (SAV) communities
		Measure of the amount of time Lake Okeechobee stage is within the beneficial lake stage envelope, the amount of time Lake Okeechobee is below the extreme high lake level and above the extreme low lake level, and the Lake Okeechobee hydrology using 6 nearshore ecological scoring metrics.

Northern Estuaries	**Caloosahatchee Estuary Salinity Envelope** • Performance Measure (PM) 3.1 Low-flow Targets • PM 3.2 High-flow Targets **St. Lucie Estuary Envelope** • PM 4.1 Low-flow Targets • PM 4.2 High-flow Targets	Measure of the frequency of flows correlated to downstream estuarine salinities favorable to marine fish, shellfish, oysters, and SAV.

3.2.3.1 Wetland Restoration Benefit Calculations

One of the goals of the LOWRP is to restore the hydrology of watershed wetlands. This will serve to increase habitat, water supply, and recreation in the watershed. The overall CERP target for wetland restoration from the Restudy was a minimum of 3,500 acres. The PM used five sub-metrics that establish the wetland targets for screening: wading bird support; percent connectivity; surface water connection; restoration potential; and public access. Based on the screening criteria, 9 potential sites were narrowed down to 4 sites. These 4 sites were carried forward into the final array of alternatives and GIS analysis was used to calculate HUs. The screening process is described in **Appendix E** of the PIR. The wetland sites that were carried on to the HU analysis are Lake Okeechobee West, IP-10, Paradise Run, and the new Kissimmee River sites. Using best professional judgment, supplemented by limited field evaluations, a "quality factor," called ecological value (EV), was assigned for each habitat type within the 4 wetland restoration sites based on land use code. The size of each FLUCCS polygon within each potential restoration site was measured and multiplied by its EV to arrive at a HU for that polygon.

HU were calculated as follows:
Existing $\text{Eco-Value}_{FLUCCS2110} \times \text{Acres}_{FLUCCS2110} = HU_1$ *e.g.,* 0.2 x 2515.08 = 503.02 HUs
and then summed as $HU_1 + HU_2 + \ldots HU_9 = HU_{total}$ *e.g.,* 503.02 + 25.22 + … 16.55 = 620.25 HUs

To estimate HUs under FWO project conditions, the team made assumptions about how the wetland and upland land covers would change over time. Because CERP projects are evaluated over a 50-year period, the possible land use change scenarios were estimated as: 1) no change within the site; 2) the site is restored by another entity such as the Wetland Reserve Easement Program; or 3) the ecological value of the site is reduced. For additional information please refer to **Appendix G** of the PIR

3.2.3.1.1 Wetland Restoration Future Without Project Calculations of HUs

The LOWRP area is generally rural; however, given the proximity of Lake Okeechobee as a water resource and the relatively good transportation and utility infrastructure, combined with the recent increase in population immigration into Florida and the possibility that the coastal populations of humans will move inland as sea level rise, it was assumed that it is more likely that these wetland sites would be degraded over time (*i.e.,* converted to more developed conditions). Sites farther from human population centers (*e.g.,* Fish Slough) are probably less likely to undergo habitat degradation, but it is not possible to accurately predict the relative degree. To estimate HUs under FWO, the team made assumptions about how the wetland and upland land covers would change over time. Because CERP projects are evaluated over a 50-year period, the possible land use change scenarios were estimated as: 1) no change within the site; 2) the site is restored by another entity such as the Wetland Reserve Easement Program; or 3) the ecological value of the site is reduced.

As the TSP was refined for the Recommended Plan, the footprint of the WAF and Paradise Run wetland sites were modified to eliminate the unused land in between the two. Additionally, the Paradise Run footprint was modified to include a 1,000-foot buffer from State Road 78. The portion of Paradise Run that was removed and added to the WAF footprint was an area that would be difficult to hydrate and would have low wetland restoration value. The HUs were re-calculated for the revised Paradise Run Wetland site. **Figure 3-1** shows the updated Paradise Run footprint and land use codes for all components of the Recommended Plan. **Table 3-5** shows the existing HUs for the Recommended Plan wetland restoration sites. To calculate the benefits for each wetland site, the HUs for the FWO condition are subtracted from the HUs in the future with project (FWP) condition. This results in the HU lift for each wetland site. **Table 3-6** shows the HU lift for each wetland site in the Recommended Plan. **Table 3-7** shows the AAHU from 2028 through 2078 for each wetland site in the Reccommended Plan.

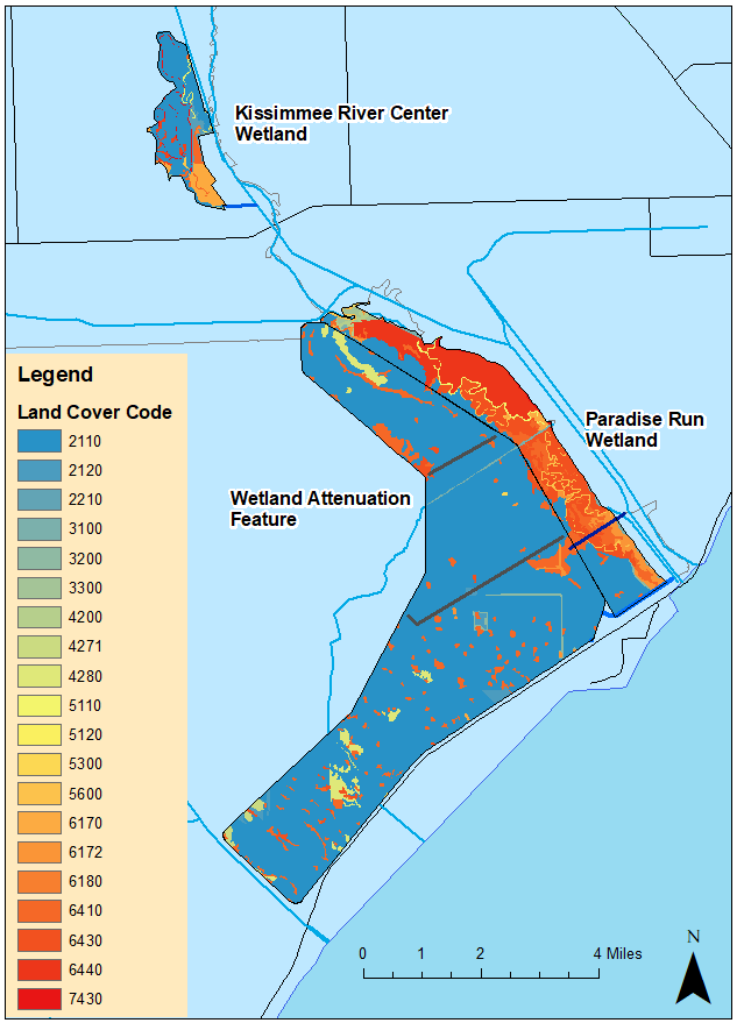


Figure 3-1 Land cover (FLUCCS) codes for the ECB for the Recommended Plan including the Kissimmee River Center and Paradise Run wetland sites and the WAF footprint.

Table 3-5. Summation of the ECB HUs for the Recommended Plan wetland sites.

FLUCCS Level 4 Code	FLUCCS Code Description	Existing Eco-Value	Kissimmee River Center Area (acres)	Kissimmee River Center ECB HUs	Kissimmee River Center FWO HUs	Kissimmee River Center FWP HUs	Paradise Run Area (acres)	Paradise Run ECB HUs	Paradise Run FWO HUs	Paradise Run FWP HUs
2110	Improved Pastures	0.2	796	159	124	796	836	167	129	836
2120	Unimproved Pastures	0.3	64	19	16	64	0	0	0	0
2130	Pastures	0	5	0	0	0	1	0	0	0
3100	Herbaceous Rangeland	0.3	3	1	1	3	23	16	12	54
3200	Shrub and Brushland	0.3	0	0	0	0	10	3	2	10
3300	Mixed Rangeland	0.3	0	0	0	0	40	12	9	40
4200	Upland Hardwood Forest	0.4	0	1	1	4	35	14	11	35
4270	Live Oak	0.4	3	1	1	3	0	0	0	0
4271	Oak - Cabbage Palm Forest	0.4	0	1	0	1	0	0	0	0
4280	Cabbage Palm	0.4	0	0	0	0	0	2	2	5
5110	Streams and Waterways	0.5	19	9	7	19	76	38	30	76
5120	Channelized waterways, canals	0.3	3	1	1	3	0	0	0	0
5300	Reservoirs	0.3	5	1	1	5	146	0	0	0
5600	Slough Waters	0.5	0	0	0	0	0	73	56	146
6170	Mixed Wetland Hardwoods	0.5	0	0	0	0	32	16	12	32
6172	Mixed Wetland Hardwoods - Mixed Shrubs	0.5	159	80	63	159	182	91	70	182
6180	Cabbage Palm Savannah	0.5	4	2	2	4	7	1	1	3
6410	Freshwater Marshes	0.5	55	28	21	55	402	201	155	402
6430	Wet Prairies	0.5	41	20	16	41	830	415	321	830
6440	Emergent Aquatic Vegetation	0.5	40	20	15	40	909	455	351	909
7430	Spoil Areas	0.1	0	0	0	0	53	2	2	23
	TOTALS	n/a	1,197	343	269	1,197	3,582	1,506	1,163	3,583

Table 3-6. HU lift for each wetland site of the Recommended Plan.

Wetland Site	Paradise Run	Kissimmee River-Center	Wetland Recommended Plan
ECB HUs	1,507	343	1,850
FWO HUs	1,165	269	1,434
FWP HUs	3,583	1,196	4,779
HU Lift	2,418	927	3,345

Table 3-7 – AAHU lift for each wetland site of the Recommended Plan.

Wetland Site	Paradise Run	Kissimmee River-Center	Wetland Recommended Plan
FWO AAHUs	1,363	312	1,675
FWP AAHUs	3,325	1,018	4,344
AAHU Lift	**1,963**	**706**	**2,669**

*2.75 % discount rate, 50-year period of analysis

See **Appendix G** of the PIR for a complete description of the wetland restoration plan evaluation.

3.2.3.2 Lake Okeechobee Benefit Calculations

Please refer to **Appendix G**, **Section G.4** of the PIR for a complete description of the Performance Measure analysis.

3.2.3.2.1 Lake Okeechobee Ecological Benefits

A wide body of published research (summarized in Havens 2002) documents the benefits of seasonally variable water levels within the range of 12.5 ft. NGVD29 (June-July low) and 15.5 ft. NGVD29 (November-January high) on the plant and animal communities of Lake Okeechobee. The range of 12.5 ft and 15.5 ft. NGVD 29 is the desired stage envelope for Lake Okeechobee. The nearshore and pelagic regions of Lake Okeechobee are occupied by a number of key ecological communities which can be used to evaluate the environmental health of the lake as a function of their responses to changing hydrologic conditions. The ecological indicator scores

used in this combined PM are based on the strongest statistically significant correlations between the ecological indicator data and average monthly lake stages during the data collection periods, or average monthly lake stages during the previous 1, 2, 3, or 6 months, or the previous year. **Section G.4.3** of **Appendix G** of the PIR includes the information of HU for the final array of alternatives. Alternative 1BW from the final array was modified to become the Recommended Plan.

3.2.3.3 Lake Okeechobee Habitat Unit Calculation

The calculation of ecosystem benefits (quantitative scoring) consisted of the following steps: 1) Normalize Scores—normalizing PM output to a common scale (0-1); 2) Combine Scores and Calculate HUs —combine PMs into aggregates scores for each habitat zone in the project area (e.g., Lake Okeechobee watershed, Lake Okeechobee and the Northern Estuaries) and multiply by acreages to get HUs; and 3) Compare HU —Aggregate watershed HUs and compare alternatives by habitat zones.

In Step 1, PM scores were calculated for restoration alternatives and then scaled to 0-1 scale using the processes described in **Appendix G, Section G.4.2** of the PIR for each PM. In Step 2, PM output scores are multiplied by the areas of the zones they represent to generate HU.

3.2.3.4 Lake Okeechobee Final Array of Alternatives Performance

The three performance measures are combined with the Ecological Indicator HUs contributing 45%, the Stage Envelope HUs contributing 45%, and the Extreme Stage HUs contributing 10% (2.5% for extreme low and 7.5% for extreme high). Alternative 2Cr provides the greatest HU lift of 6,664 acres, followed by Alternative 1BW with 3,399 acres, and then Alternative 1Bshlw with 2,811 acres (**Table 3-8**).

Table 3-8 – Combined Lake Okeechobee habitat units for the final array of alternatives.

	ECB	FWO	Alt 1Bshlw	Alt 1BW	Alt 2Cr
Ecological Indicator HUs	109,052	106,938	107,995	108,523	109,933
Stage Envelope HUs	25,976	26,906	29,887	29,720	30,850
Extreme Stage HUs	43,200	42,971	41,743	41,969	42,695
Overall Lake O HUs	**178,228**	**176,814**	**179,625**	**180,213**	**183,478**
Potential Lift (acres)	**1,414**	**0**	**2,811**	**3,399**	**6,664**

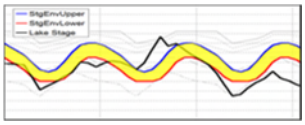
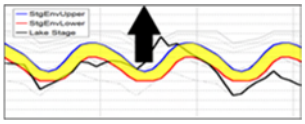
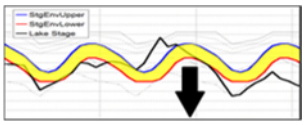
The Lake Okeechobee average AAHU lifts were calculated as the difference between the with-project and without project conditions over the period of analysis (through year 2078). For the without project condition, a straight trajectory between existing and future without project HUs was assumed to establish HU totals for each site and year.

With project HU trajectory was modeled to reflect the timeline of expected restoration effects. Lake Okeechobee HUs for each alternative are assumed to reach 25 percent potential 2 years following construction completion, 50 percent potential 5 years following construction completion, 60 percent potential 10 years following construction completion, and 100 percent potential 25 years following construction completion. At that point, the full potential of HUs will be realized for the remainder of the period of analysis.

3.2.3.5 Lake Okeechobee Recommended Plan Performance

The Recommended Plan increases the amount of time Lake Okeechobee is within the ecologically preferred stage envelope, primarily through reductions in the frequency of low (<12.5 ft. NGVD) and extreme low (<10.0 ft. NGVD) stages (**Table 3-9**). Ecological benefits result from an overall effect of reducing dramatic fluctuations in water levels, improving marsh inundation patterns by reducing intra- and inter-annual variation that tends to benefit invasive species and reduces littoral extent. Extreme low stages lead to encroachment of woody vegetation and exotic species at high elevations, loss of submerged plant beds to emergent marsh at low elevations, and loss of aquatic fauna throughout the dried marsh. Stages above the preferred envelope, which are also reduced with the Recommended Plan, cause greater mixing of nutrients and sediment from the deep, open-water (pelagic) portion of the lake, reduce light penetration in the nearshore zone at the edge of the marsh, increase nutrient transport to the inner marsh, reduce the overall marsh size through loss of plants in deeper areas, and alter the plant community to one dominated by invasive species. Maintaining lake stages closer to the depths and seasonality of the preferred-stage envelope with the Recommended Plan will improve overall ecological conditions on Lake Okeechobee relative to the FWO.

Table 3-9 –Lake Okeechobee stage envelope improvements with the Recommended Plan.

Lake Okeechobee Stage Levels		Future Without Project	ALTERNATIVE 1BWR (Recommended Plan)
% Time Inside Ecologically Preferred Stage Envelope		27.7%	31.2%
%Time Above Stage Envelope		29.9%	28.1%
%Time Below Stage Envelope		42.4%	40.7%

Lake Okeechobee Stage Levels		Future Without Project	ALTERNATIVE 1BWR (Recommended Plan)
% Time Below Navigational Min. Stage	% Time < 12.56 ft.	29.8%	27.5%
Extreme High Stage	%Time > 17 ft.	0.4%	1.2%
Extreme Low Stage	%Time < 10 ft.	3.3%	2.2%

The three PMs are combined with the Ecological Indicator HUs contributing 45%, the Stage Envelope HUs contributing 45% and the Extreme Stage HUs contributing 10% (2.5% for extreme low and 7.5% for extreme high). The Recommended Plan (Alt 1BWR) provides a HU lift of 2,674 acres. The resulting average HU lift is displayed in **Table 3-10.**

Table 3-10. Combined Lake Okeechobee habitat units for the Recommended Plan

	ECB	FWO	(Recommended Plan) Alternative 1BWR
Ecological Indicator HUs	109,052	106,938	108,347
Stage Envelope HUs	25,977	26,906	29,039
Extreme Stage HUs	43,201	42,971	42,101
Overall Lake O HUs	**178,230**	**176,814**	**179,488**
Potential Lift (acres)	**1,416**	**0**	**2,673**

3.2.3.6 Northern Estuaries Benefit Calculation

The primary areas evaluated in the Northern Estuaries are the Caloosahatchee Estuary (**Figure 3-2**) and the St. Lucie Estuary (**Figure 3-3**). These two estuaries connect directly to Lake Okeechobee. Please refer to **Appendix G, Section G.5** of the PIR for the complete Northern Estuaries evaluation.

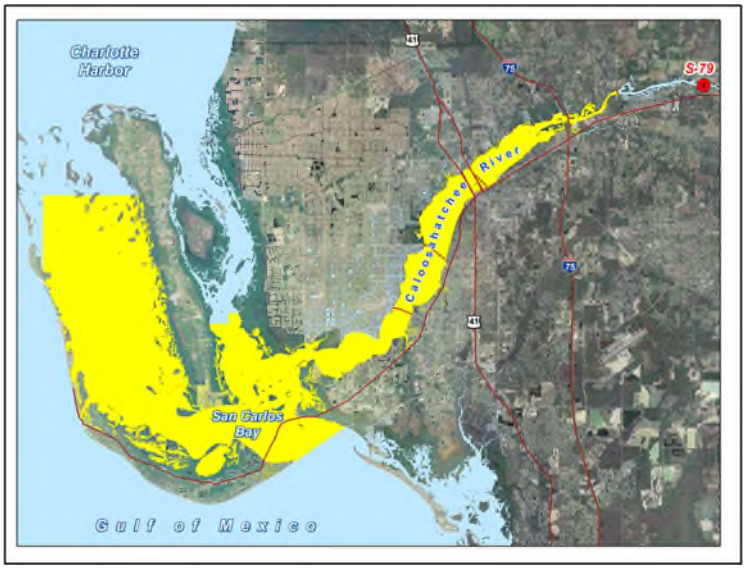


Figure 3-2 – Estimate of the Maximum Area of Potential Ecological Benefit for the Caloosahatchee Estuary (70,979 acres).

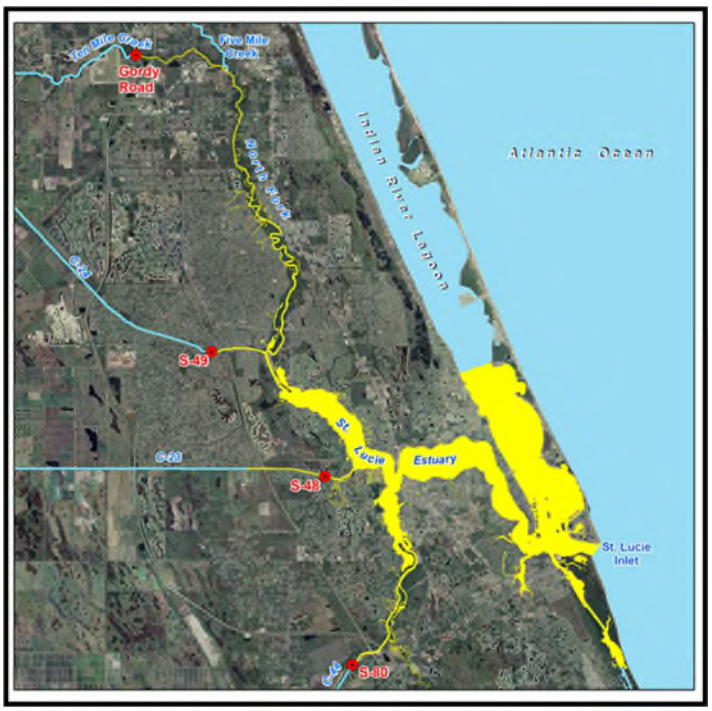


Figure 3-3 – Estimate of the Maximum Area of Potential Ecological Benefit for the St. Lucie Estuary (14,994 acres).

PMs within the Northern Estuaries were used to evaluate habitat suitability for oyster and submerged aquatic vegetation based on target flows over water control structures (**Figure 3-4**).

Within the Caloosahatchee Estuary, targets were based on freshwater discharges at the S-79 structure. Within the St. Lucie Estuary, targets were based on freshwater discharges at the S-80, S-48, S-49, and Gordy Road structures. The LOWRP is expected to improve conditions for estuarine and marine resources throughout the Northern Estuaries by restoring more natural timing, volume, and duration of freshwater flows to the Northern Estuaries. It has the potential to provide a more appropriate range of salinity conditions by reducing extreme salinity fluctuations and maintaining flows during dry periods. The salinity envelope target for the Caloosahatchee River and Estuary is a salinity range of 16 to 28 psu. The salinity envelope target for the St. Lucie is a salinity range of 12 to 20 psu. 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.

Extensive monitoring of the Caloosahatchee and St. Lucie Estuaries has been performed to determine representative median salinities associated with flow events at these structures. Salinity levels at stations throughout each of the estuaries have been recorded. Calculation of habitat benefits achieved were restricted to portions of the estuary where changes in salinity in relation to freshwater flows across water control structures (e.g., S-79, S-80, S-48, S-49, and Gordy road structures) could be reasonably predicted. For analytical purposes, the area to be potentially affected by the project was assumed to encompass 85,973 acres (70,979 acres for the Caloosahatchee Estuary and 14,994 acres for the St. Lucie Estuary). PM scores within the Northern Estuaries were generated from the RSM-BN model runs.

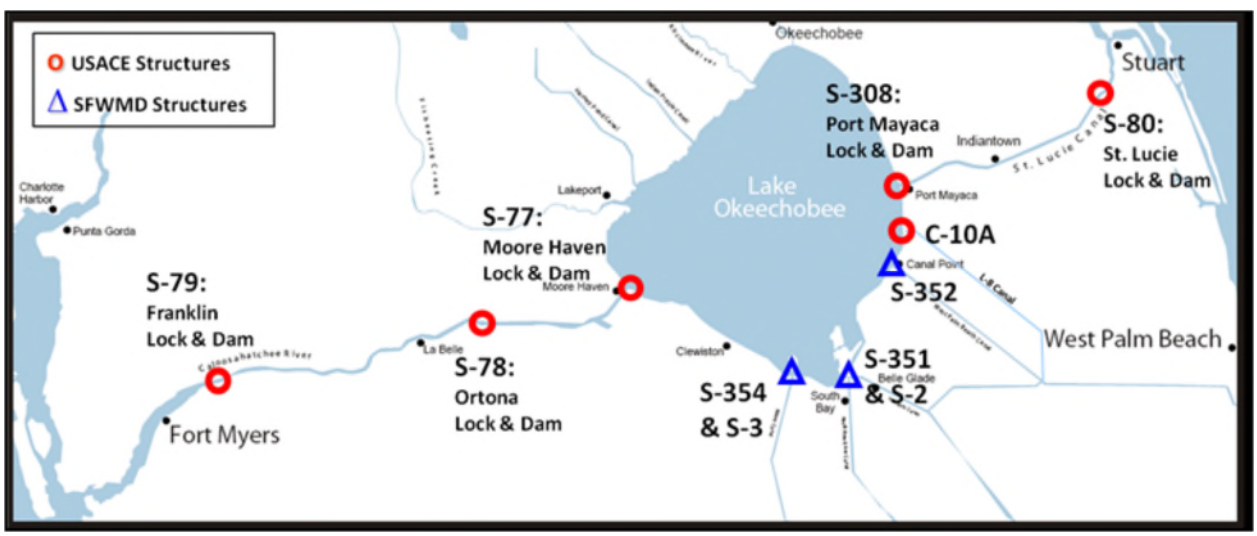


Figure 3-4 – Key structures of Lake Okeechobee and the Northern Estuaries.

3.2.3.7 Northern Estuaries Habitat Unit Calculation

The calculation of ecosystem benefits (quantitative scoring) consisted of the following steps: 1) Normalize Scores—normalizing PMs output to a common scale (0-1); 2) Combine Scores and

Calculate HUs—combine PMs into aggregates scores for each habitat zone in the project area (e.g., Lake Okeechobee watershed, Lake Okeechobee, and the northern estuaries) and multiply by acreages to get HUs; and 3) Compare HUs—Aggregate watershed HUs and compare alternatives by habitat zones. For detailed description of how the HUs were calculated and a comparison of the HUs for the final array of alternatives see **Appendix G, Section G.5.2** of the PIR. The TSP was refined to modify the WAF shape for the Recommended Plan (Alternative 1BWR). The revised WAF footprint led to additional modeling of the Recommended Plan.

3.2.3.7.1 Caloosahatchee Estuary Recommended Plan Habitat Units

Table 3-11 shows rescaled PM scores on a 0 to 100 scale for the Caloosahatchee Estuary based on the RSM-BN model output (**Figure 3-5**). The scores were then normalized (habitat suitability index; HSI) to a 0 to 1 scale to calculate HU. The low flow and high flow habitat suitability indices were combined to give one HSI for the Caloosahatchee Estuary. This HSI was multiplied by the acreage (70,979 acres) to get the HU (**Table 3-12**).

Table 3-11 – Rescaled PM scores normalized on a 0 to 100 scale for Caloosahatchee Estuary.

Metric #	PM Metric	ECB	FWO	(Recommended Plan) Alternative 1BWR
3.1	Low Flow (< 450 cfs)	4	81	80
3.2	High Flow (>2800 cfs)	4	29	39

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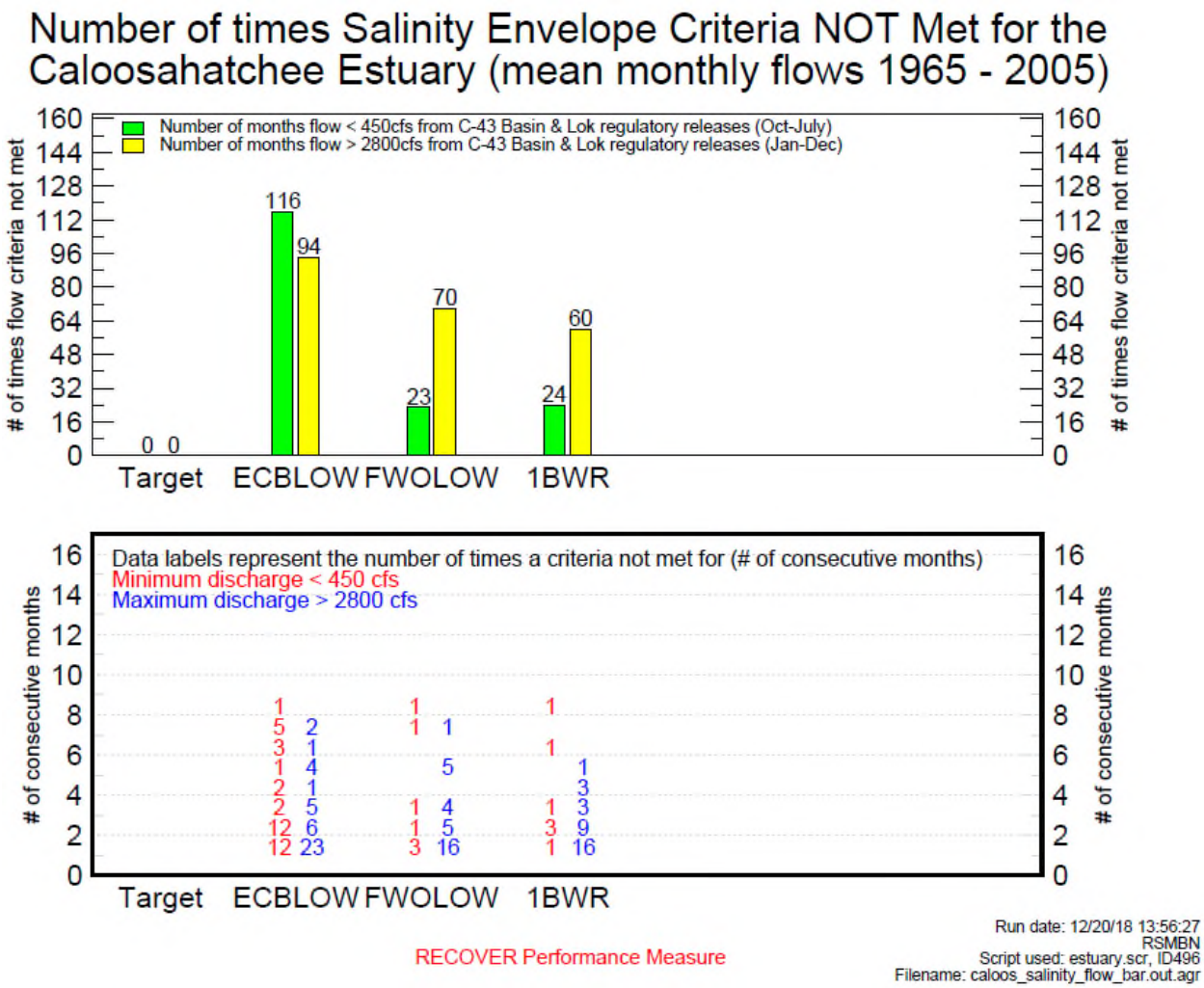

Figure 3-5 – Number of Times Salinity Criteria Not Met for the Caloosahatchee Estuary for the ECB, FWO project conditions and the Recommended Plan.

Table 3-12 – Habitat Suitability Index and Habitat Units for the Caloosahatchee Estuary.

Metric #	PM Metric	ECB	FWO	Recommended Plan Alternative 1BWR
3.1	Low Flow (< 450 cfs) Habitat Suitability Index	0.02	0.405	0.400
3.2	High Flow (>2800 cfs) Habitat Suitability Index	0.02	0.145	.195
	Total Caloosahatchee HSI	**0.04**	**0.55**	**0.60**
	Caloosahatchee Estuary Habitat Units	**2,839**	**39,038**	**42,233**

3.2.3.7.2 St. Lucie Estuary Recommended Plan Habitat Units

Table 3-13 shows rescaled performance measure scores on a 0 to 100 scale for the St. Lucie Estuary based on the RSM-BN model output for the Recommended Plan (**Figure 3-6**). The scores were then normalized (habitat suitability index) to a 0 to 1 scale to calculate HU. The low flow and high flow habitat suitablity indices were combined to give one HSI for the St. Lucie Estuary. This HSI was multiplied by the acreage (14,994 acres) to get the HUs (**Table 3-14**).

Table 3-13 – Rescaled Performance Measure scores normalized on a 0 to 100 scale for St. Lucie Estuary.

Metric #	PM Metric	ECB	FWO	Recommended Plan Alternative 1BWR
4.1	Low Flow (< 350 cfs)	14	31	31
4.2	High Flow (>2000 cfs)	14	55	77

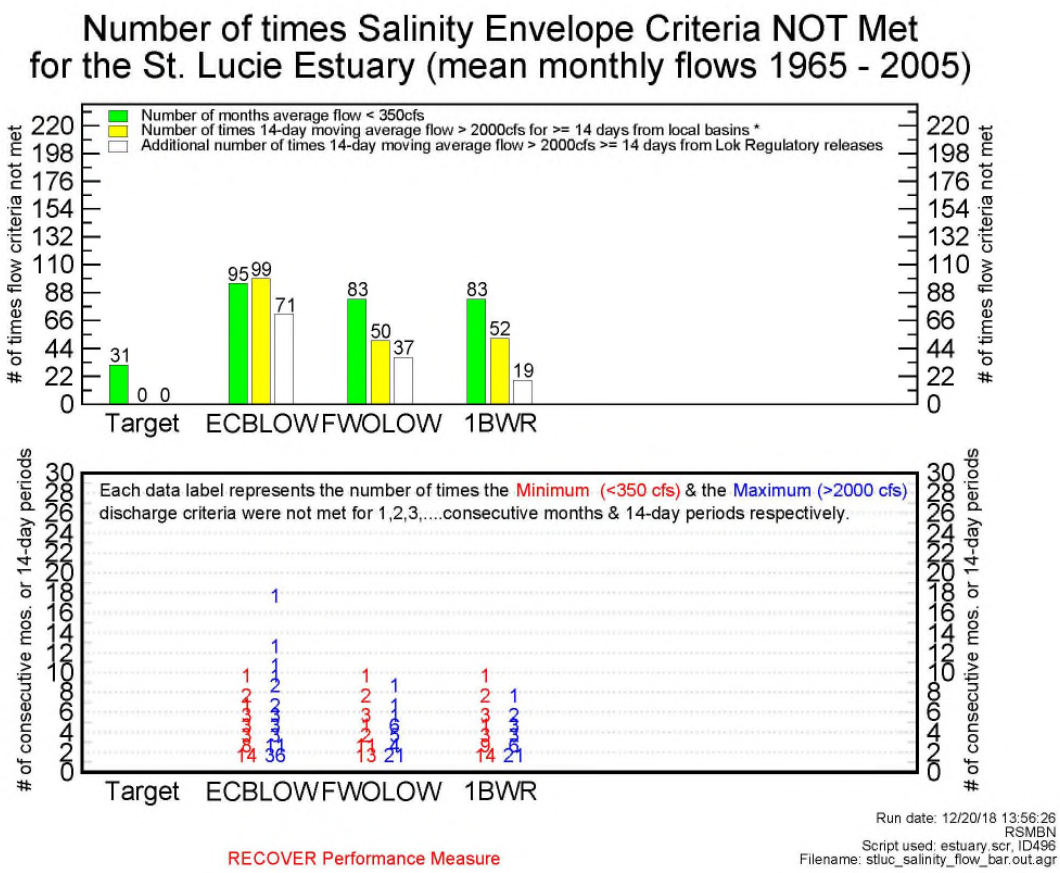

Figure 3-6 – Number of Times Salinity Criteria Not Met for the St. Lucie Estuary for the ECB, FWO project conditions and the Recommended Plan.

Table 3-14 – Habitat Suitability Index and Habitat Units for the St. Lucie Estuary.

Metric #	PM Metric	ECB	FWO	Recommended Plan Alternative 1BWR
4.1	Low Flow (< 350 cfs) Habitat Suitability Index	0.07	0.155	0.155
4.2	High Flow (>2000 cfs) Habitat Suitability Index	0.07	0.275	0.385
	Total St. Lucie HSI	**0.14**	**0.43**	**0.54**
	St. Lucie Estuary Habitat Units	**2,099**	**6,447**	**8,097**

3.2.3.8 Northern Estuaries Recommended Plan Performance

Table 3-15 shows the Northern Estuaries Recommended Plan HUs. The PMs for each estuary are combined with equal weighting. The Recommended Plan (Alt 1BWR) provides a HU lift of 4,843 acres.

Table 3-15 – Combined Northern Estuaries HU.

	ECB	FWO	Recommended Plan Alternative 1BWR
Caloosahatchee HU	2,839	39,038	42,233
St. Lucie HU	2,099	6,447	8,097
Overall Northern Estuaries HU	**4,938**	**45,485**	**50,329**
Potential Lift	**-40,547**	**0**	**4,843**

The LOWRP would reduce the moderately high freshwater releases from Lake Okeechobee to the Northern Estuaries and manage some of the extremely high and longer duration lake inflows by diverting larger flows to storage. Holding and diverting larger discharges becomes more expensive, but the ecological significance of doing so cannot be understated. The capacity for the estuaries to withstand and recover from these continued perturbations in volume and duration of high flow undesirable events is being tested over and over. LOWRP reduces flows to the St. Lucie Estuary by an additional 17% and to the Caloosahatchee Estuary by an additional 36% for a total of 30% reduction when compared to the FWO condition.

3.2.3.9 Summary of Storage Recommended Plan Performance

HUs are used to compare the Recommended Plan to the FWO for each habitat zone and for the total project area (**Table 3-16**). The Recommended Plan has total storage AAHU of 6,371 (**Figure 3-7**), which is composed of 72.2 percent estuary AAHU and 27.8 percent Lake O AAHU (**Figure 3-8**).

Table 3-16 – Total Storage HUs for the Recommended Plan.

Project Region	ECB	FWO	Alt 1BWR
Lake O Ecological Indicator	109,052	106,938	108,347
Lake O Stage Envelope	25,977	26,906	29,039
Lake O Extreme Stage	43,201	42,971	42,101
Total Lake Okeechobee	178,230	176,814	179,488
Caloosahatchee Estuary	2,839	39,038	42,233
St. Lucie Estuary	2,099	6,447	8,097
Total Northern Estuaries	4,938	45,485	50,329
Total HUs	183,168	222,299	229,817

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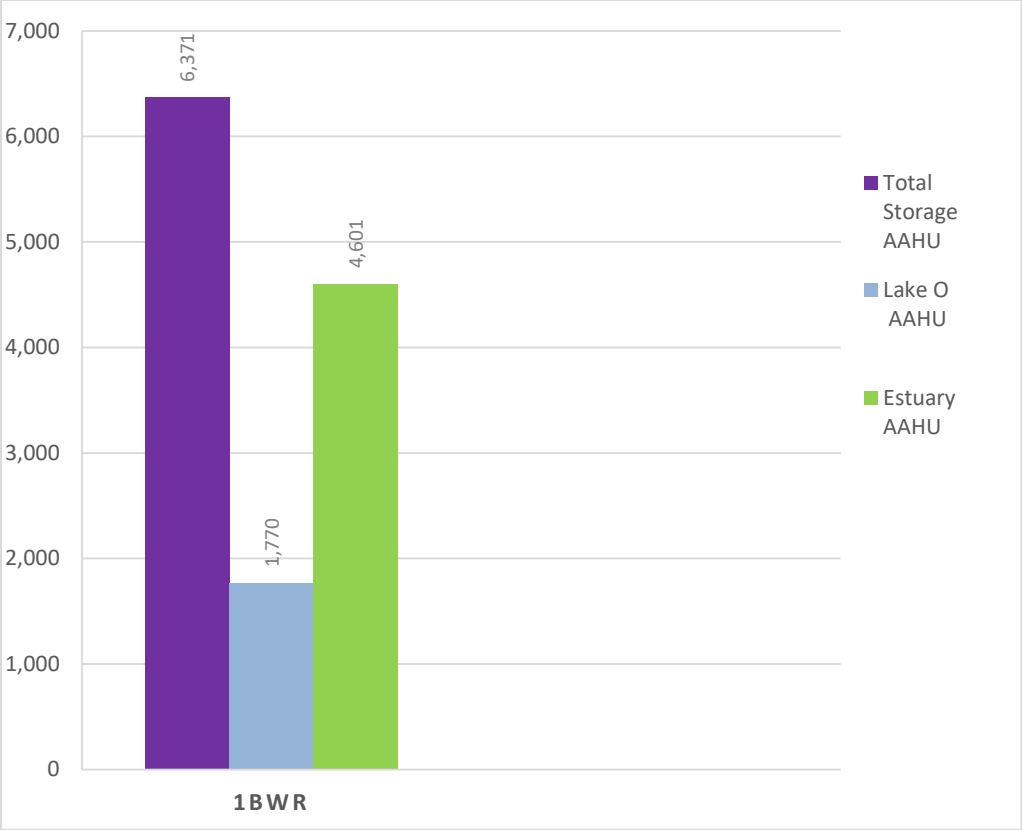

Figure 3-7 – Average annual HUs for storage for the Recommended Plan.

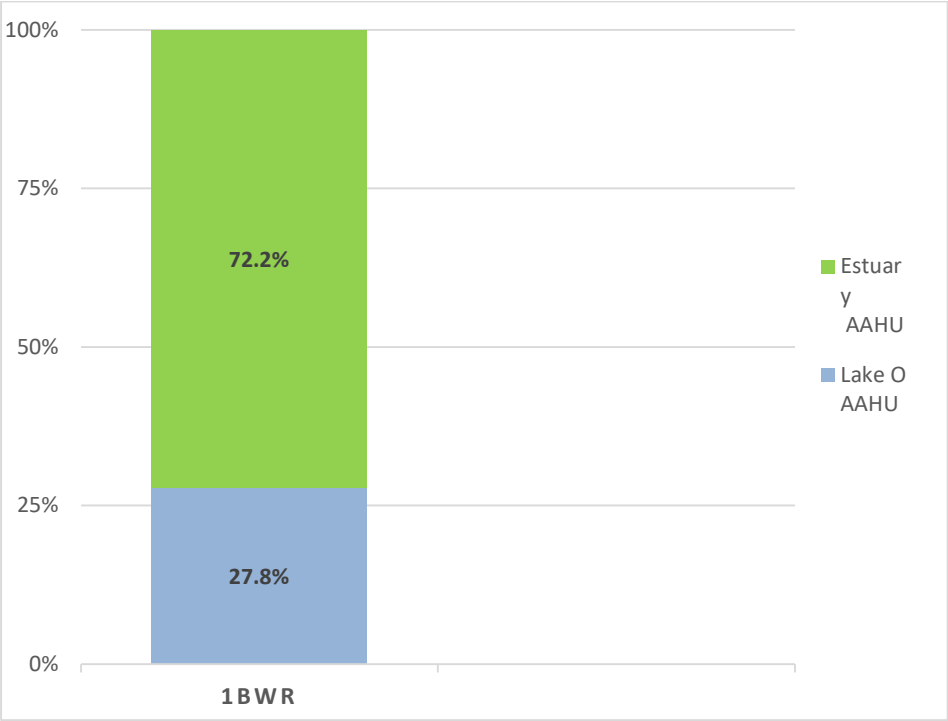

Figure 3-8 – Storage Recommended Plan AAHU percent composition.

3.2.3.10 Summary of Recommended Plan Performance

The Recommended Plan summary of HU results are displayed in **Table 3-17.**

Table 3-17 – Total Habitat Units

Project Region	ECB*	FWO**	Recommended Plan Alternative 1BWR**
Wetlands	1,850	1,434	4,779
Total Watershed	**1,850**	**1,434**	**4,779**
Lake O Ecological Indicator	109,052	106,938	108,347
Lake O Stage Envelope	25,977	26,906	29,039
Lake O Extreme Stage	43,201	42,971	42,101
Total Lake Okeechobee	**178,230**	**176,814**	**179,488**
Caloosahatchee Estuary	2,839	39,038	42,233
St. Lucie Estuary	2,099	6,447	8,097
Total Northern Estuaries	**4,938**	**45,485**	**50,329**
Total Habitat Units	**185,018**	**223,733**	**234,596**

* HU values for the ECB represent those calculated in the year 2016.
** HU values for the FWO and Alternative 1BWR are calculated for the full ecological response time.

The Recommended Plan produces 9,040 AAHUs from 2028 through 2078. Of these, 29.5% are wetland AAHUs, 50.9% are estuary AAHUs, and 19.6% are Lake Okeechobee AAHUs.

3.3 Consistency with Restudy Purpose

The purpose of the CERP is to modify structural and operational components of the C&SF Project to achieve restoration of the Everglades and the south Florida ecosystem, while providing for other water-related needs such as urban and agricultural water supply and flood protection. The 68 components identified in CERP 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 30-year period. Recommendations for interim goals and interim targets were developed by Restoration, Coordination and Verification (RECOVER) in 2005. An

intergovernmental agreement signed in 2007 among the USACE, U.S. Department of Interior (DOI) and SFWMD established interim goals for CERP. Quantitative and qualitative predictions based on results from the RECOVER approved performance measures, information gained from additional ecological planning tools and best professional judgment was used to evaluate the progress towards the interim goals. CERP is designed to achieve more natural flows by re-directing regulatory flows that are currently discharged to the Atlantic Ocean and Gulf of Mexico (via the C-44 and the C-43 Canals to the St. Lucie and Caloosahatchee Estuaries) to a more restored flow of water that is distributed throughout the system similar to pre-drainage conditions.

The project planning for the LOWRP is consistent with the sequencing of projects in the Integrated Delivery Schedule and included in the next generation of CERP project features to provide restoration benefits. LOWRP contains three (3) of the sixty-eight (68) CERP components. LOWRP consists of combinations of above ground water storage features, ASR wells, and wetland restoration sites north of Lake Okeechobee. Each of the performance measures for the LOWRP planning effort were derived from those approved for use in CERP by RECOVER. Detailed information about the performance measures and the methodology that was used to quantify ecosystem benefits and support plan evaluation and selection of the Recommended Plan can be found in **Appendix G** of the PIR.

3.4 Implementation of Project Components and Operation of the Project

Implementation of LOWRP will occur over many years and include many actions by USACE and SFWMD. Phasing of the construction incorporates the adaptive management process, per the guidance of the Programmatic Regulations for the CERP (2003) and the WRDA of 2007. Phasing of the construction into logical groupings will allow earlier restoration benefits by initially building project components that can be implemented within a shorter timeframe to begin accruing benefits, while providing assurances of sound financial investments. Other factors may influence implementation including funding availability, maintaining cost-share balance between the Federal and non-Federal sponsor, as well as the integration of projects that may be constructed by other agencies. Additional project implementation information can be found in **Section 6.6** of the PIR.

3.4.1 Implementation and Construction Sequencing

Development of sequencing for LOWRP features considers that a number of previously authorized large capital investment CERP projects await implementation. Several other basic principles were considered in development of an implementation plan for LOWRP features:

1. Construction of LOWRP 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.

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

2. Sequencing considers the earliest opportunity to realize benefits, including the features that can provide benefits that utilize existing state-owned lands
3. The sources of material needed for the WAF were considered to minimize costs associated with double handling and stockpiling of materials.
4. Where possible, sequencing should include steps and timing to test concepts, as described in the LOWRP AM Plan (**Annex D** of the PIR).
5. Recreation features will be constructed in conjunction with corresponding LOWRP plan features.

Other factors may influence implementation including funding availability, maintaining cost-share balance between the federal and non-federal sponsor, as well as the integration of projects that may be constructed by other agencies. The USACE and the SFWMD undertake integration of the Recommended Plan and the other CERP projects authorized or 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 separable construction elements based upon the unique functions of the Recommended Plan features (**Table 3-18**).

Table 3-18 - Proposed Implementation Sequencing

Wetlands	
Project Features	**Construction Contract**
• Paradise Run	• Contract 6
• Kissimmee River-Center	• Contract 7
Watershed ASR	
Project Features	**Construction Contract**
• Kissimmee Basin ASR	• Contract 1
• Taylor Creek/Nubbin Slough Basin ASR	• Contract 2
• Port Mayaca ASR	• Contract 3
• Moore Haven ASR	• Contract 4
• Indian Prairie ASR	• Contract 5
Wetland Attenuation Feature	

Project Features	Construction Contract
• WAF	• Contract 8a
• Co-located ASR wells	• Contract 8b*

** Contract 8b – construction of the co-located ASR wells may be done concurrently with construction of the WAF, but may not be constructed prior to Contract 8a*

3.4.2 Project Operations

The draft Project Operating Manual (POM) in **Annex C** of the PIR includes operating criteria based on the Alternative 1BWR hydrologic modeling assumptions and generally discusses the transitions to operations during the construction phase, the Operation, Testing & Monitoring Phase (OTMP), and the long-term Operations and Maintenance (O&M) phase. The POM assumes completion of all LOWRP components. Modifications and/or revisions to the POM will occur during subsequent implementation phases. Development of the POM is an iterative process that will continue throughout the life of the project. The POM will be updated at periodic intervals during the detailed design, construction, and operational testing and monitoring phases of the project.

Refinements to the operating criteria in the POM will be made as more project design details, data, operational experience, and general information are gained during these project phases. It is also anticipated that once the POM is completed and the long-term operations and maintenance phase is underway, it may be necessary to revise the POM from time to time based on additional scientific information and implementation of CERP or non-CERP activities. The POM will develop over time as the details of the design of LOWRP components are developed. The first draft is presented in this document with the recognition that multiple revisions and operational fine-tuning would occur over the life of the project. The operations discussed herein represent the start-up operational strategy, recognizing that constraints in the system may be removed over time due to the completion of many of the LOWRP components as well as other CERP and non-CERP Projects. The draft POM is presented with the recognition that multiple revisions and operational refinements will occur over the life of the project. The USACE and SFWMD will share in the responsibilities for conducting water management operations during the OTMP.

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 June 1, 2018, at the SFWMD B-1 3-B Bridge Conference Room in West Palm Beach, Florida and via webinar. Representatives from the following sovereign nations, agencies and organizations attended the conference:

- Miccosukee Tribe of Florida
- Seminole Tribe of Florida
- SFWMD
- FDEP
- USACE
- FDACS
- USFWS
- USEPA
- Florida Farm Bureau
- Bureau of Indian Affairs

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.

4.2 Compliance with Federal Environmental Laws, Regulations & Executive Orders

Table 4-1 summarizes required compliance with specific Federal acts, Executive Orders (E.O.), and other applicable environmental laws, and provides a summary of the compliance status associated with each act, E.O., or applicable law. **Appendix C.4** and **Section 7** of the PIR contain detailed descriptions of completed and ongoing coordination efforts.

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

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
Anadromous Fish Conservation Act	LOWRP complies with this Act.	Proposed action would not adversely affect anadromous fish species.
Archaeological Resources Protection Act of 1979	LOWRP complies with this Act and will continue to comply throughout construction and operation.	This statute was enacted to protect archaeological resources and sites on federal and Indian lands. The LOWRP will not affect cultural resources on federal or Indian lands.
American Indian	LOWRP complies with this	The policy of the U.S. is to protect and

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
Religious Freedom Act	Act.	preserve the inherent rights of freedom to believe, express, and exercise traditional religions of American Indians, Alaska Native Groups, and Native Hawaiians. These rights include, but are not limited to, access to sites, use and possession of sacred objects, and the freedom to worship through ceremony and traditional rites.
Bald and Golden Eagle Protection Act	LOWRP complies with this Act.	Proposed action would not adversely affect the bald eagle. No take permits are required.
Clean Air Act	LOWRP will comply with this Act as applicable based on detailed design; will obtain any required permits.	Potential for permanent sources of air emissions. Air emissions permits may be required for large diesel pumps.
Clean Water Act of 1972	LOWRP complies with this Act. Will obtain Water Quality Certification (WQC) from the State of Florida and any required National Pollutant Discharge Elimination System (NPDES) permits and update 404(b) analysis prior to construction.	In accordance with the Clean Water Act, a Section 404(B)(1) Evaluation has been completed and is contained within **Appendix C.4**, **subsection C.4.32** of the PIR. A Comprehensive Everglades Restoration Plan Regulation Act permit would be sought from State of Florida for Water Quality Certification.
Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990	These Acts are not applicable to this project.	There are no designated coastal barrier resources in the project area that would be affected by this project.
Coastal Zone Management Act of 1972	LOWRP complies with this Act and obtaining concurrence by the State of Florida.	A Florida Coastal Zone Consistency Determination was prepared in accordance with the provisions of 15 CFR Part 930 and is located in **Appendix C.4**, **subsection C.4.32** of the PIR. The USACE determined that the proposed action is consistent, to the maximum extent practicable, with the enforceable policies of Florida's approved Coastal Zone Management Program. A letter was received on 6 September 2019

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
		from the State Clearinghouse stating that based on the information submitted and minimal project impacts, the state has no objections to the subject project and, therefore, it is consistent with the Florida Coastal Management Program (FCMP).
Endangered Species Act of 1973	LOWRP complies with this Act and consulting with NMFS and USFWS as appropriate.	Formal consultation initiated with USFWS on 22 June 2018, with completion of Biological Assessment (BA). The Draft Biological Opinion (BO) was received from USFWS on 19 November 2018. Based on coordination of the Recommended Plan with the USFWS, a supplemental BA was not needed. The effects determinations on federally listed species in the BA that was submitted concurrent with the Draft PIR/EIS remained the same. Direct and/or indirect impacts within the action area resulting from the Recommended Plan remained the same. The Final BO will be included in **Annex A** of the PIR upon receipt. NMFS provided a Programmatic BO for the Comprehensive Everglades Restoration Plan to the USACE on 17 December 2013 that includes the LOWRP. No further NMFS consultation is required.
Estuary Protection Act of 1968	LOWRP complies with this Act.	The objectives of the proposed action are focused on environmental protection. The proposed action provides increased opportunities to redirect large freshwater releases from Lake Okeechobee to the Northern Estuaries, allowing for the re-establishment of oyster and seagrass populations that are important for providing water quality and habitat functions within the Northern Estuaries.
Farmland Protection Policy Act of 1981	LOWRP presently complies and will continue to comply with this Act at the time of construction.	Coordination with USDA/NRCS to meet the requirements of the Farmland Protection Act is ongoing. NRCS identified 0.0214% of the project lands to be prime and unique

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
		farmland. At this time, additional analysis is not needed because of the change in footprints for the Recommended Plan. Additional coordination will occur during PED phase. The proposed project is in compliance with the goals of this Act. Refer to **Appendix C.4** of the PIR for more information.
Federal Water Project Recreation Act/Land and Water Conservation Fund Act	LOWRP complies with this Act.	Effects of proposed action on outdoor recreation were described in **subsection 5.2.15.3** and **Appendix C.2.15** of the PIR. The proposed action does not adversely affect existing recreational opportunities. The proposed action will create new recreational opportunities within the Lake Okeechobee watershed.
Fish and Wildlife Coordination Act of 1958, as amended.	LOWRP complies with this Act.	The proposed action was coordinated with USFWS. USFWS actively participated on the LOWRP team, providing information on fish and wildlife elements for the project. The Draft Fish and Wildlife Coordination Act Report (CAR) was received on 15 June 2018 and is included in **Annex A** of the PIR. The Final CAR is included in **Annex A** of the PIR.
Magnuson-Stevens Fishery Conservation and Management Act	LOWRP complies with this Act.	An Essential Fish Habitat (EFH) assessment was prepared and coordinated was initiated with the NMFS on 15 June 2018. In a letter received from NMFS on 27 August, 2019; NMFS concurs with the USACE's determination of anticipated minimal EFH effects through implementation of the LOWRP. Therefore, NMFS has no EFH conservation recommendations to provide. This satisfies the consultation procedures outlined in 50 C.F.R. Section 600.920 of the regulation to implement the EFH provisions of the Magnuson-Stevens Act.
Marine Mammal Protection Act of 1972	LOWRP presently complies with this Act, and will continue to comply with	Project sites are accessible to West Indian Manatees. Safeguards to protect threatened and endangered species during

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
	the Act at the time of construction.	construction will be incorporated to protect marine mammals in the area.
Marine Protection, Research and Sanctuaries Act	This Act is not applicable.	Ocean disposal is not a component of this project; therefore, this Act is not applicable.
Migratory Bird Treaty Act of 1918	LOWRP presently complies with this Act, and will continue to comply with the Act at the time of construction.	The proposed action will not adversely affect migratory bird species. The proposed action is expected to benefit species by improving habitat and increasing availability of foraging opportunities. The USACE is in compliance and will be in full compliance with the Act at the time of construction.
National Environmental Policy Act of 1969	LOWRP is in compliance with this Act during public and agency review of this document, preparation of Final EIS, and signing of Record of Decision.	Initial public coordination for this project began with the distribution of a scoping letter dated 28 June 2016, announcing the preparation of the Draft EIS and inviting public and agency comment (**Appendix C.3** of the PIR). On 18 July 2016, a NOI to prepare an EIS was published in the Federal Register (81 Fed. Reg. 137). A public scoping meeting was held on 26 July 2016 in Okeechobee, FL. A Notice of Availability (NOA) of the Draft EIS was published in the Federal Register (83 Fed. Reg. 130; 83 FR 31535) on 6 July 2018 and mailed to interested stakeholders, beginning the 45-day review period. The review period closed on 20 August 2018. Public meetings were held on 31 July 2018 in Lehigh Acres, FL; 1 August 2018 in Stuart, FL; and 2 August 2018 in Okeechobee, FL. A NOA for the Revised Draft EIS for the LOWRP was published in the Federal Register (84 FR Volume 3216883) July 5, 2019 and mailed to stakeholders soliciting comments for this action. Comments were accepted through September 3, 2019. All comments received during the review period and at public meetings, along with responses, are included in **Appendix C.3** of the PIR. Upon

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
		public and agency review, of the Final EIS, and the signing of the Record of Decision, this project would be in full compliance with this Act.
National Historic Preservation Act of 1966 (NHPA)	LOWRP complies with this Act. USACE is executing a Programmatic Agreement with the SHPO and ACHP in consultation with Indian Tribes for compliance with this Act.	Significant cultural resources exist within the vicinity of the project area. Section 106 of the NHPA allows compliance with this Act using a phased approach. After the project is authorized and PED is implemented, further investigations and consultation will be conducted. Each suite of features will be consulted on as they arise to ensure that the most up-to-date information is considered in the subsequent determination of effects. Consultation has been initiated and a Programmatic Agreement (PA) as provided in 36 CFR § 800.4(b)(2) will be executed among the ACHP, Florida SHPO, and USACE prior to the signature of the ROD.
Native American Graves Protection and Repatriation Act	LOWRP complies with this Act.	This Act applies to federally owned lands, including reservation lands. The LOWRP does not occur on federally-owned lands or reservation lands.
Resource Conservation and Recovery Act, as Amended by the Hazardous and Solid Waste Amendments of 1984; CERCLA, as Amended by the Superfund Amendments and Reauthorization Act of 1986; Toxic Substances Control Act of 1976.	LOWRP is in compliance with this Act upon review of this document by the FDEP.	Historical environmental assessments indicate significant items regulated under these laws or other laws related to hazardous, toxic, or radioactive waste (HTRW) substances have been discovered through previous Phase 1 HTRW assessments of the project area. Essentially all parcels within the project footprint require significant environmental assessment or updates. Compliance with this Act will be achieved prior to land certification. If any items regulated under these laws are discovered, the USACE and the Non-federal Sponsor will comply with applicable requirements.
Rivers and Harbors	LOWRP complies with this	The proposed action will not obstruct

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
Act of 1899	Act.	navigable waters of the United States.
Submerged Lands Act of 1953	LOWRP complies with this Act.	The proposed action reduces freshwater flows to the Caloosahatchee Estuary and the St. Lucie Estuary that will ultimately benefit the ecological habitats that occur on submerged estuarine lands of the State of Florida. The Project does not occur on submerged lands and no construction is expected on submerged lands.
Wild and Scenic River Act of 1968	This Act is not applicable.	No designated wild and scenic rivers are located within project area.
EO 11514, Protection and Enhancement of Environmental Quality	LOWRP complies with this EO.	The objectives of the proposed action are focused on environmental protection.
EO 11593, Protection and Enhancement of the Cultural Environment	LOWRP complies with this EO.	LOWRP is in compliance for this EO.
EO 11988, Floodplain Management	LOWRP complies with this EO.	The purpose of this EO is to discourage federally-induced development of floodplains. Commitment of lands to restoration precludes such development.
EO 11990, Protection of Wetlands	LOWRP complies with this EO.	The areas proposed for restoration are considered freshwater wetlands. The objectives of the proposed action are focused on environmental protection.
EO 12962, Recreational Fisheries	LOWRP complies with this EO.	The proposed action is expected to improve recreational fisheries in Lake Okeechobee, the Caloosahatchee and St. Lucie Estuaries. The proposed action may significantly impact larval fish and aquatic invertebrates through entrainment and impingement in the aquifer storage and recovery (ASR) wells if the ASRs operate when these organisms are present in the surface water. To minimize the impact, where ASR wells will be co-located with the WAF, the ASR

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
		pumps will pull water from the WAF and not the canals. In locations where the ASR wells will pull directly from canals, the intake will be designed to limit impingement and entrainment by using intake screens set at appropriate depths and include slot size openings to reduce intake velocities and/or to include a multi-stage, filter fabric type system. When the project is authorized and PED is implemented, further design evaluations will be undertaken.
EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations	LOWRP complies with this EO.	A full environmental justice analysis was completed (**Appendix C, Part 2** of the PIR). The analysis demonstrates the project will not disproportionately adversely affect any minority or low-income population.
EO 13007, Indian Sacred Sites	This EO is not applicable	This EO directs executive branch agencies with statutory or administrative responsibility for the management of federal lands. The proposed action would not affect Department of Defense-owned or USACE-managed lands.
E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks	LOWRP complies with this EO.	The proposed action is not expected to have environmental or safety risks that may disproportionately affect children.
E.O. 13089, Coral Reef Protection	This EO is not applicable	Coral reefs are not affected.
EO 13122, Invasive Species	LOWRP complies with this EO.	A nuisance and exotic vegetation control plan was prepared to prevent or reduce establishment of invasive and non-native species within the project area. The vegetation control plan is located in **Annex G** of the PIR.

Table 4-1		
Law, Policy and Regulations	**Status**	**Comments**
EO 13175, Consultation and Coordination with Indian Tribal Governments	LOWRP complies with this EO.	USACE will continue to consult with members and representatives of the STOF, the MTIF, Seminole Nation of Oklahoma, and Thlopthlocco Tribal Town throughout PED. See **Appendix C, Part 5** of the PIR for specifics. The USACE developed the 01 November 2012 Tribal Policy Memorandum, which dictates federal responsibilities, including Trust Responsibilities, to federally-recognized tribes.
EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds	LOWRP complies with this EO.	The proposed action will not adversely affect migratory bird species. The proposed action is expected to benefit species by improving habitat and increasing availability of foraging opportunities.
Memorandum on Government to Government Regulations with Native American Tribal Governments (59 Fed. Reg. 85 (04 May 1994))	LOWRP complies with this Memorandum.	The USACE consulted with the MTIF, STOF, Seminole Nation of Oklahoma, and Thlopthlocco Tribal Town. Consultation is ongoing and will continue throughout PED (see **Appendix C, Part 3** and **Part 5** of the PIR).
Seminole Indian Claims Settlement Act of 1987	LOWRP complies with this Act.	This Act also involves an agreement known as the Water Rights Compact, which specifically defines tribal water rights. The analysis contained in the PIR demonstrates that the number and severity of water shortages and water shortage cutbacks are reduced by this project.

4.3 Compliance with USACE CERP Agricultural Chemical Policy

The USACE HTRW policy (ER 1165-2-132) directs that Construction of Civil Works projects in HTRW-contaminated areas should be avoided where practicable. In September 2011, the Army for Civil Works provided clarification to this HTRW policy for CERP Projects (Memorandum for Deputy Commanding General for Civil and Emergency Operations, Subject: CERP – Residual Agricultural Chemicals, Dated September 14, 2011). A copy of this policy is included in **Appendix C** of the PIR. If specific criteria are met, this policy memorandum allows residual

agrichemicals to remain on project lands and allows the USACE to integrate response actions directly into the construction plan.

4.4 Compliance with Florida Statutes

As described in **Section 1** of this report, the State of Florida enacted several laws pertaining to implementation of CERP projects. The SFWMD must submit a State Compliance report pursuant to Section 373.1501, F.S., for FDEP's review and approval before formally requesting Congressional authorization and receiving an appropriation of State funds for construction and other implementation activities (except the purchase of lands from willing sellers). § 373.026(8), Fla. Stat. (2018). Section 373.1501, F.S., establishes the procedures the SFWMD and FDEP must follow for submitting and reviewing requests for approval, permitting requirements and process for CERP projects. Sections 373.470 and 373.472 F.S., create the "Save Our Everglades Trust Fund" and sets forth funding and reporting requirements, and procedures for distributions from the trust fund.

In addition to the above-described statutory requirements, Chapters 373 (Water Resources) and 403 (Environmental Control), F.S., may apply to various aspects of CERP project planning and implementation. Chapter 403, F.S., and its implementing rules, govern facilities discharging, or potentially discharging, pollutants to surface and groundwaters, and the discharge of air pollutants, including facilities regulated under the federal Clean Water and Safe Drinking Water Acts and the federal Clean Air Act.

Based on the information contained in this document and the PIR, the Recommended Plan complies with the applicable state statutes. Detailed explanation of how the project complies with the applicable state requirements for CERP projects is found throughout this document, and documents referenced herein.

4.5 Permits, Entitlements, and Certifications

The SFWMD must obtain a Section 404 Clean Water Act Permit to perform work in jurisdictional wetlands and other waters of the United States. The permit application will be reviewed and coordinated with other federal agencies, including USFWS, NMFS, State Historic Preservation Office (SHPO), and the Tribes. Although areas of the project will likely be determined to be jurisdictional, most of the area has been severely degraded by past activities, and existing wetland areas currently serves to provide limited wetland functions and values. The project will have to demonstrate that wetland losses will be mitigated to the extent practicable. Based on the above-described environmental benefits, the District anticipates LOWRP will result in net increases in aquatic resource functions and services.

The SFWMD must also obtain a State Water Quality Certification and Coastal Zone Consistency Determination. Both authorizations are prerequisites to issuance of the Section 404 Permit and will be included within applicable state permits. A CERPRA permit (See § 373.1502, F.S.) will be

procured for LOWRP facilities. The ASR wells need Underground Injection Control and National Pollutant Discharge Elimination System permits.

Prior to construction, the project contractor must obtain a Generic Permit for Stormwater Discharge from Large and Small Construction activities pursuant to Subsection 62-621.300(4), F.A.C., from the FDEP, and any necessary consumptive use permits for construction dewatering activities. All required federal and state permits and/or modifications to existing permits would be acquired prior to construction activities.

4.6 Compliance with Applicable Water Quality Standards and Permitting Requirements

The LOWRP will not cause or contribute to water quality degradation of the future conditions to Lake Okeechobee. In general, any short-term impacts to water quality associated with construction of the Recommended Plan would be ameliorated by construction sequencing, best management practices for erosion and sedimentation control, and monitoring during construction. If potentially adverse effects are observed or predicted, longer-term impacts to water quality associated with the operation of project features would be addressed through operational monitoring and adaptive management actions.

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5 Reasonable Assurances

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." § 373.1501(5)(d), Fla. Stat. (2018). The LOWRP will improve the quantity, timing and distribution of water entering Lake Okeechobee, provide for better management of lake water levels, reduce freshwater releases to the Caloosahatchee and St. Lucie estuaries, improve system-wide operational flexibility, and will restore portions of the historic Kissimmee River channel and floodplain.

Maintaining Lake Okeechobee stage levels within the ecologically preferred stage envelope benefits plant and animal communities by providing appropriate depths and seasonality of flooding, concentrating prey resources in the marsh for wading birds, improving nesting and foraging habitat for endangered Everglade snail kites, increasing spawning habitat for sport fish, increasing light penetration for submerged and emergent plants at the edge of the marsh, and creating a diverse littoral vegetation community. Additionally, maintaining lake stage levels within the preferred stage envelope reduces the frequency and severity of water shortage cutbacks to the Lake Okeechobee Service Area. Reducing the return frequency, volume, and duration of regulatory discharges to the Northern Estuaries will improve salinity and turbidity conditions and benefit seagrass beds and the animals that inhabit them. The restoration of historic Kissimmee River sites would result in improved connectivity, more natural hydrologic conditions, and improved habitat for fish and wildlife resources. The WAF may also provide wetland habitat, resulting in improved connectivity, more natural hydrologic conditions, and improved habitat for fish and wildlife resources. Recreational features will enhance the existing opportunities for resource-based recreation found in the study area.

Better managing Lake Okeechobee stage levels within ecologically-preferred stage envelope benefits plant and animal communities of Lake Okeechobee by concentrating prey resources in the littoral zone where wading birds forage, providing optimal light levels for photosynthesis in the summer months to benefit submerged plants and bulrush by and favoring development of a diverse emergent plant community, along with providing water supply benefits to LOSA users. Reducing the volume, duration and magnitude of discharges to the Northern Estuaries will improve salinity and turbidity conditions and benefit seagrass beds and the animals that inhabit them. The restoration of historic Kissimmee River sites would result in more natural hydrologic conditions and improved habitat for fish and wildlife resources.

The same hydrologic models used for plan formulation are 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 RSM for Basins (RSM-BN) hydrologic model was used to simulate and evaluate the environmental effects of the LOWRP array of alternatives through comparison with pre-project base conditions simulated with the same models. The

RSM models uses a 41-year period of hydrologic record (1965 through 2005) which includes sufficient climatological variability (including natural fluctuations of water) to represent the full range of hydrologic conditions experienced within the South Florida region over a long-term period. No one modeling tool or representation of model results can definitively predict with-project hydrologic conditions across the project area given the large regional scope of the project, model tools limitations and assumptions, and future uncertainties regarding the effects of other projects. However, each snapshot of model results can form the basis for applying best professional judgment to determine whether the potential effects of Recommended Plan 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 LOWRP PIR analyzed the environmental effects and benefits of the project alternative through qualitative and quantitative comparisons between the 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 LOWRP 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 LOWRP study area (**Figure 1-1**). 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, inclusive of the Recommended Plan.

5.1 Analyses for Savings Clause including Intervening non-CERP and CERP Projects

The changes to quantity, timing, and distribution of water to be produced by the project focus on meeting hydrologic restoration targets for Lake Okeechobee and the Northern Estuaries. The purpose of the Savings Clause analyses is to determine whether the effects of the project will cause an elimination or transfer of existing legal sources of water or reduction to the level of service of flood protection. The potential effects of the LOWRP WAF, ASR wells, and wetland restoration improvements can be assessed by comparing stage duration curves and other results from the model simulations for the FWO and the Recommended Plan (1BWR). 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 Recommended Plan would need to 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 LOWRP 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, LOSOM, Modified Waters Deliveries to Everglades National Park (MWD), C-111 South Dade, Interim Operations Plan (IOP), Everglades Restoration Transition Plan (ERTP), etc.;
- Savings Clause does not require CERP to make up for reductions in quantity or quality of existing legal sources or levels of service for flood protection caused by intervening non-CERP activities, but CERP cannot cause further reductions;
- Savings Clause does not prohibit CERP from reducing quantity or quality of existing legal sources or levels of service for flood protection increased by intervening non-CERP activities, but CERP cannot reduce those increases below those in place on the date of enactment of WRDA 2000.

To determine whether it is the Recommended Plan or other intervening CERP or non-CERP activities are affecting the existing legal sources or levels of service for flood protection, the Recommended Plan can be compared to the ECB and FWO (**Table 5-1**). The simulations for Recommended Plan and the FWO include the effects of intervening CERP activities that were assumed to be implemented in 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.

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

Table 5-1 - Summary of Comparisons for Savings Clause for LOWRP

Step	Base Condition Model Run	With-Project Model Run
1	Existing Conditions Baseline – ECBLOW	Alternative 1BWR
2	Future without the project – FWOLOW	Alternative 1BWR

5.2 Water Supply Assurance

The total water and the water made available for the natural system and other-water-related needs are quantified when all project features are constructed, and the project is expected to be operational as identified in the with-project condition, the Recommended Plan. The pre-project water expected to be available when the project is operational is represented by FWO.

Water for project assurances is quantified where project benefits accrue, consistent with the HU benefits quantified during the Recommended Plan formulation resulting from water being made available by the project. The ability of the Recommended Plan to provide water to meet other water-related needs in the LOSA was also analyzed. The basins where the project may potentially supply water for the natural system or other water-related needs are listed below:

- Natural System

Lake Okeechobee

Wetlands: Kissimmee River Center and Paradise Run

- Other Water-Related Needs

  LOSA including EAA

Identification of the water made available by the project requires analysis of the RSM-BN results for the Recommended Plan. The identification of water involves both 1) existing water in the system that is available to the natural system and available for other water-related needs, and 2) water made available by the project to the natural system and for other water-related needs, as depicted in **Figure 5-1**. The sum of these two categories is the total water that is expected to be available to the natural system and available for other water-related needs.

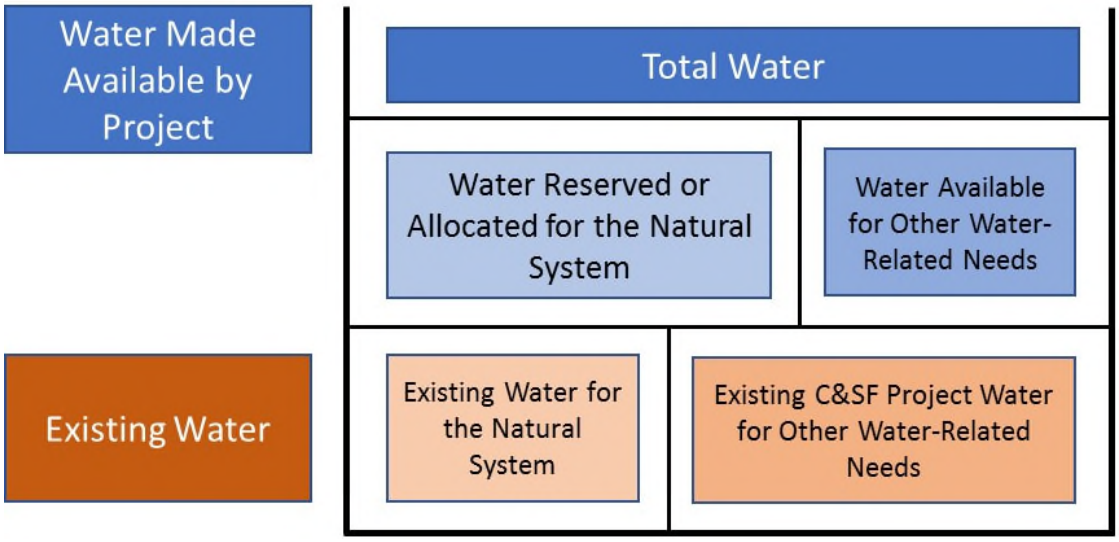

Figure 5-1 – Water Needed to Achieve the Benefits of the Plan

Identification of water made available with the project is represented by the with-project condition (Recommended Plan, 1BWR model run) as depicted in **Table 5-2.** Given that the LOWRP contains discrete storage features (WAF), wetlands attenuation ASR, and Regional ASRs, the water made available by the project can be quantified as the volume discharged from these features annually.

Table 5-2 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	FWO (FWOLOW)
Total water for the natural system with the project	Recommended Plan (1BWR)
Identification of water made available by the project	Difference between Recommended Plan (1BWR) and FWO (FWOLOW)

5.2.1 Water Made Available by the Project for the Natural System

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 Recommended Plan representing water made available by the project for the natural system. Benefits projected for the Northern Estuaries are the result of reduced discharges from Lake Okeechobee, and therefore water for the natural system is not quantified. Water returned to Lake Okeechobee or delivered to wetlands (Kissimmee River Center and Paradise Run) was quantified for the Recommended Plan only (1BWR). 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.

The HU benefits were calculated during plan formulation at three locations: Lake Okeechobee, the Lake Okeechobee watershed, and the Northern Estuaries. These locations represent where ecosystem benefits (HUs) are expected as a result of implementation of the Recommended Plan. Quantification of flows produced from all storage features benefiting Lake Okeechobee which include the (1) WAF assisted by co-located ASR wells and (2) independent watershed ASR facilities can be found in **Figure 5-2.** Quantification of flows into Kissimmee River-Center and Paradise Run wetlands can be found in **Figure 5-3.** Although habitat unit benefits were tabulated for the Northern Estuaries, they benefit from reducing high discharge events. For that reason, water made available for the natural system is not quantified for the Northern Estuaries.

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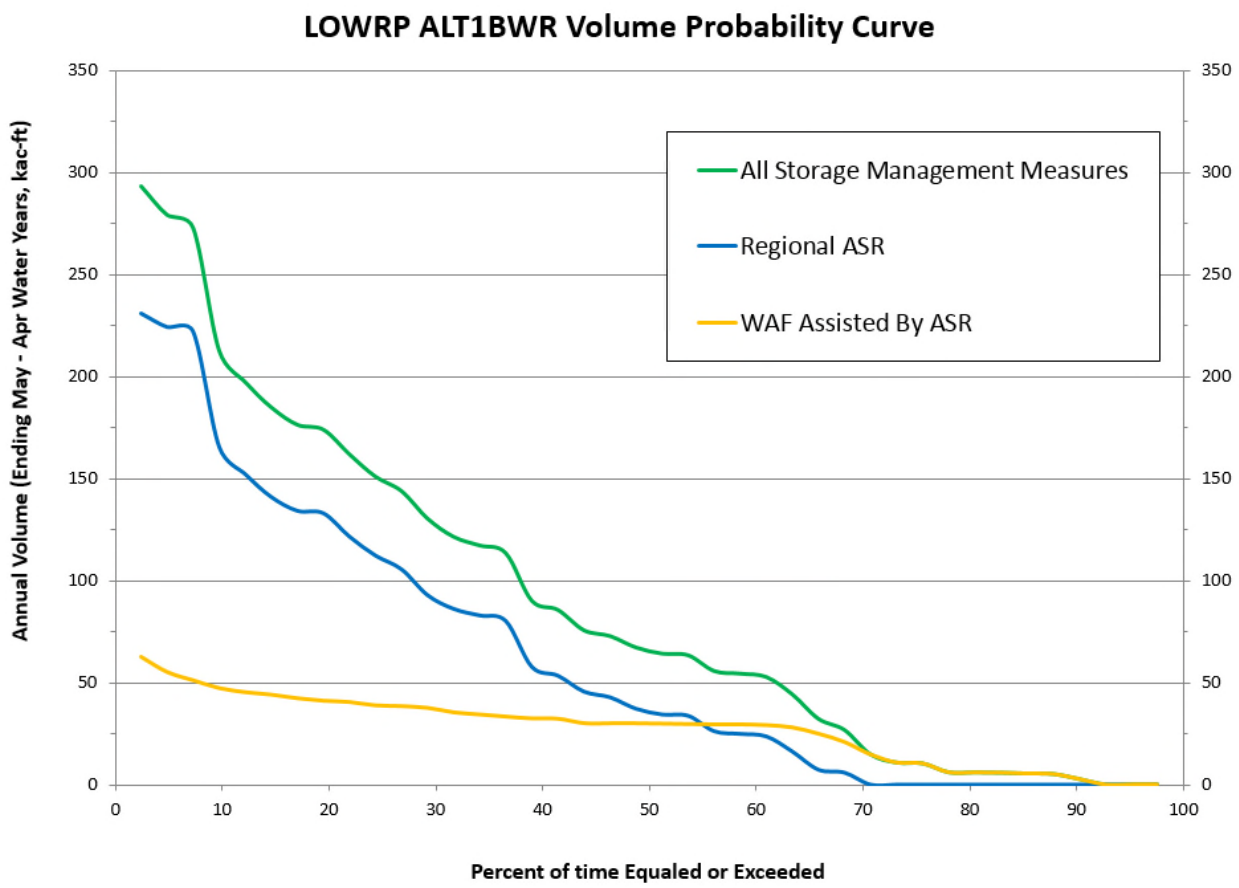

Figure 5-2 – LOWRP volume probability curve for the Recommended Plan: WAF with Wetland Attenuation ASR and Regional ASR.

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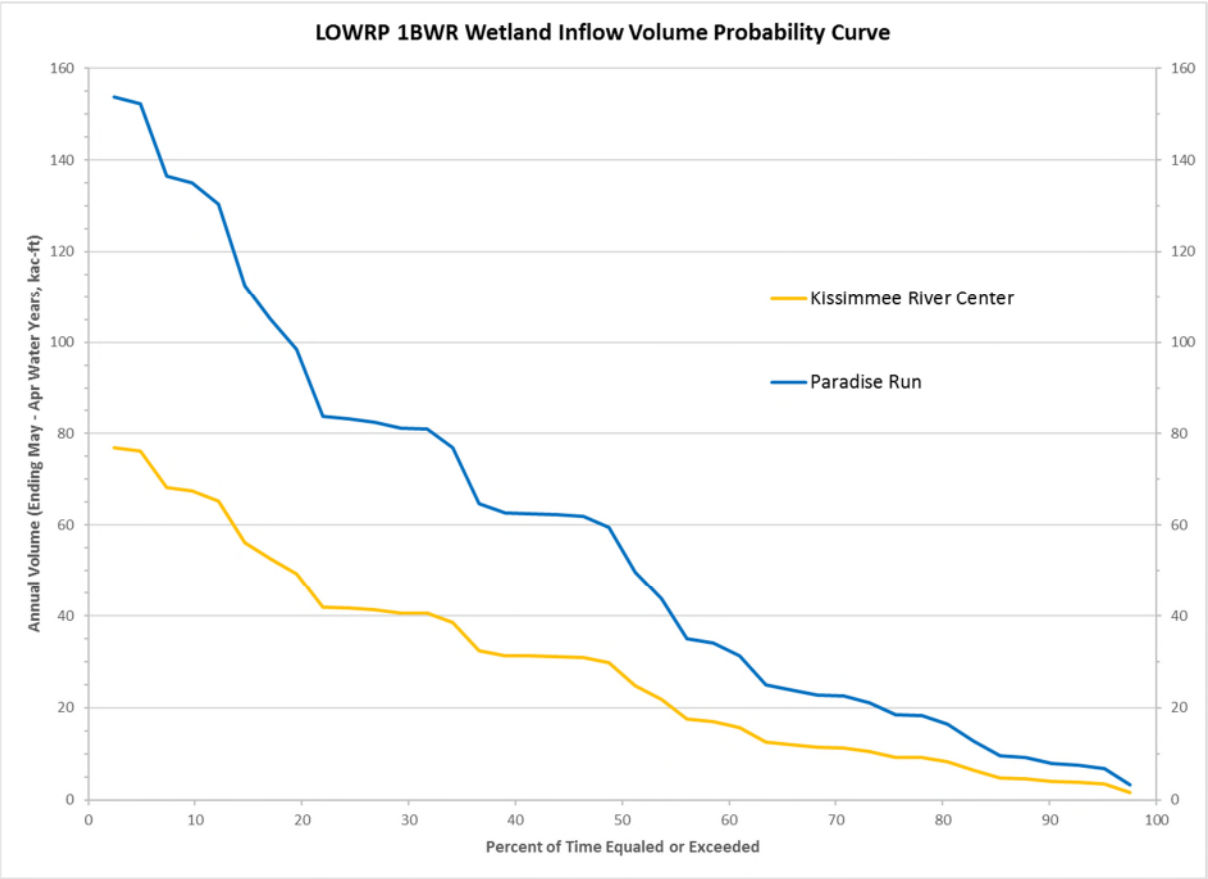

Figure 5-3 – LOWRP Volume Probability Curve for the Recommended Plan: Kissimmee Center and Paradise Run Wetlands.

The volumes of water at the 10th, 50th, and 90th percentiles are identified for the Recommended Plan (future with-project) conditions and can be found in **Table 5-3.**

Table 5-3 Water made available for the natural system by the LOWRP

Total Water Available for the Natural System (Difference between Recommended Plan and FWOLOW)			
Location	**Water Available equaled or exceeded 10% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 50% of Water Years (1,000 ac-ft)**	**Water Available equaled or exceeded 90% of Water Years (1,000 ac-ft)**
WAF Assisted by ASR	47	30	3
Regional ASR	165	37	0
Kissimmee Center Wetlands	68	30	4
Paradise Run Wetlands	135	60	8

5.2.2 Water for Other Water Related Needs

The ability of the LOWRP water storage features to provide water to meet other water-related needs in the LOSA and STOF's Brighton and Big Cypress Reservations was analyzed for the Recommended Plan. The storage features of the LOWRP are designed to capture water from Lake Okeechobee during high stage events that would otherwise be lost to tide. Water stored in LOWRP is released during dry periods when lower stages in Lake Okeechobee may present water supply risks within LOSA. Water made available by LOWRP benefits water users within LOSA by increasing the reliability of their supply relative to ECB or FWO (refer to **Annex B**, **Section B.2.3** and **Section B.3** of the PIR). Increased water supply does not enable new or expanded allocations in LOSA.

5.3 Flood Protection Assurance

The implementation of the Recommended Plan will not degrade the existing level of flood protection offered by various components of the C&SF Project for this area. Further, the Recommended Plan will ensure flood protection of the area through engineering design and construction following industry standards for design and construction of pertinent features of the plan. U.S. Army Corps of Engineers, Engineering Regulation(s) 1110-2-1150 (Engineering and Design for Civil Works Projects) 1110-2-1156 (Engineering and Design Safety of Dams – Policy and Procedures) along with various other site/structure specific regulations will be adhered to prior to and during the PED phase.

5.4 Adaptive Management to Meet the Needs of the Natural Environment

The primary objective of the LOWRP Adaptive Management and Monitoring Plan (AMMP) (**Annex D** of the PIR/EIS; hereon **Annex D**) is to identify the monitoring necessary to inform the decision-makers, LOWRP partner agencies, and the public on achieving restoration success, as well as addressing uncertainties related to project performance that can be addressed with efficiently structured approaches. The LOWRP AMMP contain descriptions of monitoring that should address specific uncertainties identified during LOWRP planning, required parameters such as water quality and water levels, and ecological features that track LOWRP's progress toward success. The monitoring data will indicate LOWRP's progress toward the objectives of LOWRP, and LOWRP's conformance to applicable legal requirements. The monitoring descriptions are found in detail in **Annex D**.

For each LOWRP objective, the monitoring parameters, their value to LOWRP, timeframe needed to see changes, measurement frequencies, decision criteria for triggering adaptive management options, and suggested adaptive management options are provided in the adaptive management plan text. The information is also summarized for each project objective in **Tables D-2** through **D-10** of **Annex D**. 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. Adaptive management and ecological success monitoring will continue up to 10 years, per WRDA 2007, Section 2039, in coordination with the phases of LOWRP construction. See **Annex D - Part 1 Section D.6** for a description of the rolling

implementation of the monitoring and the feedback that the data will provide to inform management decisions.

5.4.1 Invasive and Nuisance Species Management Plan

The purpose of the Invasive and Nuisance Species Management Plan (INSMP) is to outline measures for preventing, controlling, reducing and monitoring invasive species within the LOWRP footprint in order to achieve restoration benefits. The plan proposes to complete both initial and long-term invasive species management within the WAF, wetlands, and ASR sites. The INSMP is a living document and will be updated throughout design, construction and OMRR&R. Annex F of the PIR contains the INSMP.

5.4.2 Other Project Monitoring Plans

In addition to the AMMP, **Annex D** contains the Water Quality Monitoring Plan and Hydrometeorological Monitoring Plan. These include regulatory monitoring associated with water quality and the USFWS BO, as well as hydrometeorological monitoring to inform system operations, and ecological success monitoring directly related to project objectives. The LOWRP AMMP has been designed to support achievement of CERP and LOWRP goals and objectives and remain within constraints by providing the data necessary to detect changes expected due to LOWRP.

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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." Agency coordination and public involvement has taken place throughout the LOWRP planning process. PDT and public involvement have been a critical component of the development of the PIR.

6.1 Summary of Utilities and Coordination with Utilities and Public Infrastructure

Preliminary aerial and ground inspections have revealed no major transmission lines within project areas. There are expected to be service lines for occupied structures in those project areas. Since these areas are to be acquired, no facility or utility relocations are expected. PDT membership consists of those individuals designated by the USACE and the SFWMD, the implementing agencies, and representatives designated by other governmental agencies or Tribes. 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. Participants include USEPA, USFWS, United States Geological Survey (USGS), National Park Service (NPS), Miccosukee Tribe of Indians of Florida, STOF, Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Agriculture and Consumer Services (FDACS) and FDEP. Representatives from Highlands, Okeechobee, Glades, Martin, Palm Beach, Lee and St. Lucie Counties were also active participants. Designated public comment periods provided opportunities for public participation during PDT meetings. A NEPA scoping letter dated June 28, 2016 invited comments from federal, state, and local agencies; affected Indian Tribes; and interested private organizations and individuals. Scoping comments were accepted through August 12, 2016. A Notice of Intent (NOI) to prepare an EIS for the LOWRP was published in the Federal Register (Volume 81, Number 137; 81 FR 16920) July 18, 2016. A public scoping meeting was held on July 26, 2016 in Okeechobee, Florida.

Agencies including the DOI, USFWS, Bureau of Indian Affairs, SFWMD, and the Tribes were asked at the beginning of the planning process to become cooperating agencies under NEPA for the LOWRP. The SFWMD, Bureau of Indian Affairs and the Seminole Tribe of Florida agreed. Due to the robust interagency process planned for this project, the other agencies and Tribe did not wish to enter into a cooperating agency agreement; however, these agencies were fully involved in all phases of the LOWRP planning process.

Public outreach efforts for LOWRP began early in the planning process. Due to intense public, political, and media interest in restoration of the south Florida ecosystem, public participation was a critical component of the development of the PIR. Workshops were held at key phases of LOWRP planning process during the formulation of project objectives, management measures, and evaluation of alternatives. **Appendix C, Part 3** of the PIR contains all the pertinent correspondence information regarding the agencies and public meetings.

The DOI, Office of Everglades Restoration Initiatives South Florida Ecosystem Restoration Task Force (Task Force) Working Group (WG) hosted a series of public workshops and provided input to USACE. Presentations have also been provided to SFWMD Governing Board, Water Resources Advisory Commission, and the Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP).

Specific outreach efforts will be undertaken 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. The purpose of this 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 agencies will ensure that the implementation of the project components minimizes impacts to and relocation of existing utilities or public infrastructure.

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7 Increased Water Supply Available from Project

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

The Recommended Plan achieves the project objectives by changing the timing, distribution, and volume of water conveyed, to the natural system. The large regional scale of the Recommended Plan causes large volumes of water to move between ecosystems and basins consistent with the project's objectives (**Table 7-1**). 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 and ecologic targets for natural system restoration. The Recommended Plan provides a further reduction to regulatory releases from Lake Okeechobee to the Northern Estuaries. The Savings Clause and project assurances analyses for the Recommended Plan focus on whether these regional-scale changes meet the requirements of WRDA 2000 and the Programmatic Regulations and chapter 373.1501 F.S.

Table 7-1 - Goals and Objectives of CERP and LOWRP

CERP Objective	LOWRP Objective
Improve habitat and functional quality.	Improve estuary discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster, submerged aquatic vegetation (SAV), and other estuarine community habitats in the Northern Estuaries.
Increase the total spatial extent of natural areas.	Increase the spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed.
Improve native plant and animal species abundance and diversity.	Improve quantity, timing, and distribution of flows into Lake Okeechobee to maintain ecologically desired lake stage ranges more often.
CERP Goal: Enhance Economic Values and Social Well-Being	
Increase availability of fresh water (agricultural/municipal & industrial).	Increase availability of water supply for existing legal water users of Lake Okeechobee.
Reduce flood damages (agricultural/urban).	No corresponding LOWRP objective beyond Savings Clause.
Provide recreational and navigation opportunities.	Provide recreational opportunities.
Protect cultural and archeological resources and values.	Protect cultural and archeological resources and values.

Identification of water for the natural system is quantified at four locations in the Recommended Plan: 1) releases from the WAF and co-located wetland attenuation ASR to Lake Okeechobee, 2) releases from watershed ASR (ASR separate from the WAF) to Lake Okeechobee, and deliveries to the restored wetland features in the Lake Okeechobee watershed at 3) Kissimmee River-Center, and 4) Paradise Run. These locations represent inflows to the basins where ecosystem benefits (HUs) are expected as a result of implementation of the Recommended Plan. Benefits projected for the Northern Estuaries are the result of reduced discharges from Lake Okeechobee and therefore water for the natural system is not identified. In addition, because the LOWRP storage features do not exist in the pre-project condition, water is not quantified for the without project condition. Water returned to Lake Okeechobee or delivered to wetland features (Kissimmee River-Center and Paradise Run) was quantified.

7.1.1 Water to be Reserved or Allocated for the Natural System

As required by Section 601(h)(4)(A) of the WRDA 2000 and Section 385.35 of the Programmatic Regulations for the Implementation of CERP, the water made available by the project must be protected using the State of Florida's reservation or allocation authority as described in **Table 5-3**. Water made available by the Recommended Plan must be protected before the SFWMD and Department of the Army enter into one or more Project Partnership Agreements to construct the Recommended Plan features.

7.1.1.1 Lake Istokpoga/Indian Prairie Canal System - Restricted Allocation Area

The footprint of the Recommended Plan's wetlands attenuation feature is contained within the RAA for the Lake Istokpoga/Indian Prairie Canal System. Within this RAA, no additional surface water will be allocated from District canals above existing allocations.

7.1.1.2 Lake Okeechobee Service Area - Restricted Allocation Area

Lake Okeechobee is a MFL waterbody. MFLs are the minimum flow or minimum water level at which further withdrawals would be significantly harmful to the water resources or ecology of the area. The 2008 LORS analysis anticipated the lower lake stages would turn Lake Okeechobee into a MFL waterbody in recovery. As part of the recovery strategy while 2008 LORS is in effect, the District adopted RAA criteria for LOSA. The criteria limit users' withdrawals to their base condition water use. Applicants are not authorized to use additional volumes from Lake Okeechobee waterbodies unless they identify one of the specified sources listed in the rule.

The LOSA RAA includes the waters of Lake Okeechobee including integrated conveyance systems that are hydraulically connected to and receive water from Lake Okeechobee, such as the C-43 Canal, the C-44 Canal, and secondary canal systems that receive Lake Okeechobee water for water supply purposes via gravity flow or pump.

7.2 Identifying Water Made Available for Other Water Related Needs

The ability of the LOWRP to provide water to meet other water-related needs in the LOSA was analyzed for the Recommended Plan. Based on the analysis, the water supply level of service for existing legal users in LOSA is improved over the FWO (refer to **Section B.2.3** and **Section B.3** of **Annex B** of the PIR). Increased water supply, however, does not enable new or expanded allocations in LOSA. It only reduces the 2008 LORS-anticipated frequency and severity of water shortage cutbacks. Similarly, other water related needs in the STOF Brighton and Big Cypress Reservations is improved in the Recommended Plan compared to FWO condition.

7.3 Commitments for All CERP Projects

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

The following language sets forth these commitments:

> *The overarching objective of the Plan is the restoration, preservation, and protection of the South Florida ecosystem while providing for other water-related needs of the region, including water supply and flood protection. The Federal Government and the non-Federal sponsor are committed to the protection of the appropriate quantity, quality, timing, and distribution of water to ensure the restoration, preservation, and protection of the natural system as defined in WRDA 2000, for so long as the project remains authorized. This quantity, quality, timing, and distribution of water shall meet applicable water quality standards and be consistent with the natural system restoration goals and purposes of CERP, as the Plan is defined in the programmatic regulations. The non-Federal sponsor will protect the water for the natural system by taking the following actions to achieve the overarching natural system objectives of the Plan:*
>
> *1. Ensure, through appropriate and legally enforceable means under Federal law, that the quantity, quality, timing, and distribution of existing water that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report is available to the natural system, will be available at the time the Project Partnership Agreement for the project is executed and will remain available for so long as the Project remains authorized.*
>
> *2a. Prior to the execution of the Project Partnership Agreement, reserve or allocate for the natural system the necessary amount of water that will be made*

available by the project that the Federal Government and the non-Federal sponsor have determined in this Project Implementation Report.

2b. After the Project Partnership Agreement is signed and the project becomes operational, make such revisions under Florida law to this reservation or allocation of water that the Federal Government and the non-Federal sponsor determines, as a result of changed circumstances or new information, is beneficial for the natural system.

3. For so long as the Project remains authorized, notify and consult with the Secretary of the Army should any revision in the reservation of water or other legally enforceable means of protecting water be proposed by the non-Federal sponsor, so that the Federal Government can assure itself that the changed reservation or legally enforceable means of protecting water conform with the non-Federal sponsor's commitments under paragraphs 1 and 2. Any change to a reservation or allocation of water made available by the project shall require an amendment to the Project Partnership Agreement

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Lake Okeechobee Watershed Restoration Project

1501 Pre-Application Meeting Minutes

June 1, 2018 – 2:00pm to 3:30pm

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1. Welcome & Introductions

Luis R. Colón, South Florida Water Management District (SFWMD), opened the meeting at 2:05 PM, welcomed everyone, completed the roll call (attached), and reviewed the agenda (attached).

2. Requirements of 373.1501 F.S.

Mr. Colón explained 373.1501 F.S., which codifies the District's roles, responsibilities as the Local Sponsor for the Lake Okeechobee Watershed Restoration Project, and reviewed the specific requirements of 373.1501(5) F.S., which states the District is required to:

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

3. Project Study, Scope and Schedule

Mr. Colón reviewed the Lake Okeechobee Watershed Restoration Project timeline.

Michelle Ferree, SFWMD, presented the Lake Okeechobee Watershed Restoration Project goals and objectives; which are to:

- Improve the quantity, timing, and distribution of flows into Lake Okeechobee to maintain ecologically desired lake stage ranges more often,
- Improve estuary discharges from Lake Okeechobee to improve the salinity regime and the quality of oyster, submerged aquatic vegetation, and other estuarine community habitats in the Northern Estuaries,
- Increase the spatial extent and functionality of aquatic and wildlife habitat within Lake Okeechobee and the surrounding watershed, and
- Increase availability of the water supply to the existing legal water users of Lake Okeechobee.

Ms. Ferree reviewed the project constraints. In addition to being 1501 compliant, the project must meet applicable water quality standards, maintain Lake Okeechobee navigability within the watershed, and maintain rights of the Seminole Indian Tribe of Florida under the compact.

4. Performance Measures and Project Benefits

Ms. Ferree explained to meet the project objectives, a number of locations were considered for siting the wetland restoration and aboveground storage components, as well as aquifer storage and recovery (ASR) wells. All ASR well sites considered were on land owned by the SFWMD.

5. Array of Alternatives

Ms. Ferree provided a description of the final array of alternatives, which include Alternative 1BW, Alternative 1BW-shallow, and Alternative 2Cr. All alternatives include Kissimmee River Center and Paradise Run wetlands.

Ms. Ferree discussed tribal and public input and concerns expressed during public meetings.

Ms. Ferree reviewed the Project Delivery Team's proposed Tentatively Selected Plan (TSP): Alternative 1B Wetland Attenuation Feature (1BW). The TSP includes a flow-through wetland attenuation feature situated on approximately 12,500 acres, providing 43,000 acre-feet storage; 80 ASR wells providing 48,000 acre-feet of storage per year; and wetland restoration of approximately 5,300 combined acres at Kissimmee River Center and Paradise Run.

Ms. Ferree explained Alternative 1BW increases wetland habitat spatial extent, promotes sustainability in Lake Okeechobee, promotes resiliency in the Northern Estuaries and reduces Lake Okeechobee Service Area (LOSA) demand cutback volumes.

6. 1501 Compliance

Ms. Ferree restated the Lake Okeechobee Watershed Restoration Project TSP is in compliance with 373.1501 F.S.,

- Existing Legal Uses – urban, agricultural and tribal water supply not diminished
- Flood Protection – no reduction in level of service
- Water Quality – existing water quality maintained

7. Next Steps

Ms. Ferree presented the next steps related to the Lake Okeechobee Watershed Restoration Project;

- Release Draft Project Implementation Report – June 29, 2018 (45-day public review)

8. Discussion

Gene Duncan, Miccosukee Tribe, commented on the inclusion of ASR wells in the TSP. Mr. Duncan understood ASR wells were ruled out of the final arrays.
Jennifer Leeds, SFWMD, explained deep injection wells (DIW) were considered but were removed from the project, ASR wells have been part of the project.

Gary Ritter, Florida Farm Bureau Federation, asked for clarification on the number of ASR wells and how they would be clustered together.
Bob Verrastro, SFWMD, indicated that the TSP includes 80 ASR wells. The exact number of ASR wells per site had not been finalized; however, the ASR wells will be located on SFWMD owned land.

Stacy Myers, Seminole Tribe of Florida, expressed the Tribe's concern with listed species migration onto Tribal lands from the Lake Okeechobee Watershed Restoration Project's lands.

Stanley Ganthier, Florida Department of Environmental Protection (FDEP), asked if ASR wells are being considered in Moore Haven, Florida.
Mr. Verrastro replied the Comprehensive Everglades Restoration Plan (CERP) project study area includes Moore Haven.
Mr. Colón explained the 1501 Report will include a map of the CERP project boundaries as well as the northern estuaries.

Mr. Ritter inquired about the distribution of ASR wells.
Mr. Verrastro explained the ASR well distribution is conceptual at this time. ASR wells were included in CERP and the total number of ASR wells that will be actualized as part of the Lake Okeechobee Watershed Restoration Project is dependent on test well results.

Mr. Ganthier asked if the 1501 Report is a stand-alone document.
Mr. Colón explained the 1501 Report is the State Compliance Report and will also be included in Annex B of the Draft Project Implementation Report.

Mr. Duncan explained the Miccosukee Tribe's objection to changes in land use and displacement of species from the habitat.

Mr. Ganthier inquired as to the effect of future planned communities on the north side of State Road 78.
Ms. Ferree explained the SFWMD is aware of planned development in Okatannee and planned communities located on the south side of State Road 78.

Mr. Ritter discussed the planned retail Bass Pro shop location on the north side of State Road 78 and speculation of additional growth in the area.
Ms. Leeds thanked Mr. Ritter for his comments.

Mr. Colón adjourned the meeting at 2:35 PM.