October 2017

Supplemental Environmental Assessment and Finding of No Significant Impact

INSTALLATION, TESTING AND MONITORING OF A PHYSICAL MODEL FOR THE WATER CONSERVATION AREA 3 DECOMPARTMENTALIZATION AND SHEETFLOW ENHANCEMENT PROJECT: PHASE 2

Miami-Dade County, Florida

US Army Corps of Engineers ®
Jacksonville District

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DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
701 San Marco Boulevard
JACKSONVILLE, FLORIDA 32207-8175

REPLY TO
ATTENTION OF

FINDING OF NO SIGNIFICANT IMPACT
INSTALLATION, TESTING, AND MONITORING OF A PHYSICAL MODEL FOR THE WATER CONSERVATION AREA 3 DECOMPARTMENTALIZATION AND SHEETFLOW ENHANCEMENT PROJECT: PHASE 2

MIAMI-DADE COUNTY, FLORIDA

The U.S. Army Corps of Engineers, Jacksonville District (Corps), has conducted an Environmental Assessment in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. The Corps assessed the effects of the following actions in the Installation, Testing, and Monitoring of a Physical Model for the Water Conservation Area 3 (WCA 3) Decompartmentalization and Sheetflow Enhancement Project (DECOMP): Phase 2 of DECOMP Physical Model (DPM) Operations Environmental Assessment (EA), dated June 2017. The Proposed Action consists of the following:

- The DPM is a limited duration, fully controlled field test conducted along a 3,000 foot stretch of the L-67A and L-67C Levees and Canals in WCA 3A and WCA 3B. The project provides for the temporary installation of 10, 60-inch culverts (collectively called S-152) with a combined designed discharge capacity of 750 cubic feet per second (cfs) installed along a stretch of the L-67A Levee. Three 1,000-foot backfill treatments (no backfill, partial backfill and complete backfill) are located within the L-67C Canal, adjacent to and directly east of the S-152 structure. The L-67C Levee is gapped for 3,000 feet, directly east of the backfill treatments, to allow the flow from WCA 3A to pass through the culverts, through the "pocket", across the backfill treatments and into WCA 3B.

- DPM operations would resume as early as November 2017 and continue year round, with the potential for additional years of testing through the year 2021, subject to constraints as discussed in the operational strategy. S-152 may discharge up to 750 cfs to facilitate the DPM field test, until either DPM objective(s) are met or S-152 is closed subject to operational constraints. When WCA 3B stages (at gages SRS-1 and/or Site_71) equal or exceed 8.5 feet (ft.) National Geodetic Vertical Datum of 1929 (NGVD), S-152 releases may be reduced or discontinued unless the 8.5 ft. NGVD WCA 3B stage constraint criteria has been modified under subsequent NEPA and required approvals.

- The Corps will be responsible for operation and maintenance of S-152. Water levels in WCA 3A are currently managed according to the 2012 WCAs, Everglades National Park (ENP) and the ENP to South Dade Conveyance System (SDCS) Water Control Plan, the Modified Water Deliveries (MWD) Increment 1.1 and 1.2 Operational Strategy, and the 2017 Planned Temporary Deviation for WCA 3A. The current WCA 3A regulation schedule, Increment 1.1 and Increment 1.2, and the 2017 Planned Temporary Deviation will continue to be used during the DPM unless replaced by subsequent authorized operating criteria, anticipated to include Increment 2 of the MWD Project and the Combined Operational Plan for the MWD Project and C-111 South Dade Projects.

- Total surface water deliveries to WCA 3B are expected to increase. The Corps' ongoing assessment of hydrometeorological conditions and stakeholder or agency input may result in suspension or termination of the field test due to impacts greater than expected and/or discussed within this EA. A DPM Science Plan has been developed for the Proposed Action consistent with the agency goals.

- The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test.

Section 601(b)(1) of the Water Resources Development Act of 2000 (WRDA 2000), Public Law 106-541, authorized the Comprehensive Everglades Restoration Plan (CERP) as a framework for modifications and operational changes to the Central and South Florida (C&SF) Project to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region including water supply and flood protection. The WCA 3 DECOMP Project is a component of CERP. The Corps and South Florida Water Management District entered into a design agreement dated May 12, 2000 for the purposes of conducting activities related to planning, engineering and design of CERP projects including DECOMP. The DPM is being conducted pursuant to that agreement as a design effort to gather information to formulate decompartmentalization of WCA 3 and inform the design of CERP features.

The April 13, 2010 DPM EA and Finding of No Significant Impact (FONSI) anticipated operational testing of S-152 to begin in early 2011 and continue until late 2014. Construction of the DPM was delayed by one year. Operational testing began on November 5, 2013. Operational testing of the DPM has included four flow events which started in the fall of 2013 (November 5, 2013 – December 30, 2013) and continued through 2014 (November 4, 2014 – January 29, 2015), 2015 (November 16, 2015 – January 28, 2016) and 2016 (October 17, 2016 – January 31, 2017). A July 8, 2015 DPM Supplemental FONSI was prepared to document NEPA compliance for the purposes of proposing a third and fourth year of testing in 2015 and 2016.

The Corps is proposing a fifth year of testing in 2017, with the potential for additional years of testing through the year 2021 in order to gain information to further address scientific, hydrologic, and water management uncertainties that require clarification prior to the design of decompartmentalization features within WCA 3, included in CERP. In addition to the No Action Alternative, four alternatives were considered and evaluated as the operational strategy for the DPM was developed. The Proposed Action is expected to best meet the objectives of the project.

I have reviewed the EA for the Proposed Action. This Finding incorporates by reference all discussions and conclusions contained in the Supplemental EA enclosed hereto. Based on information analyzed in the Supplemental EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the Proposed Action will not significantly affect the quality of the human environment and does not require an Environmental Impact Statement. Reasons for this conclusion are in summary:

a. The Proposed Action is in full compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act. The Proposed Action would not adversely affect protected species. The Corps agrees to maintain open and cooperative communication with the U.S. Fish and Wildlife Service and Florida Fish and Wildlife Conservation Commission during operations.

b. The Corps has coordinated a consistency determination pursuant to the Coastal Zone Management Act through the circulation of this Supplemental EA. The Corps has determined that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of the Florida Coastal Management Program. The Florida State Clearinghouse has reviewed the Proposed Action. Based on the information submitted, the state has no objections to the project. Final concurrence of consistency with the Florida Coastal Management Program will be determined during environmental permitting processes, as applicable.

c. Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the Corps has coordinated the Proposed Action with the Florida State Historic Preservation Officer and the appropriate federally recognized Tribes. The Corps has determined that the Proposed Action will have no adverse effect on historic properties listed or eligible for listing in the National Register of Historic Places in accordance with the National Historic Preservation Act and considerations given under the NEPA.

d. The Proposed Action will not adversely affect water quality and will be in compliance with the appropriate conditions in the Comprehensive Everglades Restoration Plan Regulation Act (CERPRA Permit Number 0304879-007) and consistent with the Clean Water Act. Water quality monitoring is proposed in the DPM Science Plan. Operational criteria to limit high phosphorous concentrations in the surface water entering WCA 3B were also developed to inform operations.

e. The Proposed Action will maintain the authorized purposes of the C&SF Project, which include flood control; water supply for agricultural irrigation, municipalities, and industry; ENP; regional groundwater control and prevention of saltwater intrusion; enhancement of fish and wildlife; and recreation.

In view of the above and the attached Supplemental EA, and after consideration of public and agency comments received on the project, I conclude that the Proposed Action would not result in a significant effect on the human environment. This FONSI incorporates by reference all discussions and conclusions contained in the Supplemental EA enclosed herewith.

JASON A. KIRK, P.E.
Colonel, Corps of Engineers
Commanding

9 Nov 2017
Date

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT ON INSTALLATION, TESTING AND MONITORING OF A PHYSICAL MODEL FOR THE WATER CONSERVATION AREA 3 DECOMPARTMENTALIZATION AND SHEETFLOW ENHANCEMENT PROJECT: PHASE 2

MIAMI-DADE COUNTY, FLORIDA

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1.0 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY

Section 601(b) (1) of the Water Resources Development Act of 2000 (WRDA 2000), Public Law 106-541, authorized the Comprehensive Everglades Restoration Plan (CERP) as a framework for modifications and operational changes to the Central and South Florida (C&SF) Project to restore, preserve, and protect the South Florida ecosystem while providing for other water-related needs of the region including water supply, and flood protection. The Water Conservation Area (WCA) 3 Decompartmentalization and Sheetflow Enhancement (DECOMP) Project is a component of CERP (USACE 1999). CERP addressed decompartmentalization of WCA 3A in three separate components, to be constructed in two phases, the first of which was conditionally authorized and contained two of the four components. The first phase was one of ten projects that were conditionally authorized for implementation in Section 601(b) (2) (C) (viii) (ix) of WRDA 2000, in order to expedite project construction by eliminating the need to return to Congress for approval of a Project Implementation Report (PIR).

The main purpose of the DECOMP Project is to restore natural landscape patterns and native flora and fauna in WCA 3A and Everglades National Park (ENP) by redistributing water entering the system and removing natural barriers to sheetflow in order to restore natural hydroperiods, flow and water depths, and to reestablish ecological connectivity. Scientific uncertainties hampered progress on the DECOMP Project. In an effort to avoid continuing decline in the ecosystem and achieve restoration results more quickly, a multiple PIR approach was pursued in 2007. Construction and real estate costs associated with the DECOMP Project increased significantly since the first phase was conditionally authorized. Therefore, the initially authorized component was expected to exceed the WRDA 1986 Section 902(b) cost increase limitations, and additional Congressional authorization would be necessary. Planning efforts for PIR 1 focused on restoration of WCA 3A resulting from backfilling the Miami Canal, construction of a hydropattern restoration feature located along the northern boundary of WCA 3A, and improvements to the North New River Canal (**Figure 1-2**) (USACE 2012a). Planning efforts for PIRs 2 and 3 were to focus on restoration of WCAs 3A and 3B and ENP by backfilling the southern portion of the Miami Canal within WCA 3B and the southern 7.5 miles of the L-67A Borrow Canal; removing the L-68A, L-67C, L-29, L-28, and L-28 Tieback Levees and Borrow Canals; and elevating both the eastern and western segments of the Tamiami Trail. Eight passive weir structures were also envisioned to be located along the entire length of the L-67A Canal under the DECOMP Project (USACE 1999).

A report was prepared in September 2012 to summarize plan formulation efforts to date related to DECOMP PIR 1 (USACE 2012a) prior to being integrated into a subsequent planning effort under CERP, known as the Central Everglades Planning Project (CEPP) (USACE 2014). CEPP was recently authorized under the WRDA 2016. Components of the authorized CEPP plan include

features considered during plan formulation efforts for DECOMP PIR 1 and features that were to be evaluated in PIRs 2 and 3.

The United States Army Corps of Engineers (Corps) and the South Florida Water Management District (SFWMD) entered into a design agreement dated May 12, 2000, to conduct activities related to the planning, engineering, and design of CERP projects, including DECOMP. The Decomp Physical Model (DPM) is a limited duration, fully controlled field test being conducted pursuant to that agreement as a design effort to gather information to formulate decompartmentalization of WCA 3 and to use for the design of CERP features. Congress will not appropriate funds for DECOMP construction, however, until completion of the Modified Water Deliveries (MWD) to ENP Project, authorized by Section 104 of the ENP Protection and Expansion Act of 1989, commonly called simply "Mod Waters" (WRDA 2000, Section 601 (b)(2)(D)(iv)).

1.2 PROJECT LOCATION

The DPM is located within the Everglades of southeastern Florida in Miami-Dade County (Figure 1-1 and **Figure 1-2**). The DPM is situated between WCA 3A and WCA 3B in a region referred to as the "pocket". The pocket is approximately 1.2 miles in width and is bounded on the upstream (northwest) by the L-67A and downstream (southeast) side by the L-67C Canal and Levee system.

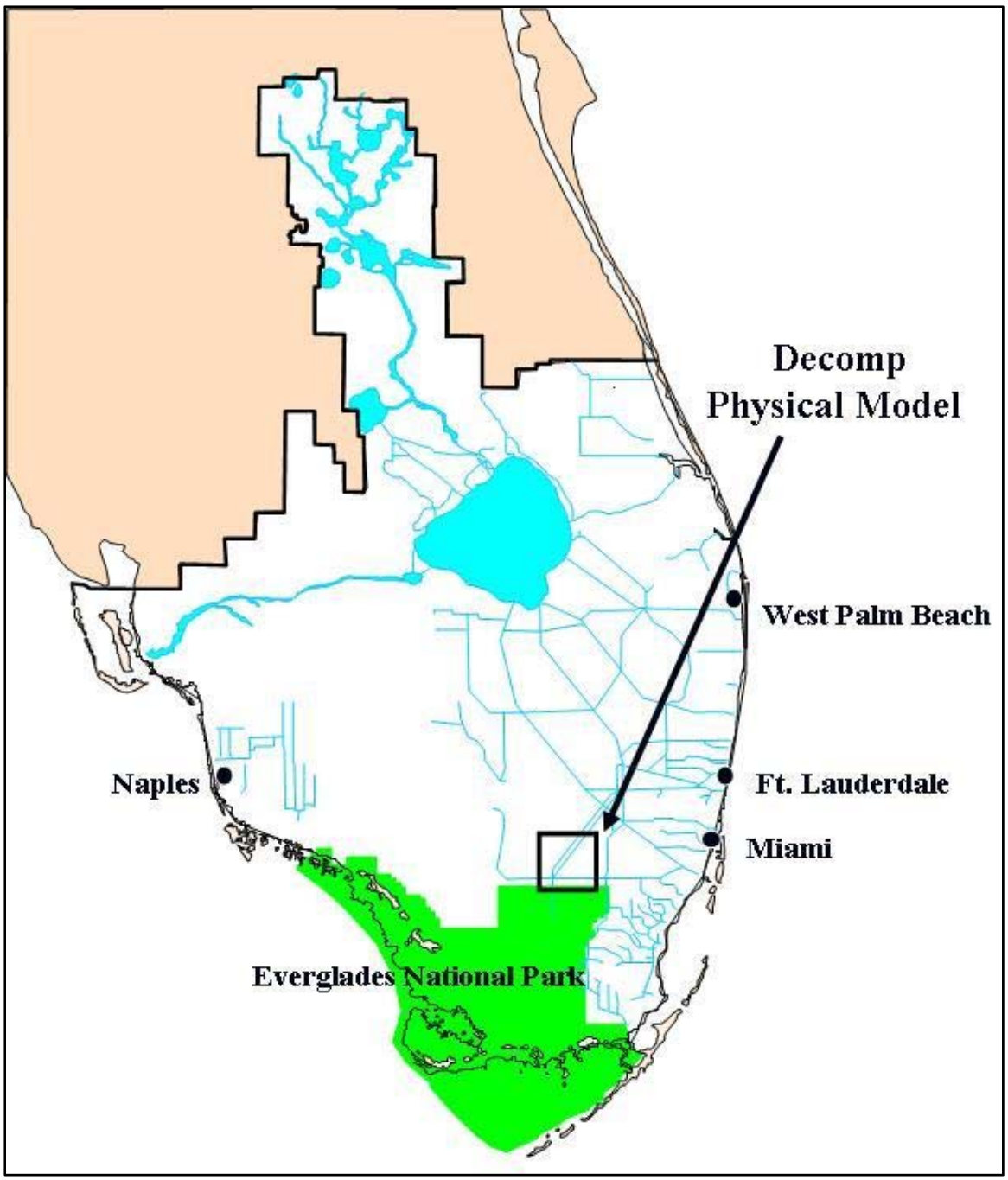

FIGURE 1-1. DPM REGIONAL LOCATION MAP

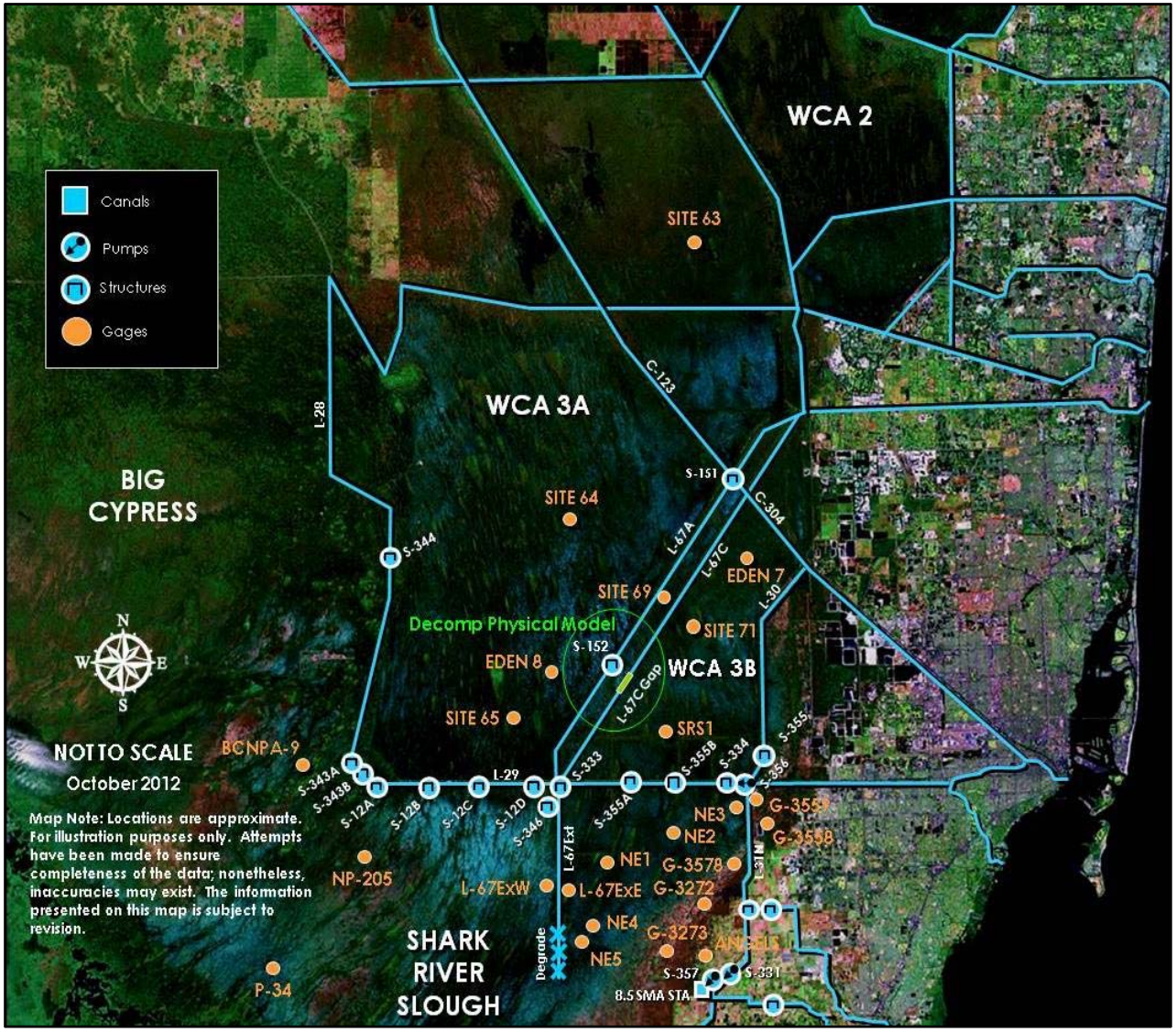

FIGURE 1-2. DPM PROJECT LOCATION

1.3 PROJECT BACKGROUND

The DPM is a temporary field test designed to provide essential information regarding mechanisms that may enable development and maintenance of the corrugated ridge and slough landscape, including minimum water deliveries required. Driven by the natural, gradual slope of water across the landscape, sheetflow was a characteristic feature of the pre-drainage Everglades. It is believed that, historically, velocities were sufficient to entrain and redistribute sediments from white water lily dominated sloughs onto sawgrass ridges, building the characteristic topography and landscape patterning of the pre-drainage Everglades. Restoration and sustenance of this landscape is an important goal of CERP and considered essential to restoration. The amount of flow needed to trigger such mechanisms, however, remains a critical uncertainty for CERP projects that aim to reconnect and rehydrate the system. Addressing this uncertainty is a primary objective of the DPM. The DPM focuses its efforts in a region referred to as the "pocket". The pocket is located between the L-67A and L-67C Canal and Levee system within WCA 3. The DPM utilizes S-152 to deliver experimental flows into the pocket to evaluate environmental responses to flow and evaluate the effects of partial and complete backfilling of canals and levee modifications. S-152 consists of 10 gated 60-inch diameter high density polypropylene culverts with a combined maximum flow of 750 cubic feet per second (cfs).

The pocket is oriented along an apparent historic flow path from approximately north-northwest to south-southeast. The L-67A Canal is both a borrow and a conveyance canal, receiving waters from the Miami Canal, S-9 pump station, and WCA 3A (**Figure 1-2**). The L-67A Canal is bounded on the east by the L-67A Levee and on the west by a spoil mound from the original excavation of the L-67A Canal. A series of gaps in the spoil mound allows mixing of canal water with WCA 3A marsh water. The L-67C Canal does not directly receive discharges from control structures nor is it used for conveyance. The L-67C Canal is bounded to the east by the L-67C Levee and on the west by a spoil mound from the original excavation of the L-67C Canal. Inflow into the pocket occurs through seepage, from WCA 3A, and direct rainfall. Water leaves the pocket through a combination of evaporation, seepage, and surface discharge through an approximately 1,000 feet (ft.) long gap in the L-67C Levee located about eight miles southwest of the Miami Canal within WCA 3B.

The DPM uses a before-after-control impact (BACI) experimental design to evaluate hydrologic and ecological responses to flow (USACE 2010). During operation of the DPM, water is allowed to pass from WCA 3A through the L-67A Canal into the pocket through S-152. The 10 culverts with vertical slide gates discharge directly into the pocket and are manually operated on site. The culverts were designed to generate velocities of at least two centimeters per second (cm/s), the expected threshold velocity to entrain sediments. In order to establish sheetflow and evaluate canal back filling options, a 3,000 ft. long gap was opened in the L-67C Levee downstream of S-152 during installation of the culverts. Levee material was deposited in the L-67C Canal to create a 1,000 ft. long completely full backfill segment and a 1,000 ft. long partially full backfill segment.

An Environmental Assessment (EA) and Design Test Documentation Report (DTDR) was completed for the DPM with the signing of a Finding of No Significant Impact (FONSI) on April 13, 2010 (USACE 2010). The EA and DTDR incorporated a DPM Science Plan (*i.e.* monitoring plan) which identified testable hypotheses and experimental designs to address scientific uncertainties related to sheetflow (USACE 2010). The 2010 EA and DTDR anticipated

operational testing of S-152 to begin in early 2011 and continue until late 2014. Construction of the DPM was delayed by one year. The DPM includes three baseline years and four flow events. Operational testing of the DPM started in the fall of 2013 (November 5, 2013 – December 30, 2013) and continued through 2014 (November 4, 2014 – January 29, 2015), 2015 (November 16, 2015 – January 28, 2016) and 2016 (October 17, 2016 – January 31, 2017). A Supplemental FONSI was prepared to document National Environmental Policy Act (NEPA) compliance for purposes of proposing a third and fourth year of testing in 2015 and 2016 on July 8, 2015 (USACE 2015). Operations of the DPM are currently limited to the months of October, November, December and January based on criteria developed during planning stages of the project as defined in the 2010 DPM EA and FONSI (USACE 2010). Lessons learned from operations of the DPM are summarized on a yearly basis in the South Florida Environmental Report (https://www.sfwmd.gov/science-data/sfer) and in annual reports submitted by the United States Geological Survey (USGS) to the Corps. A copy of the 2016 USGS annual report is provided in **Appendix F**.

Due to very strong El Niño conditions experienced across the C&SF Project during the November 2015 to January 2016 dry season, regional water management operation transitioned into a temporary emergency deviation to the 2012 WCAs, ENP and the ENP to South Dade Conveyance System (SDCS) Water Control Plan (USACE 2012b) to alleviate high water levels within WCA 3. The 2016 Temporary Emergency Deviation mediated high water levels within WCA 3 by allowing for the full discharge capacity through S-333 into the L-29 Canal in addition to the use of additional WCA 3A outlets such as S-152, and included other operational changes needed to mediate any concern with increased seepage from ENP into the SDCS. As part of the 2016 Temporary Emergency Deviation, S-152 was utilized from February 19 to February 23 and from March 9 to May 3 in 2016. The latter operations provided opportunities to test operations outside of the previous DPM Phase 1 operational window and assess effects under a larger flow window (17 weeks). NEPA documentation to support the 2016 Temporary Emergency Deviation was completed on February 12, 2016, with the signing of a FONSI, incorporating an EA (USACE 2016a). A Supplemental EA and FONSI were completed on May 10, 2016 (USACE 2016b).

1.4 STUDY AREA LAND USE

WCA 3, located directly north of ENP, is part of the Everglades Complex of Wildlife Management Areas (ECWMA), and is managed by the Florida Fish and Wildlife Conservation Commission (FWC). The FWC has outlined a conceptual management plan for the ECWMA (FWC 2007) providing general information on resource management goals and objectives. Management activities within the ECWMA include the maintenance and restoration of plant and animal communities, public education, recreation, and habitat protection. Management emphases by the FWC consists of the development and recommendation of water regulation schedules to address hydrological restoration, improvement of the quality of existing habitats to benefit native fish and wildlife species through prescribed burns, control of exotic species, and plantings of native trees and shrubs. Recreational hunting is used as the primary management tool to maintain resident game populations in the ECWMA. The FWC also manages the sport fishery within the ECWMA by providing regulations pertaining to size and possession limits. The FWC also coordinates with cooperating agencies to maintain access to the canal system and public use areas to maximize boat and bank fishing opportunities.

1.5 PROJECT NEED OR OPPORTUNITY

The DPM is a temporary field test designed to provide information regarding environmental responses to flow and the effects of partial and complete backfilling of canals and levee modifications on the ridge and slough landscape. The DPM is being conducted pursuant to a design agreement between the Corps and SFWMD dated May 12, 2000 to conduct activities related to planning, engineering and design of CERP projects, including DECOMP. The Corps is proposing a fifth year of DPM testing in 2017, with the potential for additional years of testing through the year 2021 to gain information to further address scientific, hydrologic and water management uncertainties that require clarification prior to the design of decompartmentalization features within WCA 3, included in CERP. Water flow, stage, sediment movement, water quality, and ecological parameters will continue to be measured consistent with the objectives outlined within the 2010 DPM EA and FONSI (USACE 2010). Extension of DPM operations outside of the October to January time frame; *i.e.* end of the wet season through the early dry season, , as well as additional years of operation will provide greater confidence in the overall reliability of the data collected and will allow the opportunity to more accurately address uncertainties associated with decompartmentalization of WCA 3. Continued operation of the DPM will also increase the likelihood of capturing a wider range of hydrologic events to substantiate lessons learned to date.

The 2010 DPM EA and FONSI and DTDR incorporated a DPM Science Plan (*i.e.* monitoring plan) which identified testable hypotheses and experimental designs to address scientific uncertainties related to sheetflow (USACE 2010). Monitoring within the DPM Science Plan focuses on the effects of sheetflow and associated nutrient loading on biological and physical processes in the ridge and slough landscape; interactions of canal-backfilling effects and sheetflow on sediment and phosphorus dynamics in and around the L67C Canal; and landscape-scale responses of enhanced hydrologic connectivity in WCA 3B. The DPM Science Plan has been amended prior to each year of operational testing to incorporate lessons learned from the previous year. Part 1 of the 2017 DPM Science Plan describes lessons learned from prior flow events, monitoring that will take place with respect to future operations and outlines remaining priorities for understanding the ecological effects of flow and canal backfilling (**Appendix C**). Additional years of operation as outlined with the Proposed Action will allow the opportunity to address these remaining priorities. The DPM Science Plan will continue to be amended on a yearly basis as information is gained.

Previous results from prior flow events suggest that sustained flows of at least 8 to 10 weeks duration, rather than multiple pulses, are needed to maximize slough velocities, sediment transport, and sediment redistribution; critical steps for landscape restoration. Sustained water column velocities > 3 cm/s were achieved, primarily in sloughs with sustained flows. Despite relatively constant discharges over 8 to 10 weeks, slough velocities and sediment transport tended to increase with sustained flows. Findings also support hypotheses that sediment movement is less impeded through sloughs while sediment movement through ridges is reduced due to vegetative resistance and decreased velocities. Previous results from prior flow events have also confirmed that responses of algal communities and periphyton in sloughs are responsible for creating higher velocities and sediment transport observed during sustained flows. Structural changes to sloughs (loss of periphyton) may lead to changes in the biological and physical properties of floc. Floc consists of a loosely clumped mass of fine particles that may become more erodible or more labile as structural changes occur in sloughs. These structural changes assist to further accelerate flow

and the sediment redistribution needed to maintain the ridge and slough landscape. Immediate responses to flow were observed within ~500 meters of S-152 inflows. High velocities and sediment transport rapidly diminished beyond ~500 meters of the S-152 structure and tended to move preferentially eastward toward the L-67C Canal, then southwest down the canal. Although slough velocities of ≥ 1 cm/s were limited to ~500 meters from S-152, results suggest that biogeochemical changes in floc are occurring over a larger area up to ~ 1000 meters from S-152. Water Total Phosphorus (TP) has remained low with surface water concentrations averaging ≤ 10 micro grams per liter (μg/L) across the DPM study area, including sites adjacent to inflow.

Sediment dynamics in the ridge and slough landscape are complex. The 2010 DPM Science Plan incorporated into the 2010 DPM EA and FONSI listed 13 hypotheses related to the role of flow in structuring and maintaining the ridge and slough landscape. While findings from prior flow events have confirmed and quantified the physical impacts of flow, DPM testing also showed that biological responses by periphyton and algae to flow were substantial, and in some cases regulated flow itself. In addition, pilot studies to enhance flow by reconnecting historic sloughs showed that active management might be needed to achieve sheetflow restoration over larger areas. The next phase of DPM operations prioritizes monitoring that addresses hypotheses related to how biological responses respond to flow and the extent to which active management can be utilized to expand the areal extent of flow (**Appendix C**). Remaining priorities are briefly summarized below. Reference **Appendix C** for further information.

Biological (Algal and Food Web) Responses to and Feedbacks on Sheetflow

- Results of prior flow events demonstrated the clearing out of periphyton from sloughs within the project area further accelerated flow and sediment redistribution. Changes in the properties of floc have also been observed. DPM monitoring in subsequent flow events will address how rapidly and how far changes in periphyton may occur. Potential effects on small fish population growth were also observed with changes in algal communities suggesting that high flows fundamentally change food web dynamics. Continued monitoring will further inform this relationship as well as observations made with regard to the effects of backfilling canals on fish abundance and movement.

Hydrologic Limitations on Sheetflow Restoration and the Role of Active Management

- The effectiveness of S-152 in restoration remains an uncertainty. Additional DPM testing is needed to understand the rate at which benefits accrue as a result of introducing sheetflow (*i.e.* Do the potential benefits associated with sheetflow spread on a small scale (e.g. a few meters per decade) or a large scale (e.g. 100 to 1000s of meters per year)?). A large-scale active management study was initiated in the fourth flow event (2016-2017) to reconnect sloughs (up to 2-km from S-152) that have been encroached by sawgrass for purposes of evaluating the degree to which active management can increase the extent of sheetflow and/or accelerate the restoration of sloughs. Initial findings show that active management can increase flow and sediment transport. Velocities in the created slough were raised 5-fold (approximately 15 cm/s) above those of the surrounding sawgrass dominated landscape (2-3 cm/s). Given evidence showing the importance of vegetation in shaping the direction and speed of flows, larger-scale active management of sloughs could be used

to redirect more flow toward the natural (south) orientation of the landscape, and to increase the areal extent of sheetflow and sediment redistribution.

Potential Effects of Sediment and Phosphorous Resuspension in the L-67C Canal and Evaluation of Ecological Effects of Canal Backfilling

- Two thirds of the discharges from S-152 has been observed to enter the open canal treatment via the canal itself, rather than the marsh. Discharges from S-152 move preferentially eastward, entering the L-67C Canal north of the canal backfill treatments. As a result, flows into and out of the canal treatments are unevenly distributed. Sediment and nutrient loading into the canal backfill treatments varies substantially; ***i.e.*** the no backfill treatment conveys the majority of flow, and thus requires more information to provide appropriate comparisons among treatments. Quantifying sediment and phosphorous loading in the canal and backfill area and potential effects on the downstream marsh remains an important component of the DPM.

  Furthermore, submerged and emergent vegetation in the partial and complete backfill treatments continues to change after construction completion. Monitoring of vegetation and potential interactions with the backfill treatments will be needed during subsequent flow events, as vegetation has not yet stabilized.

Potential Effects of Connectivity and Year-Round Flow on Landscape Hydrology and Tree Island Responses in WCA 3

- It is anticipated that the extension of DPM operations outside of the October to January period, ***i.e.*** the end of the wet season through the early dry season, has the potential to increase connectivity within the project area. Monitoring at a larger spatial scale will be pursued to understand how hydrology will potentially be influenced around tree islands within WCA 3B (refer to DPM Science Plan, **Appendix C**).

While the Corps is proposing additional testing of the DPM for the reasons outlined above, it should be noted that additional operation of the DPM beyond the October 2016 to January 2017 time frame is also being pursued to address the mandated Reasonable and Prudent Alternative (RPA) of the July 22, 2016 Everglades Restoration Transition Plan (ERTP) Biological Opinion (BO) (USFWS 2016). The Corps reinitiated Endangered Species Act (ESA) consultation on ERTP on November 17, 2014 as a result of an exceedance of an Incidental Take Reinitiation Trigger from the November 17, 2010 BO for the Cape Sable Seaside Sparrow (CSSS). ERTP was implemented in October 2012 through the Water Control Plan (USACE 2012b) and included operational guidance for the constructed features of the MWD and C-111 South Dade Projects until those projects are fully completed and a Combined Operating Plan is implemented (USACE 2011).

A BO states the opinion of the USFWS as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. USFWS issued a new BO for ERTP on July 22, 2016 developed in formal ESA consultation with the Corps (USFWS 2016). As a result of this consultation, USFWS

determined that current conditions within CSSS habitat threaten the survival of the sparrow, and as a result, USFWS issued a "jeopardy" BO which explains that unless alternatives to current water operational practices (which then included the 2012 Water Control Plan) are explored and implemented, continued implementation of ERTP is likely to jeopardize the continued existence of the CSSS. The revised BO, issued July 22, 2016 presented a RPA that would avoid jeopardizing the CSSS. The RPA identifies operational modifications and expediting restoration initiatives for some of the structures in the southern portion of the Everglades ecosystem to provide suitable nesting habitat for the endangered CSSS.

In response to the BO, the Corps has committed to taking specific actions to comply with the BO terms and conditions and implement the RPA. The RPA requires that the Corps, in partnership with the SFWMD and subject to the successful completion of NEPA and other environmental requirements continue to operate the DPM, pursuant to State Water Quality Certification, for purposes of obtaining additional information through Fiscal Year 2017 and Fiscal Year 2018. The RPA acknowledged that continued utilization of the DPM during the time limited effort is expected to provide direct and incidental benefits to the CSSS by shifting water east.

1.6 AGENCY GOALS AND OBJECTIVES

Objectives of the Proposed Action remain consistent with those defined in the 2010 DPM EA and FONSI and DPM Science Plan (USACE 2010). During the initial design of the DPM, a number of scientific uncertainties were identified. The 2010 DPM Science Plan outlined the details or the scientific approach that was to be used to address these uncertainties (USACE 2010). Scientific uncertainties as defined in the 2010 DPM EA and FONSI and DPM Science Plan (USACE 2010) are briefly summarized as follows:

Effects of Complete and Partial Backfilling of Canals

- The differential effects of partial versus more extensive backfilling of canals on the hydrology, sediment transport, vegetation and fish and wildlife resources will be addressed through operation of the DPM. These results will be directly applicable to decompartmentalization of WCA 3 to further refine expected benefits with regard to the degradation of portions of the L-29, L-28, L-67A and L-67C Canals.

Magnitude and Direction of Sheetflow Necessary to Maintain Landscape Characteristics of the Everglades

- The DPM will further the understanding of the magnitude and direction of sheetflow necessary to maintain the landscape characteristics of the Everglades. The DPM will directly address any questions that could arise during the implementation of decompartmentalization of WCA 3 as this effort focuses on increased sheetflow connectivity between WCA 3A, WCA 3B and ENP.

Ecological Effects of Levee Modifications

- Understanding the function of levees as a system that may buffer overdrainage is necessary in the context of decompartmentalization of WCA 3. The DPM will address levee degradation, and subsequent impacts, through implementation of a flow-way design.

Water Depth and Hydroperiod Tolerance of Ridge, Sloughs, and Tree Islands

- Monitoring of water levels during the DPM will assist in developing a clearer understanding of the hydroperiod tolerances of vegetation communities within the ridge and slough landscape. These results will be directly applicable to the decompartmentalization of WCA 3.

Effects of Water Levels and Seepage in WCA 3B and NESRS on Seepage in the Lower East Coast

- Efforts will be made to associate water level monitoring through the DPM to concurrent seepage management efforts for the L-31N Canal to more clearly understand the effect of increased water level stages in WCA 3B and NESRS on seepage in the Lower East Coast.

Variance of Hydrologic Models Compared to System Conditions

- Hydrologic data collected during the DPM will be available to support continued refinements to hydrologic models that may potentially be used during plan formulation for CERP.

1.7 CONSTRAINTS

During the initial design of the DPM, a number of environmental and operational constraints were identified. Environmental and operational constraints, which remain applicable as defined in the 2010 DPM EA and FONSI, are briefly summarized as follows:

A. Maintain the authorized purposes of the C&SF Project which include flood control; water supply for agricultural irrigation, municipalities, industry, and ENP; regional groundwater control and prevention of saltwater intrusion; enhancement of fish and wildlife; and recreation.

B. No reduction in current flood protection or mitigation in existence on the date of enactment of WRDA 2000 and in accordance with applicable law

C. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. National Geodetic Vertical Datum (NGVD) will apply for the duration of the test period.

D. Operation of S-152 will meet applicable water quality standards.

Operational constraints for the Proposed Action remain consistent with those defined in the 2010 DPM EA and FONSI (USACE 2010).

1.8 RELATED ENVIRONMENTAL DOCUMENTS

The Corps has documented a number of environmental documents relevant to the Proposed Action:

- *Comprehensive Review Study of the Central and Southern Florida Project, Comprehensive Everglades Restoration Plan Final Integrated Feasibility Report and Programmatic Environmental Impact Statement ,* U.S. Army Corps of Engineers, Jacksonville District 1999
- *Installation, Testing and Monitoring of a Physical Model for the Water Conservation Area 3 Decompartmentalization and Sheet Flow Enhancement Project Final Environmental Assessment and Design Test Documentation Report*, U.S. Army Corps of Engineers, Jacksonville District, April 2010.
- *Documentation Report for Water Conservation Area 3 Decompartmentalization and Sheetflow Enhancement – Part 1 (DECOMP PIR),* U.S. Army Corps of Engineers, Jacksonville District, September 2012.
- *Central Everglades Planning Project: Final Integrated Project Implementation Report and Environmental Impact Statement,* U.S. Army Corps of Engineers, Jacksonville District, July 2014.
- *Supplemental Finding of No Significant Impact Installation, Testing and Monitoring of a Physical Model for the Water Conservation Area 3 Decompartmentalization and Sheet Flow Enhancement Project,* U.S. Army Corps of Engineers, Jacksonville District, July 2015.
- *Environmental Assessment; L-29 Canal and South Dade Conveyance System Temporary Emergency Deviation to Affect Relief of High Water Levels within Water Conservation Area 3A*, U.S. Army Corps of Engineers, Jacksonville District, February 2016.
- *Supplemental Environmental Assessment; L-29 Canal and South Dade Conveyance System Temporary Emergency Deviation to Alleviate High Water Levels in Water Conservation Area 3A,* U.S. Army Corps of Engineers, Jacksonville District, May 2016.
- *Biological Opinion for the Everglades Restoration Transition Plan,* U.S. Fish and Wildlife Service, South Florida Ecological Services Office, July 2016.

Information contained within the documents listed above is incorporated by reference into this Supplemental EA.

1.9 DECISIONS TO BE MADE

Whether to adopt the Preferred Alternative is the primary decision that must be made. Please reference **Section 1.5** for agency goals and objectives.

1.10 SCOPING AND ISSUES

Reference Appendix D of the 2010 DPM EA and FONSI and the 2015 DPM Supplemental FONSI for pertinent correspondence related to the operation of S-152 (USACE 2010, USACE 2015). A NEPA scoping letter was mailed on February 10, 2009, to solicit input from federal and state agencies, tribal representatives and members of the general public submitted comments during the initial design of the DPM. Comments received during scoping and subsequent public review of the above referenced NEPA documentation are summarized below.

2010 DPM EA and FONSI Summary of Comments Received:

- Concerns were expressed with regard to the authority under which the DPM was constructed and operated, including potential funding sources.
- Comments were received regarding the scale of the DPM and the ability of the field test to address scientific uncertainties related to the decompartmentalization of WCA 3 given the limited footprint and short duration. Concerns were expressed with regard to the applicability of the DPM to larger scale restoration efforts and the ability to extrapolate the results of the DPM given the operational constraints (*i.e.* limited flow, dry season operations) identified during the initial design.
- Concerns were received during the initial design of the DPM regarding potential effects on water levels within WCA 3B and the resulting effects on water quality, tree islands and fish and wildlife resources given the limited discharges from WCA 3B. Concerns were received regarding potential effects on recreational access during construction and operation of the DPM. Potential impacts to recreation not only include modifications to the L-67C Canal (*i.e.* backfilling) but also loss of access due to construction related activities (*i.e.* staging and stockpiling fill material in the vicinity of S-333). Potential concerns were raised regarding potential increases in stage within the L-29, L-30 and L-31 Canals as a result of increased seepage and the ability to maintain flood protection east of WCA 3B. Completion of an EIS was suggested, rather than an EA, due to potential effects on the human environment.

2015 DPM Supplemental FONSI Summary of Comments Received:

- Support was provided for the continued operation of the field test for purposes of understanding how sheetflow across WCA 3A and WCA 3B will potentially affect the current system. It was noted that operation of the field test would continue to reduce uncertainties with respect to the potential benefits received from decompartmentalizing the central Everglades. Support was provided for the continued operation of the field test to gain additional knowledge to improve the planning and construction of CERP related efforts.

1.11 PERMITS, LICENSES, AND ENTITLEMENTS

A Comprehensive Everglades Restoration Plan Regulation Act (CERPA) permit was obtained from the State of Florida to satisfy the requirement for water quality certification under the Clean Water Act. CERPRA Permit Number 0304879-002 was obtained for the DPM on January 9, 2012. This permit authorized construction and operational testing in accordance with the Interim Operations Monitoring Plan and was scheduled to expire on January 9, 2017. The Corps applied for and received a renewal permit (CERPRA Permit Number 0304879-007) on November 30, 2016 for the DPM. This permit renewal for DPM testing expires November 30, 2021. This permit renewal only allows testing to continue in the October through January time frame. In compliance with the conditions of the permit, coordination with the Florida Department of Environmental Protection (FDEP) will occur prior to additional operational testing. Further FDEP authorization will be required to extend the testing window outside of the October through January timeframe.

A large-scale active management study was initiated in the fourth flow event to reconnect sloughs (up to 2 km from S-152) that have been encroached by sawgrass for purposes of evaluating the degree to which active management can increase the extent of sheetflow and restoration of sloughs

(Reference **Appendix C**). Active management was performed through application of herbicide along pathways connecting remnant sloughs. Application of herbicides to areas within WCA 3B is authorized by a FWC aquatic permit and a National Pollutant Discharge elimination System (NDPES) permit. Only U.S. Environmental Protection Agency (EPA) approved herbicides authorized for application in an aquatic environment will be used for vegetation management. Herbicide application will be conducted by a properly qualified applicator in a manner consistent with the approved application instructions. Herbicide application within WCA 3B is closely coordinated with the FWC, the agency primarily responsible for managing the WCA 3B resources.

2.0 ALTERNATIVES

2.1 DESCRIPTION OF ALTERNATIVES

Each of the following alternatives described below in **Section 2.1.1** through **Section 2.1.5** were considered and evaluated as Phase 2 of the operational strategy for DPM operations. Alternatives differ based on: (1) the timing of DPM operations within a given year (*i.e.* operations are limited to certain months of the year); (2) the duration of DPM operations through a given year; and (3) the degree of relaxation of the Site_71/SRS-1 stage constraint of 8.5 ft. NGVD.

2.1.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

The No Action Alternative would continue C&SF water management operations as defined by the 2012 Water Control Plan (USACE 2012b) which includes the WCA 3A Regulation Schedule and Rainfall Plan with the exception of operating criteria for water control structures related to subsequently approved deviations. Increment 1.1 and Increment 1.2 is a planned deviation from the 2012 Water Control Plan for the operations of water management infrastructure connected to the MWD to ENP and C-111 South Dade Projects (USACE 2016c) including S-12A, S-12B, S-328, S-151, S-331, S-333, S-334, S-335, S-337, S-338, S-343A, S-343B, S-344, S-355A, S-355B, S-356, S-357, S- 357N, S-332B, S-332C, S-332D, S-194, S-196, S-176, S-177, and S-197. The planned deviation was anticipated to extend until March 1, 2018 after which a subsequent planned deviation is anticipated under the MWD Project. The Corps initiated a planned temporary deviation on June 28, 2017 with completion of an EA and FONSI (USACE 2017) for WCA 3A. The 2017 EA consisted of four major components including but not limited to, the opening of S-152 to discharge water from WCA 3A to WCA 3B (Reference **Section 3.5**). The deviation described within the 2017 EA for WCA 3A is expected to continue until the WCA 3A 3-station gage average falls below Zone A of the regulation schedule.

Under the No Action Alternative, the 2012 Water Control Plan and current approved deviations will continue to be used unless replaced by subsequent authorized operating criteria. S-152 is currently being utilized under the 2017 Planned Temporary Deviation to alleviate high stages within WCA 3A; however the structure would no longer be operated at the conclusion of the approved deviation. Operational testing for the DPM concluded on January 31, 2017. The physical features of the DPM are temporary would be removed and the project site would be returned to original conditions (prior to DPM Phase 1).

2.1.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Alternative B is similar to Alternative A, except for the operation of S-152. The DPM is a limited duration, fully controlled field test conducted along a 3,000 foot stretch of the L-67A and L-67C Levees and Canals in WCA 3A and WCA 3B. The project provides for the extended operation of DPM Phase 1, a temporary installation of 10, 60-inch culverts (collectively called S-152) with a total design discharge capacity of 750 cfs installed along a stretch of the L-67A Levee. Three 1,000-foot backfill treatments (no backfill, partial backfill and complete backfill) are located within the L-67C canal, adjacent to and directly east of the S-152 structure. The L-67C levee is gapped for 3,000 ft., directly east of the backfill treatments, to allow the flow from WCA 3A to pass through the culverts, through the "pocket", across the backfill treatments and into WCA 3B. No construction is proposed under Alternative B. The S-152 gated culverts and L-67C backfill

treatments for Phase 2 of the DPM are unchanged from the features originally constructed for Phase 1 of the DPM.

Alternative B would continue DPM operations in 2017 year round, with the potential for additional years of testing through the year 2021. S-152 may discharge up to 750 cfs (design capacity) to facilitate the DPM field test, until either DPM objective(s) are met or S-152 is closed as outlined below:

1. When WCA 3B stages (at SRS-1 and/or Site_71) equal or exceed 8.5 ft. NGVD, S-152 releases may be reduced or discontinued unless the 8.5 ft. NGVD criteria have been modified under subsequent NEPA and required approvals.

2. When S-355A and S-355B are closed due to high water in the L-29 Borrow Canal, S-152 releases may be reduced or discontinued before the 7.5 ft., NGVD (Increment 1.1) or 7.8 ft., NGVD (Increment 1.2) or 8.5 ft., NGVD (current temporary deviation) stage limit is reached. If the L-29 stage maximum operating limit is modified again prior to or during implementation of Phase 2 of the DPM, the modified constraint will replace the previous high water constraint. This is scheduled to happen by March 1, 2018.

3. When water quality constraint criteria per the FDEP Permit for DPM Phase 2 (including any modifications to the permit) are exceeded, S-152 releases may be reduced or discontinued.

4. When the L-67A Borrow Canal stage is below 7.5 ft. NGVD and water is not available from another source S-152 releases will be discontinued as no water is available from WCA 3A.

Water quality operational rules have been developed to guide initiation of DPM testing within a given year and to determine the continuation of operations once S-152 is opened in addition to the above criteria. Collection of canal water TP data from the L67A Canal during prior DPM operations has enabled robust statistical analyses for forecasting when canal water TP is sufficiently low and flow can occur as needed to maintain oligotrophic conditions within the downstream marsh. Information regarding the operational rules are defined in Appendix B. Operational rules are based on the forecasted geometric mean for TP concentrations at S-151, as well as biweekly data collection to ensure low inflow TP concentrations into WCA 3B. These rules are anticipated to be incorporated into FDEP authorization by modifying the existing FDEP Permit (Permit Number 0304879-007) prior to the start of DPM operations. During the extension of the DPM, operation of S-152 will be consistent with FDEP Permit Number 0304879-007, as modified.

The current 2012 Water Control Plan and current approved deviations (Increment 1.1 and Increment 1.2 and 2017 Planned Temporary Deviation) will continue to be used during DPM operations for water control structures unless replaced by subsequent authorized operating criteria documented through NEPA. Operation of S-355A and S-355B are included within the current 2012 Water Control Plan. A FDEP permit (FDEP Permit Number 0246512-003) has been issued to the Corps for operation of these structures. Total surface waters to WCA 3B are expected to increase. Reference **Section 4.5.2** (**TABLE 4-1**). Under prior operations of the DPM, the range

of water delivered through S-152 ranged from 29,314 acre feet to 36, 472 acre feet. Total surface water deliveries to NESRS and ENP during DPM operations are anticipated to remain approximately the same as they would under current (non-DPM) operations. In addition, deliveries to meet water supply demands in the LEC will be maintained. The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test. Reference **Appendix A** for a complete description of Alternative B.

2.1.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Alternative C is similar to Alternative B, except for the timing of DPM operations within a given year. Under Alternative C DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of October, November, December and January within a given year. Prior operation of the DPM was limited to these months as described in the 2010 DPM EA and FONSI and the 2015 DPM Supplemental FONSI (USACE 2010, USACE 2015). Water quality operational rules to guide initiation of DPM testing within a given year and to determine the continuation of operations once S-152 is opened, as described under Alternative B, would be applied under this Alternative. The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test.

2.1.4 ALTERNATIVE D: YEAR ROUND OPERATIONS THROUGH 2021 WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Alternative D is similar to Alternative B except for the SITE_71/SRS-1 stage constraint of 8.5 ft. NGVD. Under Alternative D, this operational constraint would no longer apply. Water quality operational rules to guide initiation of DPM testing within a given year and to determine the continuation of operations once S-152 is opened, as described under Alternative B, would be applied under this Alternative. The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test.

2.1.5 ALTERNATIVE E: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Alternative E is similar to Alternative D in that the SITE_71/SRS-1 stage constraint would no longer apply, except the timing of DPM operations within a given year differ. Under Alternative E, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; though, operations would be limited to the months of October, November, December and January within a given year. The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test.

2.2 ISSUES AND BASIS FOR CHOICE

The DPM is designed to provide information regarding the effects of levee removal and canal backfill on the ridge and slough landscape for purposes of conducting activities related to the planning, engineering and design of CERP projects including DECOMP. The alternatives described in **Section 2.0** were formulated, considered, and evaluated based on the achievement of project objectives (**Section 1.5**) and compliance with project constraints (**Section 1.6**). Potential environmental effects were also evaluated (**Section 4.0**). Alternatives were eliminated from detailed evaluation if the alternative: (1) did not maximize opportunities to test remaining priorities for understanding the ecological effects of year round flow and canal backfilling; and (2) did not address potential concerns related to increased water levels within WCA 3B and the resulting increased seepage to the adjacent L-30 and L-31N Canals.

The DPM coordinates the operation of S-152 with the collection of monitoring data in a statistically robust manner to reduce the uncertainty associated with canal backfilling and velocity thresholds for restoring the ecological attributes of the historic ridge and slough landscape. Alternative B best accomplishes this objective and is consistent with the RPA from the 2016 ERTP BO to continue to operate the field test, while maintaining existing levels of flood protection along the adjacent L-30 and L-31N Canals. Alternative A concludes operation of the DPM. Alternative C limits operations to the months of October, November, December and January within a given year. Implementation of these alternatives would not maximize opportunities to further address the remaining scientific uncertainties related to the decompartmentalization of WCA 3. The extension of DPM operations outside of the October to January time frame, as well as additional years of operation under Alternative B, will provide greater confidence in the overall reliability of the data collected and will also increase the likelihood of capturing a wider range of hydrologic events to substantiate lessons learned to date.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

The Proposed Action will maintain the authorized purposes of the C&SF Project, which include flood control; water supply for agricultural irrigation, municipalities, industry, and ENP; regional groundwater control and prevention of saltwater intrusion; enhancement of fish and wildlife; and recreation. The current level of flood protection east of the L-30 and L-31N levees must be maintained. Increased water levels within WCA 3B may result in increased seepage to the east as well as potential impacts to the protective levee system. This may occur when the stage at SRS-1 and/or Site_71 in WCA 3B rises to 8.5 ft. NGVD. The purpose of the Site_71 constraint of 8.5 ft. NGVD was established during the Experimental Program of Water Deliveries to ENP authorized by Section 1302 of Public Law 98-181. Correspondence from 1985 indicates that the criteria were developed in order to avoid detrimental impacts on Everglades ecosystems within WCA 3B. Alternatives D and E remove this constraint and are inconsistent with the 2012 Water Control Plan (USACE 2012b). Phase 1 of the DPM allowed some latitude to allow Site_71 to rise slightly above 8.5 ft., NGVD early in the test if WCA 3B has not already experienced high water durations stressful to the tree islands located within WCA 3B, but the operational window for Phase 1 did not encompass the wet season months including May through September. Implementation of Alternatives D and E would increase the likelihood of exceedingly high water levels in WCA 3B. The L-67A and C Canals and the associated L-67A and L-67C Levees were constructed to reduce seepage under the eastern perimeter levees of WCA 3, L-33, and L-30, by providing a step down of the water level difference between WCA 3A and WCA 3B, thereby, providing flood protection

for the developed communities east of WCA 3B. Alternatives A, B, and C were retained for detailed evaluation in **Section 4**.

2.4 PREFERRED ALTERNATIVE

Based upon the effects analysis conducted within this Supplemental EA, Alternative B is the Preferred Alternative. This plan is expected to best meet the objectives and constraints identified in **Sections 1.5** and **1.6**. Summary details of the Preferred Alternative are listed below:

- DPM operations would continue in 2017 year round, with the potential for additional years of testing through the year 2021 as defined in the operational strategy (**Appendix A**). S-152 may discharge up to 750 cfs to facilitate the DPM field test, until either DPM objective(s) are met or S-152 is closed subject to operational constraints. When WCA 3B stages (at gages SRS-1 and/or Site_71) equal or exceed 8.5 ft. NGVD, S-152 releases may be reduced or discontinued unless the 8.5 ft. NGVD WCA 3B stage constraint criteria has been modified under subsequent NEPA and required approvals. Water quality operational rules have been developed to guide initiation of DPM testing within a given year and to determine the continuation of operations once S-152 is based on the forecasted geometric mean for TP concentrations at S-151, as well as biweekly data collection to ensure low inflow TP concentrations into WCA 3B. Reference **Appendix B**. These rules are anticipated to be incorporated into FDEP authorization by modifying the existing FDEP Permit (Permit Number 0304879-007) prior to the start of DPM operations. During the extension of the DPM, operation of S-152 will be consistent with FDEP Permit Number 0304879-007, as modified.
- Total surface water deliveries to WCA 3B are expected to increase. Total surface water deliveries to NESRS and ENP during DPM operations are anticipated to remain approximately the same as they would under current, non-DPM operations. In addition, LEC deliveries to meet water supply demands will be maintained.
- A DPM Science Plan has been developed for the Proposed Action consistent with the agency goals. A DPM Science Plan (**Appendix C**) has been developed for the Proposed Action consistent with the agency goals and objectives outlined within **Section 1.5**.
- The Corps' ongoing assessment of hydrometeorological conditions and stakeholder or agency input may result in suspension or termination of the field test due to impacts greater than expected and/or discussed within this EA.
- The physical features of the DPM are temporary and are expected to be removed at the end of the field test. The project site would be returned to original conditions (prior to DPM Phase 1) at the conclusion of the test.

3.0 AFFECTED ENVIRONMENT

3.1 GENERAL ENVIRONMENTAL SETTING

The remaining portion of the Greater Everglades wetlands includes a mosaic of interconnected freshwater wetlands and estuaries located primarily south of the Everglades Agricultural Area (EAA). A ridge and slough system of patterned, freshwater peat lands extends throughout the WCAs into Shark River Slough (SRS) in ENP. The ridge and slough wetlands drain into tidal rivers that flow through mangrove estuaries into the Gulf of Mexico. Higher elevation wetlands that flank either side of SRS are characterized by marl substrates and exposed limestone bedrock. Those wetland areas located to the east of SRS include the drainage basin for Taylor Slough, which flows through an estuary of dwarf mangrove forests into northeast Florida Bay. The Everglades wetlands merge with the forested wetlands of Big Cypress National Preserve (BCNP) to the west of WCA 3.

Declines in the ecological function of the Everglades have been well documented. Construction of canals and levees by the C&SF Project has resulted in the creation of artificial impoundments and has altered hydroperiods and depths within the project area. The result has been substantially altered plant community structures, reduced abundance and diversity of animals, and the spread of non-native vegetation. Within WCA 3B, the ridge-slough-tree island structure has been severely compromised by the virtual elimination of overland sheetflow since the construction of the L-67 Canal/levee system in the early 1960s. WCA 3B has become primarily a rain-fed compartment, experiencing very little overland flow; it has largely turned into a sawgrass monoculture, where relatively few sloughs or tree islands remain.

Features associated with the DPM are located along a 3,000 foot stretch between the L-67A and L-67C Levees and Canals in WCA 3A and WCA 3B. The project provides for the temporary installation of 10, 60-inch culverts (collectively called S-152) with a combined discharge capacity of 750 cfs installed along a stretch of the L-67A Levee. Three 1,000 foot backfill treatments (no backfill, partial backfill and complete backfill) are located within the L-67C Canal, adjacent to and directly east of the S-152 structure. The L-67C levee is gapped for 3,000 ft., directly east of the backfill treatments, to allow the flow from WCA 3A to pass through the culverts, through the "pocket", across the backfill treatments and into WCA 3B. While areas of both WCA 3A and WCA 3B are potentially affected, the project is expected to mainly influence WCA 3B, the receiving basin.

3.2 CLIMATE

The climate of South Florida is subtropical. Seasonal rainfall patterns in South Florida resemble the wet and dry season patterns of the humid tropics more than the winter and summer patterns of temperate latitudes. Of the 53 inches of rain that South Florida receives on average annually, 75% falls during the wet season months of May through October. Tropical storms and hurricanes also provide major contributions to wet season rainfall. During the dry season, November through April, rainfall is governed by large-scale winter weather fronts that pass through the region approximately weekly. However, due to the variability of climate patterns (La Niña and El Niño), dry periods may occur during the wet season and wet periods may occur during the dry season. High evapotranspiration rates in South Florida roughly equal annual precipitation. Mean annual

temperature for the South Florida ecosystem ranges from 72 ° Fahrenheit (F) (22 ° Celsius [C]) in the northern Everglades to 76 ° F (24 °C) in the southern Everglades (Thomas 1974). There is now evidence of anthropogenic changes to global climate patterns that will likely have an impact on South Florida in terms of rainfall, evapotranspiration, and temperature.

3.3 GEOLOGY AND SOILS

The geology and soils of South Florida represent many of the opportunities, constraints, and impacts of regional water management. The high transmissivity of the Biscayne Aquifer allows rapid recharge of lower east coast well fields while it sets the stage for water competition between the Everglades and Biscayne Bay regarding the issue of seepage control. The loss of the peat soils of the Everglades provides an indicator of ecosystem change due to drainage activities. Peat soils predominate in previously flooded areas. Peat soils have subsided as a result of oxidation due to drainage, which has affected local topography and hydroperiods.

The lower east coast on the Atlantic Coastal Ridge is mostly underlain by thin sand and Miami Limestone that are highly permeable and moderately to well-drained. To the west of the coastal ridge, soils of the lower east coast contain fine sand and loamy material and have poor drainage. Rockland areas on the coastal ridge in Miami-Dade County are characterized by weathered limestone surfaces and karst features such as solution holes and sinkholes. Higher elevation marshes of the southern Everglades on either side of SRS are characterized by calcitic marl soils deposited by calcareous algal mats and exposed lime rock surfaces with karst features such as solution pits and sinkholes.

3.4 HYDROLOGY

The major characteristics of South Florida's hydrology are: (1) local rainfall; (2) evapotranspiration; (3) canals and water control structures; (4) flat topography; (5) the highly permeable surficial aquifer along a thirty to forty mile-wide coastal strip. Local rainfall is the source of all of South Florida's freshwater. The surface water that is not removed from the land by evapotranspiration and seepage to the underlying aquifer is drained to the Atlantic Ocean, Florida Bay, or the Gulf of Mexico by very slow, shallow sheetflow through wetlands or relatively quickly through man-made canals.

The levees and canals constructed during the last 60 years under the C&SF Project have divided the former Everglades into areas designated for development and areas for fish and wildlife benefits, natural system preservation, and water storage. The natural areas consist of the three WCAs located north of Tamiami Trail. ENP is located south of Tamiami Trail. The WCAs provide detention storage for water from Lake Okeechobee, the EAA, and parts of the east coast region. Detention of water helps prevent floodwaters from inundating the east coast urban areas; provides water supply and detention for east coast urban and agricultural areas and ENP; improves the water supply for east coast communities by recharging underground freshwater reservoirs; reduces seepage; and provides control for saltwater intrusion in coastal aquifers. While the WCAs may reduce the severity of the drainage of the Everglades caused by the major canal systems, thus reducing impacts to fish and wildlife caused by the major drainage systems, the levees surrounding the WCAs still function to impound the Everglades, precluding the historic flow patterns. Within WCA 3B, the ridge-slough-tree island structure has been severely compromised by the virtual elimination of overland sheetflow since the construction of the L-67 Canal/levee system in the

early 1960s. WCA 3B has become primarily a rain-fed compartment, experiencing very little overland flow; it has largely turned into a sawgrass monoculture, where relatively few sloughs or tree islands remain. The C&SF Project infrastructure, combined with operational constraints, makes it difficult to provide natural timing, volume, and distribution. In wet periods, water is impounded in the WCAs and then discharged to ENP or coastal canals for eventual release to tide. During dry periods, water can flow through the canals to coastal areas and bypass the ENP wetlands.

3.4.1 WATER CONSERVATION AREAS 3A AND 3B

The largest WCA is WCA 3, which is divided into two parts, 3A and 3B. It is approximately 40 miles long from north to south and covers approximately 915 square miles. Ground elevations slope southeasterly one to three feet in ten miles ranging from 13 ft. NGVD in northwest WCA 3A to six ft., NGVD in southeast WCA 3B. The area is enclosed by approximately 111 miles of levees, of which 15 miles are common to WCA 2. An interior levee system across the southeastern corner of the area reduces seepage into an extremely pervious aquifer.

The upper pool, WCA 3A, provides an area of approximately 752 square miles for storage of excess water from the following sources: regulatory releases from WCA 2A; rainfall excess from approximately 750 square miles in Collier and Hendry counties (through Mullet Slough); flood control inflows from 71 square miles of the former Davie agricultural area lying east of pump station S-9 in Broward County; and excess water from a 208 square mile agricultural drainage area of the Miami Canal and other adjacent EAA areas to the north. WCA 3A provides water supply to the LEC, as well as the SDCS, in accordance with the WCA 3A Regulation Schedule, and WCA 3A provides water deliveries to ENP in accordance with the Rainfall Formula and the WCA 3A Regulation Schedule, collectively referred to as the Rainfall Plan (USACE 2006). Due to its limited discharge capacity compared to the spatial extent of the watershed from which it receives water, consecutive rainfall events have the potential to quickly utilize potential storage within WCA 3A and result in discharges from WCA 3A to SRS and/or the SDCS via the S-12 structures and/or S-333 and S-334.

South of WCA 3 and within ENP, the northern portion of SRS is also partially divided by the remaining 5.5 miles of the L-67 Extension Levee, which extends south from the southern terminus of L-67A at Tamiami Trail. Outflows from WCA 3A to ENP are regulated according to the WCA 3A Regulation Schedule, with some additional WCA 3A outflows to ENP from groundwater seepage across Tamiami Trail and seasonal surface water flows through the L-28 gaps, which then continue south along the L-28 Borrow Canal towards the Tamiami Trail bridges west of S-12A.

Stage variability within WCA 3 typically follows an annual cycle; the levels vary from high stages in the late fall and early winter to low stages at the beginning of the wet season; typically late May or early June. Water stages within WCA 3A typically exceed the top of the WCA 3A Regulation Schedule during the months of August through October, with this duration extended to earlier in the wet season (May) and/or later into the dry season during wet years (November and December). Above normal rainfall patterns associated with El Niño conditions during the dry season months, November through May, may also result in water stages that exceed the top of the Regulation Schedule. Overall, water stage decreases from northwest to southeast within WCA 3, consistent with the general direction of surface water flow and prevailing topography within WCA 3. Water

depth is typically between one to two and a half feet, with the shallower waters in the higher elevation northwestern portion of WCA 3. Water stages and depths in WCA 3B are typically much lower than water stages and depths in WCA 3A, due to limited surface water inflows into WCA 3B and the reduction of seepage from WCA 3A to WCA 3B consistent with the design purpose of the L-67A and L-67C Levees. Water levels in WCA 3B are affected by seepage losses to the east towards the L-30 Borrow Canal and seepage losses to the south towards the L-29 Canal.

Water supply deliveries from the C&SF Project (also known as the Regional system) to coastal canals are utilized to recharge coastal well fields and to prevent saltwater intrusion into the Biscayne aquifer. When canal levels drop below adequate recharge levels due to a combination of well field drawdowns, evaporation, and lack of rainfall, water supply deliveries are typically made from the Regional system. When canal levels drop in Miami-Dade County, regional water supply is delivered from WCA 3A through one of two delivery routes. Depending on system conditions, both routes may be utilized concurrently. For the northern delivery route from WCA 3A, water supply deliveries are either released from S-151 to the Miami Canal within WCA 3B (C-304), followed by downstream releases to either Miami-Dade County's SDCS by utilizing S-337 and/or by utilizing S-31 to release into the C-6 Canal. For the southern delivery route from WCA 3A, water supply deliveries are released from S-333,from the upstream L-67A Canal, passed through the L-29 Canal, and released to the SDCS by utilizing S-334.

The most important component of the groundwater system within the study area is the Biscayne aquifer, an unconfined aquifer unit underlying an area of approximately 3,000 square miles in southeast Florida, from southern Palm Beach County southward through Broward County to South Miami-Dade County. Groundwater in WCA 3 generally flows from the northwest to the southeast, with extensive seepage across the eastern and southern levees, at L-30, southeast corner of WCA 3B in particular. However, the direction of groundwater flow may be locally influenced by rainfall, drainage canals, or well fields. Fluctuations in groundwater levels are seasonal. Groundwater levels within WCA 3 are influenced by water levels in adjacent canals. Where there is no impermeable formation above the aquifer, surface water recharges the system and the groundwater level can rise freely. In times of heavy rainfall, the aquifer fills and the water table rises above the land surface, contributing to seasonal inundation patterns throughout the area.

3.4.2 NORTHEAST SHARK RIVER SLOUGH

NESRS is a complex area located in the northeast corner of ENP. It is currently the northern terminus of SRS, which is aligned from the northeast to southwest across ENP. Tamiami Trail is the northern boundary, the L-31N Canal the eastern boundary, and the L-67 Extension Canal the western boundary of the NESRS. Prior to construction and operation of the C&SF Project, NESRS would have been characterized as wet most of the year, but regional developments have impacted historic freshwater routes into the area. In addition, if historic levels are not maintained through the end of the wet season, significant reductions in surface water can occur during the dry season below historic dry season levels.

Water enters NESRS primarily from WCA 3A via S-333, and then to the L-29 Borrow Canal and subsequent passage through several sets of culverts and the one-mile Tamiami Trail bridge, completed as part of the MWD Project in 2013 under the Tamiami Trail. S-355A and S-355B may also be used to deliver water from WCA 3B to the L-29 Canal for subsequent passage through the

culverts to NESRS. The discharges made from WCA 3A through the S-12 structures and S-333 are target flows determined from the Rainfall Plan (USACE 2012b). Under the Rainfall Plan, water deliveries would be computed and operations adjusted weekly, if necessary, based on the sum of two components: a rainfall response component and a WCA 3A regulatory component. The normal operational target flow distribution is 55% through the S-333 into NESRS and 45% through the S-12 structures into ENP west of the L-67 Extension. Eastern portions of the ENP are also influenced by the system of canals and structures that provide flood control and water supply for the LEC urban and agricultural areas.

3.5 REGIONAL WATER MANAGEMENT (OPERATIONS)

The C&SF Project contains multiple water bodies created by the existing C&SF levee infrastructure and implementation of the water management operating criteria, including WCA 1, WCA 2, and WCA 3. Associated with the inflow to and discharge from the water bodies is an infrastructure of structures and canals that are managed by the implementation of water management operating criteria that can include specified water levels or ranges. The WCA 3A Interim Regulation Schedule, which was implemented with the 2012 Water Control Plan, is a compilation of water management operating criteria, guidelines, rule curves, and specifications that govern storage and release functions. Typically, a regulation schedule has water level thresholds which vary with the time of year and result in discharges. The threshold lines of regulation schedules define the discharge zones and are traditionally displayed graphically. Additionally, a corresponding table is typically used to identify the structure discharge rules for the zones. As with most regulation schedules, the WCA 1, WCA 2, and WCA 3A regulation schedules must take into account various, and often conflicting, project purposes. The WCAs are regulated for the congressionally-authorized C&SF Project purposes to provide flood control; water supply for agricultural irrigation, municipalities, industry, and ENP; regional groundwater control and prevention of saltwater intrusion; enhancement of fish and wildlife; and recreation. An important component of flood control is the maintenance of marsh vegetation in the WCAs, which provide a dampening effect on hurricane-induced wind tides that have the potential to affect residential areas to the east of the WCAs. The marsh vegetation, along with the east coast protection levee, also prevents floodwaters that historically flowed eastward from the Everglades from flowing into the developed areas along the southeast coast of Florida.

Besides releases from WCA 2A via the S-11 structures, WCA 3A receives inflow from pumping stations S-8, S-9, and S-140. The S-9 pump station removes runoff in the area west of Ft. Lauderdale known as Western C-11. The S-9A pump station, located adjacent to the S-9 pump station, returns seepage water from WCA 3A and WCA3B collected in the L-37, L-33 and the U.S. 27 borrow canals. The S-140 pump station serves the 110 square mile area north and east of the interceptor canal and west of L-28. S-140 is used to maintain canal levels below 10.5 ft., NGVD unless gravity flow into WCA 3A is possible at an adequate rate. Water also enters northeastern WCA 3A by gravity through the S-150 gated culvert. Discharges at S-142 are made from WCA 3A into the North New River Canal. The SFWMD can pump runoff from the North New River Canal and the C-13 Canal into WCA 3A through S-142 by operating their pump station, G-123.

Water levels in WCA 3A are managed primarily by five gated spillways: the S-12 structures (S-12A, S-12B, S-12C, and S-12D) and S-333. Additionally, the S-151, S-343A, S-343B, and S-

344 gated culvert structures can be utilized to discharge from WCA 3A. From July 2002 through October 2012, WCA 3A was regulated according to a seasonally varying 8.75 to 10.75 ft., NGVD regulation schedule and the Rainfall Plan (initiated in 1985), as per IOP (2002 IOP EIS and 2006 IOP Final Supplemental EIS). In October 2012, the WCA 3A Regulation Schedule was revised with implementation of the ERTP recommended plan through the 2012 Water Control Plan. Revisions to the WCA 3A Regulation Schedule included incorporation of the WCA 3A 1960 9.5 to 10.5 ft. NGVD Zone A, along with expansion of Zone D forward to December 31 and expansion of Zone E1 backwards to January 1. The discharges made from WCA 3A through the S-12s and S-333 are target flows determined from the Rainfall Plan; when WCA 3A is in Zone A, these target flows are the maximum flow possible based on structure design capacities and consideration of downstream operational constraints. Under the Rainfall Plan, water deliveries are computed and operations adjusted weekly, if necessary based on the sum of two components: a rainfall response component and a WCA 3A supplemental regulatory component. The Rainfall Plan provides for the rainfall response component within all zones of the WCA 3A Regulation Schedule, with the additional regulatory release requirement added when the WCA 3A water levels fall within the higher regulation schedule zones above Zone E, including Zone E1.

Operations within the project area are managed according to the 2012 Water Control Plan (USACE 2012b) which includes the WCA 3A Regulation Schedule and Rainfall Plan with the exception of operating criteria for water control structures related to subsequently approved deviations. Increment 1.1 and Increment 1.2 is a temporary planned deviation from the 2012 Water Control Plan and governs operations of water management infrastructure connected to the MWD to ENP and C-111 South Dade Projects (USACE 2016c) including S-12A, S-12B, S-328, S-151, S-331, S-333, S-334, S-335, S-337, S-338, S-343A, S-343B, S-344, S-355A, S-355B, S-356, S-357, S-357N, S-332B, S-332C, S-332D, S-194, S-196, S-176, S-177, and S-197. Increment 1.1 and Increment 1.2 includes the ability to raise the L-29 Canal maximum operating limit from 7.5 up to 7.8 feet, NGVD contingent upon downstream constraints. The planned deviation was anticipated to extend until March 1, 2018 after which a subsequent deviation is anticipated under the MWD Project. Increment 1.1 (L-29 Canal maximum operating limit of 7.5 feet, NGVD) was implemented from February 21, 2017 to June 27, 2017 after which the Corps began to proceed with a planned temporary deviation from the 2012 Water Control Plan in order to provide relief from high water stages within the WCAs.

The Corps initiated a planned temporary deviation on June 28, 2017 with completion of an EA and FONSI (USACE 2017) for WCA 3A. The 2017 EA consisted of four major components including: (1) opening of S-12A, S-12B, S-343A, S-343B and S-344 structures prior to the official opening date of July 15, 2017; (2) opening of S-152 to discharge water from WCA 3A to WCA 3B; (3) increasing discharges at S-332D from 250 cfs to 500 cfs to increase discharge from WCA 3A to the SDCS using the S-333 and S-334, if needed; and (4) increasing discharge at S-197 from 400 cfs to 2,400 cfs to accommodate additional flows from WCA 3A to the SDCS using S-333 and S-334 while retaining capacity to manage local basin run off. The deviations described within the 2017 EA for WCA 3A are expected to continue until the WCA 3A 3-station gage average falls below Zone A of the regulation schedule.

3.6 FLOOD CONTROL

Water management and flood control is achieved in South Florida through a variety of canals, levees, pumping stations, and control structures within the WCAs, ENP, and SDCS. The WCAs provide a detention reservoir for rainfall over the WCAs, excess water from the EAA and parts of the east coast region, and for flood discharge from Lake Okeechobee to tide. The WCAs provide levees to prevent the Everglades floodwaters from inundating the east coast urban areas; provide a water supply for the east coast areas and ENP; improve water supply for east coast communities by recharging underground freshwater reservoirs; reduce seepage; ameliorate salt-water intrusion in coastal well fields; and provide mixed quality habitat for fish and wildlife in the Everglades.

3.7 VEGETATIVE COMMUNITIES

The Everglades landscape is dominated by a complex of freshwater wetland communities that includes open water sloughs and marshes, dense grass- and sedge-dominated marshes, forested islands, and wet marl prairies. The primary factors influencing the distribution of dominant freshwater wetland plant species of the Everglades are soil type, soil depth, and hydrological regime (USFWS 1999). These communities generally occur along a hydrological gradient with the slough/open water marsh communities occupying the wettest areas (flooded more than nine months per year), followed by sawgrass marshes (flooded six to nine months per year), and wet marl prairie communities (flooded less than six months per year) (USFWS 1999). The Everglades freshwater wetlands eventually grade into intertidal mangrove wetlands and sub tidal seagrass beds in the estuarine waters of Florida Bay. Development and drainage over the last century have dramatically reduced the overall spatial extent of freshwater wetlands within the Everglades, with approximately half of the pre-drainage 2.96 million acres of wetlands being converted for development and agriculture (Davis and Ogden 1997). Alteration of the normal flow of freshwater through the Everglades has also contributed to conversions between community types, invasion by exotic species, and a general loss of community diversity and heterogeneity.

Vegetative communities of the WCAs have suffered from both over-drainage and prolonged periods of inundation associated with the stabilization of water levels (USACE 1999). Many areas of WCA 3A still contain relatively good wetland habitat consisting of a complex of tree islands, sawgrass marshes, wet prairies, and aquatic sloughs. However, the northern portion of WCA 3A has been over-drained, resulting in increased fire frequency and the associated loss of tree islands, wet prairie, and aquatic slough habitat. Northern WCA 3A is currently dominated largely by mono-specific sawgrass stands and lacks the diversity of communities that exists in southern WCA 3A. In southern WCA 3A, Wood and Tanner (1990) first documented the trend toward deep water lily dominated sloughs due to impoundment. In approximately 1991, the hydrology of southern WCA 3A shifted to deeper water and extended hydroperiods resulting in corresponding shifts in vegetation communities (Zweig and Kitchens 2008). Typical Everglades vegetation, including tree islands, wet prairies, sawgrass marshes, and aquatic sloughs is contained in WCA 3B. However, within WCA 3B, the ridge and slough landscape has been severely degraded by the virtual elimination of overland sheetflow due to the L-67 Canal and Levee system. WCA 3B experiences very little overland flow and has become primarily a rain-fed system pre-dominated by shorter hydroperiod sawgrass marshes with relatively few sloughs or tree islands remaining. Water levels in WCA 3B are also too low and do not vary seasonally, contributing to poor ridge and slough patterning. Loss of sheetflow to WCA 3B has also accelerated soil loss, reducing

elevations of the remaining tree islands in WCA 3B and making them vulnerable to high water stages.

Vegetative trends in ENP have included a substantial shift from the longer hydroperiod slough/open water marsh communities to shorter hydroperiod sawgrass marshes (Davis and Ogden 1997; Armentano et al. 2006). In addition, invasion of sawgrass marshes and wet prairies by exotic woody species has led to the conversion of some marsh communities to forested wetlands (Gunderson et al. 1997).

3.8 FISH AND WILDLIFE RESOURCES

Aquatic macroinvertebrates form a vital link between the algal and detrital food web base of freshwater wetlands and the fishes, amphibians, reptiles, and wading birds that feed upon them. Important macro invertebrates of the freshwater aquatic community include crayfish (*Procambarus alleni*), riverine grass shrimp (*Palaemonetes paludosus*), amphipods (*Hyallela aztecus*), Florida apple snail (*Pomacea paludosa*), Seminole ramshorn (*Planorbella duryi*), and numerous species of aquatic insects (USACE 1999).

Small freshwater marsh fishes are also important processors of algae, plankton, macrophytes, and macroinvertebrates. Marsh fishes provide an important food source for wading birds, amphibians, and reptiles. Common small freshwater marsh species include the native and introduced golden topminnow (*Fundulus chrysotus*), least killifish (*Heterandria formosa*), Florida flagfish (*Jordenella floridae*), golden shiner (*Notemigonus crysoleucas*), sailfin molly (*Poecilia latipinna*), bluefin killifish (*Lucania goodei*), oscar (*Astronotus ocellatus*), eastern mosquitofish (*Gambusia holbrookii*), and small sunfishes (*Lepomis* spp.) (USACE 1999).

Within the Greater Everglades, numerous sport and larger predatory fishes occur in deeper canals and sloughs. Common species include largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), redear sunfish (*Lepomis microlophus*), black crappie (*Pomoxis nigromaculatus*), Florida gar (*Lepisosteus platyrhincus*), threadfin shad (*Dorosoma petenense*), gizzard shad (*Dorosoma cepedianum*), yellow bullhead (*Ameiurus natilis*), white catfish (*Ameiurus catus*), bowfin (*Amia calva*), and tilapia (*Tilapia* spp.) (USACE 1999). Larger fishes are an important food source for wading birds, alligators, otters, raccoons, and mink.

The freshwater wetland complex supports a diverse assemblage of reptiles and amphibians. Common amphibians include the greater siren (*Siren lacertina*), Everglades dwarf siren (*Pseudobranchus striatus*), two-toed amphiuma (*Amphiuma means*), pig frog (*Rana grylio*), southern leopard frog (*Rana sphenocephala*), Florida cricket frog (*Acris gryllus*), southern chorus frog (*Pseudacris nigrita*), squirrel tree frog (*Hyla squirela*), and green tree frog (*Hyla cinerea*) (USACE 1999). Amphibians also represent an important forage base for wading birds, alligators, and larger predatory fishes (USACE 1999).

Common reptiles of freshwater wetlands include the American alligator (*Alligator mississippiensis*), snapping turtle (*Chelydra serpentina*), striped mud turtle (*Kinosternon bauri*), mud turtle (*Kinosternon subrubrum*), cooter (*Chrysemys floridana*), Florida chicken turtle (*Deirochelys reticularia*), Florida softshell turtle (*Trionys ferox*), water snake (*Natrix sipidon*),

green water snake (*Natrix cyclopion*), mud snake (*Francia abacura*), and Florida cottonmouth (*Agkistrodon piscivorus*) (USACE 1999).

The freshwater wetlands of the Everglades are noted for their abundance and diversity of colonial wading birds. Common wading birds include the white ibis (*Eudocimus albus*), glossy ibis (*Plegadus falcenellus*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodius*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), snowy egret (*Egretta thula*), green-backed heron (*Butorides striatus*), cattle egret (*Bubulcus ibis*), black-crowned night heron (*Nycticorax nycticorax*), yellow-crowned night heron (*Nycticorax violacea*), roseate spoonbill (*Ajaia ajaja*), and wood stork (*Mycteria americana*) (USACE 1999).

Mammals that are well-adapted to the aquatic and wetland conditions of the freshwater marsh complex include the rice rat (*Oryzomys palustris natator*), round-tailed muskrat (*Neofiber alleni*), and river otter (*Lutra canadensis*). Additional mammals that may utilize freshwater wetlands on a temporary basis include the white-tailed deer (*Odocoileus virginianus*), Florida panther (*Puma concolor coryi*), bobcat (*Lynx rufus*), and raccoon (*Procyon lotor*).

3.9 THREATENED AND ENDANGERED SPECIES

3.9.1 FEDERALLY PROTECTED SPECIES

The Corps has coordinated with USFWS in accordance with Section 7 of the Endangered Species Act, to determine federally listed threatened and endangered species that are either known to occur or are likely to occur within the project area (**Table 3-1**).

TABLE 3-1. FEDERALLY THREATENED AND ENDANGERED SPECIES WITHIN THE PROJECT AREA

Common Name	Scientific Name	Status
Mammals		
Florida panther	*Puma concolor coryi*	E
Florida manatee	*Trichechus manatus latirostris*	T, CH**
Florida bonneted bat	*Eumops floridanus*	E
Birds		
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	E, CH**
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	E, CH
Wood stork	*Mycteria americana*	T
Reptiles		
Eastern indigo snake	*Drymarchon corais couperi*	T

E = Endangered; T = Threatened; CH = Critical Habitat
** Indicates Critical Habitat for the designated species is not within the action study area

3.9.2 STATE LISTED SPECIES

The project area also provides habitat for several state listed species (**Table 3-2**).

TABLE 3-2. STATE LISTED SPECIES WITHIN THE PROJECT AREA

Common Name	Scientific Name	Status
Mammals		
Florida black bear	*Ursus americanus floridanus*	T
Everglades mink	*Mustela vison evergladensis*	T
Florida mouse	*Podomys floridanus*	SC
Florida mastiff bat	*Eumops glaucinus floridanus*	E
Birds		
Piping plover	*Charadrius melodus*	T
Snowy plover	*Charadrius alexandrinus*	T
American oystercatcher	*Haematopus palliates*	E
Brown pelican	*Pelecanus occidentalis*	SC
Black skimmer	*Rynchops niger*	SC
Least tern	*Sterna antillarium*	T
White-crowned pigeon	*Columba leucocephalus*	T
Least tern	*Sterna antillarum*	T
Limpkin	*Aramus guarauna*	SC
Little blue heron	*Egretta caerulea*	SC
Tricolored heron	*Egretta tricolor*	SC
Snowy egret	*Egretta thula*	SC
Reddish egret	*Egretta rufescens*	SC
White ibis	*Eudocimus albus*	SC
Roseate spoonbill	*Ajajaajaja*	SC
Fish		
Mangrove rivulus	*Rivulus marmoratus*	SC
Invertebrates		
Miami blue butterfly	*Cyclargus [=Hermiargus] thomasi bethunebakeri*	E
Florida tree snail	*Liguus fasciatus*	SC
Plants		
Pine-pink orchid	*Bletia purpurea*	T
Lattace vein fern	*Thelypteris reticulate*	E
Eatons spikemoss	*Selaginella eatonii*	E
Wright's flowering fern	*Anemia wrightii*	E
Tropical fern	*Schizaea pennula*	E
Mexican vanilla	*Manilla mexicana*	E

E=Endangered; T=Threatened; SC=Species of Special Concern

3.10 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, 16 USC 1801 et seq. Public Law 104-208 reflects the Secretary of Commerce and Fishery Management Council authority and responsibilities for the protection of essential fish habitat (EFH). There is no EFH within the project area.

3.11 WATER QUALITY

Water quality in the area adjacent to the project area is significantly influenced by development, landscape modifications, and water management infrastructure. The area of study, WCA 3B has been an impounded (surrounded by levees) rain driven system since the 1960s. Inflows from the L67A Canal have only occurred for a brief testing period in the late 1990's and more recently with the DPM inflows. Water quality within WCA 3B due to the impoundment condition has limited nutrient enrichment noted in the soils as compared to WCA 3A. Natural drainage patterns in the region have been disrupted by the extensive array of levees and canals which has resulted in further water quality degradation outside of the project area. Hydrology within WCA 3B has been extensively disrupted by impounding the area and the existence of agricultural canals from pre C&SF activities. Water quality within WCA 3 is largely controlled by Lake Okeechobee and the EAA to the north and urban and agricultural development southeast of ENP. The northern WCAs are fed from Lake Okeechobee as well as runoff from the EAA via the Stormwater Treatment Areas (STAs). The STAs were constructed to reduce total phosphorus from surface water runoff, primarily from the EAA. Four of the five current STAs have also been treating an increasing amount of water from Lake Okeechobee. Water quality degradation within WCA 3B has been limited to the impoundment of this area with only limited flows introduced into the project area from the impacted areas adjacent to WCA 3A. A short discussion of the water pollutants associated with nutrients is provided below followed by a review of water quality within and adjacent to the project area.

3.11.1 NUTRIENTS

Nutrients such as phosphorus and nitrogen compounds are a concern in the estuaries, WCAs, ENP, and Lake Okeechobee since they result in an imbalance of flora and fauna. To address nutrient discharges, the FDEP has established surface water quality numeric nutrient criteria (NNC) for a significant portion of Florida but NNC was not established for the wetlands (except for the Everglades Protection Area) and south Florida Canals. For the DPM project area, only the narrative water quality criteria applies. Total Maximum Daily Loads (TMDLs) for phosphorus and/or nitrogen currently exist for Lake Okeechobee. Additional information on the status and implementation of TMDLs within the study area can be found at http://www.dep.state.fl.us/water/tmdl/.) Within the Everglades Protection Area (EPA), phosphorus concentrations are regulated by the "Phosphorus Rule" 62-302.540 F.A.C. as well as water quality based effluent limitation requirements for the STAS. WCA 1 and ENP are also subject to the terms of the 1992 Consent Decree in United States v. South Florida Water Management. District (S.D. Fla No. 88-1886-CIV-MORENO).

Total phosphorus is the nutrient of concern within WCA 3 and NESRS. Under the current conditions, total phosphorus concentrations at the structures involved in this project area are within the low to average range (~5-10 µg/L TP) for this time of year. SRS was in compliance with the SA requirements for WY 2016 (1 October 2015-30 September 2016).

There are three long term marsh nutrient monitoring stations within WCA 3B. Two of these three stations had a geometric mean below 5 µg/L for WY 2016. The remaining station located in the southern reach of WCA 3B had a geometric mean below 10 µg/L. Northern WCA 3 feeds into S-151, which is the precursor structure to the S-152 (flows into WCA 3B). Due to the long duration of the upstream wet season conditions in the WCA's, water quality was good (low phosphorus

concentrations, 5- 10 µg/L TP) for deliveries to WCA 3B and the ENP NESRS during Water Year (WY) 2016 as compared to average rainfall and dry years. If current rainfall conditions continue and WY 2017 is a wet to average rainfall year, water quality conditions for WY 2017 in the areas adjacent to WCA 3B are expected to be good (<10 µg/L TP) after wet season conditions are established/marsh recovery completed, until dry season conditions resume.

3.12 NATIVE AMERICANS

There are two federally recognized tribes, the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida) that are located adjacent to the project area (**Figure 3-1**). Both Tribes maintain a strong connection to the project area through continued use and regard the indigenous populations of Florida as their ancestors. The Miccosukee Tribe of Indians of Florida and Seminole Tribe of Florida have a long history of living within the project area. Both Tribes moved into the region during the eighteenth and nineteenth centuries from Georgia and Alabama. Fleeing the U.S. Army and the forced relocation policies of the Indian Removal Act (1830), the Miccosukee and Seminoles were part of Native American groups commonly referred to as Seminoles; however, there are references to some of the groups involved in the conflict as *Mikasuki*, which supports the subsequent separation of the two groups (Weisman 1999). Many of these groups fled into the swamp areas of South Florida and made their homes within the Everglades and other remote areas of region. The coming of the Civil War led to the abandonment of the removal efforts and the various Native American groups were largely left alone until the late nineteenth century. In 1928 the Tamiami Trail opened, cutting through the Everglades and bringing along with it tourists and explorers into the region, and, for the first time, bringing complete access for the various tribes to participate in the larger economy that was growing in South Florida.

As early as 1894, the federal government, and later the State of Florida, started to acquire lands within the Big Cypress area. However, initial attempts to relocate tribal members to these areas failed, as there were simply no incentives to abandon traditionally occupied areas in favor of the new lands (Weisman 1999). "The Indian New Deal changed that, and for the first time, services, programs, and land were brought together…at Big Cypress" (Weisman 1999:125). In the 1930s, the federal Government started to bring services to the various Seminole groups. Some of the groups relocated and started to receive federal aid, while some groups resisted government intrusion into their lives and remained in various traditional areas that now included sites along Tamiami Trail (Weisman 1999). Throughout the next two decades, the federal Government instituted various aid programs to assist the Native American groups living within the reservations until the early 1950s. In the early 1950s, the federal Government's policies radically changed, as it was felt that native groups should now join "mainstream society" and that federal aid should end (Weisman 1999:131). Faced with a reduction in support and possible termination of recognition as a group by the government, various Native American groups on these reservations began to organize and form their own tribal governments to assist in the protection of their interests. In 1957, the Seminole Tribe of Florida received federal recognition. However, wishing to remain separate and to maintain their own identity, many of the groups along the Tamiami Trail refused to join and instead held out to form their own government that would be federally recognized in 1962 as the Miccosukee Tribes of Indians of Florida.

Today most of the Miccosukee Tribe lives within the confines of the reservation located along the forty-mile bend of Tamiami Trail while many of the Seminoles tribal members live on various reservations properties with the largest being those of Big Cypress, Hollywood, and Brighton Reservations. In addition to the federal reservation, the Miccosukee Tribe has also established a perpetual lease to large portions of WCA 3A while the Seminole Tribe has a lease within the northwestern portion of WCA 3A. The members of both groups maintain a traditional life style that is intricately connected to the Everglades. Traditional practices of hunting, fishing and general living are still maintained, along with modern entrepreneurship through various enterprises such as cattle ranching and with tourism related businesses along Tamiami Trail. Today, both tribes have vibrant, thriving cultures based within the Everglades region. These practices continue to tie the Tribes to the Everglades is such a way that careful consideration of effects is warranted.

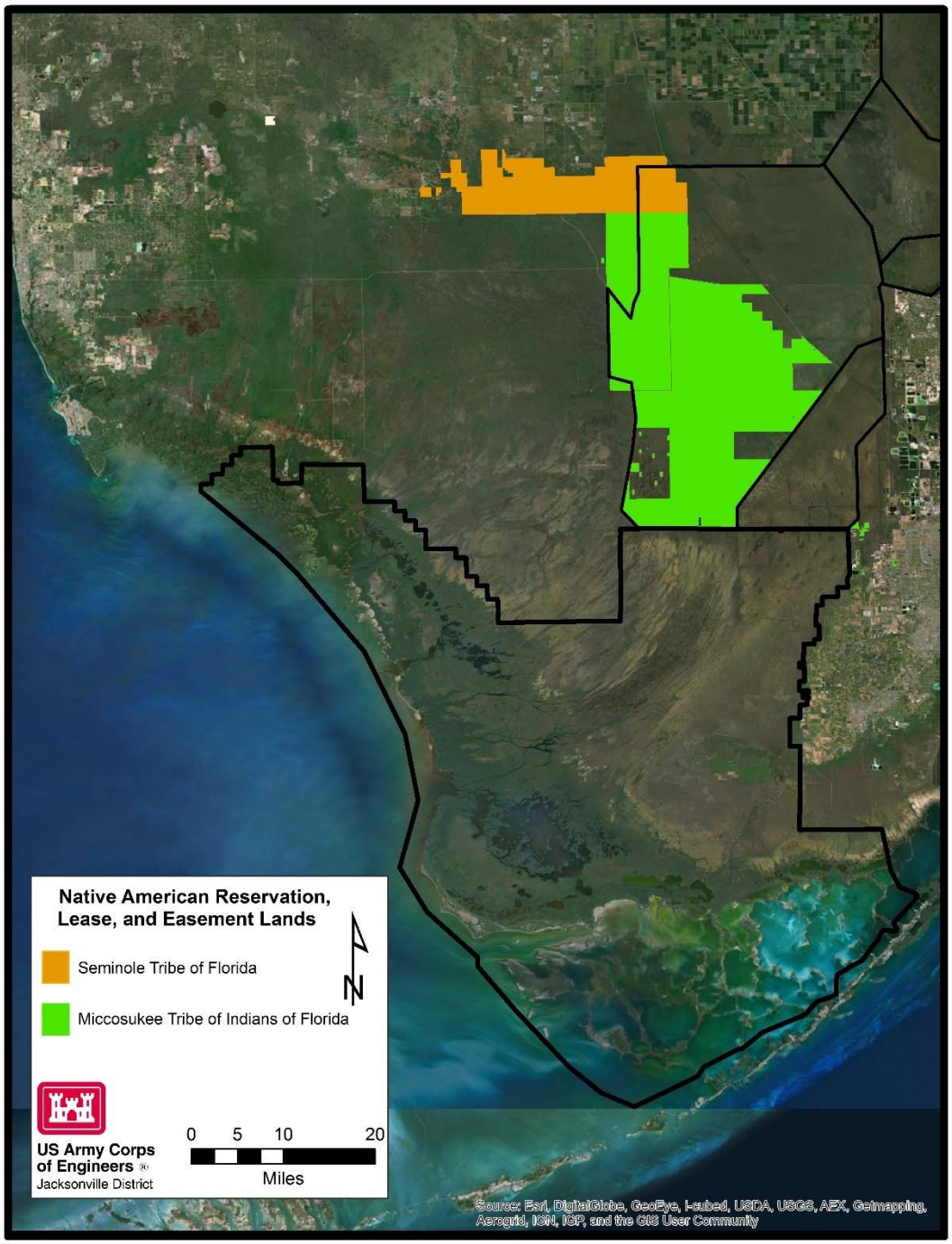

FIGURE 3-1. MAP OUTLINING THE LOCATION OF TRIBAL RESERVATION, LEASED AND EASEMENT LANDS

3.13 CULTURAL RESOURCES

Numerous cultural resources surveys have been conducted within WCA 3B, including a *Preliminary Cultural Resource Assessment of the Everglades Wildlife Management Area, Conservation Areas 2A, 2B, 3A North, 3A South, and 3B* (Taylor 1988) which used aerial

photography to interpret the potential location of 102 archaeological sites. A Phase I cultural resources assessment of several of the tree islands within WCA 3B was also conducted in the report entitled *Central Everglades Planning Project Cultural Resources Survey of Water Conservation Areas 3A and 3B* (Gregory et al. 2013).

A total of 36 previously identified archaeological sites and 31 associated tree islands are located within WCA 3B. The archaeological sites consist predominately of prehistoric midden sites that have not been evaluated for listing in the National Register of Historic Places (NRHP). Historic and prehistoric peoples in the Everglades have long used tree islands located in the DPM area of potential effect (WCA 3B). Tree islands were used for habitation sites, resource procurement and processing, and mound sites. This use extends into the modern period; thus, these islands often contain significant archaeological remains and cultural material that may hold significance to present-day tribes. The Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Indians have traditional, aboriginal, and statutory rights to live in the Everglades. Operational and seasonal constraints have been in effect during DPM testing to avoid adverse impacts to tree islands and the potential cultural resources they may contain. Additionally, water depths of tree islands and associated cultural resources are currently monitored using the Everglades Depth Estimation Network (EDEN) network as part of the Everglades Restoration Transition Plan Programmatic Agreement between the Corps, Florida State Historic Preservation Officer (SHPO), Seminole Tribe of Florida, ENP, and the Advisory Council on Historic Preservation.

Initial consultation with the SHPO and review of the Florida Master Site File in 2010 indicated that no known historic structures or archaeological sites were located within the DPM installation area of potential effects (APE). Elevation and tree community surveys were also conducted on tree islands within the DPM APE. The results indicate that the islands in WCA 3B are significantly drier than the islands in WCA 3A; however, most of the islands are dominated by flood-tolerant species. This suggests that the average annual hydro-period on the islands in WCA 3B could be increased significantly above the values reported for these islands over the last seven years, while still maintaining hydrologic conditions within the known tolerances of their dominant species. As such, the Corps determined that the DPM project posed no adverse effect to tree islands or historic properties within the APE. Consultation letters were sent to the Florida SHPO, the Seminole Tribe of Florida, and the Miccosukee Tribe of Indians of Florida in letters dated July 14, 2009. Both the SHPO and Seminole Tribe of Florida concurred with the determination of no effect in letters dated August 4, 2009 and July 22, 2009 respectively (**Appendix E**).

3.14 AIR QUALITY

Air monitoring reports are prepared annually by FDEP to inform the public of the air pollutant levels throughout the State of Florida. All areas within the state are designated with respect to each of the six pollutants (carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particle pollution (10 microns or less in diameter (PM_{10}), and 2.5 microns or less in diameter ($PM_{2.5}$), and sulfur dioxide (SO_2)) as attainment (*i.e*. in compliance with the standards); non-attainment (*i.e*. not in compliance with the standards); or unclassifiable (*i.e*. insufficient data to classify). Attainment areas can be further classified as maintenance areas. Maintenance areas are areas previously classified as non-attainment which have successfully reduced air pollutant concentrations to below the standard. Southeast Florida, including Miami-Dade County continues to be classified by the USEPA as an attainment/maintenance area for ozone. Florida remains

designated as unclassifiable for PM_{10}. Although sufficient data have been collected for attainment determinations, USEPA has not considered PM_{10} for attainment determinations in Florida yet.

3.15 HAZARDOUS, TOXIC OR RADIOACTIVE WASTES

Activity within the WCA is generally limited to fishing, hunting, and birding though there may be some illegal dumping of solid wastes along the perimeter. No soil testing for residual contaminants has been conducted within the WCA 3A and WCA 3B as part of this project since the lands have no history of prior agricultural or industrial use that would cause such contamination.

A site visit was conducted during the initial design of the DPM on October 28, 2008 for purposes of performing a preliminary HTRW evaluation. No obvious sources of ground water or soil contamination (*i.e.* drums, solid waste or other areas of recognized environmental concern) were observed. The SFWMD levees and inspected areas showed no visible evidence of contamination such as discolored soil, seeping liquids, films on water, abnormal grading, or fills. Nor were the following discovered which could have indicated potential HTRW problems: landfills, dumps and disposal areas, burning or burned areas, pits, quarries and borrow areas, wells, odors, water treatment plants, abandoned buildings, and/or transport areas such as boat yards, harbors, and truck terminals.

The Dade Bombing Range used during World War II is located approximately 6 miles north of the DPM site. The bombing range was a Formerly Used Defense Site (FUDS). The bombing range was actively used prior to the construction of the L-67A and L-67C Levees and Canals Activity within the footprint of the construction of these levees and canals would have likely identified any unexploded ordnance at that time.

3.16 NOISE

Noise levels are associated with surrounding land use. Within the major natural areas of South Florida, external sources of noise are limited and of low occurrence. Existing sources of noise are limited to vehicular traffic travelling on roads adjacent to and cutting through the project area. Other sources of noise which may occur within these natural areas include air boats, off road vehicles, swamp buggies, motor boats, and occasional air traffic. Sources of noise in rural, areas include noise associated with agricultural production such as the processing and transportation of agricultural produce. Within the rural municipalities and urban areas, sound levels would be expected to be of greater intensity, frequency, and duration. Noise associated with transportation arteries, such as highways, railroads, primary and secondary roads, airports, operations at commercial and industrial facilities etc., inherent in areas of higher population would be significant and probably override those sounds associated with natural emissions.

3.17 AESTHETICS

The visual characteristics of South Florida can be described according to the three dominant land use categories: natural areas, agricultural lands, and urban areas. The natural areas consist of a variety of upland and wetland ecosystems, including lakes, ponds, vast expanses of marsh and wet prairie, with varying vegetative components. Uplands are often dominated by pine, although other sub-tropical and tropical hardwoods do occur. Overall, the land is extremely flat, with few natural topographic features such as hills or other undulations. Much of the visible topographic features

within the natural areas are man-made. Generally, urban development is concentrated along the LEC. Development is typically immediately adjacent to or nearby protected natural areas.

3.18 RECREATION

There are many recreational opportunities throughout South Florida. WCA 3 has been used for recreational activities including hunting, fishing, frogging, boating, camping, and off-road vehicle use. Private camps are located throughout WCA 3. The L-67A and L-67C Canals are open year round and provide fishing opportunities from both the canal and from levee banks. Recreational boaters can gain access to WCA 3 by more than twenty ramps. In the vicinity of the project area, there are three boat ramps in WCA 3A (north) near the Holey Land and Rotenberger WMAs. Six boat ramps are in WCA 3A (north) and 3A (south) which include boat access to L-67A. There are three boat ramps in WCA 3B, the Francis S. Taylor WMA, which provide access to the L-67A and L-67C canals. A variety of other nature-based recreational opportunities are also provided to the public within WCA 3. These activities include wildlife viewing and nature photography. Hiking and bicycling are also permitted on existing levees within the project area where appropriate. There are also several recreation areas at locations along the boundary of WCA 3.

4.0 ENVIRONMENTAL EFFECTS

4.1 GENERAL ENVIRONMENTAL EFFECTS

The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects. Environmental effects of the DPM are expected to be spatially limited to WCA 3B and small in magnitude. Adjacent areas including WCA 3A and NESRS are not anticipated to be significantly affected as a result of observed limitations in hydrologic effects to the immediate vicinity of the DPM field test. Potential environmental effects of current water management operations (No Action Alternative) as described in the 2012 Water Control Plan are thoroughly evaluated within the ERTP Final EIS, the Increment 1.1 and Increment 1.2 EA and FONSI (dated February 16, 2017), and the 2017 Planned Temporary Deviation EA and FONSI (dated June 27, 2017) and are hereby incorporated by reference (USACE 2011, USACE 2016c, USACE 2017). Lessons learned from operations of the DPM are summarized on a yearly basis in the South Florida Environmental Report (https://www.sfwmd.gov/science-data/sfer) and in annual reports submitted by USGS to the Corps. A copy of the 2016 annual report is provided in **Appendix F**. General lessons learned are incorporated into the sections below as appropriate. Please reference Volume 1 Chapter 6 of the 2017 South Florida Environmental Report and **Appendix F** for a more comprehensive review of results gained from previous flow events.

4.2 CLIMATE

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to the climate of South Florida.

4.3 GEOLOGY AND SOILS

The continued implementation of the No Action Alternative and current management operations within WCA 3B has the potential to affect (*i.e.* increased oxidation, subsidence and peat fires) soils due to increased durations of dry downs as a result of current infrastructure and water management practices. WCA 3B experiences very little overland flow and has become primarily a rain-driven system. Water levels in WCA 3B are too low and do not vary seasonally. Loss of sheetflow to WCA 3B has accelerated soil loss and reduced elevations between ridges and sloughs, as well as existing tree islands.

Alternative B is expected to provide minor beneficial effects on geology and soils by increasing flows to WCA 3B. Water levels experienced within WCA 3B under implementation of Alternative B would be similar to the range of water levels experienced under current water management operations. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 feet NGVD will apply for the duration of the test period. Improved hydroperiods resulting from increases in water levels would be spatially limited to the immediate vicinity of the DPM within WCA 3B. Implementation of Alternative C would result in similar effects as Alternative B. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however, operations would be limited to the months of October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized to the end of the wet season through the early dry season, increases in water levels would be of lesser magnitude and of shorter duration.

Improved hydroperiods within WCA 3B have the potential to reduce soil oxidation and promote peat accretion. Previous results from prior flow events demonstrate that immediate responses to flow were observed within ~500 meters of S-152 inflows. Responses to flow rapidly diminished beyond ~ 500 meters of the S-152 structure. Potential benefits would be spatially limited to the immediate vicinity of the DPM within WCA 3B and temporary in nature. Previous results from prior flow events have demonstrated sediment transport from sloughs to ridges; a critical step to maintain the characteristic landscape and topography of the Everglades.

4.4 STUDY AREA LAND USE

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to study area land use.

4.5 HYDROLOGY

4.5.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

The No Action Alternative would continue C&SF water management operations as defined by the 2012 WCAs-ENP-SDCS Water Control Plan (USACE 2012b) which includes the WCA 3A Regulation Schedule and Rainfall Plan with the exception of operating criteria as defined by Increment 1.1 and Increment 1.2 (USACE 2016c) and the 2017 Planned Temporary Deviation (USACE 2017). Under the No Action Alternative, the 2012 Water Control Plan and current approved temporary planned deviations will continue to be used unless replaced by subsequent authorized operating criteria. Under the No Action Alternative, operational testing for the DPM concluded on January 31, 2017. However, S-152 is currently being utilized under the 2017 Temporary Planned Deviation to alleviate high stages within WCA 3A. The structure would no longer be operated at the conclusion of the approved deviation to the 2012 Water Control Plan. Rainfall is the main driver of surface hydrology in South Florida, and it can be used as an overall index of expected hydrological conditions. The variations for WCA 3A and WCA 3B annual rainfall in **Figure 4-1** and **Figure 4-2** are included to compare the conditions during the four years of DPM operations (2013-2016) against the pre-project hydrological conditions since the beginning of Next Generation Radar (NEXRAD) record for these basins in 1997. WCA 3A rainfall is included to characterize the conditions for the upstream basin. Both WCA 3A and WCA 3B rainfall during DPM operations were within the 95% confidence interval for the basin-averaged mean rainfalls, 49.5 inches and 51.1 inches, respectively.

Figure 4-3 shows the observed variations in the variables used in S-152 operational criteria. The stage hydrographs for the nearby stations provided in the figure indicates that the variations in water levels follow a periodic, seasonal pattern as expected from a rainfall-driven system. The TP concentrations plotted in the figure (TP S-152) are derived from the TP grab samples collected for S-151 station as explained in **Appendix B**. The cumulative exceedance curves presented in **Figure 4-4** shows the observed water elevations in WCA 3B as measured at SRS-1 and Site_71 monitoring stations (refer to **Figure 1-2** for monitoring site locations). The hydrologic assessment was conducted using the historical period from 2003 through early 2017 (report compilation started in March 2017), with 2003 selected as the first full year with regional operations for WCA 3A, ENP, and the SDCS under the Interim Operations Plan (IOP). Stage levels experienced within WCA 3B for Alternative A would be similar to the range of water stages experienced under the current water management operations.

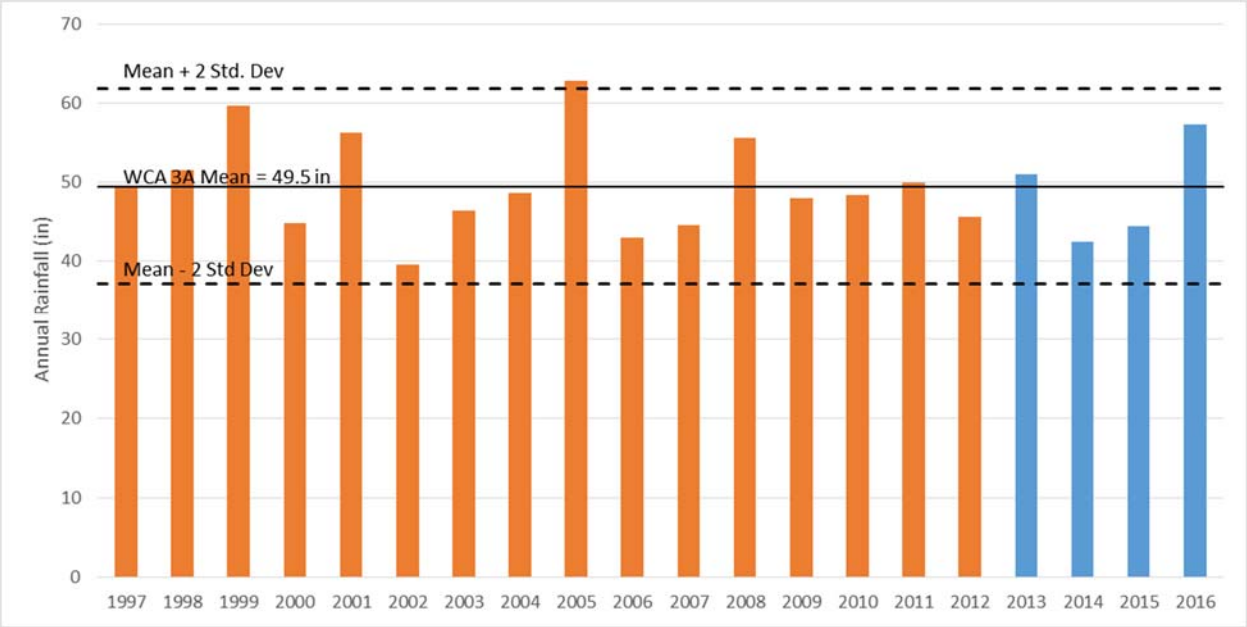

FIGURE 4-1. HISTORICAL ANNUAL RAINFALL FOR WCA 3A FOR 1997-2016 BASED ON NEXRAD (NEXT GENERATION RADAR) DATA.

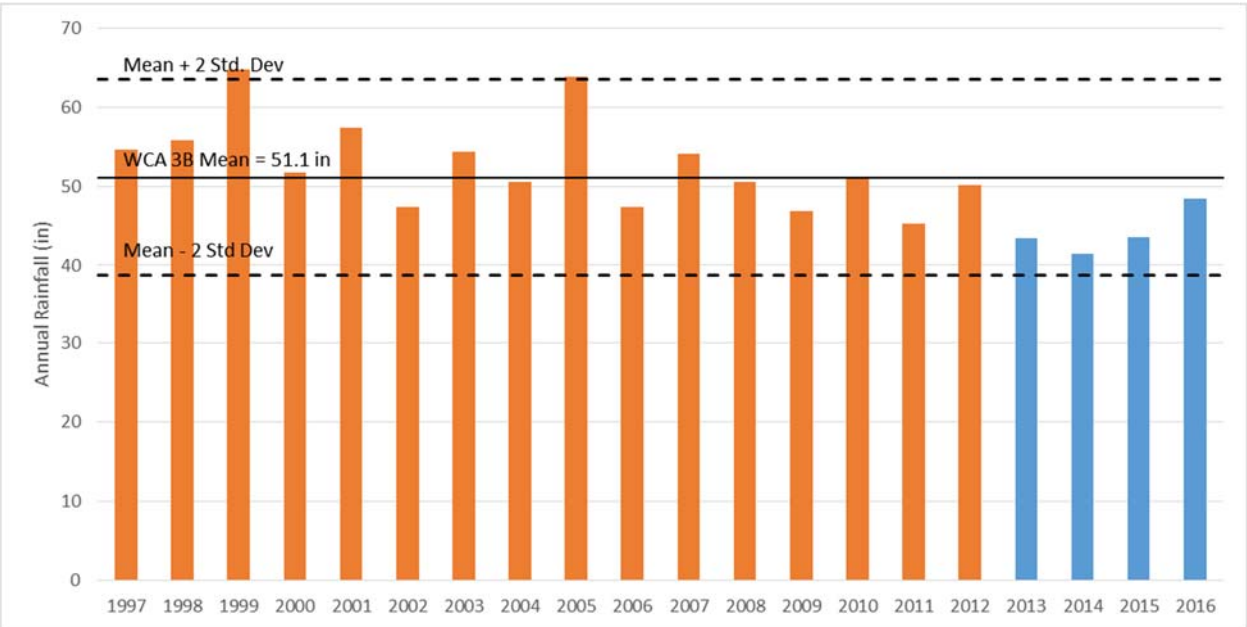

FIGURE 4-2. HISTORICAL ANNUAL RAINFALL FOR WCA 3B FOR 1997-2016 BASED ON NEXRAD DATA.

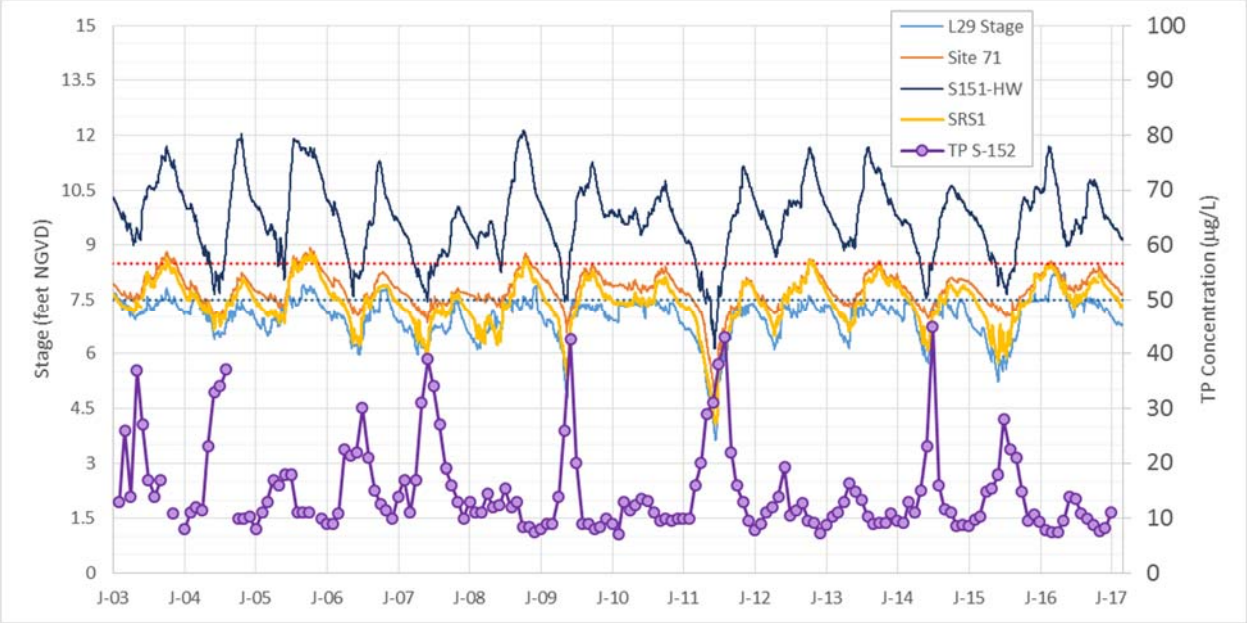

FIGURE 4-3. MONITORING DATA FOR THE VARIABLES USED IN S-152 OPERATIONAL DECISIONS SINCE JANUARY 1, 2003.

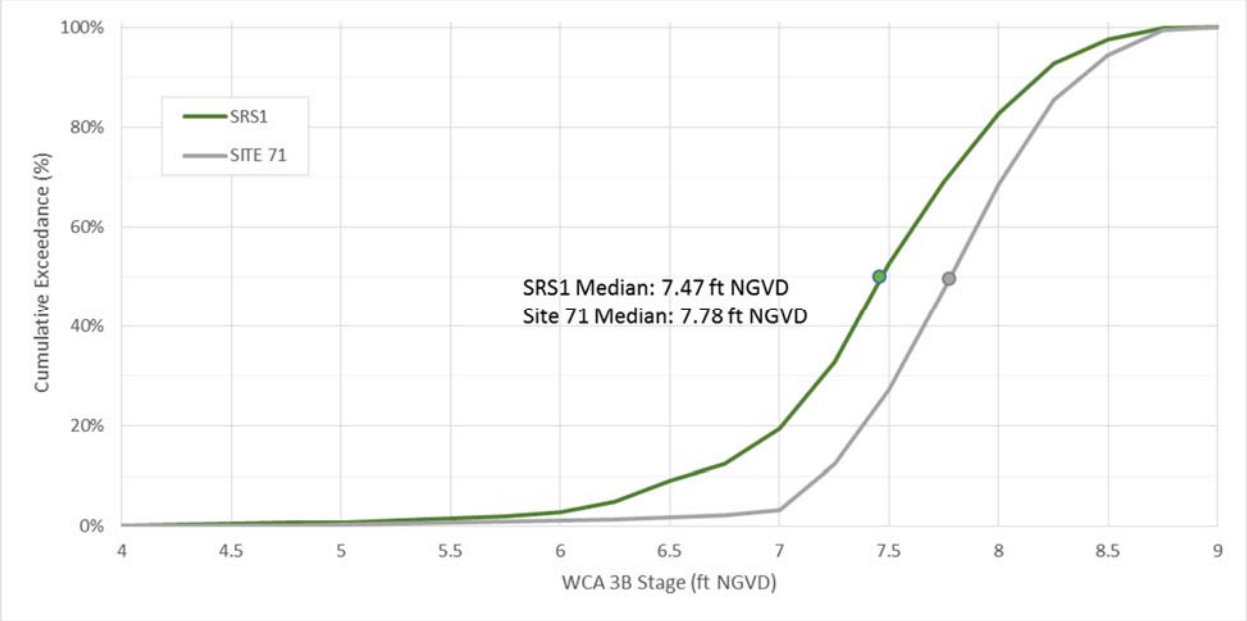

FIGURE 4-4. CUMULATIVE EXCEEDANCES FOR SRS-1 AND SITE_71 FOR THE JANUARY 1, 2003 TO FEBRUARY 28, 2017 PERIOD.

4.5.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Water levels experienced within WCA 3B under implementation of Alternative B would be similar to the range of stages experienced under current water management operations as the Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. NGVD will apply for the duration of the test period. Localized increases in water levels and velocities adjacent to the DPM are expected under Alternative B relative to the No Action Alternative. Increases in water levels and velocity are expected to decrease with increasing distance from S-152 inflows. Lessons learned from operations of the DPM are summarized on a yearly basis in the South Florida Environmental Report (https://www.sfwmd.gov/science-data/sfer) and in annual reports submitted by USGS to the Corps. A copy of the 2016 annual report is provided for reference in **Appendix F**.

Since the start of the field test in 2013, there have been four flow events during which the criteria for S-152 operations were met. A summary of these flow events is provided in **Table 4-1**. The stage hydrographs shown in **Figure 4-5** confirms that water level changes due to DPM releases is limited to the immediate vicinity of the S-152 structure as shown in tailwater stages recorded at the "S152 (below)" Station (refer to **Figure 1-2** for monitoring site locations). Noticeable increases in water elevations dissipate further away from the structure as seen in the hydrographs for SRS-1, located 5.5 miles to the southeast, Site _71, located 4.2 miles to the east-northeast, and 3-69, located 3.3 miles to the northeast. Stage hydrographs in **Figure 4-6** focus on the WCA 3B flow monitoring sites SRS-1 and Site_71, which are used in the DPM operational decision tree as a high water constraint (Reference **Appendix A** and **Appendix B**). The stages at these sites are desired to be kept below 8.5 ft. NGVD. As shown in the figure, despite the slight increases in the water elevations, the water stages at these sites were kept below the target stages during the S-152 flow events.

Stage and flow hydrographs provided in **Figure 4-7** indicate that the design head difference of 0.5 ft. needed for a design flow rate of 800 cfs has not been realized during the four years of DPM operational events. Except for the 2016 Emergency Deviation releases, authorized due to strong El-Nino conditions, all four DPM flow events experienced maximum daily flow rates observed to be lower than 400 cfs.

TABLE 4-1. SUMMARY OF S-152 OPERATIONS.

Flow Event	Open	Close	Duration (days)	Average Flow Rate (cfs)	Max Flow Rate (cfs)	Delivery Volume (ac-feet)
Event 1	5-Nov-13	30-Dec-13	55	274	304	29,314
Event 2	4-Nov-14	29-Jan-15	86	274	296	46,207
Event 3	16-Nov-15	28-Jan-16	73	329	392	45,025
Emergency Deviation	20-Feb-16	2-May-16	72	327	528	36,285
Event 4	17-Oct-16	31-Jan-17	106	224	381	36,472

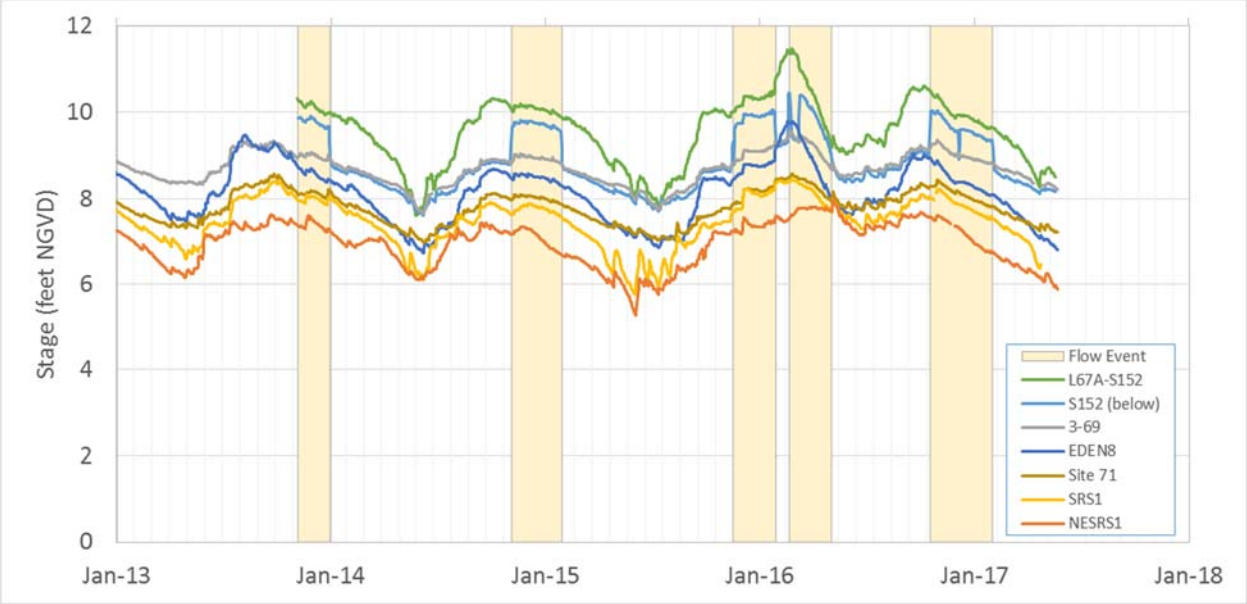

FIGURE 4-5. S-152 FLOW EVENTS AND VARIATIONS OF WATER STAGES IN PROJECT VICINITY SINCE THE START OF TESTING IN NOVEMBER 2013.

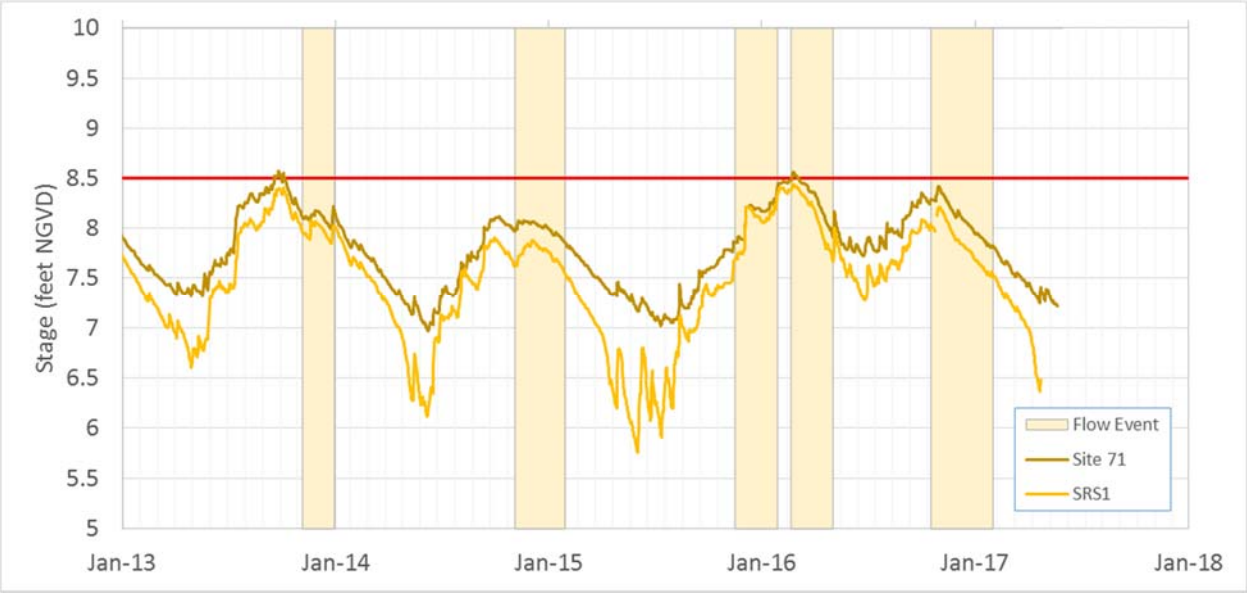

FIGURE 4-6. STAGE HYDROGRAPHS FOR SITE_71 AND SRS-1.

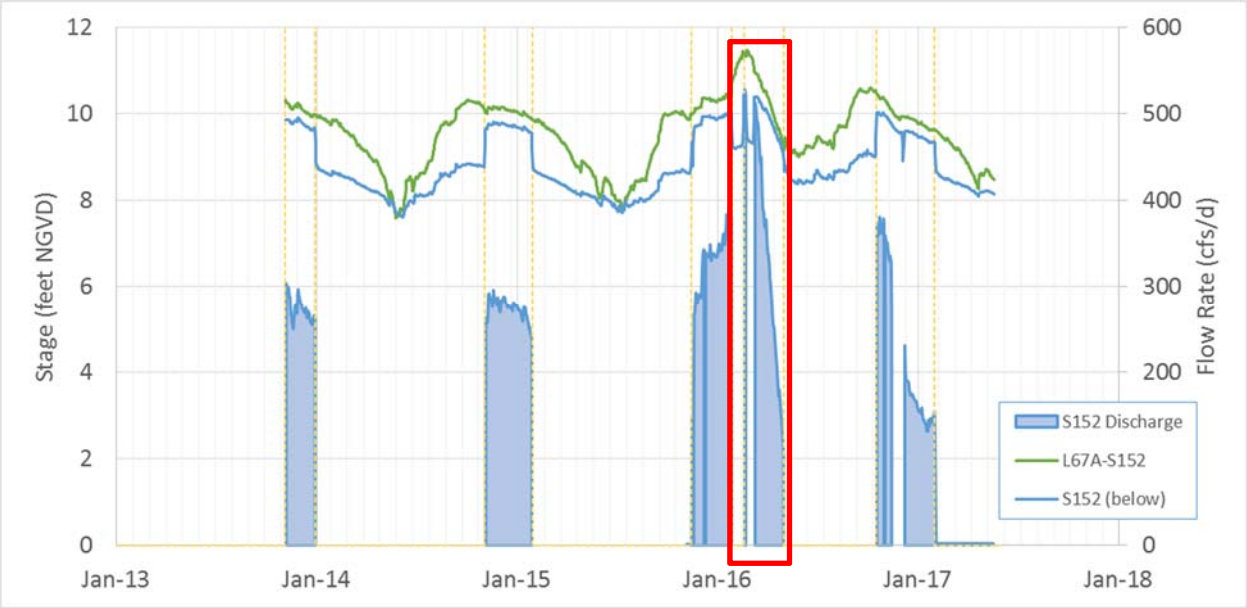

FIGURE 4-7. OBSERVED S-152 FLOW RATES, AND HEADWATER AND TAILWATER STAGES ACROSS THE STRUCTURE. RED BOX NOTES OPERATION OF S-152 UNDER THE 2016 TEMPORARY EMERGENCY DEVIATION.

Lessons learned from operations of the DPM are summarized on a yearly basis in the South Florida Environmental Report (https://www.sfwmd.gov/science-data/sfer) and in annual reports submitted by USGS to the Corps. A copy of the 2016 annual report is provided in **Appendix F**. **Appendix F** and the 2017 South Florida Environmental Report (SFWMD 2017) describes maximum water levels and monitoring locations directly adjacent to the S-152 structure as a result of previous flow events. This information has been summarized below **Figure 4-8** depicts locations of DPM monitoring stations.

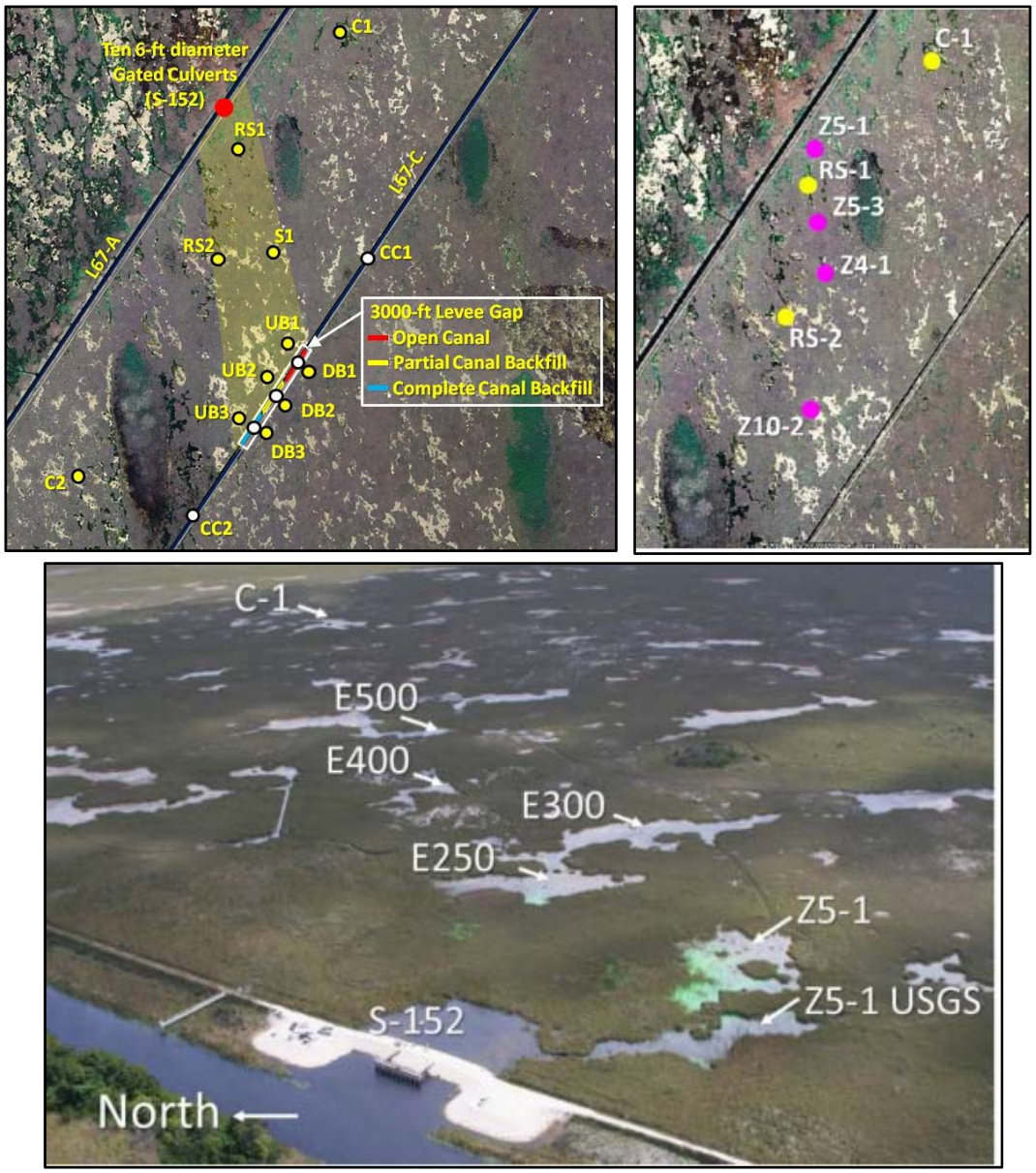

FIGURE 4-8. MAP OF DPM LOCATION IN POCKET BETWEEN L-67A AND L-67C CANAL AND LEVEE SYSTEM AND ASSOCIATED MONITORING SITES. (TOP LEFT) MONITORING SITES DEPICTED AS YELLOW (MARSH SITES) AND WHITE (CANAL SITES) CIRCLES. C = CONTROL SITE, RS = RIDGE/SLOUGH, S= SLOUGH, UB = UPSTREAM BACKFILL, DB = DOWNSTREAM BACKFILL; CB = CANAL BACKFILL; CC= CANAL CONTROL. (TOP RIGHT) DEPICTS ADDITIONAL MONITORING SITES ADDED IN 2016 (PINK CIRCLES) TO EVALUATE POTENTIAL CHANGES ALONG A NORTH TO SOUTH FLOWPATH. (BOTTOM CENTER) DEPICTS LOCATION OF EAST TRANSECT SITES (E250, 300, 400, AND 500) AND TWO Z5-1 SITES).

As reported in **Appendix F** and the 2017 South Florida Environmental Report (SFWMD 2017), the maximum rise in water depths caused by the 2013 flow event relative to pre-event stage was 11 cm (RS1), 6 cm (RS2), 5 cm (S1), 3.5 cm (UB2), and 2.5 cm (DB2). Flow speeds increased from background values (< 1 cm/s) reaching speeds up to 4.5 cm/s at RS1. The highest flow speeds were considerably less at RS2 (2 cm/s), S1 (1 cm/s), UB1-3 (1 cm/s), and DB1-3 (3 cm/s) (SFWMD 2017). In the 2014 flow event, the maximum rise in water depths was 12 cm (RS1), 5.5 cm (RS2), 5 cm (S1), 3 cm (UB2), and 4 cm (DB2). Flow speeds increased by 3.0 cm/s at RS1, 1.2 cm/s at RS2, 1.1 cm/s at S1, 0.3 cm/s at UB sites, and 0.7 cm/s at DB1 and DB2. Effects of S-152 flows on water depth and flow velocity were concentrated near the S-152 structure, decreasing with increased distance from inflow. In the 2015 flow event, the maximum rise in water depths was 20 cm at Z51_USGS and 10 cm at RS1D. Site RS1 includes an upstream and downstream boardwalk, RS1U and RS1D, respectively. Flow speeds increased by 4 to 5 cm/s and 13 cm/s at Z51_USGS respectively. At RS1D, the flow speed at the slough increased to 6 cm/s, but the ridge side increased by only 3 to 4 cm/s. Flow speeds in sloughs were generally 25 to 40 percent faster than in ridges due to reduced resistance in sloughs. Flow directions in sloughs tended to align with slough direction, while flow on ridges was somewhat misaligned with sloughs (indicating that flow jumps across ridges between sloughs).

The decision tree for S-152 operations uses both water levels and TP projections as criteria to operate the structure. **Figure 4-9** shows the observed range of values at sites used in operational criteria for the January 2003 – February 2017 period. Even though the S-152 structure was not operated before 2013, the record of variables since 2003 was used to deliberate the expected use of the structure for year-round operations. Through a what-if analysis, historical stage and water quality conditions were used to project the effects of proposed operations, and determine the frequency of potential S-152 operations. The green windows in **Figure 4-9** show the hypothetical flow events during which the flow criteria under Alternative B were met, indicating that the structure will be operated if similar hydrological and water quality conditions are experienced. For the 14-year duration shown in **Figure 4-9**, the number of months that fall into the hypothetical flow events (within the green windows) were counted and their sums were divided by total number of months. Due to missing TP data for January 2003, October 2003, December 2003, September 2004, and November 2005, the total number of months varied between 13 and 14. The percent occurrences of months with flow criteria were met are plotted in **Figure 4-10**. The chart indicates that for the month of January, for example, the flow criteria would be met 85% (12 out of 14) of the years of operations if the proposed criteria under Alternative B were in place. The chart also indicates the potential benefit of year-around operations for the months that are currently not included in operational window: 57% of months of February and 31% of months of September would met the criteria for operations. While there is a relatively small likelihood of structure operations in March, April, May and August, the what-if analysis indicated that the operational criteria are not expected to be met for months of June and July under hydrological conditions similar to those experienced during the January 2003 – February 2017 period.

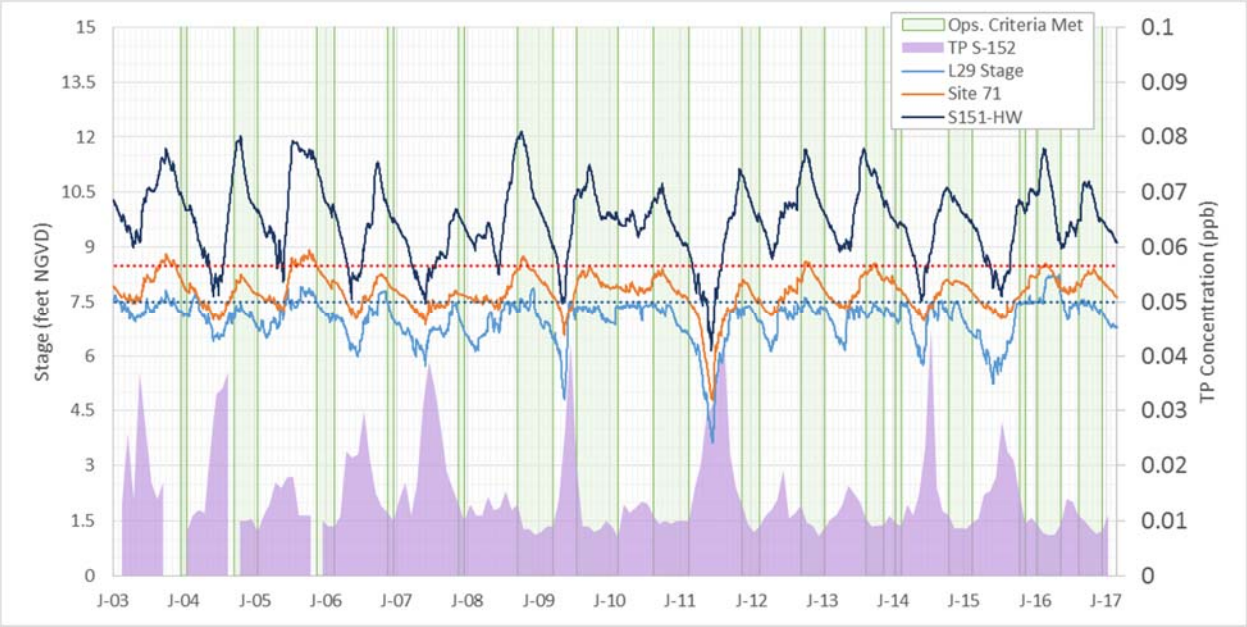

FIGURE 4-9. STAGE AND TP VARIABLES USED IN S-152 OPERATIONS AND HISTORICAL PERIODS WHEN ALL OPERATIONAL CRITERIA MET.

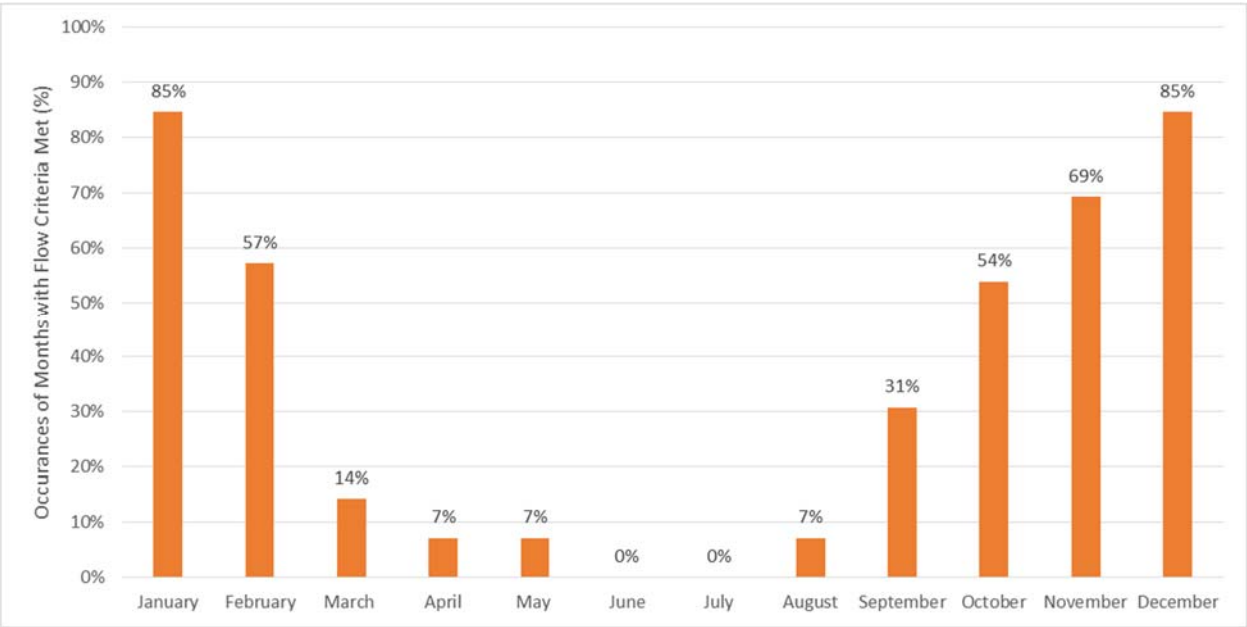

FIGURE 4-10. THE MONTHLY DISTRIBUTION OF PROPOSED S-152 FLOW CRITERIA SATISFACTION FOR OBSERVED HYDROLOGICAL CONDITIONS BETWEEN JANUARY 2003 AND DECEMBER 2016.

Figure 4-11 shows the number of months when operational criteria would be met for the historical hydrological conditions experienced in the 2003-2016 period. The number of months varied between one and nine. Using the average S-152 delivery flow rate observed in the previous four operational windows (275 cfs), it is expected that year-round operations would result in a total delivery volume ranging between 16,500 acre-feet to 150,000 acre-feet under hydrological conditions similar to those experienced during 2003-2016 period.

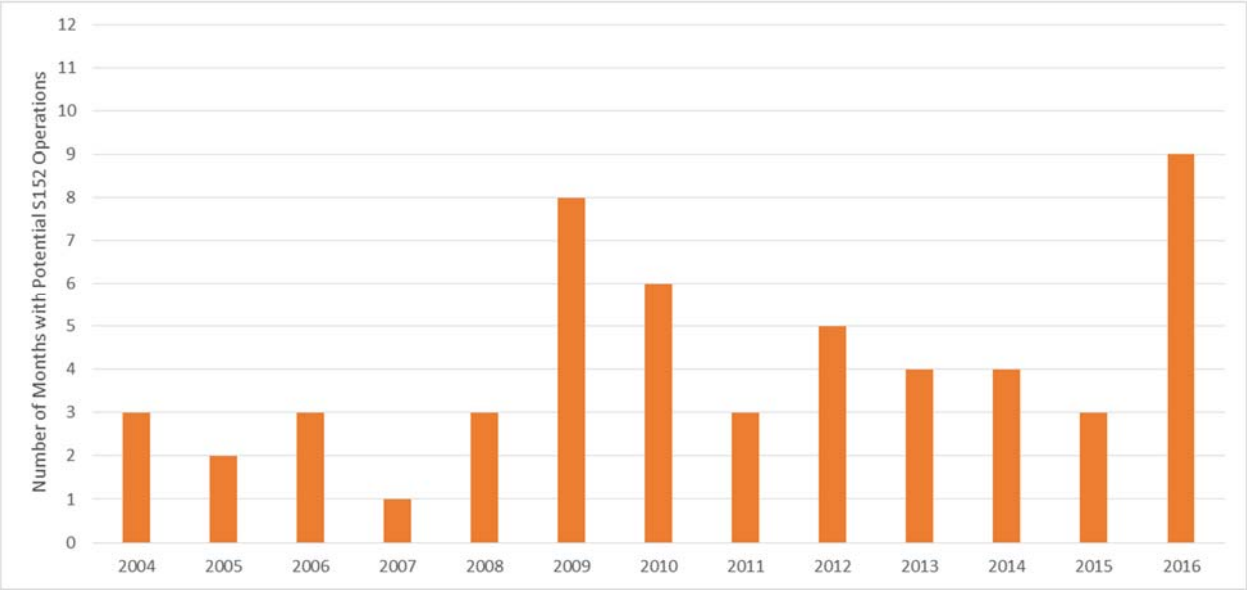

FIGURE 4-11. NUMBER OF MONTHS WITH POTENTIAL S-152 OPERATIONS FOR THE OBSERVED HYDROLOGICAL CONDITIONS FROM 2003 AND 2016.

4.5.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized to the end of the wet season through the early dry season, increases in stage would be of lesser magnitude and of shorter duration.

4.6 FLOOD RISK MANAGEMENT

4.6.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

The No Action Alternative would continue C&SF water management operations as defined by the 2012 Water Control Plan (USACE 2012b) which includes the WCA 3A Regulation Schedule and Rainfall Plan with the exception of operating criteria as defined by Increment 1.1 and Increment 1.2 (USACE 2016c) and the 2017 Planned Temporary Deviation (USACE 2017). Under the No Action Alternative, the 2012 Water Control Plan and current approved deviations will continue to

be used unless replaced by subsequent authorized operating criteria. Under the No Action Alternative, operational testing for the DPM concluded on January 31, 2017. However, S-152 is currently being utilized under the 2017 Temporary Planned Deviation to alleviate high stages within WCA 3A. The structure would no longer be operated at the conclusion of the approved deviation to the 2012 Water Control Plan. Stage levels experienced within WCA 3B would be similar to the range of water stages experienced under current water management operations. The No Action Alternative will maintain the authorized purposes of the C&SF Project.

4.6.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Implementation of Alternative B would result in similar effects as discussed under the No Action Alternative. Increased water levels within WCA 3B may result in increased seepage to the east. This may occur when the stage at SRS-1 and/or Site_71 in WCA 3B rises to 8.5 ft. NGVD. Alternative B maintains the Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. NGVD for the duration of the test. With retention of the historical 8.5 ft. NGVD high water constraint for WCA 3B stage levels, no potential impacts to the protective levee system are anticipated for Alternative B. Previous findings from prior flow events suggest that immediate responses to flow were observed within ~500 meters of S-152 inflows. Responses to flow rapidly diminished beyond ~ 500 meters of the S-152 structure. The cumulative stage exceedance curves for Site_71 and SRS-1 for the months of November, December and January are provided in **Figure 4-12** and **Figure 4-13**. These three months were selected to capture the majority of the operational window common in all four years of DPM operations since October 2013. The figures indicate that WCA 3B water levels experienced during DPM operations were not significantly different from the pre-project stages at these sites with only 0.1 feet of differences in the median values. Considering that operating criteria for S-152 includes the condition of keeping SRS-1 and Site_71 stages below 8.5 ft. NGVD, and gives consideration to South Dade Conveyance System status, Alternative B is not expected to increase flood risk for the surrounding areas. Since the releases through the structure will be discontinued when the water levels in the WCA 3B exceeds the 8.5 ft. NGVD limit, increased risks to flood protection east of the L-30 and L-31N levees is not expected under implementation of Alternative B.

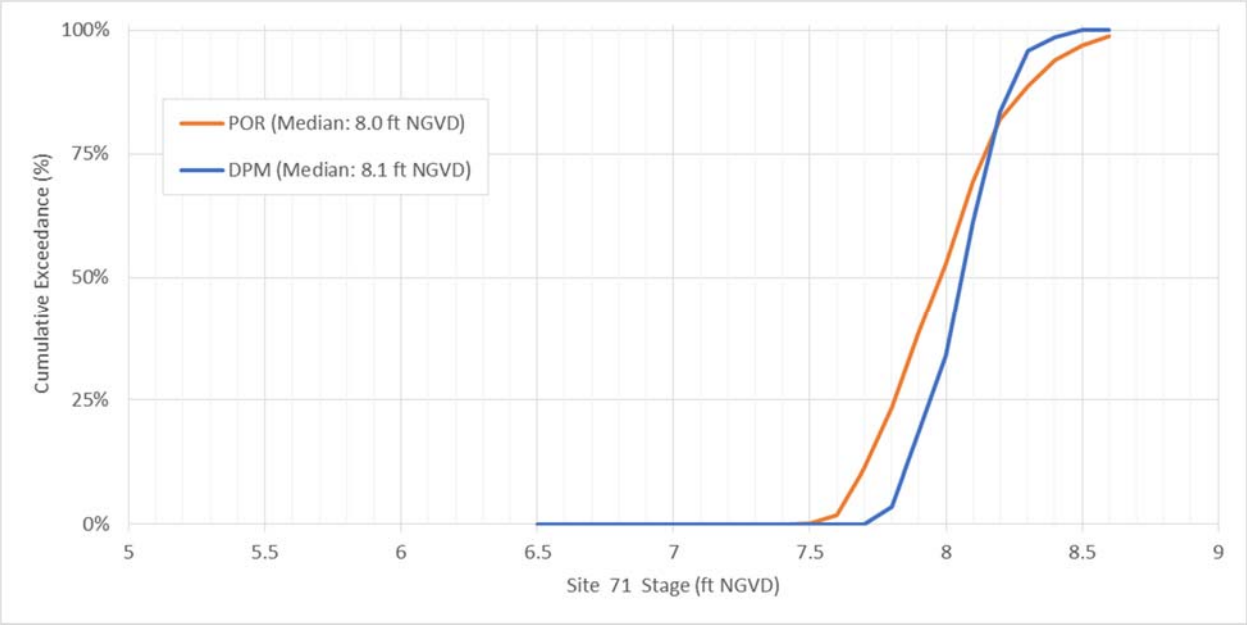

FIGURE 4-12. CUMULATIVE STAGE EXCEEDANCES FOR NOVEMBER, DECEMBER AND JANUARY AT SITE_71 DURING DPM OPERATIONS VERSUS THE PERIOD OF RECORD SINCE 2003.

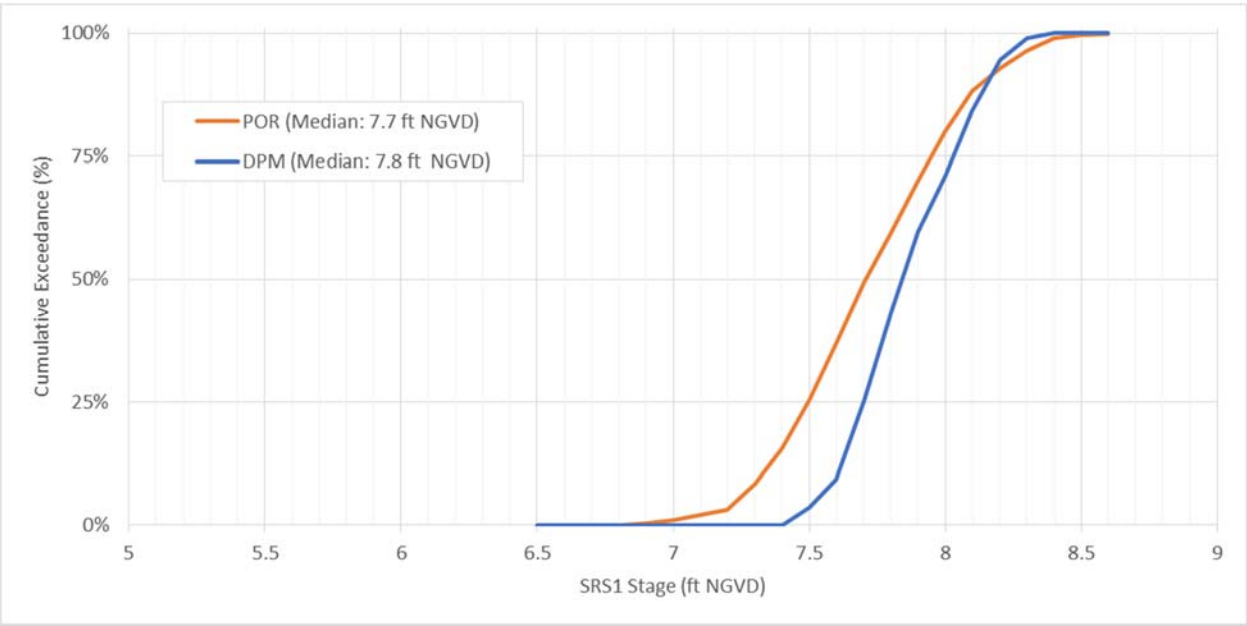

FIGURE 4-13. CUMULATIVE STAGE EXCEEDANCES FOR NOVEMBER, DECEMBER AND JANUARY AT SRS-1 DURING DPM OPERATIONS VERSUS THE PERIOD OF RECORD SINCE 2003.

The stage hydrograph for the EDEN8 station (located within WCA 3A, 3.8 miles to the west of the S-152) shown in **Figure 4-5**does not indicate a significant increase in stage during the DPM operational windows since the start of operations in October 2013. To supplement the visual inspection of WCA 3A stage in response to DPM operations, a stage exceedance curve for the closest WCA 3A monitoring site was developed (**Figure 4-14**). **Figure 4-14** shows cumulative stage exceedance curves for EDEN8 for the months of November, December and January, recorded during DPM operations and for the period of record since January 2003. Similar to the analysis done for SRS 1 and Site_71, these three months were selected to capture the majority of the operational window common in all four years of DPM operations since October 2013. The figure indicates that WCA 3A water levels experienced during DPM operations were not significantly different from the pre-project stages at the site with only 0.03 feet of differences in the median values. The difference in the spreads of the curves is expected and unavoidable when two datasets with different lengths are compared for exceedances.

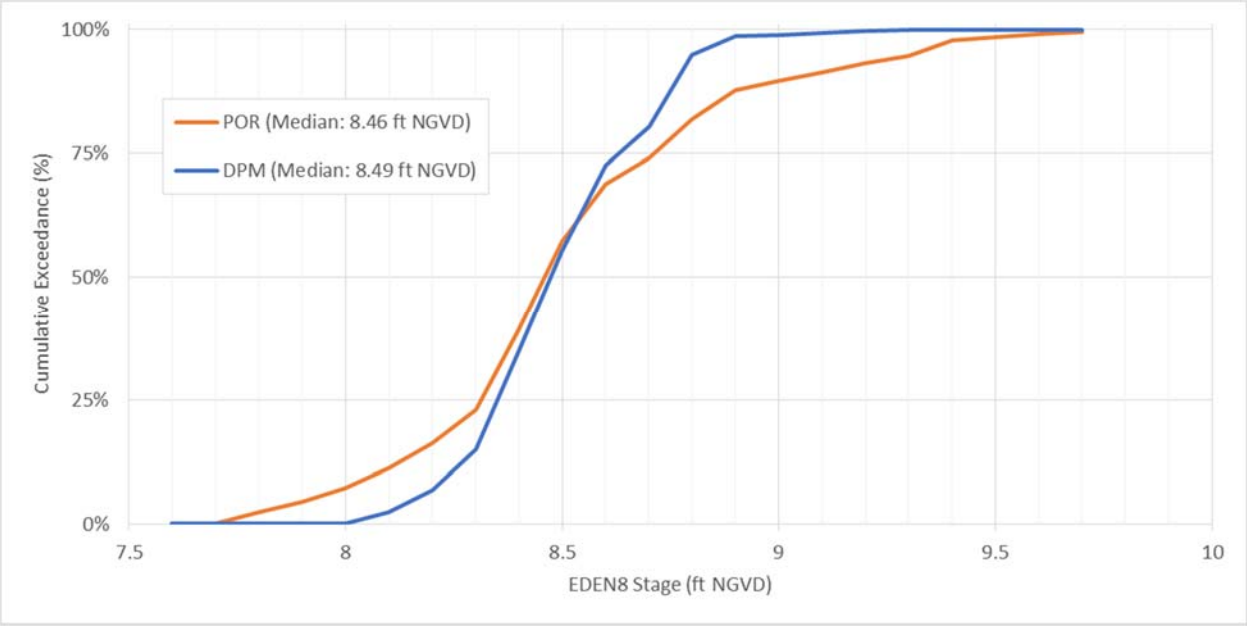

FIGURE 4-14. CUMULATIVE STAGE EXCEEDANCES FOR NOVEMBER, DECEMBER AND JANUARY AT EDEN8 DURING DPM OPERATIONS VERSUS THE PERIOD OF RECORD SINCE 2003.

4.6.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however, operations would be limited to the months of October to January within a given year. Increased risks to flood protection east of the L-30 and L-31N levees is not expected as Alternative C maintains the Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. NGVD for the duration of the test. Since Alternative C reduces the time in which S-

152 is utilized to the end of the wet season through the early dry season, increases in stage would be of lesser magnitude and of shorter duration.

4.7 VEGETATIVE COMMUNITIES

4.7.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

The implementation of the No Action Alternative would allow the continuation of adverse effects on vegetative communities within WCA 3B upon which fish and wildlife resources rely. Typical Everglades vegetation, including tree islands, wet prairies, sawgrass marshes, and aquatic sloughs is contained in WCA 3B. The ridge and slough landscape has been severely degraded by the virtual elimination of overland sheetflow due to the L-67 Canal and Levee system. WCA 3B has become primarily a rain-fed system pre-dominated by shorter hydroperiod sawgrass marshes with relatively few sloughs or tree islands remaining. Water levels in WCA 3B are also too low and do not vary seasonally, contributing to poor ridge and slough patterning. Loss of sheetflow to WCA 3B has accelerated soil loss reducing elevations of remaining tree islands, making them vulnerable to high water stages. The continued implementation of current water management operations within WCA 3B has the potential to affect vegetation within WCA 3B. Please refer to **Section 3.7** for existing information on vegetation within the project area.

4.7.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Environmental effects of the DPM are expected to be spatially limited to WCA 3B and small in magnitude. Adjacent areas including WCA 3A and NESRS are not anticipated to be significantly affected as a result of observed limitations in hydrologic effects to the immediate vicinity of the DPM field test. Alternative B is expected to provide minor beneficial effects on vegetative communities by increasing flows to WCA 3B. Water levels experienced within WCA 3B under implementation of Alternative B would be similar to the range of water levels experienced under current water management operations. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 NGVD will apply for the duration of the test period. Improved hydroperiods resulting from increases in water levels would be limited to the immediate vicinity of the DPM within WCA 3B. Improved inundation patterns may help to maintain existing wetland vegetation and/or decrease durations of dry downs associated with current infrastructure and water management practices. Implementation of Alternative B has the potential to increase hydrologic connectivity within the project area relative to the No Action Alternative. Negative affects to tree islands are not anticipated. Elevation and tree community surveys conducted on tree islands within the DPM project area indicate that tree islands in WCA 3B are significantly drier than islands in WCA 3A; however, most of the islands are dominated by flood-tolerant species. Reference **Section 4.13** for potential effects to tree islands.

As reported on in **Appendix F** and the 2017 South Florida Environmental Report (SFWMD 2017), results from prior flow events have demonstrated potential changes in algal communities and large-scale changes in periphyton in response to increased flows. In sloughs, algal communities are typically observed as periphyton, in the form of metaphyton (floating mats), epiphyton (adhering to stems), or epipelon (mats that cover benthic floc). Monitoring during the 2015 flow event was conducted to document periphyton productivity, biomass and species response to flow. Accelerated flows were expected to increase local TP loads, attenuating with distance from inflow.

Native periphyton is phosphorous limited. The impacts of increased TP loads is a key uncertainty associated with the DPM. Periphyton biomass was observed to be higher at monitoring sites nearest S-152 and during periods of high flow. Biomass attenuated with increased distance from S-152 (*i.e.* lower velocities) or was reduced under low or non-flowing conditions. Higher biomass with higher flow also appears consistent with greater algal species abundance, particularly green algae under high flow. Productivity results showed greater variation. Temperature or other seasonal variation may also play a role and potentially interact with flow. While results suggest that flow may stimulate biomass and productivity, floc measurements indicate that increases in biomass and productivity are insufficient to maintain original pre-floc levels. In areas within 500 meters of S-152 inflows, the most immediate responses to high flow included increased slough velocities of ~3 cm/s within hours, and sinking of most slough metaphyton community within days, exemplified at monitoring site RS1 (**Figure 4-8**). Metaphyton collapse may lead to initial, rapid floc accumulation (*i.e.* suspended mass of fine particles), but results suggest that metaphyton does not recover. Furthermore, floc production may be reduced with the loss of metaphyton, and green algae production may increase as a result of reduced metaphyton.

The extent to which these observations occur as a result of increased flows and the influence of changes in algal communities and periphtyon in assisting with the maintenance of sustained sheetflow remains unknown. Results from prior flow events and subsequent development of a conceptual ecological model for sediment dynamics within the ridge and slough landscape suggest that the combination of reduced floc production, increased floc erodibility, and potentially more labile floc likely contribute, to varying degrees, to reduced floc stocks over 8 to 10 weeks of DPM flow. Furthermore, since slough velocities increase with reduced biomass, the combined loss of metaphyton, along with floc, provide a positive feedback increasing slough velocities, which typically peaked after 2 months of flow. This positive feedback would then amplify the physical and biological responses described above. Immediate responses observed within ~ 500 meters of S-152 (*i.e.* higher velocities and sediment transport, metaphyton collapse, increased green algae, and reduced floc) may happen farther away from the immediate vicinity of S-152 inflows, but the pace at which these observed responses remains unknown. Operations of the DPM have the potential to influence localized changes in algal communities and periphyton as reported on in **Appendix F** and in the 2017 South Florida Environmental Report (SFWMD 2017).

It should be noted, that a large-scale active adaptive management study was initiated during prior the 2016-2017 flow event. This active adaptive management study reconnected sloughs (up to 2-km from S-152) that have been encroached by sawgrass for purposes of evaluating the degree to which active management can increase the extent of sheetflow and restoration of sloughs. Active management of vegetation, achieved by creating a curvilinear slough within a sawgrass-dominated area was effective in enhancing flow velocities and sediment redistribution. Active management was performed through application of herbicide along pathways connecting remnant sloughs. It is anticipated that maintenance of these sloughs will continue throughout DPM operations as needed. Reference **Figure 4-15** for the location of the slough.

Figure 4-15 depicts the location of the DPM study area from 1940 (top left) and present aerial imagery (top right). The yellow area depicts the general location for active management of sheetflow by reconnecting historic sloughs (evident as dark areas in the 1940 image (top left)) and increasing the overall flow footprint. A tree island boundary is shown for visual reference. A map of areas proposed for herbicide application along two historic flowpaths are depicted in the bottom

left hand graphic. The bottom right hand graphic depicts a helicopter view of actively managed areas (treated sawgrass patches indicated by brown patches).

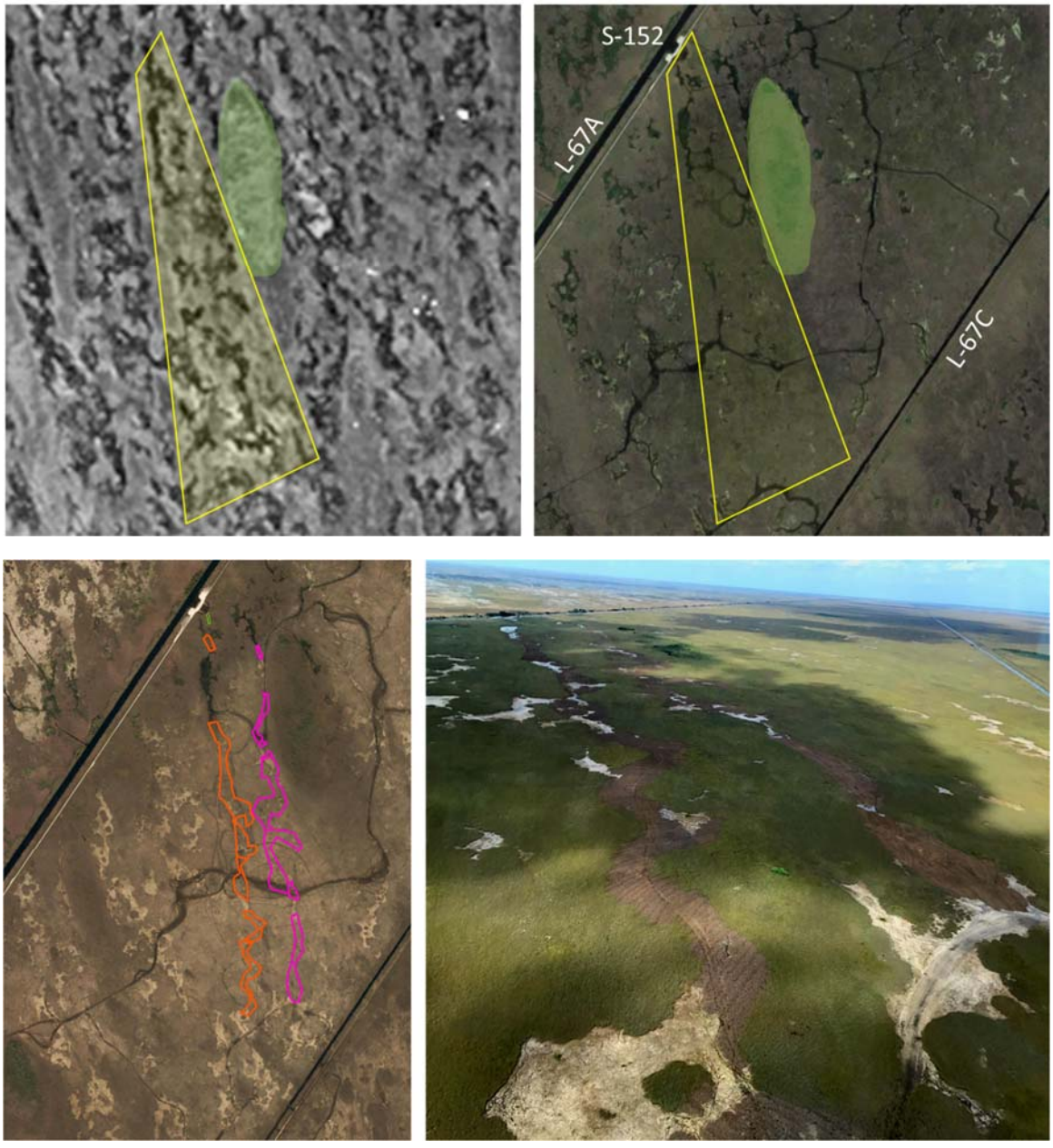

FIGURE 4-15. LOCATION OF ACTIVE MANAGEMENT SLOUGHS. TOP IMAGES DEPICTS HISTORIC SLOUGH PATH (LEFT) AND CURRENT CONDITION (RIGHT). BOTTOM IMAGES DEPICT LOCATIONS OF ACTIVE MANAGEMENT STUDY.

4.7.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Alternative C is similar to Alternative B, except for the timing of DPM operations within a given year. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized to the end of the wet season through the early dry season potential effects to vegetative communities would be of lesser magnitude and limited to the operational window.

4.8 FISH AND WILDLIFE RESOURCES

4.8.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

The implementation of the No Action Alternative would allow the continuation of adverse effects on vegetative communities within WCA 3B upon which fish and wildlife resources rely. Typical Everglades vegetation, including tree islands, wet prairies, sawgrass marshes, and aquatic sloughs is contained in WCA 3B. The ridge and slough landscape has been severely degraded by the virtual elimination of overland sheetflow due to the L-67 Canal and Levee system. WCA 3B has become primarily a rain-fed system pre-dominated by shorter hydroperiod sawgrass marshes with relatively few sloughs or tree islands remaining. Water levels in WCA 3B are also too low and do not vary seasonally. Reduced hydroperiods and increased durations of dry downs decrease forage prey availability, *i.e.* crayfish, other invertebrates, and fish, thereby providing a negative impact to amphibian, reptile, small mammal, and wading bird species within WCA 3B. Please refer to **Section 3.8** for existing information on vegetation within the project area.

4.8.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Environmental effects of the DPM are expected to be spatially limited to WCA 3B and small in magnitude. Adjacent areas including WCA 3A and NESRS are not anticipated to be significantly affected as a result of observed limitations in hydrologic effects to the immediate vicinity of the DPM field test. Alternative B is expected to provide minor beneficial effects on fish and wildlife resources by increasing flows to WCA 3B. Water levels experienced within WCA 3B under implementation of Alternative B would be similar to the range of stages experienced under current water management operations. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 NGVD will apply for the duration of the test period. Improved hydroperiods resulting from increases in localized water levels would be spatially limited to the immediate vicinity of the DPM within WCA 3B. Results from prior flow events demonstrate potential changes in fish abundance and the manner in which fish utilize habitat and move across the marsh. Potential food web interactions were also observed.

As reported on in **Appendix F** and the 2017 South Florida Environmental Report (SFWMD 2017, small fish (< 8 cm standard length) density and species composition was changed by implementation of the DPM when compared to control sites outside of the DPM project area. Following canal filling, levee removal, and flow implementation, the density of small fishes that serve as prey for apex predators was increased by over 2-fold in the marsh west of the L67C Canal

compared to control sites. Changes in the relative abundance of these species was linked to movements toward and away from the canal backfill fill treatments. Small marsh fish responded to the DPM modifications by changing their movement and habitat use as water levels rose and dropped.

Results from prior flow events also suggest that increasing flow velocities has the potential to affect small fish (< 8 cm standard length) population growth by improving the edibility of biofilms. Water flow in the 2015 flow event led to loading of phosphorus in biofilms growing on plastic substrates placed in experimental cages in a high-flow area compared to similar substrates in the month before, during the pre-flow period. These biofilms had high relative abundance of green algae compared to biofilms produced in the pre-flow period. These biofilms also had high relative abundance of fatty acid markers for algae. Flowing water favored a more edible biofilm, dominated by algae high in essential fatty acids compared to biofilms produced in periods of low water flow. Herbivorous fish benefitted from this more edible food source by storing more fat, accumulating relatively more phosphorous in their tissues and more essential fatty acids; suggesting fish would be a higher quality prey item for apex predators like wading birds.

Large fish (>8cm standard length) catch-per-unit-effort (CPUE), an index of density, was greatly changed by the DPM, with some species increasing and others decreasing. Largemouth bass doubled CPUE in canal fill treatments, where sunfish also increased. Other species decreased in CPUE in the partial or complete fill areas, or both areas, compared to the control areas and before-fill sampling, notably the Florida gar and Lake Chubsuckers. Largemouth bass and bowfin with surgically implanted radio transmitters were observed to move throughout the study area, crossing from the L67C Canal and gap area into WCA 3B once the levee was degraded.

Results from fish sampling suggest there has been no loss of fishing habitat with the partial or complete fills. The partial fill and complete fill areas have created a new deeper water habitat that supports a similar community to the one currently only found on the canal edge. The canal-fill areas became filled with emergent vegetation that appeared to be treated by fish similar to the vegetated littoral zone of the unmodified canal. The fill treatments increased the aerial coverage of high CPUE habitat by providing attractive habitat across the entire width of the canal. This suggests the possibility of canal partial or complete backfills as a fishing enhancement, if submerged aquatic vegetation can be kept from filling the space.

Increases in forage prey availability (*i.e.* crayfish and other invertebrates, fish) resulting from improved hydroperiods would in turn provide beneficial effects for amphibian, reptile, small mammal, and wading bird species. Mammals occurring in WCA 3B are adapted to naturally fluctuating water levels. Localized increases in water levels is not expected to have significant adverse impacts to the mammal community in WCA 3B. Increases in water levels anticipated during DPM operations is expected to have no significant adverse impacts to the mammal community in WCA 3B.

4.8.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITHOUT SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Alternative C is similar to Alternative B, except for the timing of DPM operations within a given year. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized to the end of the wet season through the early dry season, potential effects to fish and wildlife resources would be of lesser magnitude and limited to the operational window.

4.9 THREATENED AND ENDANGERED SPECIES

4.9.1 FEDERALLY PROTECTED SPECIES

The Corps requested written confirmation of federally listed threatened and endangered species that either are known to occur or are likely to occur within the project area from USFWS by letter dated March 16, 2017. USFWS provided a revised list of listed species on April 4, 2017. Effects determinations for federally threatened and endangered species within the project area are listed in **Table 4-2.** The Corps provided correspondence dated June 7, 2017 to the USFWS requesting concurrence on species determinations listed in **Table 4-2**. Concurrence was provided by USFWS via letter dated July 27, 2017. Reference **Appendix E** for pertinent correspondence. Upon completion of an assessment for species under National Marine Fisheries Service (NMFS) purview it was determined that the Proposed Action would have no effect on these species; therefore, consultation with NMFS was not necessary.

TABLE 4-2. FEDERALLY THREATENED AND ENDANGERED SPECIES WITHIN THE PROJECT AREA AND SPECIES DETERMINATION FOR THE PROPOSED ACTION

Common Name	Scientific Name	Status	May Affect, Likely to Adversely Effect	May Affect, Not Likely to Adversely Effect	No Effect
Mammals					
Florida panther	*Puma concolor coryi*	E			X
Florida manatee	*Trichechus manatus latirostris*	T, CH**			X
Florida bonneted bat	*Eumops floridanus*	E		X	
Birds					
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	E, CH**			X
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	E, CH		X	

Wood stork	*Mycteria americana*	T		X	
Reptiles					
Eastern indigo snake	*Drymarchon corais couperi*	T		X	

E=Endangered; T=Threatened; CH=Critical Habitat; Candidate Species

4.9.2 STATE LISTED SPECIES

Implementation of the Proposed Action would not result in significant impacts to state listed species (**Table 4-3**). Impacts to state listed species would be similar to those outlined for fish and wildlife resources in **Section 4.8**.

TABLE 4-3. STATE LISTED SPECIES WITHIN THE PROJECT AREA AND SPECIES DETERMINATION FOR THE PROPOSED ACTION

Common Name	Scientific Name	Status	May Affect, Likely to Adversely Effect	May Affect, Not Likely to Adversely Effect	No Effect
Mammals					
Florida black bear	*Ursus americanus floridanus*	T			X
Everglades mink	*Mustela vison evergladensis*	T			X
Florida mouse	*Podomys floridanus*	SC			X
Florida mastiff bat	*Eumops glaucinus floridanus*	E			X
Birds					
Limpkin	*Aramus guarauna*	SC		X	
Little blue heron	*Egretta caerulea*	SC		X	
Tricolored heron	*Egretta tricolor*	SC		X	
Snowy egret	*Egretta thula*	SC		X	
Reddish egret	*Egretta rufescens*	SC		X	
White ibis	*Eudocimus albus*	SC		X	
Florida sandhill crane	*Grus canadensis pratensis*	T		X	
Burrowing owl	*Athene cunicularia*	T			X
Invertebrates					
Florida tree snail	*Liguus fasciatus*	SC			X

E=Endangered; T=Threatened; SC=Species of Special Concern

4.10 ESSENTIAL FISH HABITAT

No EFH has been designated within the project area. Therefore, implementation of the No Action and Action Alternatives would not result in any effects on EFH.

4.11 WATER QUALITY

4.11.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

Under the No Action Alternative, water quality within the project area would not be expected to change from current conditions. Please refer to **Section 3.11** for existing water quality within the project area.

4.11.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Some limited additional nutrient loading to WCA 3B is expected to occur as compared to the No Action Alternative and the previously authorized limited operations (October to January). However, due to the operational constraints that limit nutrient loading, the additional nutrient load is expected to be very low. Hydrologic modeling was not performed for the development of these alternatives so the limited additional load cannot be quantified. It should be noted that the operational criteria developed allow opening of the S-152 only when the forecasted geometric mean for total phosphorous is at or below 10 µg/L. These criteria will be protective by limiting surface water phosphorus concentrations to levels that prevent degradation of the marsh. Collection of canal water TP data from L67A Canal during prior DPM operations have enabled robust statistical analyses for forecasting when canal water TP is sufficiently low and flow can occur as needed to maintain oligotrophic conditions within the downstream marsh. Operational rules are based on the forecasted geometric mean for TP concentrations at S-151 as well as biweekly data collection to ensure low inflow TP concentrations into WCA 3B. Reference **Appendix B**. These rules are anticipated to be incorporated into FDEP authorization by modifying the existing FDEP Permit (Permit Number 0304879-007) prior to the start of year round DPM operations. Currently the FDEP authorization allows the operation of the DPM 1 October through 31 January. During the extension of the DPM testing, operation of S-152 will be consistent with FDEP Permit Number 0304879-007 as modified. Restoration of pre-impoundment flow patterns in historic sloughs is expected to provide an overall environmental lift to the area. Year-round operations would provide the most benefit to the hydrology of WCA 3B and would provide a benefit to help re-establish ridge and slough formation. Improved hydroperiods resulting from increases in water levels would be limited to the immediate vicinity of the DPM within WCA 3B and temporary in nature. As compared to the No Action Alternative, Alternative B helps restore flow patterns in the historic paths as compared to leaving WCA 3B impounded/stagnant.

4.11.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITH SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Some limited additional nutrient loading to WCA 3B is expected to occur as compared to the No Action Alternative (no flows into WCA 3B) but due to the operational constraints that limit nutrient loading, the additional nutrient load is expected to be very limited. As hydrologic

modeling was not conducted for the development of these alternatives, the additional loading cannot be defined. It should be noted that the operational criteria developed allow opening of the S-152 only when the forecasted geometric mean for total phosphorus is at or below 10 µg/L. These criteria will be protective by limiting surface water phosphorus concentrations to levels that prevent degradation of the marsh. Under Alternative C, operations would be limited to the months of October to January within a given year. The potential increase in nutrient loading resulting from this alternative will be less than the year round operations alternative. Flows into WCA 3B will improve the hydrology of WCA 3B as compared to the No Action (no flows) Alternative and would help reestablish ridge and slough formation. Improved hydroperiods resulting from increases in water levels would be limited to the immediate vicinity of the DPM within WCA 3B and temporary in nature. As compared to the No Action Alternative, Alternative C helps restore flow patterns in the historic paths as compared to leaving WCA 3B impounded/stagnant.

4.12 NATIVE AMERICANS

As part of the development of this project, consultation has occurred between the Corps and the appropriate federally recognized tribes within the project area of interest. Letters requesting government-to-government consultation were sent to both the Miccosukee and Seminole Chairmen on April 12, 2016 (**Appendix E**). In addition, the USACE conducted email and in-person correspondence with tribal government staff members to brief them on the project development and to discuss potential issues of concern with each tribe. Consultation with the Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida did not indicate concern with the continued testing of the DPM. The following evaluations are designed to assess potential impacts to Native American lands discussed in Section 3.12. The reader should note that Native American concerns extend beyond physical impacts to their lands and, as such, considerations have taken into account discussions and consultations that have occurred with federally recognized tribes.

4.12.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

Under the No Action Alternative, effects to tribal properties within the project area would not be expected to change from current conditions. Please refer to **Section 3.12** for information related to Native Americans within the project area.

4.12.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Implementation of Alternative B is not anticipated to effect tribal lands. The Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida rely upon the Everglades in its natural state to support their cultural, subsistence, and commercial activities, including the gathering of materials, hunting, trapping, frogging, and fishing. Water levels experienced within WCA 3B under implementation of Alternative B would be similar to the range of water levels experienced under current water management operations. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. NGVD will apply for the duration of the test period. Improved hydroperiods resulting from increases in water levels would be limited to the immediate vicinity of the DPM within WCA 3B. Improved inundation patterns may help to maintain existing wetland vegetation and/or decrease durations of dry downs associated with current infrastructure and water management practices.

Implementation of Alternative B has the potential to increase hydrologic connectivity within the project area relative to the No Action Alternative. Negative affects to tree islands are not anticipated. As Alternative B is expected to provide minor beneficial effects on vegetative communities by increasing flows to WCA 3B and have no effect on tree islands which Native American communities utilize for cultural and subsistence practices, no impacts to Native American land use are anticipated.

4.12.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITH SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized at the end of the wet season through the early dry season, increases in stage would be of lesser magnitude and of shorter duration. Implementation of Alternative C would have no effect on tree islands which Native American communities utilize for cultural and subsistence practices.

4.13 CULTURAL RESOURCES

As part of consideration of effects, the Corps actively consulted with interested parties in conjunction with its obligation under Section 106 of the National Historic Preservation Act (NHPA) and consideration given under the NEPA. Consultation has occurred between the Corps, the State Historic Preservation Officer (SHPO), and the appropriate federally recognized tribes. Letters requesting concurrence of the Corp's determination of effects were sent to the SHPO, Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma on June 8, 2017 (**Appendix E**). The SHPO concurred with the Corp's determination of effect in a letter dated July 10, 2017. The Seminole Tribe of Florida indicated "no objection" to the Preferred Alternative in a letter dated June 20, 2017. The Seminole Nation of Oklahoma "has no concerns" with the Preferred Alternative and "concurs with USACE's determination of no historic properties affected" in an email dated July 10, 2017. The Muscogee (Creek) Nation "respectfully defer to the other Tribes that have been contacted" in a letter dated August 16, 2017 (**Appendix E**). The Miccosukee Tribe of Indians of Florida did not provide formal comments regarding the Preferred Alternative; however, the Miccosukee cultural resources representative indicated no objection to the continued testing of the DPM in a phone call with the project archaeologist on June 9, 2017.

4.13.1 ALTERNATIVE A: NO ACTION ALTERNATIVE

Under the No Action Alternative, effects to cultural resources within the project area would not be expected to change from current conditions. Please refer to **Section 3.13** for existing cultural resources within the project area.

4.13.2 ALTERNATIVE B: YEAR ROUND OPERATIONS THROUGH 2021 WITH SITE_71/SRS-1 STAGE CONSTRAINT OF 8.5 FEET NGVD

Alternative B is not expected to affect cultural resources within the APE as water levels experienced within WCA 3B under the implementation of Alternative B would be similar to the

range of stages experienced under current water management operations. Based on ecological monitoring provided in the annual report of the DPM testing conducted over the last three years (**Appendix F**), the APE of the DPM is limited to WCA 3B and the effects themselves are small in magnitude. Prior flow events demonstrate that immediate responses to flow from the DPM rapidly diminished beyond approximately 500 meters of the S-152 structure. The maximum rise in water depths within the adjacent slough during the 2013-2015 flow events was 20 centimeters directly adjacent to S-152 structure, 12 centimeters approximately 500 meters south of S-152, 6 centimeters approximately 1,500 meters south of S-152, and 3.5 centimeters approximately 2,500 meters south of S-152.

In order to assess potential direct and indirect effects to cultural resources within the APE, the Corps developed a detailed analysis of the maximum water elevations that the 31 previously identified tree islands and 36 archaeological sites within WCA 3B may be subject to, based on the DPM constraint of 8.5 ft NGVD (as measured at gages SRS-1 and Site_71). Using the Everglades Depth Estimation Network (EDEN), water elevations were collected and reviewed for the tree islands in WCA 3B when Site_71 was at or above 8.5 ft. NGVD. Based on the period of record for Site_71, water elevations from July 1991 to March 2017 were averaged by month to estimate the maximum water elevation the tree islands and corresponding cultural resources may be exposed to prior to discontinuation of the DPM test. These results were then compared to water elevations at the same tree islands during the 2002-2012 period of Interim Operational Plan regulation in accordance with the ERTP Programmatic Agreement.

As a result of this analysis, WCA 3B may experience slight water level increases due to the operational testing of S-152; however, increased water depths will not exceed the maximum water elevations tree islands and corresponding cultural resources have experienced historically. Additionally, tree islands that have not been subject to seasonal inundation during the Interim Operational Plan period will not be inundated as a result of the implementation of Alternative B. It is important to note that the direct effect of DPM operations are limited to a distance of approximately 3,000 meters south of S-152, and situations that would require the discontinuation of testing based on the constraints noted above would likely be the result of flooding or drought conditions.

Based upon this analysis, the temporary nature of the field test, and as no inundation of tree islands is expected other than those typically experienced during seasonal operations, implementation of Alternative B is not anticipated to adversely affect cultural resources. In addition, as part of the ERTP Programmatic Agreement, the Corps is currently monitoring water levels at the 31 known tree islands (25 of which contain known cultural resources) within WCA 3B. This monitoring will continue throughout the operational field test to provide further information to inform future water management plans and ensure oversight of this determination.

4.13.3 ALTERNATIVE C: LIMITED OPERATIONS (OCTOBER TO JANUARY THROUGH 2021) WITH SITE_71/SRS-1 STAGE CONSTRAINT FOR WCA 3B OF 8.5 FEET NGVD

Implementation of Alternative C would result in similar effects as discussed under Alternative B. Under Alternative C, DPM operations would continue in 2017, with the potential for additional years of testing through the year 2021; however operations would be limited to the months of

October to January within a given year. Since Alternative C reduces the time in which S-152 is utilized at the end of the wet season through the early dry season, increases in stage would be of lesser magnitude and of shorter duration. Water depths would not exceed the maximum water elevations that tree islands and corresponding cultural resources have experienced during previous DPM field tests due to the implementation of Alternative C. Therefore, the implementation of Alternative C would have no effect to cultural resources.

4.14 AIR QUALITY

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to air quality. Air quality within the project area would not be expected to change from current conditions. S-152 consists of 10, 60-inch manually operated slide-gated culverts with a combined discharge capacity of 750 cfs installed along a stretch of the L-67A Canal and Levee. Since there is no construction activity associated with the Proposed Action, none of the Action Alternatives are expected to affect air quality within the project area. Operation of the structure is passive. Emissions of diesel exhaust are not existent or associated with the operation of S-152.

4.15 HAZARDOUS, TOXIC OR RADIOACTIVE WASTES (HTRW)

Implementation of the No Action Alternative and Action Alternatives would not alter HTRW conditions within the project area. Since there is no construction activity associated with the Proposed Action, none of the Action Alternatives are likely to directly or indirectly result in the discovery of HTRW materials. The project has a very low risk for increased mobilization of existing HTRW where it might exist within the study area.

4.16 NOISE

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to the noise environment. S-152 consists of 10, 60-inch manually operated slide-gated culverts with a combined discharge capacity of 750 cfs installed along a stretch of the L-67A levee. Noise levels within the project area are not expected to change as a result of the continued operation of the structure. No construction is proposed.

4.17 AESTHETICS

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to aesthetic resources. The Action Alternatives consist of continued operation of S-152 and does not include construction of permanent structures or structural modifications to existing C&SF Project features.

4.18 RECREATION

Implementation of the No Action Alternative and Action Alternatives would not result in significant impacts to recreational resources. Under the Action Alternatives, fifteen miles of the L-67C Canal within the DPM footprint would continue to be inaccessible to recreational boaters for the duration of the test. Access to the L-67C Canal can only be gained at the southern terminus, prohibiting recreational boater's entry to the northern portion of the canal. At the conclusion of the test, the levee and canals are anticipated to be restored to initial conditions. Other recreational

resources will continue to be accessible within the project area including use of the L-67A Canal for boating and fishing and air boating trails throughout WCA 3.

4.19 CUMULATIVE EFFECTS

Cumulative effects are defined in 40 CFR 1508.7 as those effects that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The following summarizes past, present, and projected Corps efforts that cumulatively affect the regional environment of South Florida (**TABLE 4-3**). The physical features of the DPM are temporary and are anticipated to be removed at the end of the field test. **Table 4-5** shows the net cumulative effects of the various resources that are directly or indirectly impacted. Operations of the DPM are expected to be spatially limited to the immediate project area adjacent to the S-152 structure.

TABLE 4-4. PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS AND PLANS AFFECTING SOUTH FLORIDA AND THE PROJECT AREA

	Past Actions/Authorized Plans	Current Actions and Operating Plans	Reasonably Foreseeable Future Actions and Plans
Status of Non-CERP Projects	- C&SF Project (1948) -ENP Protection and Expansion Act (1989) - MWD GDM and Final EIS (1992) - C-111 South Dade GRR (1994)	- MWD 8.5 SMA GRR (2000) - MWD Tamiami Trail Modifications Limited Reevaluation Report (2008) - MWD 8.5 SMA Interim Operating Criteria EA (2011) and Design Refinement EA (2012) - C&SF C-51 West End Flood Control Project - Kissimmee River Restoration - Seepage Barrier near the L-31 N Levee (Miami-Dade Limestone Products Association) - Tamiami Trail Modifications Next Steps (TTMNS) Project - SFWMD Florida Bay Initiatives	- SFWMD Restoration Strategies Project - MWD Completion and associated operations - C-111 South Dade Project (Contracts 8, 8A, and 9) - Combined Operations Plan (COP; replaces 2012 Water Control Plan)
Operations Plan for Lake Okeechobee, WCA 3A, ENP and the SDCS	- Water Supply and Environment (WSE) Lake Okeechobee Regulation Schedule (2000) - IOP 2002 to Present	- Lake Okeechobee Regulation Schedule (LORS 2008) - SFWMD LEC Regional Water Supply Plan - ERTP October 2012 to present; deviation includes Increment 1 Operational Strategy - Herbert Hoover Dike Dam Safety Modification Study (HHD DSMS) risk reduction measures (2011 through 2025)	- LORS 2008 to be replaced by revised Lake Okeechobee Regulation Schedule by 2024-2025 (per Integrated Delivery Schedule) - SFWMD periodically revises the LEC Regional Water Supply Interim Plan - ERTP to be replaced by COP to be completed to include MWD and C-111 components.
CERP Projects		Congressional Authorization Received: - Broward County Water Preserve Areas Project - Caloosahatchee River (C-43) West Basin Storage Reservoir - Central Everglades Planning Project Congressional Authorization Received and Construction in Progress: - Indian River Lagoon-South Project	- Future CERP Projects (Lake Okeechobee Watershed Restoartion Project, Loxahatchee River Watershed Restoration Project, Western Everglades Restoration Project)

	Past Actions/Authorized Plans	Current Actions and Operating Plans	Reasonably Foreseeable Future Actions and Plans
		- Picayune Strand Restoration Project - Site 1 Impoundment Project - Biscayne Bay Coastal Wetlands Project - C-111 Spreader Canal Western Project - Caloosahatchee River (C-43) West Basin Storage Reservoir	

TABLE 4-5. SUMMARY OF CUMULATIVE EFFECTS

Hydrology	
Past Actions	Flood and water control projects have greatly altered the natural hydrology.
Present Actions	Federal and state agencies are coordinating on and implementing projects to improve hydrology.
Proposed Action Alternative B	Modifications under the Proposed Action would continue DPM operations in 2017 year round, with the potential for additional years of testing through the year 2021. S-152 may discharge up to 750 cfs to facilitate the objectives of the field test. Flows to WCA 3B are anticipated to be more than what would have otherwise been discharged relative to the 2012 Water Control Plan. Water levels experienced within WCA 3B under the Proposed Action would be similar to the range of water levels experienced under current water management operations. The Site_71/SRS-1 stage constraint for WCA 3B of 8.5 ft. NGVD will apply for the duration of the test period. Improved hydroperiods resulting from increases in localized water levels would be spatially limited to the immediate vicinity of the DPM within WCA 3B and are anticipated to be temporary in nature.
Future Actions	Additional CERP projects (Refer to **Table 4-4**) propose to restore hydrology to more natural conditions.
Cumulative Effect	Although it is unlikely that natural hydrologic conditions would be fully restored to pre-drainage conditions, improved hydrology would occur with implementation of the Proposed Action within the immediate vicinity of the DPM. CERP is expected to improve the quantity, quality, timing and distribution of freshwater flow.
Threatened and Endangered Species	
Past Actions	Water management practices and urbanization have resulted in the degradation of existing habitat function and direct habitat loss leading to negative population trends of threatened and endangered species.
Present Actions	ERTP was implemented in October 2012 through the Water Control Plan. Implementation represents a paradigm shift from single species to multi-species management. ERTP includes performance measures specifically directed at managing water levels and releases for the protection of multiple species and their habitats within the project area. The Corps reinitiated ESA consultation on ERTP on November 17, 2014 as a result of an exceedance of an Incidental Take Reinitiation Trigger from the November 17, 2010 BO for the CSSS. USFWS issued a new BO for ERTP on July 22, 2016. As a result of this consultation, USFWS determined that current conditions within CSSS habitat threaten the survival of the sparrow, and as a result, USFWS issued a "jeopardy" BO which explains that unless alternatives to current water operational practices (which then included the 2012 Water Control Plan) are explored and implemented, continued implementation of ERTP is likely to jeopardize the continued existence of the CSSS. In response to the BO, the Corps has committed to taking specific actions to comply with the BO terms and conditions and implement the RPA. The RPA requires that the Corps, in partnership with the SFWMD and subject to the successful completion of NEPA and other environmental requirements continue to operate the DPM, pursuant to State Water Quality Certification, for purposes of obtaining additional information through Fiscal Year 2017 and Fiscal Year 2018. Other current actions to comply with the BO include implementation of Increment 1.1 and Increment 1.2; as well as Increment 2 by March 1, 2018 and COP by 2019.
Proposed Action Alternative B	The Corps has determined that the Proposed Action may affect, but is not likely to adversely affect; the Everglade snail kite and its associated critical habitat; wood stork; Florida bonneted bat; and eastern indigo snake. Effects determinations for federally threatened and endangered species within the project area are listed within **Section 4.9**. The Proposed Action is being implemented in accordance with the mandated RPAs of the 2016 ERTP BO and RPA for the CSSS.
Future Actions	Ongoing projects would be implemented to maintain threatened and endangered species within the project area.

Cumulative Effect	Habitat improvement, monitoring and management of threatened and endangered species are anticipated to allow populations to be maintained. Improvement of degraded populations is expected to be facilitated by the restoration and enhancement of suitable habitat through efforts to restore more natural hydrologic conditions within the project area.
Fish and Wildlife Resources	
Past Actions	Water management practices have resulted in aquatic vegetation community changes and a resultant disruption of aquatic productivity and function that has had repercussions through the food web, including effects on wading birds, large predatory fishes, reptiles and mammals.
Present Actions	Ongoing efforts have been made by federal and state agencies to implement projects to improve hydrology within the project area to restore habitat conditions for fish and wildlife resources.
Proposed Action Alternative B	Increases in forage prey availability (*i.e.* crayfish and other invertebrates, fish) resulting from improved hydroperiods would in turn provide beneficial effects for amphibian, reptile, small mammal, and wading bird species. Improved hydroperiods resulting from increases localized in water levels would be spatially limited to the immediate vicinity of the DPM within WCA 3B and are anticipated to be temporary in nature. Canal fill and levee removal as a result of DPM operations have been observed to change the way fish move across the landscape. Fish used the fill treatments in similar density and species composition as the littoral zone of unfilled habitat. This indicates that canal backfill treatments increased the area of preferred habitat for fish within the canal; however, the quality of these habitats this is uncertain over the long term because canal vegetation continues to change in the partial and filled areas. Small marsh fish responded to the DPM modifications by changing their movement and habitat use as water levels rose and dropped.
Future Actions	Some level of improvement to fish and wildlife resources is expected to occur as a result of implementation of projects with the capability of improving the timing, quantity, quality and distribution of freshwater flow to the study area. Hydrologic restoration planned as part of CERP would further improve fish and wildlife habitat.
Cumulative Effect	Habitat improvement efforts are anticipated to benefit fish and wildlife resources.
Vegetation and Wetlands	
Past Actions	Drainage of Florida's interior wetlands, conversion of wetlands to agriculture, and urban development has reduced the spatial extent and quality of wetland resources.
Present Actions	Efforts are being taken by state and federal regulatory agencies to reduce wetland losses.
Proposed Action Alternative B	The Proposed Action may have a temporary minor beneficial effect on vegetative communities within WCA 3B. Improved hydroperiods resulting from increases in localized water levels would be spatially limited to the immediate vicinity of the DPM and are anticipated to be temporary in nature. Prior results from previous flow events have demonstrated changes in algal communities and periphyton in response to increased flows. Vegetation may be sprayed with herbicides and/or physical removed from sawgrass encroached sloughs to determine if active management increases the restoration of sloughs in relation to sheetflow.
Future Actions	Some level of improvement to vegetative communities is expected to occur as a result of implementation of projects with the capability of improving the timing, quantity, quality and distribution of freshwater flow to the study area. More natural hydrology as part of the CERP would assist in restoring natural plant communities.
Cumulative Effect	While the spatial extent of natural plant communities would not be restored to historic proportions, the quality of vegetative communities would be improved.
Cultural Resources	
Past Actions	Previous water control plans and associated environmental analyses had determined that there were no effects to cultural resources associated with changing water regulation schedules. However, effects of fluctuating water levels to historic properties and culturally significant sites remains unknown. Current testing associated with the 2012 ERTP Programmatic Agreement is investigating these effects, and will be completed prior to the determination of the effects of fluctuating water on historic properties.

Present Actions	Ongoing efforts have been made by federal and State agencies to implement projects to improve hydrology within the project area, thereby stabilizing the tree islands which are known to have a high potential for cultural resources.
Proposed Action Alternative B	The Proposed Action by its short nature is not capable of producing a cumulative effect, as such effects if they were to occur would cease at the end of the Proposed Action. Based on the Site_71/SRS-1 stage constraint, increased water depths will not exceed the maximum water elevations tree islands and corresponding cultural resources have experienced historically. Therefore, implementation of the Proposed Action would pose no effect to historic properties eligible or potentially eligible for listing in the NRHP.
Future Actions	Continued improvement to hydroperiods and sheetflow within WCA 3A, 3B and ENP could reduce soil oxidation, which could stabilize the environment, and this in turn could stabilize tree islands containing cultural resources. Long-term effects of fluctuating water levels to historic properties and culturally significant sites remains unknown. Current testing mandated in the ERTP Programmatic Agreement is investigating these effects.
Cumulative Effect	Cumulative effects of fluctuating water levels to historic properties and culturally significant sites remains unknown. Current testing associated with the ERTP Programmatic Agreement is investigating these effects. If necessary, mitigation measures for effects to historic properties could potentially reduce the cumulative effect to any long-term adverse effects. Mitigation measures for culturally significant sites are unknown.
Water Quality	
Past Actions	Water quality has been degraded from urban, suburban, commercial, industrial, recreational and agricultural development. Due to impoundment of WCA 3B, nutrient enrichment to this area has been limited.
Present Actions	Efforts to improve water quality from agricultural areas are ongoing. Construction of federal and state projects can temporarily elevate localized levels of suspended solids and turbidity.
Proposed Action Alternative B	Water TP has remained low with surface water concentrations averaging ≤ 10 micrograms per liter (µg/L) across the DPM study area including sites adjacent to inflow during prior flow events. Operational rules have been developed to guide initiation of DPM testing within a given year and to determine the continuation of operations once S-152 is opened. Collection of canal water TP data from L67A Canal during prior DPM operations has enabled robust statistical analyses for forecasting when canal water TP is sufficiently low and flow can occur as needed to maintain oligotrophic conditions within the downstream marsh. These rules are anticipated to be incorporated into FDEP authorization by modifying the existing FDEP Permit (Permit Number 0304879-007) prior to the start of DPM operations. During the extension of the DPM, operation of S-152 will be consistent with FDEP Permit Number 0304879-007 as modified.
Future Actions	Actions by the State of Florida's Restoration Strategies will decrease nutrient concentration and loadings to the project area. The Broward County Water Preserve Area Project would reduce storm runoff deliveries to WCA 3 and improve water quality coming across Tamiami Trail. In general there is a slowly improving trend in water quality entering and exiting the upstream WCA's.
Cumulative Effect	While anthropogenic effects on water quality are unlikely to be eliminated, water quality is expected to slowly improve. Corps and SFWMD are committed to ensuring that project feature implementation will not result in violations of water quality standards.

4.20 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. The Proposed Action consists of continued

operation of the DPM and does not include construction of permanent structures or structural modifications to existing C&SF Project features. Resources to be committed include the expenditure of funding, energy, and labor. The Proposed Action would not cause the permanent removal or consumption of any natural resources.

4.21 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Environmental effects for each resource are discussed in **Section 4.0**. Implementation of the Proposed Action is not expected to result in unavoidable adverse environmental effects and is expected to result in beneficial environmental effects within the project area. Additional years of DPM operation will provide greater confidence in the overall reliability of the data collected and will allow the opportunity to more accurately address uncertainties associated with decompartmentalization of WCA 3, as well as address the mandated RPA of the July 22, 2016 ERTP BO. The loss of recreational access within the L-67C Canal will continue throughout the duration of DPM operations. Other recreational resources will continue to be accessible within the project area including use of the L-67A Canal for boating and fishing and air boating trails throughout WCA 3. DPM features are anticipated to be removed at the conclusion of testing, with restoration of natural features including canal access. Reference **Section 4.18**. Care was taken during the initial design of the DPM to minimize the temporary loss of recreational access by limiting the size of the project area.

4.22 CONFLICTS AND CONTROVERSY

At this time, there is no known conflict or controversy associated with the Proposed Action. Potential concerns addressed during the initial design and operation of the DPM are summarized in **Section 1.9**. Reference the 2010 DPM EA and FONSI and 2015 DPM Supplemental FONSI for further information. The Corps continually strives to include all interested parties in its decision making process and will continue to consider all issues that arise.

4.23 ENVIRONMENTAL COMMITMENTS

Mitigation of environmental impacts is appropriately discussed in terms of avoidance, minimization and compensatory actions that reduce or offset the negative environmental impacts resulting from an action. Implementation of the Proposed Action is not expected to result in environmental impacts that would require mitigation. The DPM Science Plan (**Appendix C**) has been developed for the Proposed Action consistent with the agency goals and objectives outlined within **Section 1.5**. Hydrologic and ecological parameters are measured during operations to evaluate responses to flow.

The Corps is proposing a fifth year of testing in 2017, with the potential for additional years of testing through the year 2021. Operations of the DPM as described in the 2010 DPM EA and FONSI were previously limited to the months of October, November, December and January based on criteria developed during planning stages of the project (USACE 2010). Phase 2 of the DPM field test includes year-round operation of S-152, subject to constraints as noted in **Appendix A**, from as early as November 2017 through 2021. Environmental effects of the DPM are expected to be spatially limited to WCA 3B and small in magnitude. Adjacent areas including WCA 3A and NESRS are not anticipated to be significantly affected as a result of observed limitations in hydrologic effects to the immediate vicinity of the DPM field test. The frequent exchange of

information is expected to occur during DPM operations between Corps water management staff and member(s) of the DPM Science Team regarding current system conditions and gate operations. Coordination meetings are expected to occur on an approximately biweekly basis once operations are initiated for purposes of project compliance regarding fish and wildlife concerns and water quality constraints as described in **Appendix A**. The Corps ongoing assessment of hydrometerological conditions and stakeholder or agency input may result in suspension or termination of the field test due to impacts greater than expected and/or discussed within this EA.

4.24 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.24.1 National Environmental Policy Act of 1969

Environmental information on the project has been compiled and this Supplemental EA and FONSI have been prepared and coordinated for public, state, and federal agency review. The Proposed Action is in compliance with the NEPA.

4.24.2 Endangered Species Act of 1973

The Corps requested written confirmation of federally listed threatened and endangered species that are either known to occur or are likely to occur within the project area from USFWS by letter dated March 16, 2017. USFWS provided a revised list of listed species on April 4, 2017. Informal consultation was initiated with USFWS on June 7, 2017 (**Appendix E**). The Corps provided correspondence to the USFWS requesting concurrence on species determinations listed in **Table 4-2**. Concurrence was provided by USFWS via letter dated July 27, 2017. The Proposed Action is in compliance with Section 7 of the ESA. Upon completion of an assessment for species under NMFS purview it was determined that the Proposed Action would have no effect on these species; therefore, consultation with NMFS was not necessary

4.24.3 Fish and Wildlife Coordination Act of 1958, as amended

The Proposed Action has been fully coordinated with USFWS and Florida Fish and Wildlife Conservation Commission. In response to the requirements of the Act, the Corps has and will continue to maintain continuous coordination with federal and State wildlife agencies. The Proposed Action is in full compliance with the Act.

4.24.4 National Historic Preservation Act of 1966

The Proposed Action is in compliance with Section 106 of the National Historic Preservation Act, as amended (PL 89-665). As part of the requirements and consultation process contained within the National Historic Preservation Act implementing regulations of 36 CFR 800, this project is also in compliance with the Archaeological and Historic Preservation Act, as amended (PL 93-29), Archeological Resources Protection Act (PL96-95), American Indian Religious Freedom Act (PL 95-341), Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601), Executive Order 11593, 13007, and 13175, the Presidential Memo of 1994 on Government to Government Relations and appropriate Florida Statutes. Consultation has occurred with the Florida SHPO, appropriate federally recognized tribes, and other interested parties (**Appendix E**). The Proposed Action is in compliance with the goals of this Act.

4.24.5 Clean Water Act of 1972

The Proposed Action is in compliance with this Act. The Corps normally obtains water quality certification from the delegated authority prior to constructing civil works projects. The operations and maintenance of S-152 is covered under FDEP File No. 0304879-007. Necessary modifications to this existing permit will be obtained prior to implementation of the Proposed Action.

4.24.6 Clean Air Act of 1972

The Proposed Action is being coordinated with the State of Florida. No air quality permits are required for the Proposed Action. The Proposed Action will not cause or contribute to violations of the National Ambient Air Quality Standards. The Proposed Action is in compliance with this act.

4.24.7 Coastal Zone Management Act of 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as **Appendix D**. The Corps has coordinated a consistency determination pursuant to the CZMA through the circulation of the Supplemental EA and Proposed FONSI. The Corps has determined that the Proposed Action is consistent to the maximum extent practicable with the enforceable policies of Florida's approved CZMP. The Florida State Clearinghouse has reviewed the Proposed Action. Based on the information submitted, the state has no objections to the project. Final concurrence of consistency with the CZMP will be determined during environmental permitting processes, as applicable

4.24.8 Farmland Protection Policy Act of 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.24.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This Act is not applicable.

4.24.10 Marine Mammal Protection Act of 1972

No marine mammals would be harmed, harassed, injured, or killed as a result of the Proposed Action. Therefore, the Proposed Action is in compliance with this Act.

4.24.11 Estuary Protection Act of 1968

No designated estuary would be affected by the Proposed Action. This Act is not applicable.

4.24.12 Federal Water Project Recreation Act of 1965, as amended

Recreation and fish and wildlife enhancement have been given full consideration in the Proposed Action.

4.24.13 Fishery Conservation and Management Act of 1976

No fisheries or other areas under the purview of the NMFS would be affected by this action. The Proposed Action is in compliance with the Act.

4.24.14 Submerged Lands Act of 1953

The Proposed Action would not occur on submerged lands of the State of Florida. The Proposed Action is in compliance with the Act.

4.24.15 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the project area that would be affected by the Proposed Action. These Acts are not applicable.

4.24.16 Resource Conservation and Recovery Act (RCRA), As Amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Toxic Substances Control Act (TSCA) of 1976

Implementation of the Proposed Action is not expected to result in the discovery of HTRW since there is no excavation or other construction activities associated with this project. The Proposed Action is in compliance with these Acts.

4.24.17 Rivers and Harbors Act of 1899

The proposed project would not obstruct the navigable waters of the United States. The project has been subject to public notice and other evaluations normally conducted for activities subject to the Act. The proposed project is in compliance with the goals of this Act.

4.24.18 Safe Drinking Water Act of 1974, As Amended

The Proposed Action would not impact safe drinking water standards. The Proposed Action is in full compliance.

4.24.19 Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646)

Acquisition of real estate is not required for the Proposed Action. The Proposed Action is in compliance with this Act.

4.24.20 Anadromous Fish Conservation Act

Anadromous fish species would not be affected. The Proposed Action is in compliance with the Act.

4.24.21 Migratory Bird Treaty Act and Migratory Bird Conservation Act

Migratory and resident bird species have been observed within the project area and are likely to use available habitat for foraging, nesting, and breeding. The Proposed Action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The Proposed Action

will not pursue, hunt, take, capture, kill or sell migratory birds. The Proposed Action is in compliance with these Acts.

4.24.22 Marine Protection, Research and Sanctuaries Act

The Marine Protection, Research and Sanctuaries Act does not apply to the Proposed Action. Ocean disposal of dredge material is not proposed as part of the Proposed Action.

4.24.23 Magnuson-Stevens Fishery Conservation and Management Act

No EFH would be impacted by this action. Therefore the Proposed Action is in compliance with this Act.

4.24.24 E.O. 11990, Protection of Wetlands

The Proposed Action is expected to have beneficial effects on wetlands. The Proposed Action is in compliance with the goals of this Executive Order (E.O.).

4.24.25 E.O. 11988, Floodplain Management

This E.O. instructs federal agencies to avoid development in floodplains to the maximum extent possible. The Proposed Action continues operation of S-152 through 2022. S-152 is existing infrastructure; therefore, no construction is proposed. This action is consistent with the intent of this E.O. and is in compliance.

4.24.26 E.O. 12898, Environmental Justice

E.O. 12989 provides that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low income populations. The Proposed Action would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The Proposed Action is in compliance with this E.O.

4.24.27 E.O. 13089, Coral Reef Protection

No coral reefs would be impacted by the Proposed Action. This E.O. does not apply.

4.24.28 E.O. 13112, Invasive Species

The Proposed Action would have no significant impact on invasive species. The Proposed Action is in compliance with the goals of this E.O.

4.24.29 E.O. 13045, Protection of Children

E.O. 13045, requires each federal agency to "identify and assess environmental risk and safety risks [that] may disproportionately affect children" and ensure that its "policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This action has no environmental safety risks that may disproportionately affect children. The Proposed Action is in compliance.

4.24.30 E.O. 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Migratory and resident bird species have been observed within the project area and are likely to use available habitat for foraging, nesting, and breeding. The Proposed Action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The Proposed Action is in compliance with the goals of this E.O.

5.0 LIST OF PREPARERS

Table 5-1 provides the list of preparers associated with the Supplemental EA and FONSI. Please reference **Appendix B** and **Appendix C** for the primary authors associated with these documents.

TABLE 5-1. LIST OF PREPARERS

Name	Organization	Role in EA
Tim Gysan	USACE	Project Manager
Melissa Nasuti	USACE	Biologist
Ceyda Polatel	USACE	Hydrologist/Engineer
Adam Stuart	USACE	Water Manager
Jim Riley	USACE	Water Quality
Meredith Moreno	USACE	Archeologist

6.0 PUBLIC INVOLVEMENT

6.1 SCOPING AND EA

Reference **Section 1.9**. Reference the 2010 DPM EA and FONSI and 2015 DPM Supplemental FONSI for further information regarding comments received during preparation of prior NEPA documentation (USACE 2010, USACE 2015).

6.2 AGENCY COORDINATION

The Corps is in continuous coordination with other federal and state agencies, tribal representatives, and members of the general public. This extensive coordination is a result of the magnitude of Corps efforts underway to implement water management strategies in South Florida. All agency coordination letters related to the Proposed Action are included in **Appendix E**.

6.3 LIST OF RECIPIENTS

A notice of availability for this Supplemental EA was mailed to federal and state agencies, tribal representatives, and members of the general public. A complete mailing list is available upon request. The Supplemental EA was also posted the internet at the following address:

http://www.saj.usace.army.mil/About/DivisionsOffices/Planning/EnvironmentalBranch/EnvironmentalDocuments.aspx#

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