March 2016

Supplemental Environmental Assessment and Proposed Finding of No Significant Impact

TEMPORARY EMERGENCY DEVIATION TO ALLEVIATE HIGH WATER LEVELS IN WATER CONSERVATION AREA 3A

Broward and Miami-Dade Counties Florida

US Army Corps of Engineers ®
Jacksonville District

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SUPPLEMENTAL PROPOSED FINDING OF NO SIGNIFICANT IMPACT

TEMPORARY EMERGENCY DEVIATION TO AFFECT RELIEF OF HIGH WATER LVELS WITHIN WATER CONSERVATION AREA 3A

BROWARD AND MIAMI-DADE COUNTY, FLORIDA

I have reviewed the Supplemental Environmental Assessment (EA) for the Federal Action. This Finding incorporates by reference all discussions and conclusions contained in the attached Supplemental EA and the EA and Finding of No Significant Impact (FONSI) previously prepared for this Federal Action dated February 12, 2016. 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 Federal Action will not significantly affect the quality of the human environment and does not require an Environmental Impact Statement. The following supports this conclusion:

a. Operations in the project area have been governed by Increment 1 (G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy) which is a deviation to the 2012 Water Conservation Areas (WCAs), Everglades National Park (ENP) and the ENP to South Dade Conveyance System (SDCS) Water Control Plan. The EA and FONSI for that action is dated May 27, 2015.

b. The U.S. Army Corps of Engineers (Corps), Jacksonville District, initiated a temporary emergency deviation to the current Everglades Restoration Transition Plan (ERTP) and Increment 1 operating limit constraint of 7.5 feet National Geodetic Vertical Datum (of 1929 NGVD) in the L-29 Canal up to 8.5 feet NGVD for purposes of providing high water relief in WCA 3A. The WCAs are flooding in a manner that inundates tree islands and other wildlife habitat, and if sustained will negatively impact birds and mammals dependent on that habitat. Sustained flooding of natural habitat, especially tree islands, will negatively impact white-tailed deer and wading birds by eliminating foraging and nesting opportunities. These species support and encourage substantial outdoor recreational opportunities in this region. Increased S-333 discharges are expected to be of a relatively short duration (90-days from date of implementation). There will be a 60 day recovery period once the L-29 Canal constraint is returned to 7.5 feet NGVD, during which the water level would recede to stages typical of the recent hydrological conditions and the operational criteria under current Central and South Florida Project operations. As part of the recovery period, the lowered operational ranges within the operational strategy and SDCS will remain until this recovery period is completed. S-151 and S-152 will be used to provide high water relief to WCA 3A by passing flows from WCA 3A to WCA 3B. The temporary emergency deviation is expected to benefit natural resources within WCA 3A.

c. Implementation of the temporary emergency deviation occurred on February 15, 2016. National Environmental Policy Act documentation to support the temporary emergency deviation was completed on February 12, 2016 with signing of a FONSI incorporating an EA. The objective of this Supplemental EA and Proposed FONSI is to provide further documentation of the potential environmental effects resulting from the alternatives considered and the action taken.

d. The Federal Action is in full compliance with the Endangered Species Act and the Fish and Wildlife Coordination Act. The Federal 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 emergency operations.

e. The Corps has determined that the Federal Action is consistent to the maximum extent practicable with the enforceable policies of the Florida's approved Coastal Zone Management Program. The Florida Department of Environmental Protection (FDEP) has concurred.

f. The Federal Action has been coordinated with the Florida State Historic Preservation Officer and the appropriate federally recognized Tribes in accordance with the National Historic Preservation Act and consideration given under the National Environmental Policy Act. The Corps has determined that the Federal Action has no adverse effect on historic properties eligible or potentially eligible for the National Register of Historic Places. The State Historic Preservation Officer has concurred with the determination of no adverse effect. The Miccosukee Tribe of Indians of Florida have declined to comment on the determination of no adverse effect. The Seminole Tribe of Florida's Tribal Historic Preservation Office stated that they are unable to provide comments on the determination of effect due to the limited review period and lack of a comprehensive assessment of cultural resources within the affected area. However, coordination and consultation with both tribes is ongoing.

g. The Federal Action is not anticipated to adversely affect water quality and the requirement to obtain state water quality certification has been waived by the FDEP. The Federal Action is in compliance with the Clean Water Act.

h. The Federal Action will maintain the authorized purposes of the Central and Southern Florida Project, which include to provide flood control, water supply for municipal, industrial, and agricultural uses, prevention of saltwater intrusion, water supply for ENP, and protection of fish and wildlife.

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 Federal 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. Date
Colonel, U.S. Army
District Commander

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
ON
TEMPORARY EMERGENCY DEVIATION TO AFFECT RELIEF OF HIGH WATER LEVELS WITHIN WATER CONSERVATION AREA 3 A
BROWARD AND MIAMI-DADE COUNTIES, FLORIDA

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BROWARD AND MIAMI-DADE COUNTIES, FLORIDA

1.0 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY

The Central & Southern (C&SF) Florida Project was initially authorized by the Flood control Act of 1948, Public Law 80-858, approved June 30, 1948. The remaining works of the Comprehensive Plan were authorized by the Flood Control Act of 1954, Public Law 83-780, approved September 3, 1954.

1.2 PROJECT LOCATION

The water management operating criteria relating to the Federal Action affects an area within the C&SF Project located in south Florida and includes Water Conservation Area 3 (WCA 3), Everglades National Park (ENP) and adjacent areas. Features of the Federal Action are located in Broward and Miami-Dade Counties (**Figure 1**). Relevant C&SF Project features are depicted in **Figure 2**.

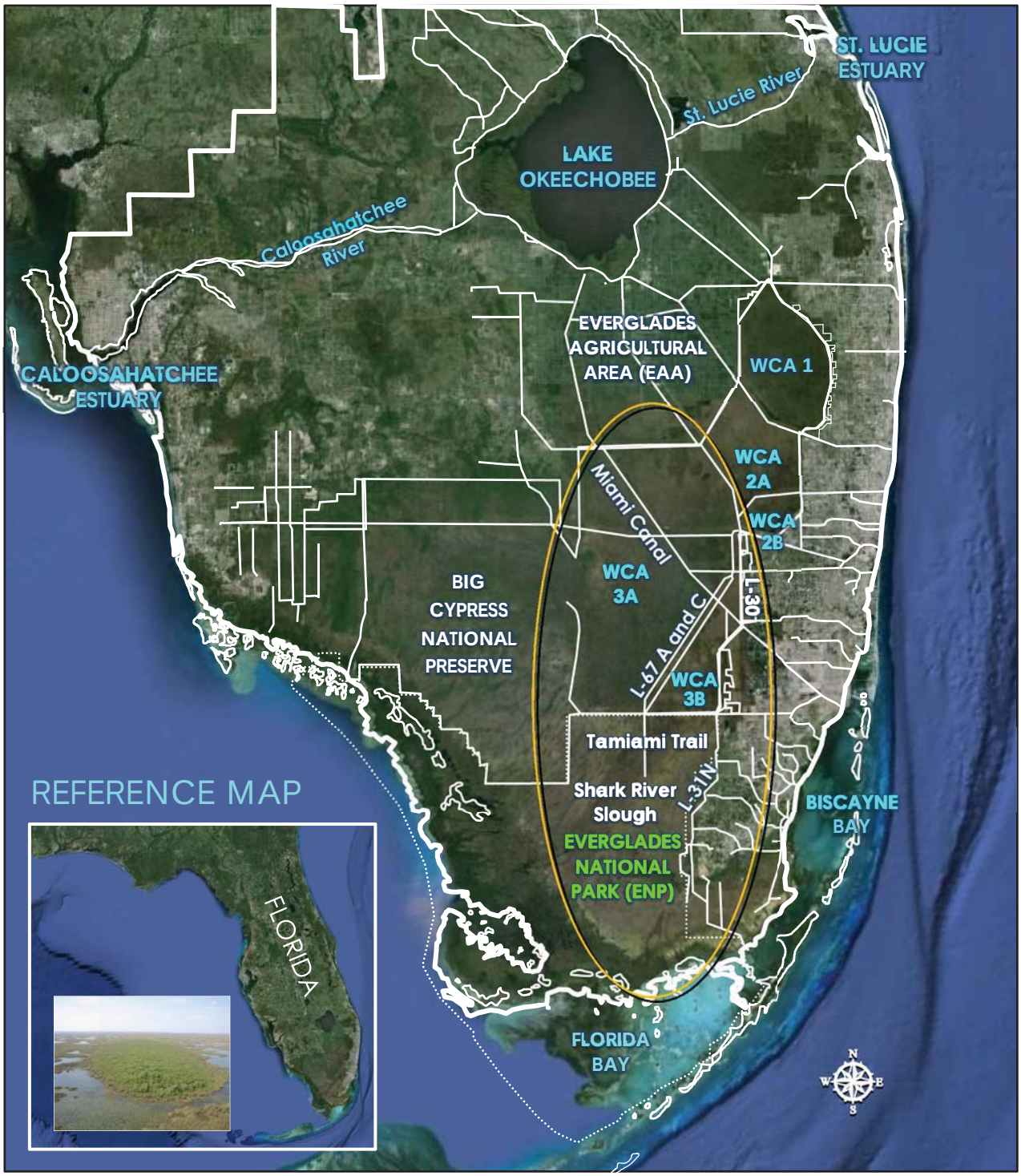


FIGURE 1. PROJECT LOCATION

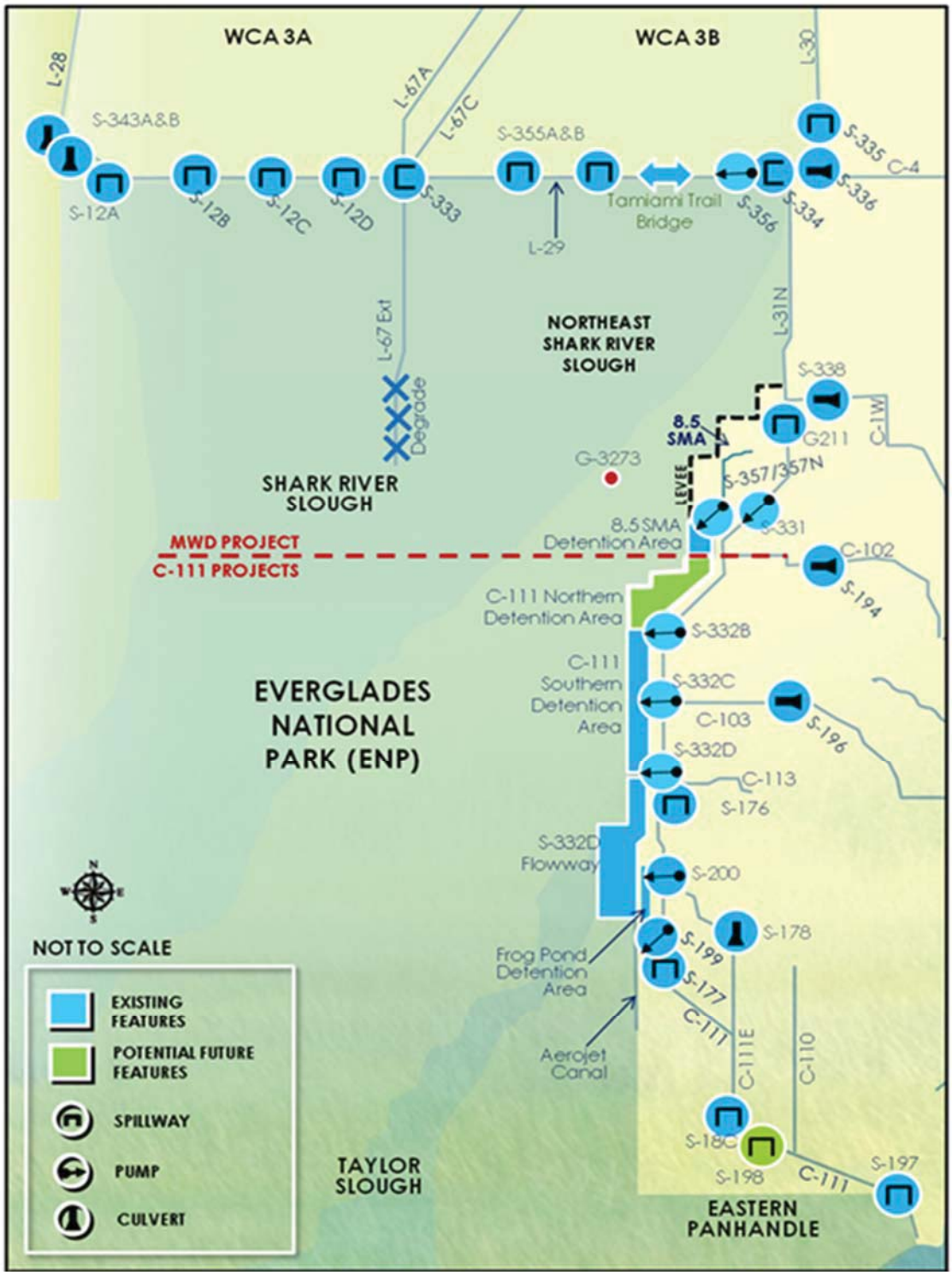


FIGURE 2. RELEVANT C&SF PROJECT FEATURES

1.3 PROJECT NEED OR OPPORTUNITY

The C&SF Project currently functions, and was originally authorized to function, as a multi-purpose water management system. The Congressionally-authorized purposes of the C&SF Project include flood control, agricultural irrigation, municipal and industrial water supply, preservation of fish and wildlife, water supply to ENP, preservation of ENP, prevention of saltwater intrusion, drainage and water control, groundwater recharge, recreation, and navigation. Operations in the project area have been governed by Increment 1 (G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy [USACE 2015]) which is a deviation to the 2012 WCAs, ENP and the ENP to South Dade Conveyance System (SDCS) Water Control Plan (USACE 2012a).

The highest rainfall on record has occurred within the South Florida Ecosystem during the month of January. The first half of the dry season (November 2015-January 2016) was the wettest for this period since record keeping began in 1932. Very Strong El Niño conditions are forecasted to continue for the rest of the dry season. All areas of South Florida are inundated with water restricting the ability to safely move water to alleviate the effects of flooding. The WCAs are flooding in a manner that inundates tree islands and other wildlife habitat, and if sustained will negatively impact birds and mammals dependent on that habitat. Sustained flooding of natural habitat, especially tree islands, will negatively impact white-tailed deer by eliminating upland refugia and will negatively impact wading birds by eliminating foraging and nesting opportunities. These species support and encourage substantial outdoor recreational opportunities in this region. There is an immediate threat and impact to valuable natural resources that underpin local economies. Immediate action is necessary to deviate from permitted water management practices to move flood water out of WCA 3A. The U.S. Army Corps of Engineers (Corps), Jacksonville District, initiated a temporary emergency deviation from the approved Water Control Plan for purposes of alleviating high water conditions within the project area on February 15, 2016. The temporary emergency deviation is expected to benefit natural resources within WCA 3A.

1.4 AGENCY GOALS AND OBJECTIVES

National Environmental Policy Act (NEPA) documentation to support the temporary emergency deviation was completed on February 12, 2016 with signing of a Finding of No Significant Impact (FONSI) incorporating an Environmental Assessment (EA). The objective of this Supplemental EA and Proposed FONSI is to provide further documentation of the potential environmental effects resulting from the alternatives considered and the action taken.

The objective of the Federal Action is to mediate high water levels in WCA 3A by allowing for the full discharge capacity through S-333 into the L-29 Canal. Other operational changes will be needed to mediate any concern with increased seepage from ENP into the SDCS.

1.5 RELATED ENVIRONMENTAL DOCUMENTS

The Corps has identified a number of environmental documents relevant to the Federal Action:

- *General Design Memorandum and Environmental Impact Statement, Modified Water Deliveries to Everglades National Park*, U.S. Army Corps of Engineers, Jacksonville District, June 1992

- *C-111, Central and Southern Florida Project for Flood Control and Other Purposes, Final General Reevaluation Report and Environmental Impact Statement,* U.S. Army Corps of Engineers, Jacksonville District 1994
- *1998 Emergency Deviation from Test 7 of the Environmental Program of Water Deliveries to Everglades National Park to Protect the Cape Sable Seaside Sparrow, Central and Southern Florida Project for Flood Control and Other Purposes, Final Environmental Assessment,* U.S. Army Corps of Engineers, Jacksonville District, 1999
- *Jeopardy and Adverse Modification Biological Opinion on the Modified Water Delivery to Everglades National Park Experimental Program to Everglades National Park and Canal-111 South Dade Projects,* U.S. Fish and Wildlife Service, Vero Beach, Florida 1999
- *General Reevaluation Report and Final Supplemental Environmental Impact Statement, 8.5 Square Mile Area,* U.S. Army Corps of Engineers, Jacksonville District, July 2000
- *Central and Southern Florida Project for Flood Control and Other Purposes, Interim Structural and Operational Plan, Emergency Deviation from Test 7 of the Experimental Program of Water Deliveries to Everglades National Park for Protection of the Cape Sable Seaside Sparrow Final Environmental Assessment,* U.S. Army Corps of Engineers, Jacksonville District, 2000
- *Interim Operating Plan for the Protection of the Cape Sable Seaside Sparrow Final Supplemental Environmental Impact Statement,* U.S. Army Corps of Engineers, Jacksonville District, 2002
- *Biological Opinion, Final Interim Operating Plan,* U.S. Fish and Wildlife Service, Vero Beach, Florida, November 17, 2006
- *Interim Operational Plan for the Protection of the Cape Sable Seaside Sparrow Final Supplemental Environmental Impact Statement,* U.S. Army Corps of Engineers, Jacksonville District, December 2006
- *C-111 Engineering Documentation Report,* U.S. Army Corps of Engineers, Jacksonville District, May 2007
- *Draft Environmental Assessment; Design Modifications for the Canal 111 Project,* U.S. Army Corps of Engineers, Jacksonville District, June 2007
- *Modified Water Deliveries to Everglades National Park Tamiami Trail Modifications Final Limited Reevaluation Report and Environmental Assessment,* U.S. Army Corps of Engineers, Jacksonville District, June 2008
- *Draft Environmental Assessment; Proposed Interim Operating Criteria for 8.5 Square Mile Area Project,* U.S. Army Corps of Engineers, Jacksonville District, November 2008
- *Revised Draft Environmental Assessment; Proposed Interim Operating Criteria for 8.5 Square Mile Area Project,* U.S. Army Corps of Engineers, Jacksonville District, April 2009
- *Canal-111 Spreader Canal Project Implementation Report,* U.S. Army Corps of Engineers, Jacksonville District, 2009
- *Biological Opinion, Canal-111 Spreader Canal,* U.S. Fish and Wildlife Service, Vero Beach, Florida, August 25, 2009
- *Biological Opinion, Everglades Restoration Transition Plan,* U.S. Fish and Wildlife Service, Vero Beach, Florida, November 17, 2010
- *Installation, Testing and Moitoring of a Physical Model for the Water Conservation Area 3A Decompartmentalization and Sheet flow Enhancement Project, Final Environmental*

Impact Statement and Design Documentation Report, U.S. Army Corps of Engineers, Jacksonville District, April 2010.

- *Central and Southern Florida Project Comprehensive Everglades Restoration Plan C-111 Spreader Canal Western Project Final Integrated Project Implementation Report and Environmental Impact Statement*, U.S. Army Corps of Engineers, Jacksonville District, January 2011
- *Environmental Assessment; Proposed Interim Operation Criteria for 8.5 Square Mile Area Project*, U.S. Army Corps of Engineers, Jacksonville District, June 2011
- *Environmental Assessment; Design Refinement for the 8.5 Square Mile Area*, U.S. Army Corps of Engineers, Jacksonville District, August 2012
- *Environmental Assessment for Expansion of C-111 Detention Area and Associated Features South Miami-Dade County*, U.S. Army Corps of Engineers, Jacksonville District, May 2012
- *Everglades Restoration Transition Plan Final Environmental Impact Statement*, U.S. Army Corps of Engineers, Jacksonville District, October 19, 2012
- *Environmental Assessment ; G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy*, U.S. Army Corps of Engineers, Jacksonville District, May 2015.
- *Environmental Assessment; L-29 Canal and South Dade Conveyance System Temporary Emergency Deviation to Affect Relief of High Water Levels within WCA 3A*, U.S. Army Corps of Engineers, Jacksonville District, February 2016

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

1.6 DECISIONS TO BE MADE

Please reference **Section 1.4**.

1.7 SCOPING AND ISSUES

NEPA documentation to support the temporary emergency deviation was completed on February 12, 2016 with signing of a FONSI incorporating an EA. Coordination with other Federal and state agencies, and tribal representatives regarding the temporary emergency deviation are documented within Appendix B of the 2016 EA and FONSI, and are hereby incorporated by reference (USACE 2016a). A Notice of Availability for the 2016 EA and FONSI was prepared on February 16, 2015. Comments were solicited through March 18, 2016. See **Appendix C** of this EA for comments received to date.

1.8 PERMITS, LICENSES, AND ENTITLEMENTS

The Florida Department of Environmental Protection (FDEP) issued an emergency final order (Emergency Authorization for Temporary Operational Changes to Address High Water Conditions in the South Florida Region, OGC case Nos.: 00-0889) waiving the requirement for state water quality certification for this Federal Action. This waiver is for a period of 90 days starting February 11, 2016. See Appendix B of the 2016 EA and FONSI.

2.0 ALTERNATIVES

2.1 DESCRIPTION OF ALTERNATIVES

A summary description of the alternatives is depicted in **Figure 3**. Alternatives differ based on: (1) the operation of S-152 to discharge flows from WCA 3A to WCA 3B; and (2) the use of S-337 to discharge flows from WCA 3B to the L-30 Canal. The operational changes will allow for full discharge capacity through S-333 helping to mediate high water in WCA 3A for a period of 90 days. There will be a 60 day recovery period once the L-29 Canal constraint is returned to 7.5 feet National Geodetic Vertical Datum (of 1929 NGVD), during which the water level would recede to stages typical of the recent hydrological conditions and the operational criteria under current C&SF Project operations. The lowered operational ranges within the SDCS will remain until this recovery period is completed. Releases from Lake Okeechobee may be delivered to WCA 3A if capacity becomes available consistent with Part C of the 2008 Lake Okeechobee Regulation Schedule.

Installation and operation of a temporary pump to address potential flood protection concerns for the Las Palmas Community adjacent to 8.5 Square Mile Area (SMA) is being undertaken by the State in conjunction with the Federal Action. The 8.5 SMA features were constructed to provide flood mitigation to the privately-owned lands in the Las Palmas Community located east of ENP, in order to prevent impacts from higher stages within Northeast Shark River Slough (NESRS) resulting from the implementation of the Modified Water Deliveries (MWD) Project. A General Reevaluation Report (GRR) and Final Supplemental Environmental Impact Statement (EIS) for the 8.5 SMA were completed in July 2000 (USACE 2000). The GRR recommended Alternative 6D, consisting of a perimeter levee (Levee 357W [L-357W]), internal levees, an interior seepage collection canal (C-357), a new pump station (S-357), and a detention area that would discharge into the proposed C-111 South Dade Northern Detention Area (NDA), as part of the C-111 South Dade Project (**Figure 2**). A design refinement for the 8.5 SMA and EA were completed in August of 2012 (USACE 2012b).

An operational test conducted in 2009 indicated that the S-357 pump station and other 8.5 SMA features may not adequately mitigate the southwest corner of the 8.5 SMA. To ensure utilization of the S-357 pump station at maximum design capacity following completion of the NDA, new hydrologic modeling identified an additional east-west seepage collection canal (C-358) was needed to properly mitigate groundwater stages in the southwest corner (east of L-357W). A gated control structure (S-357N), currently planned to be constructed by November 2016, will connect the C-358 seepage collection canal to the existing C-357 Canal, upstream of S-357. Potential environmental effects of operation of S-357N is thoroughly evaluated within the 2015 EA and FONSI for the G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy (USACE 2015) and is hereby incorporated by reference.

A single 30 inch temporary diesel pump has been installed by the South Florida Water Management District (SFWMD) south of the 8.5 SMA and south of Richmond Drive to remove water from the C-358 Canal and pump it into the C-357 Canal in absence of the construction of S-357N. The pump is intended to help maintain normal water levels within the 8.5 SMA during the period of the temporary emergency deviation. The pump is rated at 40 cubic feet per second (cfs). Additional pumps may be installed by the SFMWD if deemed necessary.

In addition, the SFWMD may construct temporary plugs in the drainage swales located north and south of Richmond Drive to further assist with potential flood protection concerns for the Las Palmas Community adjacent to 8.5 SMA. Richmond Drive (SW 168th Street) is a Miami-Dade County Road that provides access into ENP west of the 8.5 SMA. Richmond Drive constitutes a lower elevation gap in the flood mitigation system for the 8.5 SMA as long as the road and the adjacent drainage swales extend west into ENP. Design refinements associated with the C-111South Dade Project include the extension of the L-357 W Levee from the 8.5 SMA Detention Cell to the southern limits of Richmond Drive and the completion of the remaining levee segment to cross Richmond Drive, including construction of a ramp over the new levee segment to maintain western access to ENP. The temporary plugs are intended to help decrease potential increases in groundwater stages adjacent to the existing LPG-1 groundwater monitoring gauge, which is located to the north of Richmond Drive, between SW 213th Avenue and the L-357 W Levee alignment, in the absence of the completion of the L-357 W extension. Potential environmental effects of the L-357W extension is thoroughly evaluated within the 2012 EA and FONSI; Design Refinement for the 8.5 SMA (USACE 2012b) and the 2016 EA and Proposed FONSI for Modifications to the C-111 South Dade North and South Detention Areas and Associated Features (USACE 2016b) and is hereby incorporated by reference. Effects of the temporary plugs are consistent with environmental effects of the L-257W extension; no impacts are expected that are not addressed in the 2012 EA and the 2016 EA.

Furthermore, the SFWMD has installed temporary pumping systems adjacent to S-355B in order to help facilitate achieving the objectives of the temporary emergency deviation and reduce water levels in WCA 3A. At S-355B, a total of four 30 inch temporary diesel pumps were installed across the L-29 Levee to discharge excess water from WCA 3B, via 185 foot long temporary discharge pipes to the L-29 Canal, and ultimately NESRS. Each pump is rated at 50 cfs, for a total temporary installed capacity of 200 cfs. The MWD General Design Memorandum (GDM) and Final EIS (USACE 1992) includes a discussion of the location, capacity, and environmental impacts of the S-355 structures (*i.e.* S-355A and S-355B). Furthermore, consideration of the operation of the S-355 structures has been evaluated within the 2015 EA and FONSI for the G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy (USACE 2015) and is hereby incorporated by reference. The temporary pumps at S-355B will be used in place of the S-355B structure in order to move additional water through WCA 3B and to prevent reverse flows into WCA 3B consistent with S-355B design operational intent. Under the temporary emergency deviation flows to WCA 3B are constrained by the Trigger Stage (measured at Site 71) of 8.5 feet NGVD. Utilization of the temporary pumps will provide additional capacity to move water from WCA 3A to WCA 3B and into NESRS as the current S-355B structure is non-operational due to the head differential between the L-29 Canal and the S-355B structure.

These actions work in conjunction with but are independent from the temporary emergency deviation to the water control plan. All required permits and/or modifications to existing permits related to the installation and operation of the temporary pump and construction of plugs would be the responsibility of the State. It is the intent of the SFWMD that these pumping systems will remain in place throughout the duration of the temporary emergency deviation, at which time they will be removed and any disturbed areas will be returned to the original condition.

2.1.1 Alternative A: No Action Alternative

The No Action Alternative would continue current C&SF water management operations as defined by Increment 1 (G-3273 Constraint Relaxation/S-356 Field Test/S-357N Operational Strategy) of the Combined Operating Plan (COP), for the operation of the water management infrastructure connected to the MWD to ENP and C-111 South Dade Projects (USACE 2015). Increment 1 of the COP is a deviation to the 2012 WCAs, ENP and the ENP to SDCS Water Control Plan (USACE 2012a).

2.1.2 Alternative B: Relaxation of the L-29 Canal Constraint; South Dade Conveyance System

Alternative B will increase the operational trigger level in the L-29 Borrow Canal to elevation 8.5 feet, NGVD between structure S-333 and S-334 and the other necessary changes to C&SF Project operations that are required to support this change (**Figure 2**). To the extent that the raised L-29 Canal stage limit allows, S-333 discharges will be sent to NESRS. S-334 will only be used to the extent that is required to maintain the L-29 Canal stage below the temporary stage limit of 8.5 feet NGVD while operating S-333 within its limits (maximum of 1,350 cubic feet per second [cfs]). It is expected that if the L-29 stage limit is raised to 8.5 feet NGVD that initially there will be sufficient capacity for most if not all of S-333's full capacity.

Reference **Appendix A** for a description of Alternative B, apart from the operation/mention of S-152 and S-337. S-152 is located on the L-67C Canal and conveys water from WCA 3A to WCA 3B. S-337 is located adjacent to the L-30 levee in WCA 3B and conveys water south to the SDCS.

2.1.3 Alternative C: Relaxation of the L-29 Canal Constraint: South Dade Conveyance System; Use of S-152.

Alternative C is the same as Alternative B except for the operation of S-152. S-152 will be used in conjunction with S-151 to release water from WCA 3A into WCA 3B to the extent that the trigger stage (measured at Site 71 of 8.5 feet NGVD) allows. Alternative C also includes the use of S-337. If the L-29 Canal stage peaks well below the 8.5 feet NGVD limit, with S-333 discharging at the maximum rate, water from WCA 3A could be delivered through the manual route of S-151, S-337, and S-356 under Alternative C as long as the pumping rate at S-356 exceeds the discharge rate at S-335. Reference **Appendix A** for a complete description of Alternative C.

2.1.4 Alternative D: Relaxation of the L-29 Canal Constraint: South Dade Conveyance System; Use of S-152; Exclusion of S-337.

Alternative D is the same as Alternative C except for the exclusion of the operation of S-337. Reference **Appendix A** for a complete description of Alternative D, apart from the operation/mention of S-337.

The EA and FONSI signed on February 12, 2016 to support the Federal Action identified three alternatives. Subsequent refinement of Alternative C to Alternative D is included within this Supplemental EA for purposes of evaluating potential effects resulting from the use of S-337 during the temporary emergency deviation.

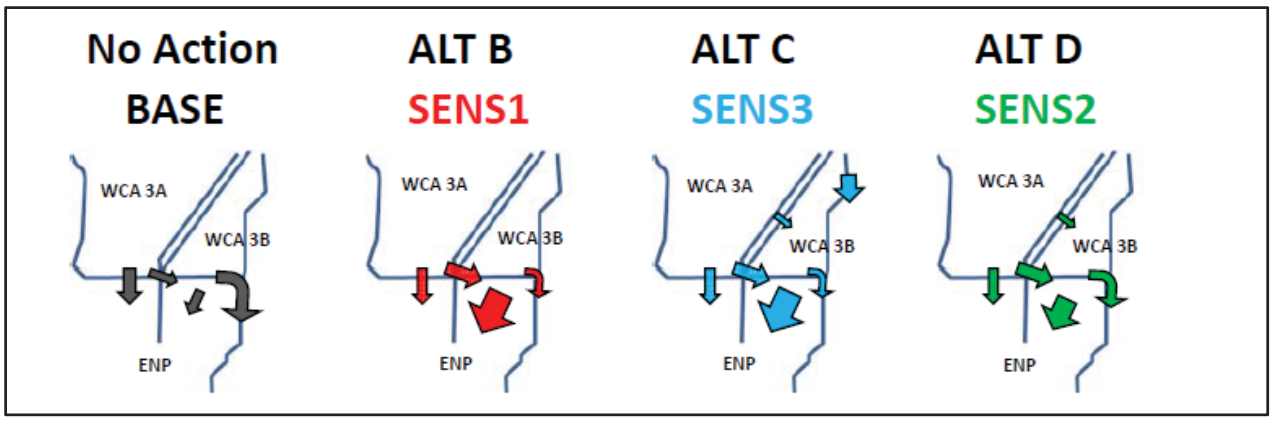


FIGURE 3. GRAPHICAL DEPICTION OF NO ACTION AND ACTION ALTERNATIVES. ARROWS REPRESENT DIFFERENCES IN FLOW FROM WCA 3A TO WCA3B AND ENP.[1]

2.2 ISSUES AND BASIS FOR CHOICE

The alternatives described in **Section 2.0** were formulated, considered, and evaluated based on achievement of agency goals and objectives (**Section 1.4**). Potential environmental effects and effects to other resources outlined in **Section 4.0** were also evaluated.

2.3 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

No Alternatives were eliminated from detailed evaluation. Alternative B, C, and D are considered feasible and were carried forward for detailed evaluation within **Section 4.0**.

2.4 PREFERRED ALTERNATIVE

Based upon the impact analysis conducted within the Supplemental EA, Alternative C is the Preferred Alternative. Due to the very strong El Nino this dry season WCA 3A has experienced unseasonably high water levels. The operational limitations of the current approved Water Control Plan severely limits releases (closure of the outlet structures S-12A, S-12B, S-343A, S-343B,and S-244) at the southern boundary of WCA 3A. Alternative C best utilizes the existing capacity within the C&SF system to alleviate high water levels in WCA 3A (Reference **Section 4.5**). Reference **Appendix A** for a summary table describing how operational guidance for the Preferred Alternative deviates from the 2012 WCAs, ENP and the ENP to SDCS Water Control Plan and Increment 1 operating criteria.

[1] "SENS1", "SENS2", and "SENS3" refer to terminology used during a regional-scale hydrologic sensitivity analysis performed by the SFWMD to estimate the potential system response to the Federal Action. Reference **Section 4.5**.

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 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 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 spread of non-native vegetation.

Further detailed information on the affected environment is discussed within the 2015 G-3273 EA and FONSI (USACE 2015) and is hereby incorporated by reference.

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. Multi-year high and low rainfall periods often alternate on a time scale approximately on the order of decades (USACE 1999).

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). Infrequently, freezing temperatures and frost occur when arctic air masses follow winter cold fronts into the area.

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. Increases in air temperature are expected to increase evapotranspiration. More frequent intense rainfall events will occur coupled with longer dry periods in between. Future rates of sea level change are expected to result in significant impacts on coastal canals and communities, with loss of flood protection and increased saltwater intrusion being the primary effects. Additionally, coastal ecosystems and

estuaries are expected to be adversely affected and require additional deliveries of freshwater to maintain desirable salinity patterns and healthy ecosystem.

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 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 Shark River Slough 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 STUDY AREA LAND USE

The existing land use within the study area varies widely from agricultural to high-density multi-family and industrial urban uses. Much of the land use/cover change occurring in south Florida over the past several years can be categorized as either the creation of new developments in previously natural or agricultural areas, or the change in the types of agriculture practiced. Generally, urban development is concentrated along the Lower East Coast (LEC) from Palm Beach County to Miami-Dade County. WCA 3, located directly north of ENP, is part of the Everglades Complex of Wildlife Management Areas and are managed by the Florida Fish and Wildlife Conservation Commission (FWC).

3.5 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 fresh water. 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.

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. 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.

3.5.1 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 feet NGVD in northwest WCA 3A to six feet 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- December).

Above-normal rainfall patterns associated with El Nino conditions during the dry season months (November through May) may also result in water stages which 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 are 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, 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.

3.5.2 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 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 2012a). 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.

3.5.3 Western Shark River Slough

Western SRS located to the west of L-67 Extension Levee and bounded on the north by Tamiami Trail, is primarily influenced by rainfall and water management operations at the S-12 structures (A, B, C and D). Under the ERTP, the utilization of the S-12 structures and the seasonal sequential closure periods beginning from the west at S-12A (November 1 – July 15) and S-12B (January 1 – July 15) is meant to move water from WCA 3A into SRS while providing conditions for Cape Sable seaside sparrow Subpopulation-A (CSSS-A) nesting and breeding. Releases from WCA 3A are specified by the Rainfall Plan, which includes the regulation schedule for WCA 3A and the Rainfall Formula. This Rainfall Based Management Plan consists of a rainfall-based delivery target and a supplemental regulatory component that specifies the amount of water to be delivered to ENP in weekly volumes through the S-333 and S-12 structures. Under ERTP, the normal operational target flow distribution is 55% through S-333 into NESRS and 45% through the S-12 structures into ENP west of the L-67 Extension.

3.5.4 Taylor Slough

Taylor Slough is in the southeast quadrant of ENP. The area through the Rocky Glades and Taylor Slough is higher in elevation compared to ground levels north, south, or west. Because of this characteristic, the area is normally drier than other areas in the ENP. The Rocky Glades and Taylor Slough are somewhat like an island or a peninsula extending from the canals into the ENP. Under ERTP, specified C-111 basin canal water levels/ranges and S-332D pump station operations have resulted in Taylor Slough being provided water from the C-111 Basin mainly during the wet season. During the dry season, under ERTP, water deliveries to Taylor Slough were limited to provide conditions conducive to CSSS Sub-population C nesting (325 cfs from December 1 – January 31; 250 cfs from February 1 – July 14).

3.5.5 Lower East Coast Area

The LEC area is located to the east of the L-31N, L-31W, and C-111 canals. Under ERTP, specified canal water levels/ranges are meant to provide flood protection, water supply, and prevention of saltwater intrusion for the LEC. The LEC can be provided water supply from WCA 3A and Lake Okeechobee according to their respective regulation schedules. In wet conditions, the excess water from the LEC is discharged to tide.

3.5.6 8.5 Square Mile Area

The 8.5 SMA is a primarily residential area adjacent to, but west of, the L-31N Canal. The 8.5 SMA, which is also known as the Las Palmas community, is bordered on both the west and north by NESRS. The community has water management infrastructure consisting of a perimeter levee, a seepage collection canal, a pump station (S-357), and a southern detention area meant to collectively provide flood mitigation as part of the MWD Project (USACE 2000). An additional seepage collection canal and gated water control structure (S-357N), which are being constructed along the southern boundary of the 8.5 SMA (along Richmond Drive) as part of the MWD Project, are presently planned for completion in November 2016.

3.5.7 Biscayne Bay

Biscayne Bay is a shallow, tidal sound located near the extreme southeastern part of Florida. Biscayne Bay, its tributaries, and Card Sound are designated by the State of Florida as aquatic preserves, while Card and Barnes Sounds are part of the Florida Keys National Marine Sanctuary. A significant portion of the central and southern portions of Biscayne Bay comprise Biscayne National Park. Under ERTP, specified canal water levels/ranges are meant to provide flood protection for the portions of the LEC and Miami-Dade County, which may result in discharges to Biscayne Bay.

3.5.8 Florida Bay

Florida Bay and the Ten Thousand Islands comprise approximately 1,500 square miles of ENP. The bay is shallow, with an average depth of less than three feet. To the north is the Florida mainland and to the south lie the Florida Keys. Sheet flow across the marl prairies of the southern Everglades and 20 creek systems fed by Taylor Slough and the C-111 Canal provide direct inflow of freshwater to the bay. Surface water from SRS flows into Whitewater Bay and these flows may also provide essential recharge for central and western Florida Bay. Exchange with Florida Bay occurs when this lower salinity water mass flows around Cape Sable into the western sub-region of the bay.

3.6 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 ERTP, 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 and 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 US 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 feet 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 feet NGVD regulation schedule and the Rainfall Plan (initiated in 1985), as per IOP (2002 IOP EIS and 2006 IOP Final Supplemental EIS). 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. Under ERTP, the goal of the rainfall and regulatory components is to split the flows between the S-12 structures and S-333, with 45% of the total flow from WCA 3A passing through the S-12 structures to Western SRS and the remaining 55% to discharge through S-333 to NESRS unless in the dry season (80% to NESRS, 20% to Western SRS in dry season), establishing the target flows for both the S-12 structures and S-333. ERTP specifies seasonal closure of the S-12A and B structures, with the following rigid closure periods: November 1 – July 14 for S-12A; January 1 – July 14 for S-12B. There are no closing periods for S-12C or D.

The Decomp Physical Model (DPM) is a field test conducted along a 3,000 foot length of the L-67A and L-67C levees and canals in WCA 3A and WCA 3B to determine how best to design and formulate plans for future decompartmentalization of WCA 3, as visualized in the Comprehensive Everglades Restoration Plan (CERP). The DPM provides for the temporary installation of the S-152 gated culvert structure (design capacity 750 cfs), a 3,000 foot gap in the L-67C Levee, and three 1,000 foot backfill treatments within the L-67C Canal. The DPM testing has been conducted

during November-December 2013, November-December 2014, and November 2015-January 2016.

Water deliveries to eastern ENP (NESRS) are controlled by the stage in L-29 Canal, as pressure from the water within the canal (hydraulic head), is required to force water through the Tamiami Trail culverts and the one mile bridge and into ENP. As the L-29 Canal stage increases, more water is forced beneath the road through 17 sets of culverts (49 total culverts, three culverts per set in most locations) and the one mile bridge. The L-29 Canal maximum operating stage has been limited under ERTP and previous regional operating plans due to concerns regarding: (1) potential flooding and seepage effects within residential or agricultural areas of Miami-Dade County; (2) potential damage to the Tamiami Trail roadway sub-base; and (3) potential flooding effects to privately-owned real estate adjacent to Tamiami Trail and within eastern ENP. The MWD Tamiami Trail Modifications (TTM) Project, which was completed in December 2013, included construction of the one mile bridge and Tamiami Trail roadway reconstruction/resurfacing to allow for the maximum operating stage in the L-29 Canal to be raised from 7.5 feet to 8.5 feet NGVD following the acquisition of the required real estate interests by the Corps and ENP. Following completion of the MWD TTM Project, the current ERTP water management operating criteria for the L-29 Canal between S-333 and S-334 is meant to limit the L-29 Canal stage to no more than 7.5 feet NGVD in response to potential flooding effects to privately-owned real estate adjacent to Tamiami Trail and within eastern ENP which may result from extended durations with higher operating stages in the L-29 Canal (above 7.5 feet NGVD). ERTP also included an additional operational constraint for the L-29 Canal water level related to potential flooding and seepage effects within residential and/or agricultural areas of Miami-Dade County; this constraint, which is removed during implementation of the two-year Increment 1 field test planned deviation, required S-333 discharges to NESRS will be discontinued when the G-3273 water level within NESRS reaches 6.8 feet NGVD during the normal Column 1 mode of operations, or S-333 discharges into the L-29 Canal to be matched with S-334 discharges out of the L-29 Canal when operating under the Column 2 mode of operations.

When WCA 3A water levels are in Zone A of the WCA 3A Interim Regulation Schedule, S-343A, S-343B, and S-344 can be utilized to discharge from WCA 3A into BCNP. Discharges can also be made through S-343A, S-343B and S-344 when agreed to by SFWMD, Corps, and NPS to extend hydroperiods within BCNP. The S-151 gated culvert structure, which is located along the Miami Canal and operated according to the WCA 3A Interim Regulation Schedule (USACE 2012a), is the only existing surface water connection between WCA 3A and WCA 3B. S-151 discharges into the Miami Canal (C-304) in WCA 3B for flood diversion and for the purpose of providing water supply to LEC canals and the SDCS. Under existing conditions, water does not flow directly from WCA 3B into the L-29 Borrow canal. There are two discharge structures, gated spillways S-355A and S-355B, along L-29 south of WCA 3B that are designed to move water from WCA 3B into the L-29 Canal. The S-355 structures are completed components of the MWD Project, intended to function in concert with the proposed MWD S-345 structures along L-67A/L-67C to address the MWD Project objective of restoring WCA 3B as a functioning component of the Everglades hydrologic system and restoration of water deliveries to NESRS.

There are three distinct modes of water management operations for ERTP, which are consistent with the previous IOP (2002, 2006 Supplement): Column 1, Column 2, and water supply.

Column 1 refers to the condition when regulatory releases from WCA 3A can be met by normal operation of the WCA 3A regulatory outlets (the S-12 structures, S-333, S-151, S-343A, S-343B, and/or S-344). Column 2 refers to the condition when regulatory releases from WCA 3A are made via S-333 to the L-29 Canal and via S-334 to the L-31N Canal and the SDCS; Column 2 operations generally require the use of pump stations S-331, S-332B, S-332C, and S-332D. During Column 2 operations, the control stages along the L-31N Canal are also lowered to minimize potential flood impacts to the SDCS and also to provide the necessary downstream gradient for the S-334 releases to reach S-332B, S-332C, and S-332D pump stations. Column 2 is used to offset or mitigate for potential adverse effects on WCA 3A related to actions taken to protect CSSS sub-population A within western ENP, including seasonal closure of the S-12A and S-12B regulatory outlets under ERTP (S-12C seasonal closure criteria were additionally included with IOP). The IOP/ERTP generally prescribed that the Column 2 mode of operation would be used when any S-12 structure is closed in order to protect the CSSS (November 1 through July 14, under ERTP), although Column 1 operations would continue until the capacity of the S-12 structures that remain open is insufficient to handle the discharge from WCA 3A. Similarly, the IOP/ERTP generally prescribed that Column 2 operations may continue past re-opening of the S-12 structures (July 15) to mitigate for adverse effects on WCA 3A stage levels resulting from the ERTP closures of S-12A, S-12B, S-343A, S-343B, and S-344, based on comparison to WCA stage levels that would have been expected under the WCA 3A Regulation Schedule in place prior to the 2000 Interim Structural and Operational Plan (ISOP; the predecessor of IOP 2002); the cited 1985 WCA 3A Regulation Schedule was first incorporated the Rainfall Plan and included no seasonal closures for the S-12s. Under historical IOP and ERTP operations, the Column 2 mode of operations has also been used as an additional water management tool for WCA 3A high water conditions. Beginning in 2014, the Corps and SFWMD are applying a WCA 3A water budget accounting tool to track the expected effect on WCA 3A stage levels resulting from the ERTP closures of S-12A, S-12B, S-343A, S-343B, and S-344.

The G-3273 Constraint Relaxation/S-356 field test (Increment 1) is a deviation from the ERTP. ERTP was implemented in October 2012 through utilization of the 2012 Water Control Plan. The 2012 Water Control Plan includes the required S-12A and S-12B seasonal closure periods of 1 November through 14 July and 1 January through 14 July, respectively, to protect CSSS sub-population A within western ENP. The 2012 Water Control Plan, which includes the WCA 3A Regulation Schedule, Rainfall Plan, and the Interim Operating Criteria for the 8.5 SMA Project will continue to govern water management operations during Increment 1, with the exception of operating criteria for S-333, S-334, S-356, S-197, and S-357N as contained in the 2015 EA and operational strategy (USACE 2015).

Increment 1, which was initiated on October 15, 2015, will maintain the ERTP operating limit constraint of 7.5 feet in L-29, while relaxing the G-3273 constraint for S-333, and utilizing S-356 for control of the seepage to the L-31N Canal. It is anticipated that during Increment 1, the combined flows through S-333 and S-356 will be more than what would have been discharged through these features under ERTP operations. Additionally, it is expected that during implementation of Increment 1 water management operations under typical hydro-meteorological conditions, the combined flows through S-173 and S-331 to the C-111 Basin will be less than what would have been discharged through these features under ERTP operations due to the reduction in flow from S-333/S-334 to the SDCS with relaxation of the G-3273 constraint. S-173 and S-331

releases are the result of water management operations to: 1) maintain target L-31N Canal stages; 2) provide flood mitigation to the 8.5 SMA eastern areas when sufficient capacity is available at S-357 and maintain flood mitigation for the 8.5 SMA when S-357 operational capacity is limited; and 3) WCA-3A regulatory releases to the SDCS from S-334 during Column 2 operations. In addition, Increment 1 water management operations will likely result in increased seepage to the L-31N Canal as the increased flow into NESRS will likely increase stages along the west side of L-31N. Increment 1 includes additional water management operating criteria for S-197 (in addition to the S-197 operating criteria defined in the 2012 Water Control Plan) to mitigate for potential risks to flood protection for areas within South Miami-Dade County.

3.7 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.

3.8 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 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).

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 the deeper water and extended hydroperiods of the new, wet hydrologic era resulting in corresponding shifts in vegetation communities north of the impoundment (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.

The estuarine communities of Florida Bay have also been affected by upstream changes in freshwater flows through the Everglades. A reduction in freshwater inflows into Florida Bay and alterations of the normal salinity balance have affected mangrove community composition and may have contributed to a large-scale die-off of seagrass beds (USFWS 1999). Mangrove communities along Biscayne Bay have also seen a reduction in freshwater inflows and a reduction in historic habitat range by urban and agricultural development leaving only a remnant ribbon of suitable habitat immediately adjacent to the bay. Both bays experiences salinities in excess of 40 psu on a seasonal basis. Manatee Bay and Barnes Sound are presently characterized by extended periods with little or no freshwater input, interspersed with erratic large volume discharges from the C-111 Canal, which is presently the major source of freshwater flows.

In contrast to the vast extent of wetland communities, upland communities comprise a relatively small component of the Everglades landscape and are largely restricted to Long Pine Key, the northern shores of Florida Bay, and the many tree islands scattered throughout the region. Vegetative communities of Long Pine Key include rockland pine forest and tropical hardwood forest. In addition, substantial areas of tropical hardwood hammock occur along the northern shores of Florida Bay and on elevated portions of some forested islands.

3.9 FISH AND WILDLIFE RESOURCES

Aquatic macro invertebrates 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 macro invertebrates. 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*).

3.10 THREATENED AND ENDANGERED SPECIES

3.10.1 Federally Protected Species

The Corps has coordinated with the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), 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 (See **Appendix C**). For a complete list of federally threatened and endangered species within the project area, their critical habitat, and candidate species refer to **Table 1**.

TABLE 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*	E, 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
Piping plover	*Charadrius melodus*	T
Red-cockaded woodpecker	*Picoides borealis*	E
Roseate tern	*Sterna dougallii*	T
Wood stork	*Mycteria americana*	T
Reptiles		
American Alligator	*Alligator mississippiensis*	T, SA
American crocodile	*Crocodylus acutus*	T, CH
Eastern indigo snake	*Drymarchon corais couperi*	T
Gopher tortoise	*Gopherus polyphemus*	C
Green sea turtle*	*Chelonia mydas*	E
Hawksbill sea turtle*	*Eretmochelys imbricate*	E
Kemp's Ridley sea turtle*	*Lipodochelys kempii*	E
Leatherback sea turtle*	*Dermochelys coriacea*	E
Loggerhead sea turtle*	*Caretta*	T
Fish		
Smalltooth sawfish*	*Pristis pectinata*	E
Invertebrates		
Bartram's hairstreak butterfly	*Strymon acis bartrami*	E
Elkhorn coral*	*Acropora palmata*	T, CH
Florida leafwing butterfly	*Anaea troglodyta floridalis*	E
Miami blue butterfly	*Cyclargus thomasi bethunebakeri*	E
Schaus swallowtail butterfly	*Heraclides aristodemus ponceanus*	E
Staghorn coral	*Acropora cervicornis*	T, CH
Stock Island tree snail	*Orthalicus reses* (not incl. *nesodryas*)	T
Plants		
Crenulate lead plant	*Amorpha crenulata*	E
Deltoid spurge	*Chamaesyce deltoidea* spp. *deltoidea*	E
Garber's spurge	*Chamaesyce garberi*	T
Johnson's seagrass*	*Halophila johnsonii*	E, CH

Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeenis*	E
Small's milkpea	*Galactia smallii*	E
Tiny polygala	*Polygala smallii*	E
Big pine partridge pea	*Chamaecrista lineata* var. *keyensis*	Pr E
Blodgett's silverbush	*Argythamnia blodgettii*	Pr T
Cape Sable thoroughwort	*Chromolaena frustrata*	E, CH
Carter's small-flowered flax	*Linum carteri* var. *carteri*	E, CH
Everglades bully	*Sideroxylon reclinatum* spp. *austrofloridense*	C
Florida brickell-bush	*Brickellia mosieri*	E, CH
Florida bristle fern	*Trichomanes punctatum* spp. f*loridanum*	E
Florida pineland crabgrass	*Digitaria pauciflora*	C
Florida prairie-clover	*Dalea carthagenensis* var. *floridana*	C
Florida semaphore cactus	*Consolea corallicola*	E, CH
Pineland sandmat	*Chamaesyce deltoidea* ssp. *pinetorum*	C
Sand flax	*Linum arenicola*	Pr E

E=Endangered; T=Threatened; SA=Similarity of Appearance; CH=Critical Habitat; Candidate Species, Pr CH = Proposed Critical Habitat

3.10.2 State Listed Species

The project area provides habitat for several state listed species. For a complete list of state listed species please see **Table 2**.

TABLE 2. STATE LISTED SPECIES WITHIN THE PROJECT AREA

Common Name	Scientific Name	Status
Mammals		
Everglades mink	*Mustela vison evergladensis*	T
Florida mouse	*Podomys floridanus*	SC
Birds		
Snowy plover	*Charadrius nivosus*	T
American oystercatcher	*Haematopus palliates*	SC
Brown pelican	*Pelecanus occidentalis*	SC
Black skimmer	*Rynchops niger*	SC
Least tern	*Sterna antillarium*	T
White-crowned pigeon	*Patagioenas leucocephala*	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	*Platalea ajaja*	T
Fish		
Mangrove rivulus	*Rivulus marmoratus*	SC
Invertebrates		

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

3.11 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, 16USC 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). The southern estuaries comprise Biscayne National Park and a large portion of ENP and are a shallow estuarine system (average depth less than 3 feet). Florida Bay is the main receiving water of the greater Everglades, heavily influenced by changes in timing, distribution, and quantity of freshwater flows into the southern estuaries. The southern estuaries contain essential fish habitat for corals; coral reef and live bottom habitat; red drum (*Sciaenops ocellatus*); penaeid shrimps; spiny lobster (*Panulirus argus*); other coastal migratory pelagic species and the snapper-grouper complex. Essential fish habitat in the southern estuaries is comprised of sea grasses, estuarine mangroves, intertidal flats, the estuarine water column, live/hard bottoms, and coral reefs.

3.12 WATER QUALITY

Water quality in the study area is significantly influenced by development. The C&SF Project led to significant changes in the landscape by opening large land tracts for urban development and agricultural uses, and by the construction of extensive drainage networks. 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. The water quality of the study area 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 the lake as well as runoff from the EAA. Water quality impairment within the study area can generally be attributed to nutrients and bioavailable forms of mercury. A short discussion of each of these water pollutants is provided below followed by a review of water quality within the project area.

3.12.1 Nutrients

Nutrients such as phosphorous 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 recently established surface water quality numeric nutrient criteria for all Florida water bodies and developed National Pollution Discharge Elimination (NPDES) Total Maximum Daily Loads (TMDLs) for many watersheds with excessive nutrient pollution. 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. and are 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).

For the project area (WCA 3A and WCA 3B and ENP NESRS) affected by this Federal Action, total phosphorus is the nutrient of concern. Under the current conditions, total phosphorus concentrations at the structures involved in this project area are within the low range for the entire water year and expected to stay in that range for the duration of this federal action. No negative impacts related to nutrient loading are expected to occur from this action, which will result in increased flows into WCA 3B and the ENP NESRS, as the expected concentrations are relatively low (8ppb range).

See below graph for background information on total phosphorus concentrations. Due to the long duration of the upstream wet season conditions in the WCA's and the expectation that these conditions will continue, water quality is expected to continue to be good (low phosphorus concentrations) for deliveries to WCA 3B and the ENP NESRS.

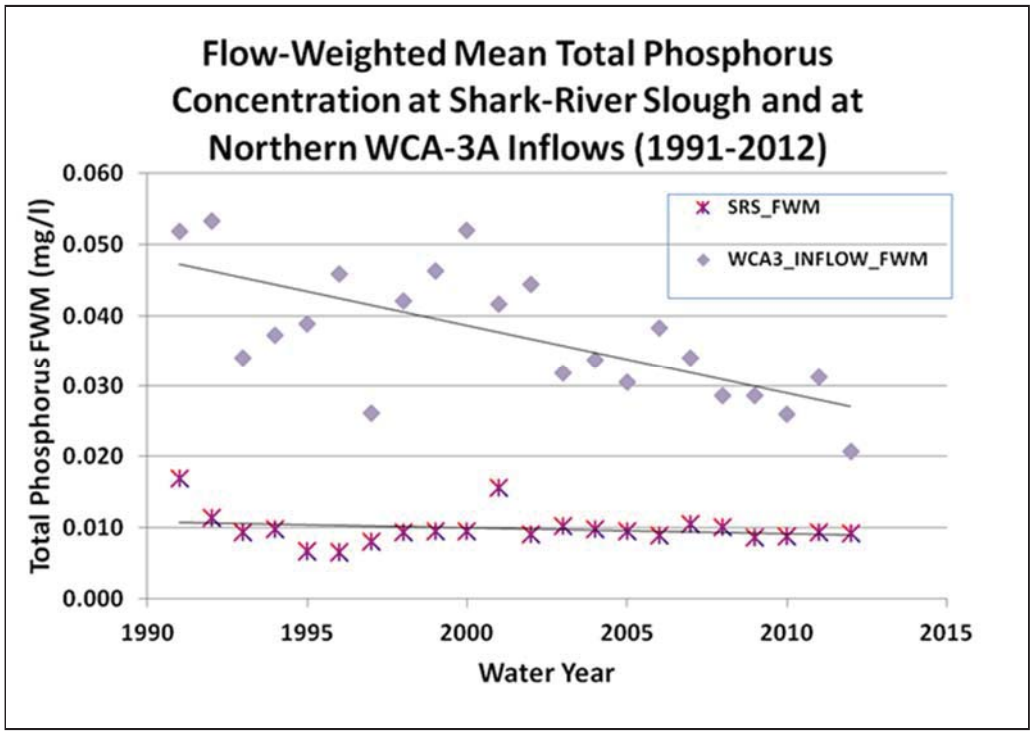


FIGURE 4. FLOW-WEIGHTED MEAN TOTAL PHOSPHOROUS CONCENTRATION AT SHARK RIVER SLOUGH AND NORTHERN WCA 3A INFLOWS

3.13 NATIVE AMERICANS

There are two federally recognized tribes (Miccosukee Tribe of Indians of Florida and the Seminole Tribe of Florida) that are located within and adjacent to the project area (**Figure 5**). Both tribes maintain a strong connection to the project area through continued use. The project area also includes a segment of the Miccosukee Tribe's reservation which spans portions of WCA 3A.

The project area also includes the Miccosukee Tribe of Indians of Florida's Tamiami Trail Reservation Area, which consists of four parcels of land, located forty miles west of Miami and is presently the site of most Tribal operations. The Tamiami Trail Reservation is also the center of the Miccosukee Indian population. In addition, both tribes have leases and easements within WCA 3A and have historically recognized rights within ENP that stems from the Native Americans who lived within ENP boundaries prior to the parks creation.

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 the WCA 3A area 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.

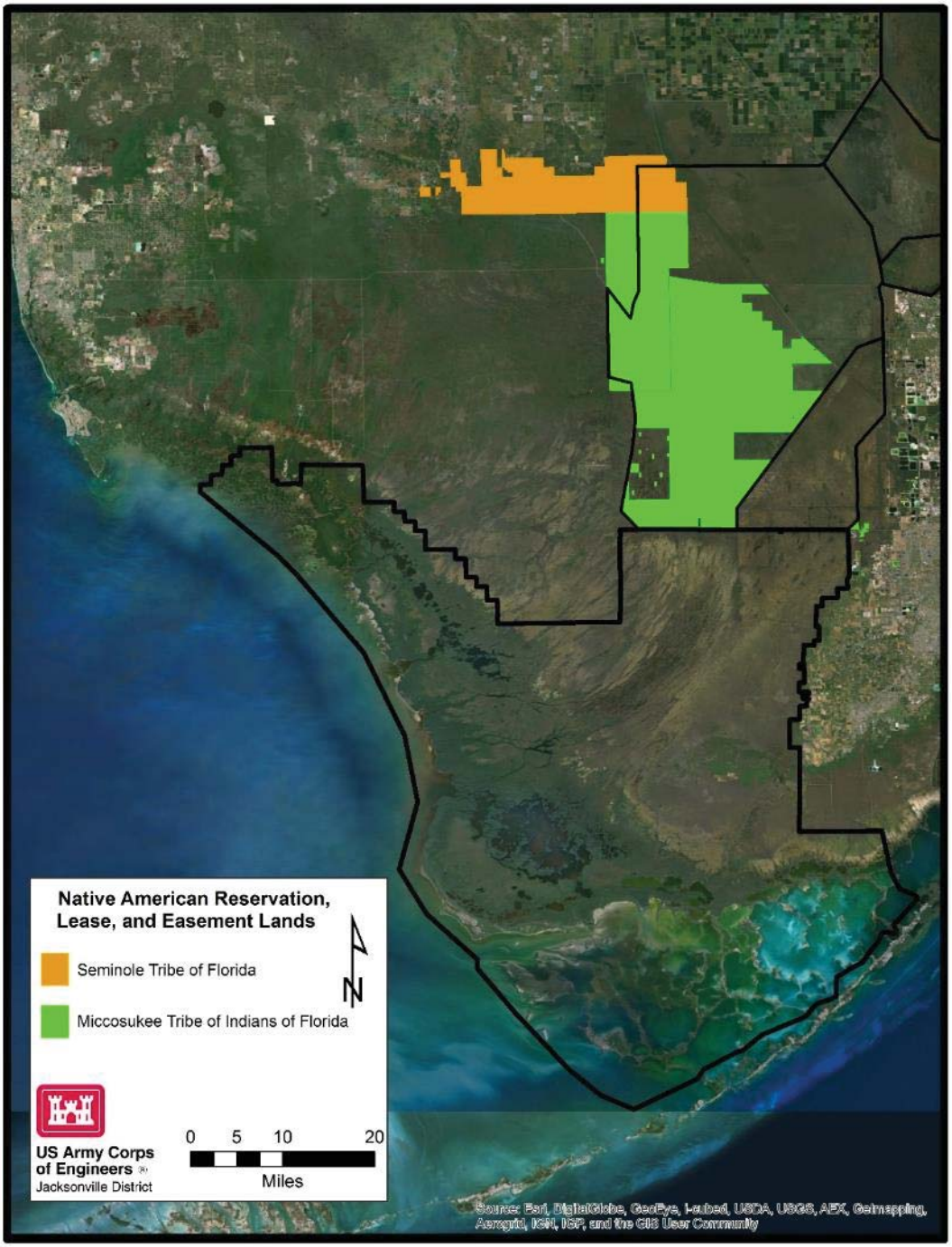


FIGURE 5. MAP OUTLINING THE LOCATION OF TRIBAL RESERVATIONS, LEASED AND EASMENT LANDS

3.14 CULTURAL RESOURCES

The project area contains a wide variety of cultural resources that vary within their significance. There are archaeological resources associated with some of the earliest habitation sequences within

south Florida and relatively recent sites directly associated with modern Native American tribes who were removed from ENP shortly after its creation.

Approximately 295 cultural resources, as identified in the Florida Master Site File, are located within the project area. Of these resources, 125 sites are located within WCA 3 north of the L-29 canal. The majority of these sites were identified based on a 1987 aerial analysis of the WCAs and the presence of archaeological materials was not ground-truthed (Taylor 1987). Only approximately 25 sites within WCA 3 have been identified based on a physical archaeological investigation. A total of 10 cultural resources within the northern portion of the project area have been identified as Eligible for listing in the National Register of Historic Places (NRHP) including Mack's Fish Camp Historical District.

The southern portion of the project area, south of the L-29 Canal, is located entirely within ENP. ENP has been subject to many archaeological investigations that have identified approximately 170 cultural resources within the project area. Of these resources, 6 are listed in the NRHP including two archaeological districts. A small portion of Ten Thousand Islands Archaeological District is located on the western edge of the project area and the Shark River Slough Archaeological District in contained entirely within the project area. The Shark River Slough Archaeological District contains no less than 63 archaeological resources, 39 of which are contributing resources to the district (Schwandron 1996). Sites typically found within the SRS are described as earth middens; however, multi-occupation sites such as Tiger Hammock (8DA11) which is associated with Glades II and III and Seminole occupations have also been identified.

3.15 AIR QUALITY

The existing air quality within south Florida is considered good, as outlined within the FDEP 2010 Air Monitoring Report (FDEP 2010). Air monitoring reports are prepared annually by FDEP to inform the public of the air pollutant levels throughout the State of Florida. The report summarizes the results of monitoring that has been conducted to measure outdoor concentrations of those pollutants for which the USEPA and the State of Florida's Environmental Protection program have established ambient air quality standards. 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.

3.16 HAZARDOUS, TOXIC OR RADIOACTIVE WASTES

3.16.1 L-29 Canal between S-333 and S-356 Structures

Along the southern boundary of WCA 3A and WCA 3B there are levees and canals constructed in the 1950s and 1960s that limit vehicle access to the interior. 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 search of FDEP petroleum spill and storage sites database done in October of 2014 identified six petroleum storage sites and one spill site along Tamiami Trail between S-333 and S-356. Petroleum storage at Everglades Safari site was closed in 2005; however, a petroleum spill at this site is listed as ongoing as of October 2014. Petroleum storage facilities operated by the SFWMD are located at the S-333 and S-356 structures.

3.16.2 L-31N Canal between Tamiami Trail and S-331 Structure

A search of FDEP's databases of contamination sites and petroleum storage facilities identified five spill sites and 15 petroleum storage facilities located along the canal or within the 8.5 SMA. The SFWMD is listed as the permit holder for storage facilities at the S-357N and S-331 pump stations. The spill at the SFWMD's S331 pump station has been completed. A spill at the General Portland, Inc. facility west of the canal is listed as ongoing. Three non-petroleum cleanup sites are located along the L-31N Canal. Two of the sites are located along the L-31N Canal buffer trail and one is located within the 8.5 SMA.

3.17 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.

3.18 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.

3.19 SOCIOECONOMICS

Florida's economy is characterized by strong wholesale and retail trade, government, and service sectors. The economy of south Florida is based on services, agriculture, and tourism. The three counties that comprise the LEC are heavily populated, and it is estimated that over 6.9 million people will reside in this region by the year 2050.

Much of the land within the area potentially impacted by the Federal Action is within ENP and is publicly owned. However, a number of privately owned parcels still exist within this region. Several private entities currently own real estate within the project area adjacent to Tamiami Trail and within ENP (**Figure 6**). Property owners include airboat concessionaires, the Airboat Association of Florida, Florida Power and Light, Lincoln Financial Media, and Salem Communications. The Miccosukee Indian Tribe of Florida currently lease two areas adjacent to Tamiami Trail (Osceola and Tigertail Camps) and have several businesses adjacent to Tamiami Trail west of S-333 including the Miccosukee Indian Village, Restaurant and airboat concessionaires.

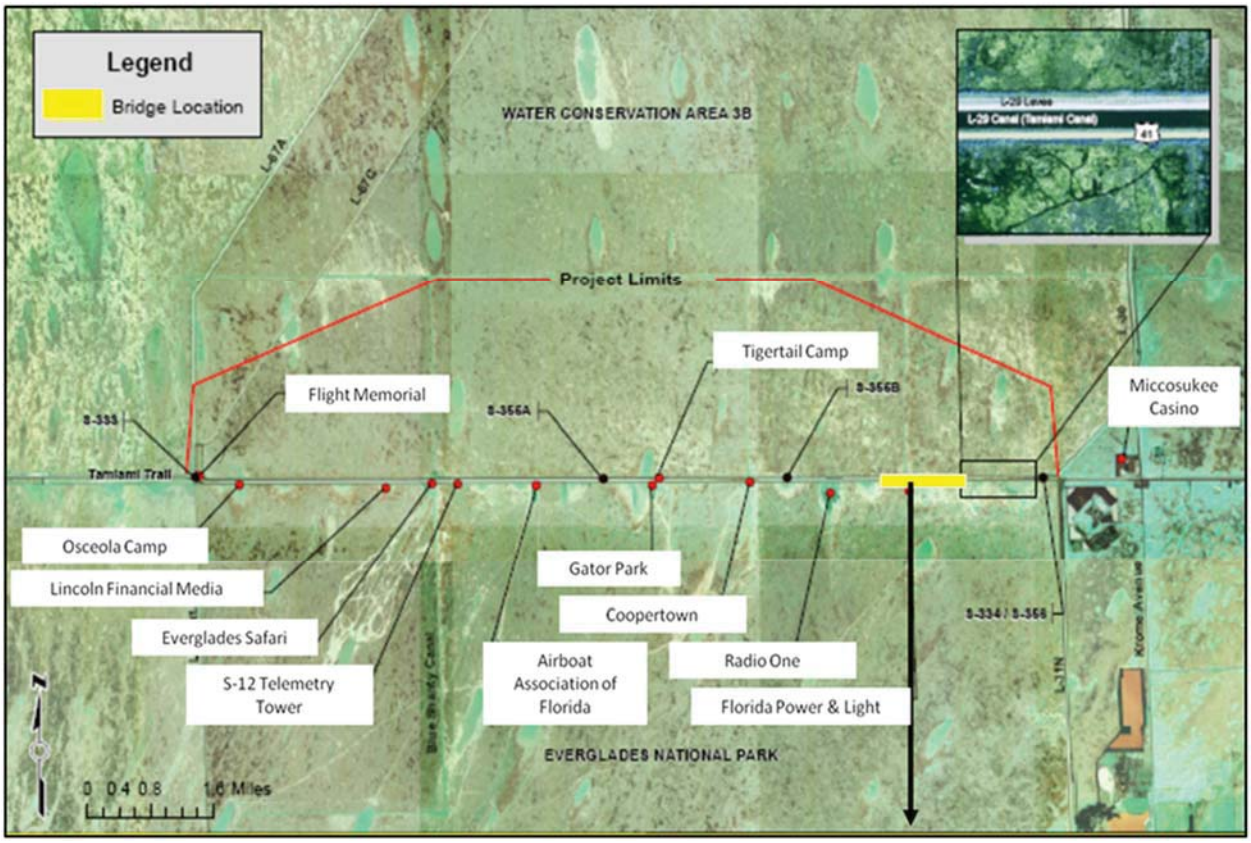


FIGURE 6. LOCATIONS OF PRIVATELY OWNED REAL ESTATE WITHIN THE PROJECT AREA

3.20 AGRICULTURE

The Miami-Dade County agricultural industry is unique in both the types of commodities produced and the method of cultivation. The majority of agricultural activities in the county are located

south of Tamiami Trail and east of ENP. A variety of vegetables, fruits, and ornamentals are grown within this region and include many tropical and subtropical crops, which are grown year-round. The most active growing season is between September and May. Because of the wet and dry rainy seasons in the area, planting times are controlled by the elevation of ground water. Soils in these agricultural areas are rocky soils and marl soils.

3.21 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. 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. Similar recreational opportunities are provided in ENP.

4.0 ENVIRONMENTAL EFFECTS

4.1 GENERAL ENVIRONMENTAL EFFECTS

The general environmental effect of the Federal Action would be beneficial and any downstream impacts would be of short duration. The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects. Potential environmental effects of current water management operations (No Action Alternative) are thoroughly evaluated within the 2015 EA and FONSI for the G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy (USACE 2015) and are hereby incorporated by reference.

4.2 CLIMATE

Implementation of the No Action Alternative, Alternative B, Alternative C, and Alternative D, would not result in significant impacts to the climate of south Florida.

4.3 GEOLOGY AND SOILS

Implementation of the No Action Alternative, Alternative B, Alternative C, and Alternative D, would not result in significant impacts to the geology and soils within the project area. The Action Alternatives consist of operational changes to C&SF Project features and does not include construction of permanent structures or structural modifications to existing C&SF Project features. Geologic impacts resulting from removal of surface cover (*i.e.* vegetation and soil), or removal of caprock from blasting and/or removal of limestone would not occur.

4.4 STUDY AREA LAND USE

Implementation of the No Action Alternative, Alternative B, Alternative C, and Alternative D, would not result in significant impacts to study area land use.

4.5 HYDROLOGY

A regional-scale hydrologic sensitivity analysis has been performed by the SFWMD to estimate the potential C&SF regional system response to the Federal Action. Position analysis is a special form of risk analysis evaluated from the "present position" of the system. Its purpose is to evaluate water resource systems and the risks associated with operational decisions. This evaluation is accomplished by estimating the probability distribution function of variables related to the water resources system, conditional on the current or a specified state of the system.

The position analysis uses the South Florida Water Management Model (SFWMM) to simulate 41 (1965-2005) one year simulations of the systems response to historic rainfall conditions. Each year of the simulation is initialized with observed antecedent hydrologic conditions, in this case January /February of 2016. **Figure 7** depicts the initial stage values on February 1 of 2016, used to initialize each of the 41 one water year simulations and is indicative of antecedent conditions prior to the Federal Action. Four simulations were developed to represent the Action Alternatives discussed in **Section 2.1**. The position analysis further examined 7 El Nino years (1965-1966, 1972-1973, 1982-1983, 1987-1988, 1994-1995, 1997-1998, and 2002-2003) from the 41 one water year simulations, since the dry season rainfall patterns observed during these years are likely more indicative of conditions expected to occur during the upcoming months in 2016. Analysis of the position analysis results are limited to the period from February to May, with emphasis on the relatively short duration (90 days or less) of the Federal Action. Maps showing structure flow volumes at key sites for the February-May period are utilized in addition to stage and discharge hydrographs averaged for the 7 El Nino years to estimate the potential C&SF regional system response to the No Action and Action Alternatives. Refer to **Appendix D** for modeling assumptions and **Figure 8** for representative gages used for analysis in WCA 3 and ENP. In the following figures, base is equivalent to the No Action Alternative, Sensitivity Run 1 (SENS1) is equivalent to Alternative B, SENS2 is equivalent to Alternative D and SENS3 is equivalent to Alternative C. Not all of the specific detail outlined within the modeling assumptions can be simulated by the SFWMM. It is expected that real-world operations will consider more factors than those captured by the model simulation and as such, the utilization of the S337/S335/L31N/SDCS route will likely fall between the conditions represented in the Alternative C (SENS3) and Alternative D (SENS2) runs.

Position analysis is used on a monthly basis by the SFWMD for purposes of operational decisions related to C&SF Project operations. Refer to the following website for more information:

http://www.sfwmd.gov/portal/page/portal/xweb%20%20release%202/operational%20planning#position_analysis.

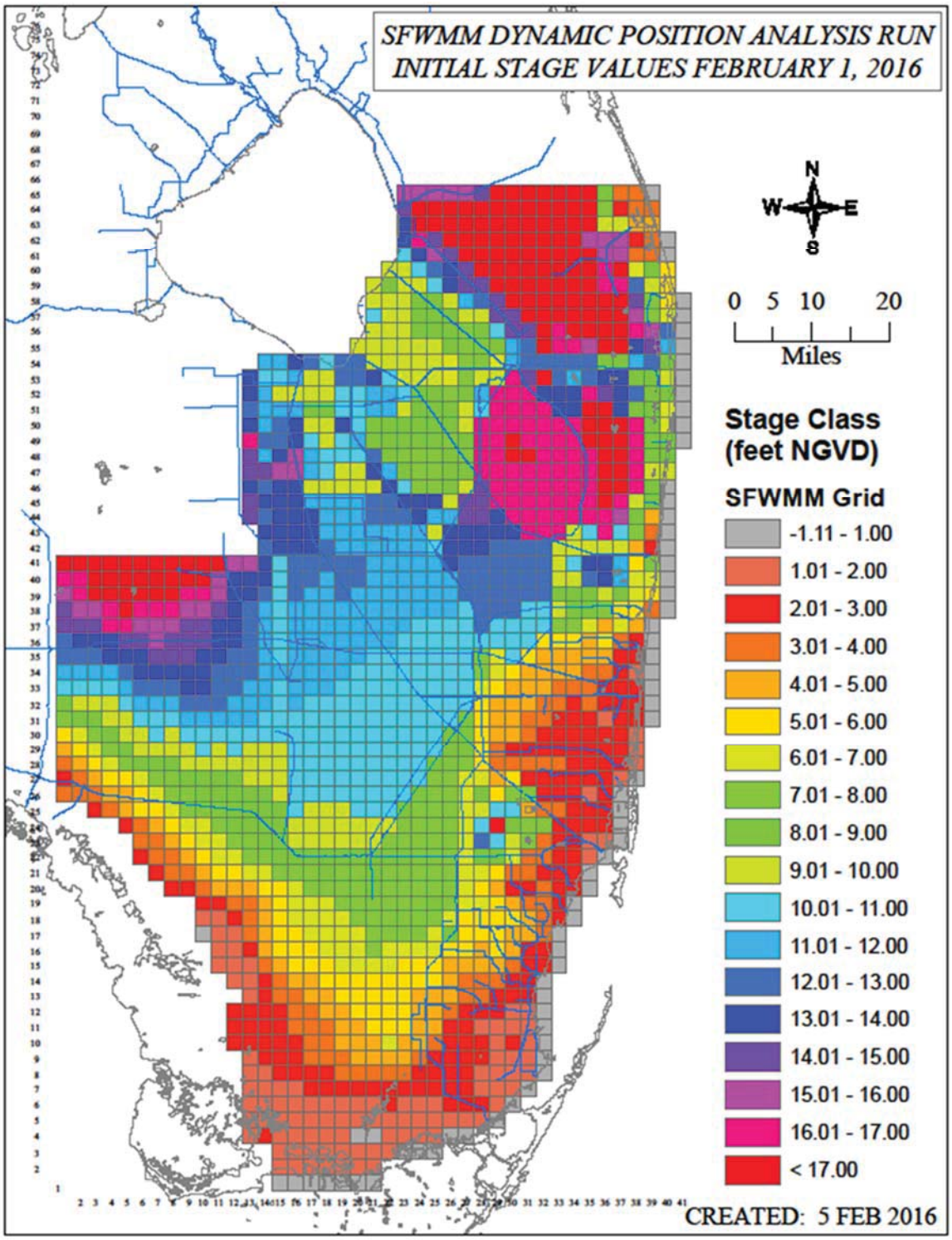


FIGURE 7. SFWMM DYNAMIC POSITION ANALYSIS RUN INITIAL STAGE VALUES FEBRUARY 1, 2016[2]

[2] Figure 7 represents an approximation of stage values within the project area for modeling purposes and does not necessarily reflect real-world conditions in all locations.

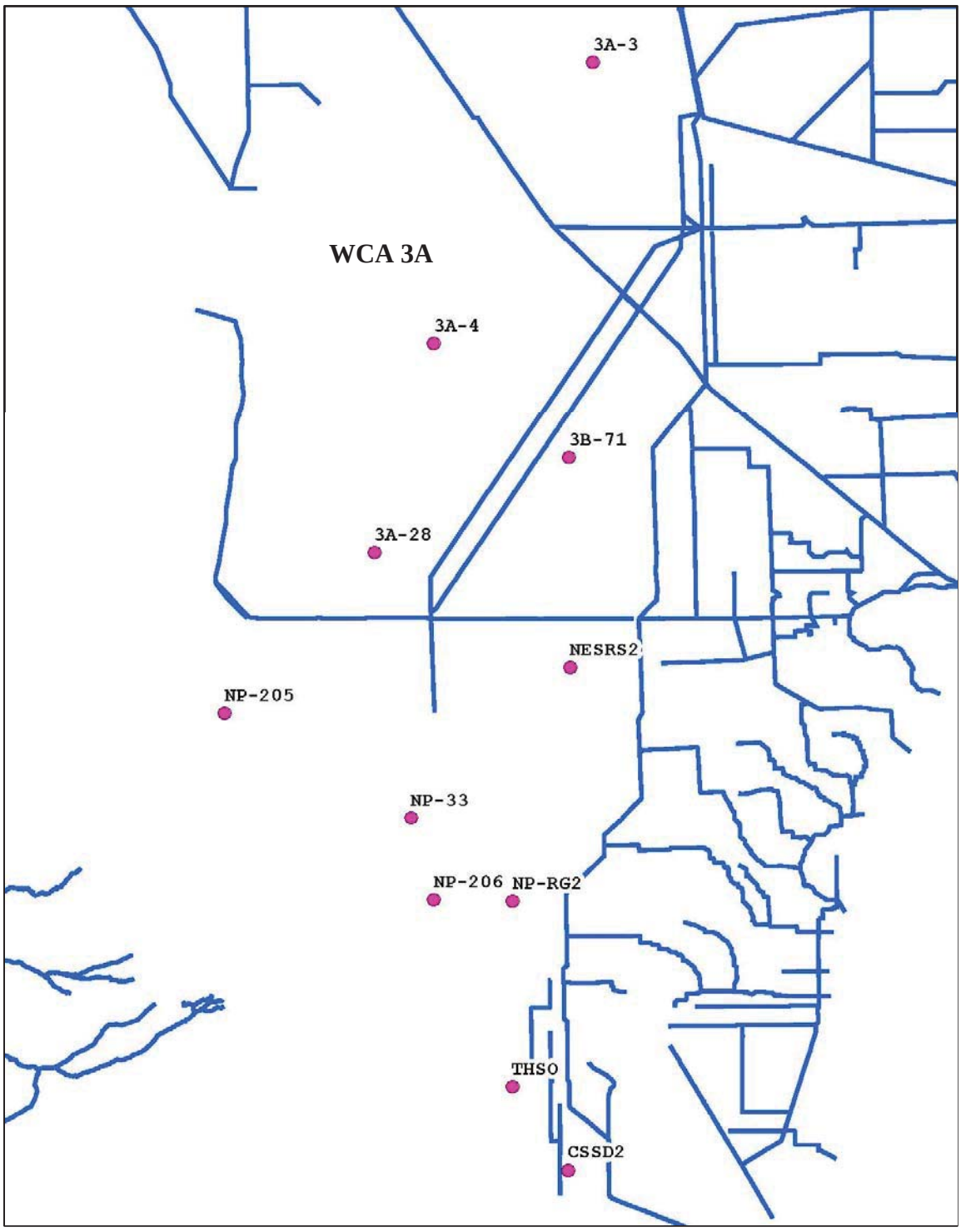


FIGURE 8. MAP OF REPRESENTATIVE GAGES USED IN POSITION ANALYSIS FOR WCA 3 AND ENP

Increased flows at S-333 were observed for the Action Alternatives in comparison to the No Action Alternative (**Figure 9**). Alternatives B, C, and D increased flows relative to base conditions by 181, 176, and 181 thousand acre feet, respectively. S-333 is expected to be utilized to its full capacity (1350 cfs) for the majority of the dry season during the temporary emergency deviation (**Figure 10**); an approximate 900 cfs increase relative to the No Action Alternative. A corresponding increase in L-29 Canal stages is observed (**Figure 11**).

Alternatives B, C, and D improved stages in WCA 3A relative to the No Action Alternative as depicted by the 3-gage average stage hydrograph (**Figure 10**). Implementation of the Action Alternatives generally produced stage decreases ranging from ~ 0.2 feet up to ~0.5 feet with Alternative C providing the greatest improvement in comparison to Alternatives B and D.

Use of the Decomp Physical Model (S-152) provides somewhat limited flows, up to ~ 300 cfs with implementation of Alternatives C and D (**Figure 12**). S-152 is not expected to be utilized to its full capacity (700 cfs) during the temporary emergency deviation. Stages at gauge 3B-71 remain comparable to the No Action Alternative for Alternatives B and D. An approximate decrease in water levels of 1 to 5 inches in WCA 3B is observed from mid-March through May with implementation of Alternative C. Increased flows at S-151, S-152, and S-337 were observed for Alternative C relative to Alternatives B, and D, and the No Action (**Figure 9**).

Stage hydrographs for gage NESRS2, NP-205, NP-RG2, NP-33 were utilized to understand how WCA 3A releases influence water levels in ENP. Alternatives B, C and D improved water levels in comparison to the No Action Alternative in NESRS (**Figure 13**), central SRS (**Figure 15**) and the northern Rocky glades adjacent to S-332 B and C (**Figure 16**), with increased water levels persisting through the dry season. Where water levels are anticipated to rise, modeling projected an approximate 3 to 5 inch rise in water level at NESRS2 (**Figure 13**), up to an approximate 1 inch rise in water levels at gage NP-33 (**Figure 15**), and an approximate 1 to 2 inch rise at gage NP-RG2 (**Figure 16**). Results of the modeling generally indicate high water levels just south of the L-29 Canal with progressively lower water stages as the flow moves south. Decreased water levels were observed with implementation of the Action Alternatives relative to the No Action Alternative in northwest ENP (**Figure 14**) at site NP-205. Observed water levels were comparable amongst the Action Alternatives in each case. A reduction in the use of the S-12s was observed with each of the Action Alternatives (**Figure 9** and **Figure 14**). Alternatives B, C, and D decreased S-12 flows relative to base conditions by 59, 94, and 58 thousand acre feet, respectively

Alternatives B, C, and D improved hydrologic conditions in NESRS in comparison to the No Action Alternative, by significantly increasing overland flows (**Figure 18**). A significant increase in total flow across Tamiami Trail is projected on the order of up to approximately 20% relative to base conditions. Compared to the No Action Alternative, monthly overland flows along eastern Tamiami Trail at Transect 18 increased by approximately 40,000 acre feet or more under Alternatives B, C, and D during the months of February, March, April and May. Improved hydrologic conditions persisted through the dry season. Transect 18 is used to measure southward flow in NESRS. Alternatives B, C, and D provided increased flows within central SRS in comparison to the No Action Alternative; however, increases in flow were not as significant as increases in observed flows in NESRS. Overland flows down central SRS (Transect 27) improved by approximately 20,000 acre feet or more with implementation of the Action Alternatives. A

decrease in overland monthly flow was observed with implementation of Alternatives B, C, and D along the western side of Tamiami Trail (Transect 17) relative to the No Action Alternative.

Conditions in Taylor Slough vary in Alternative B and Alternative D relative to Alternative C and depend on the amount of water conveyed to S-332 D (**Figure 17**). Modeling projected up to an approximate 1 to 5 inch rise in water levels at gage THSO under Alternative C (**Figure 17)**. Alternative C improved hydrologic conditions in southern ENP in comparison to the No Action Alternative and Alternatives B and D, by significantly increasing overland flows (**Figure 19**). Compared to the No Action Alternative, monthly overland flows from southern ENP to Florida Bay at Transects 23B and 23C are increased by ~4,000 acre feet or more under Alternative C during the months of February, March, April and May. Transect 23 is used to measure southward flow in Taylor Slough. Overland flows down Taylor Slough and the Eastern Panhandle are comparable in the No Action Alternative, Alternative B, and Alternative D. Increased flows at S-332B, S-332C, and S-332D were observed for Alternative C relative to the No Action Alternative and Alternatives B and D (**Figure 9**). Alternatives C increased flows at S-332D by 52,000 acre feet relative to base conditions. A 9 thousand acre feet decrease was observed with implementation of Alternatives B and D in comparison to base conditions. Alternative C also increased combined flows at S-332B and S-332C by 18 thousand acre feet (**Figure 9**) relative to base conditions.

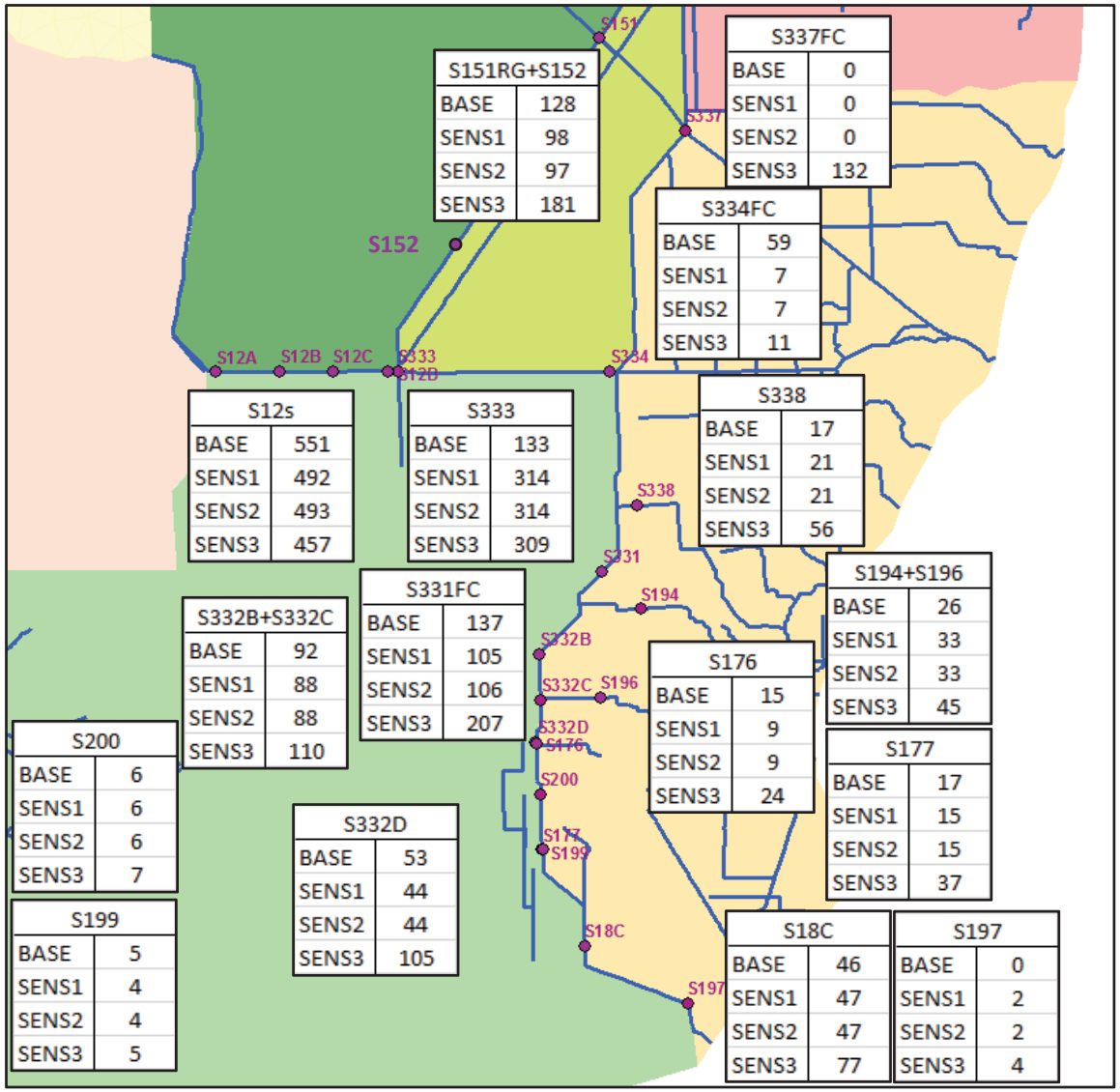


FIGURE 9. VALUES REPRESENT THE FLOW VOLUMES DURING FEBRUARY TO MAY AVERAGED FOR THE 7 EL NINO ANALOG YEARS (THOUSAND ACRE FEET).
BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

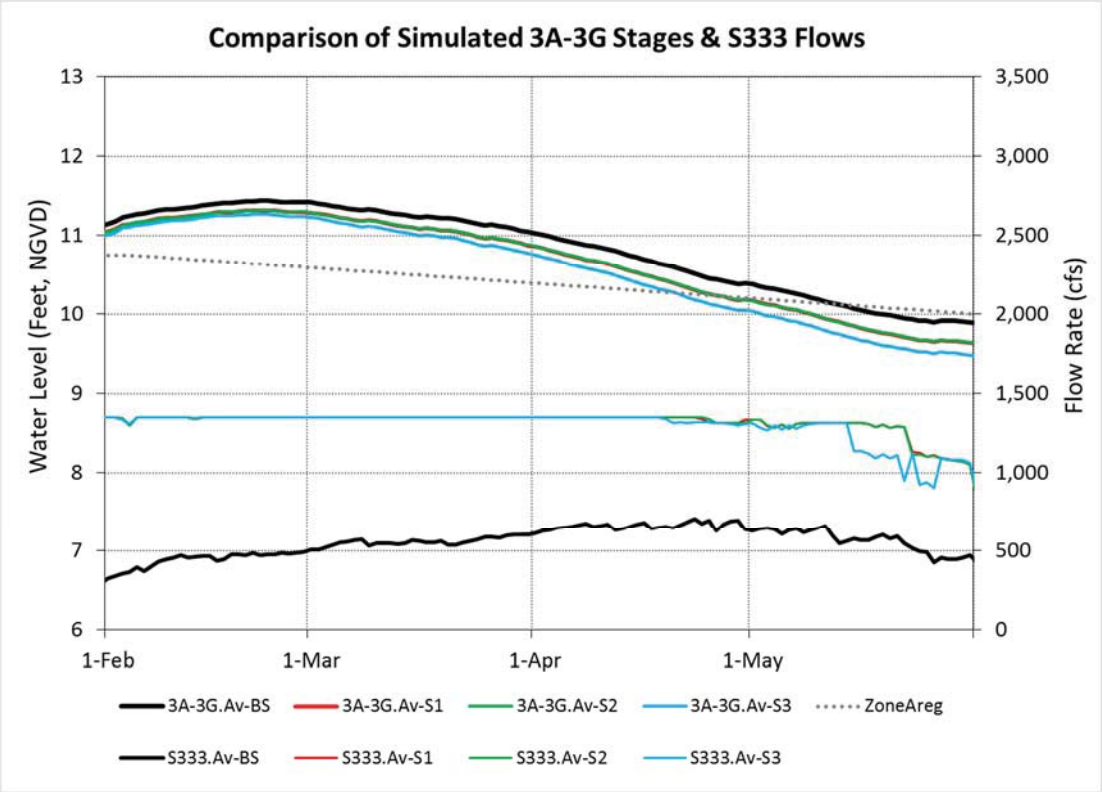


FIGURE 10. COMPARISON OF SIMULATED STAGES IN WCA 3A USING THE AVERAGE OF 3A-3, 3A-4, AND 3A-28 (SITE 63, SITE 64, SITE 65) AND S-333 FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

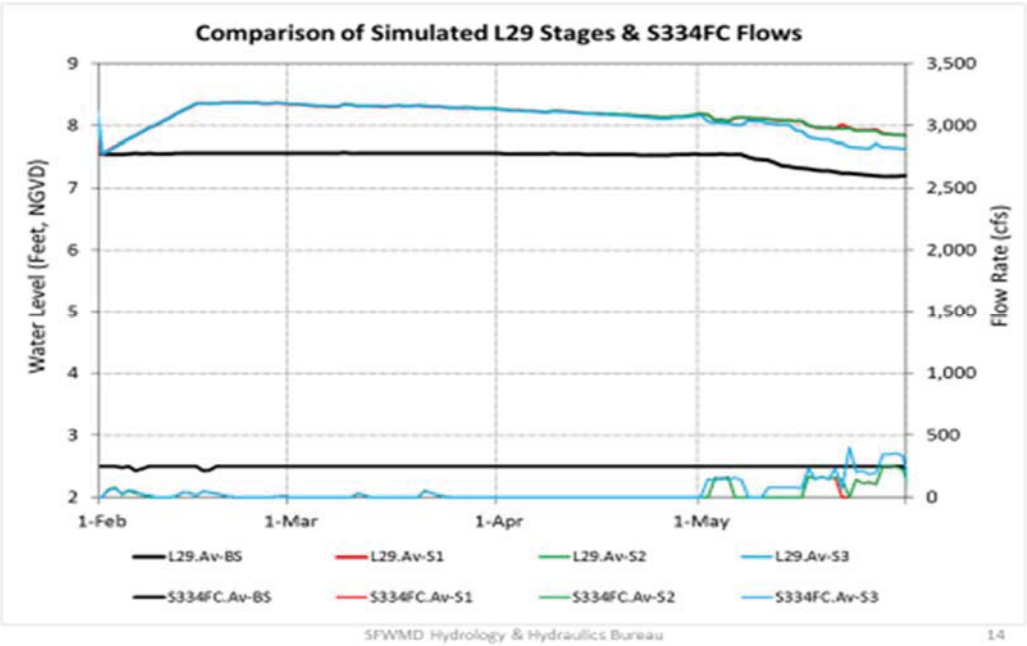


FIGURE 11. COMPARISON OF SIMULATED L-29 CANAL STAGES AND S-334 FLOOD CONTROL FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

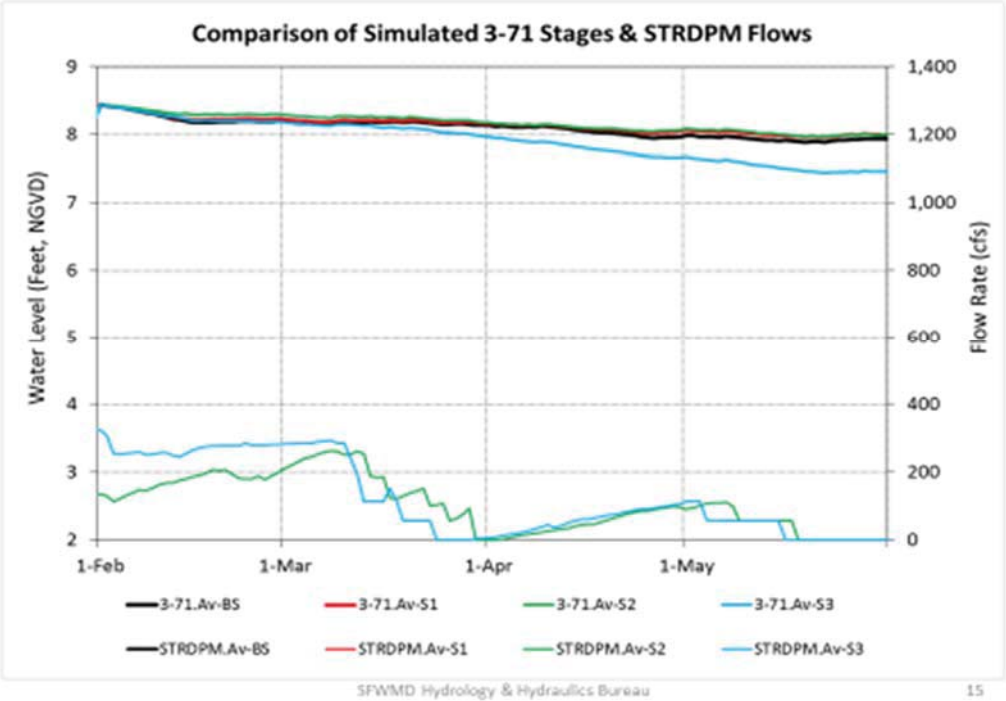


FIGURE 12. COMPARISON OF SIMULATED STAGES IN WCA 3B AT GAGE 3B-71 AND S-152 FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

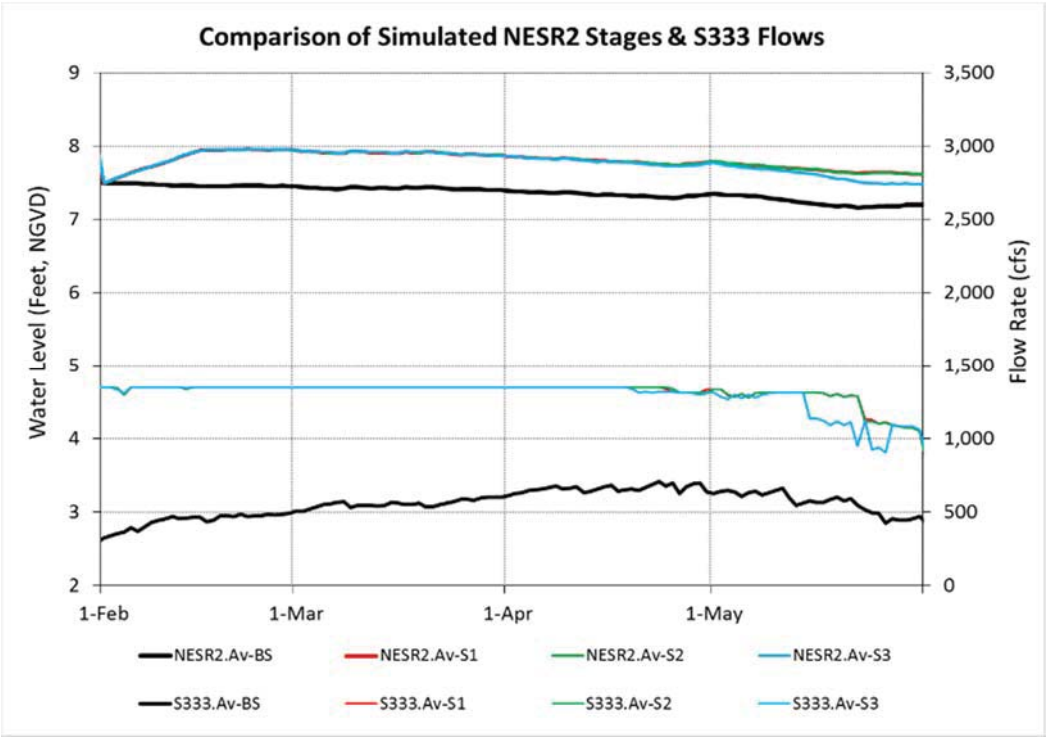


FIGURE 13. COMPARISON OF SIMULATED STAGES IN ENP AT GAGE NESRS2 AND S-333 FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

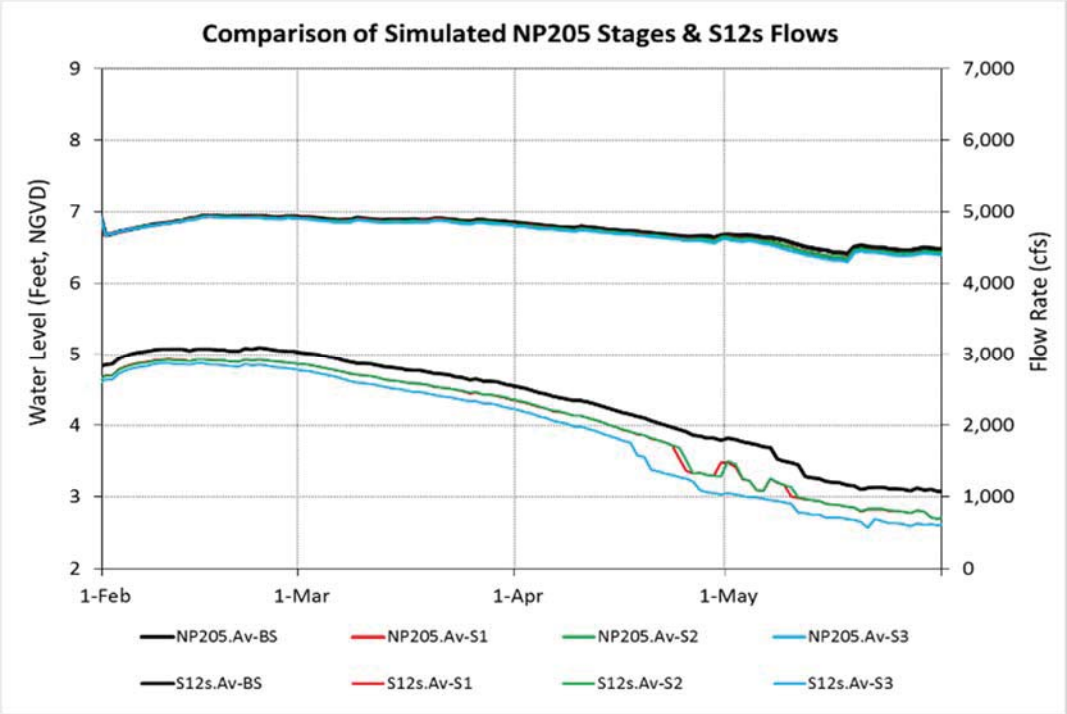


FIGURE 14. COMPARISON OF SIMULATED STAGES IN ENP AT GAGE NP205 AND S-12S FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

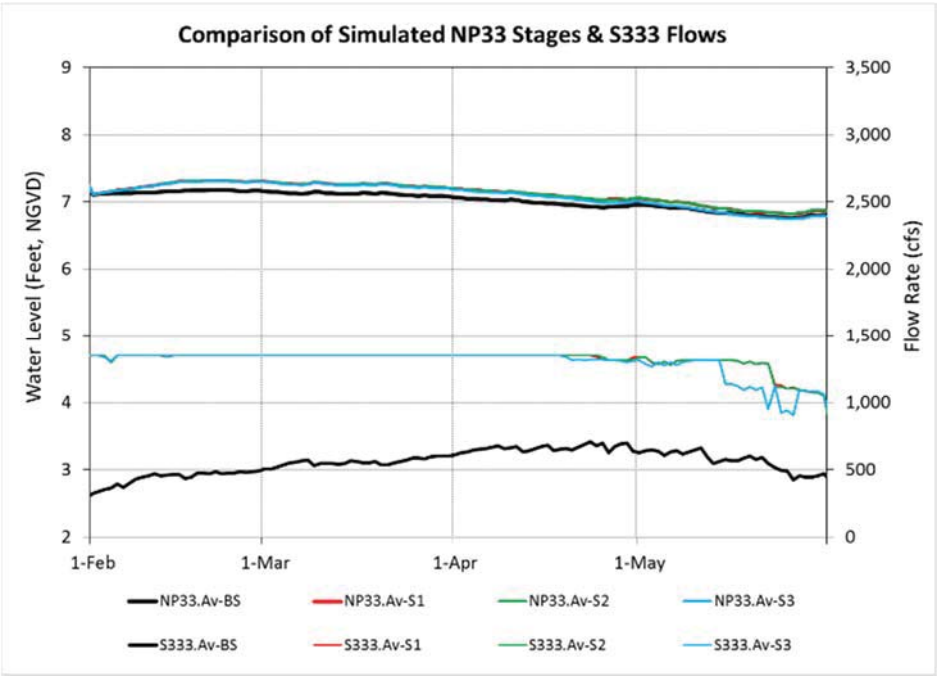


FIGURE 15. COMPARISON OF SIMULATED STAGES IN ENP AT GAGE NP-33 AND S-333 FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

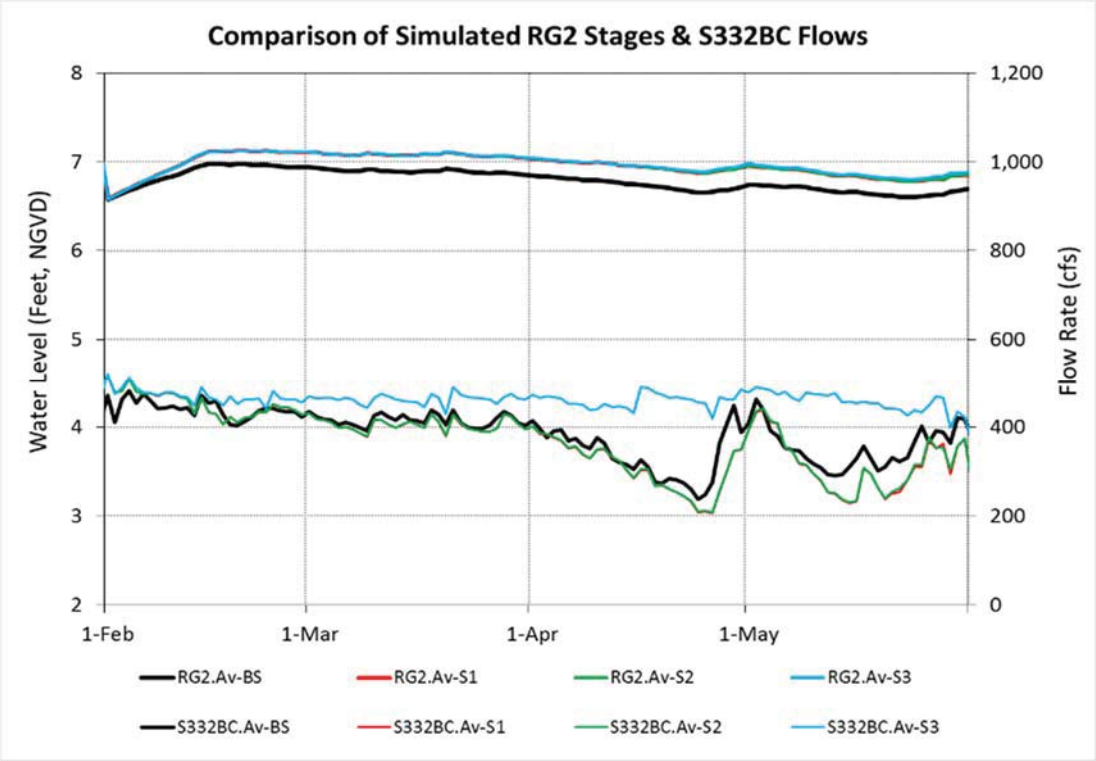


FIGURE 16. COMPARISON OF SIMULATED STAGES AT GAGE NP-RG2 AND S-332 BC FLOWS. BS =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

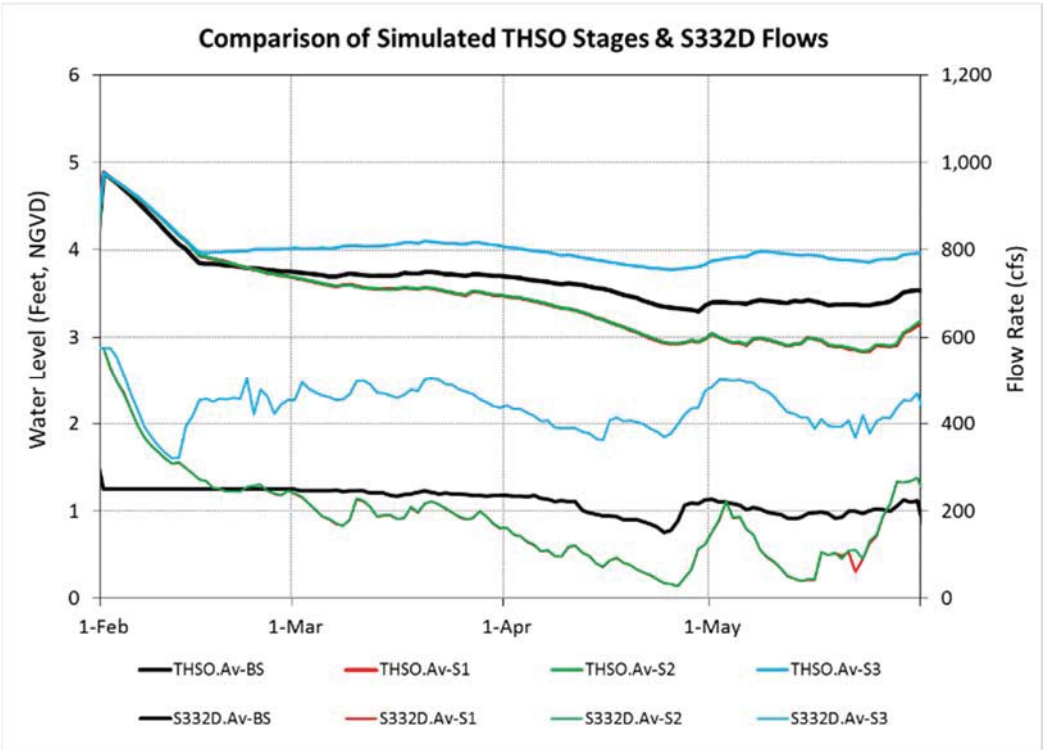


FIGURE 17. COMPARISON OF SIMULATED STAGES IN AT GAGE THSO AND S-333D FLOWS. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

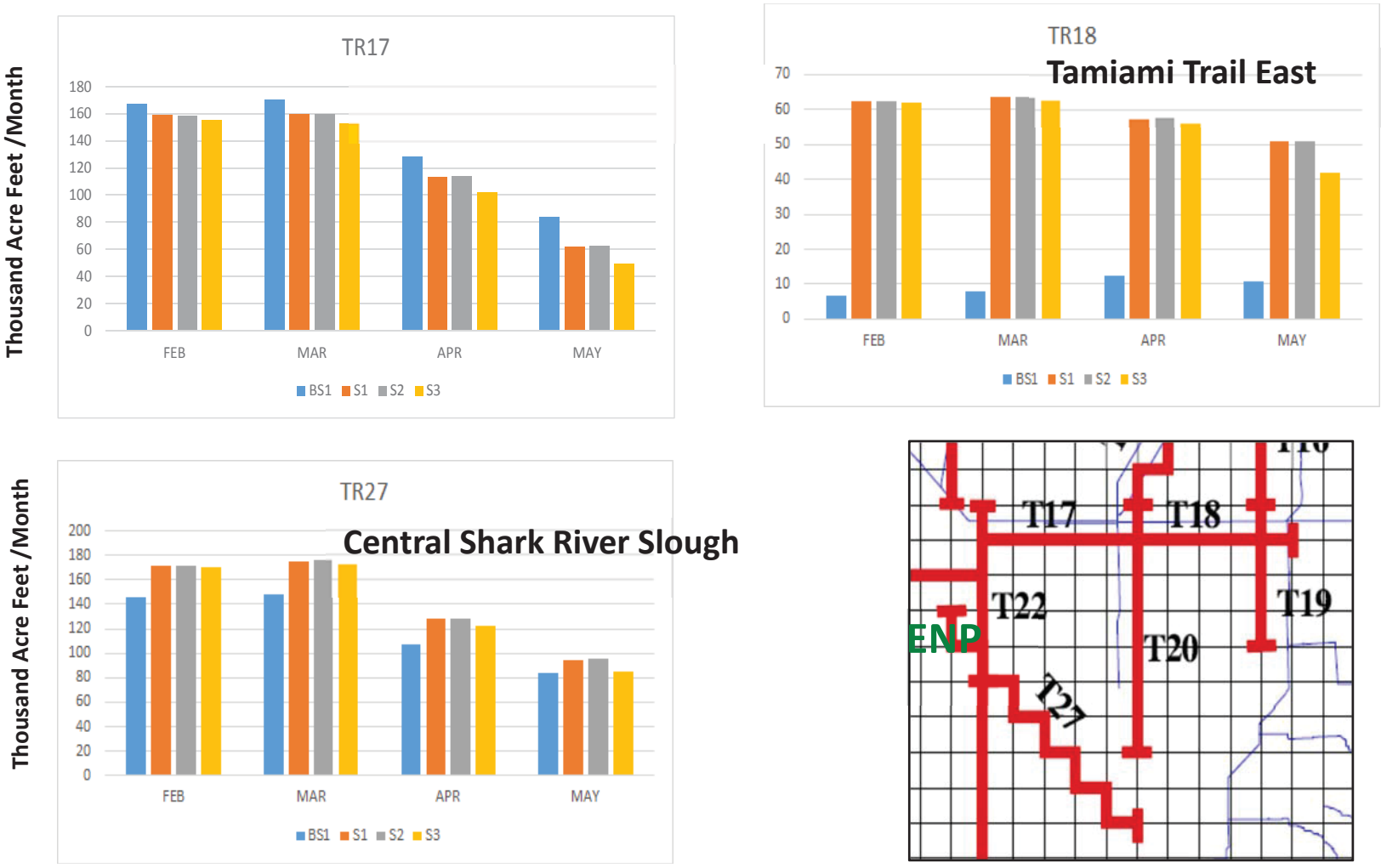
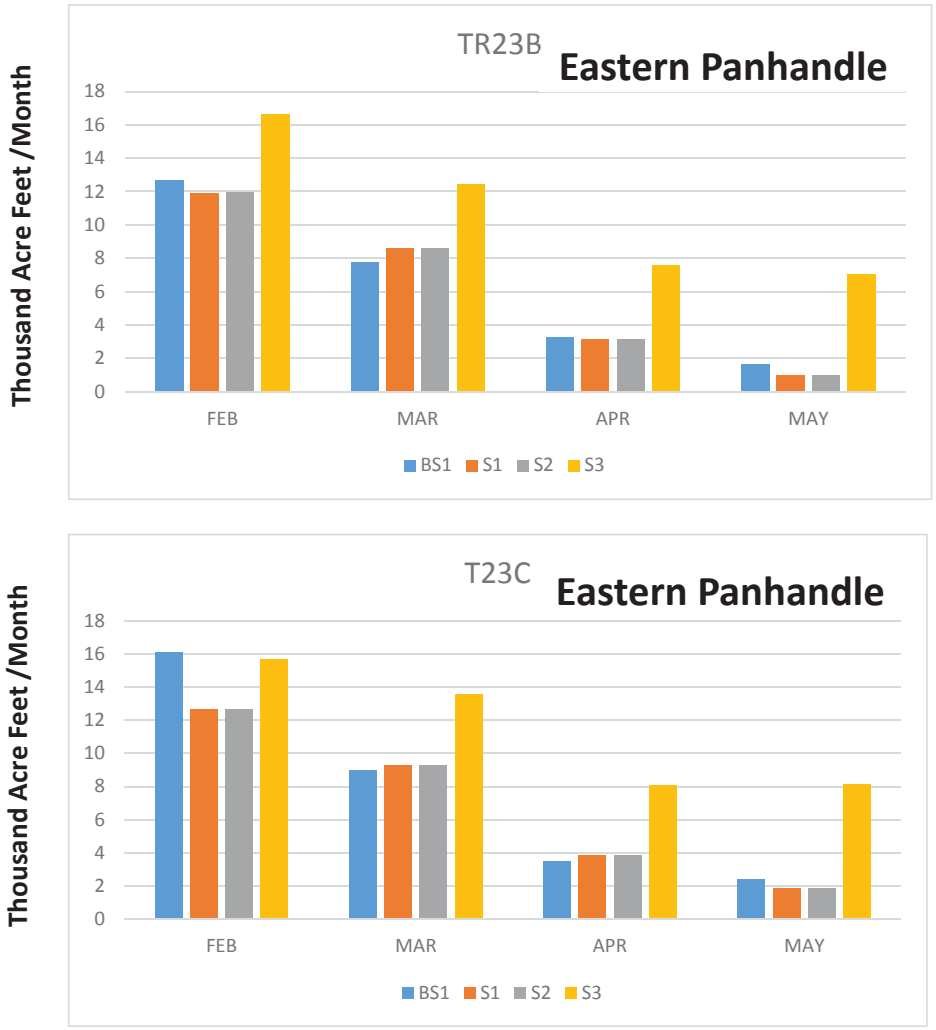


FIGURE 18. FLOW (THOUSAND ACRE FEET PER MONTH [K AC-FT]) IN NORTHERN ENP AT TRANSECTS TR17, TR18, TR27. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.



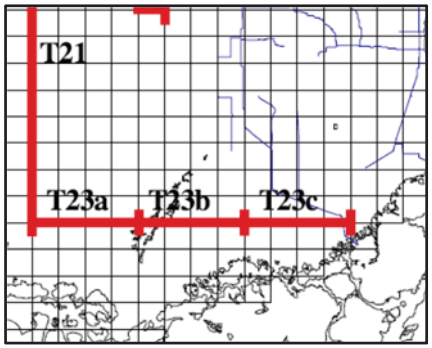


FIGURE 19. FLOW (THOUSAND ACRE FEET [K AC-FT]) IN SOUTHERN ENP AT TRANSECTS TR23B AND 23C. BS =NO ACTION, S1 = ALT B, S2 =ALT D, S3 = ALT C.

4.6 FLOOD CONTROL

Potential effects on water levels and flows in the SDCS were observed with implementation of the Action Alternatives. Comparison of the Action Alternatives to the No Action identified similar or lowered canal water levels along the L-31 Canal and SDCS (**Figure 20**, **Figure 21**, **Figure 22**). A decrease in flood control flows at S-331 and through the SDCS was observed for Alternatives B and D relative to the No Action Alternative. Increased flows at S-331, S-176, and S-177 were observed for Alternative C relative to Alternatives B, and D, and the No Action (**Figure 9**, **Figure 20**, **Figure 21**, **Figure 22**). Alternative C increased flows at S-331 by 70 thousand acre feet relative to base conditions, by nine thousand acre feet at S-176 and 20 thousand acre feet at S-177 (**Figure 9**).

Increased flows at S-18C and S-197 were observed for the Action Alternatives relative to the No Action (**Figure 9**). Alternative C produced the greatest discharge at these structures relative to Alternatives B and D. Alternative C increased flows at S-18C by 31 thousand acre feet and at S-197 by four thousand acre feet. Alternatives B and D show lower water levels upstream of S-18C (**Figure 23**) relative to base conditions and similar water levels upstream of S-197 (**Figure 24**). Alternative C shows similar water levels upstream of S-18C (**Figure 23**) relative to base conditions and higher water levels upstream of S-197 (**Figure 24**). S-197 discharges are relatively small in all cases, but most common with implementation of Alternative C.

Alternative C significantly increases flood control discharges at S-337 by 132 thousand acre feet relative to the No Action Alternative (**Figure 9**). This increase is related to increased discharges at S-331 and pumping at S-332B, C, and D. As state previously, it is expected that real-world operations will consider more factors than those captured by the model simulation and as such, the utilization of the S337/S335/L31N/SDCS route will likely fall between the conditions represented in the Alternative C (SENS 3) and Alternative D (SENS 2) runs.

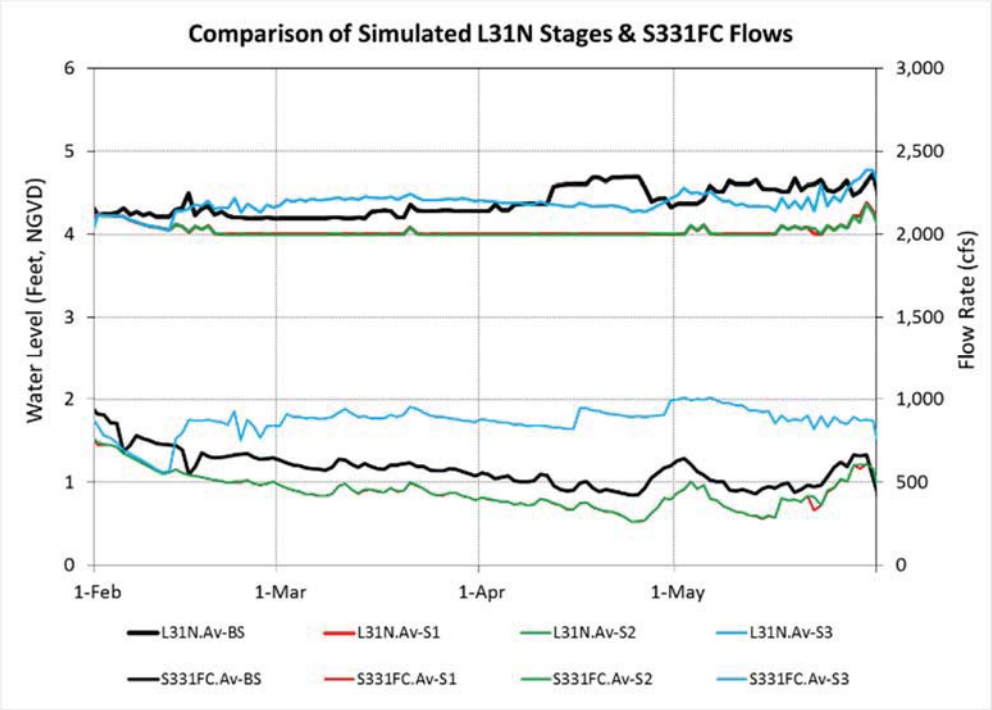


FIGURE 20. COMPARISON OF SIMULATED STAGES IN THE L-31 NORTH CANAL AND S-331FLOWS. BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

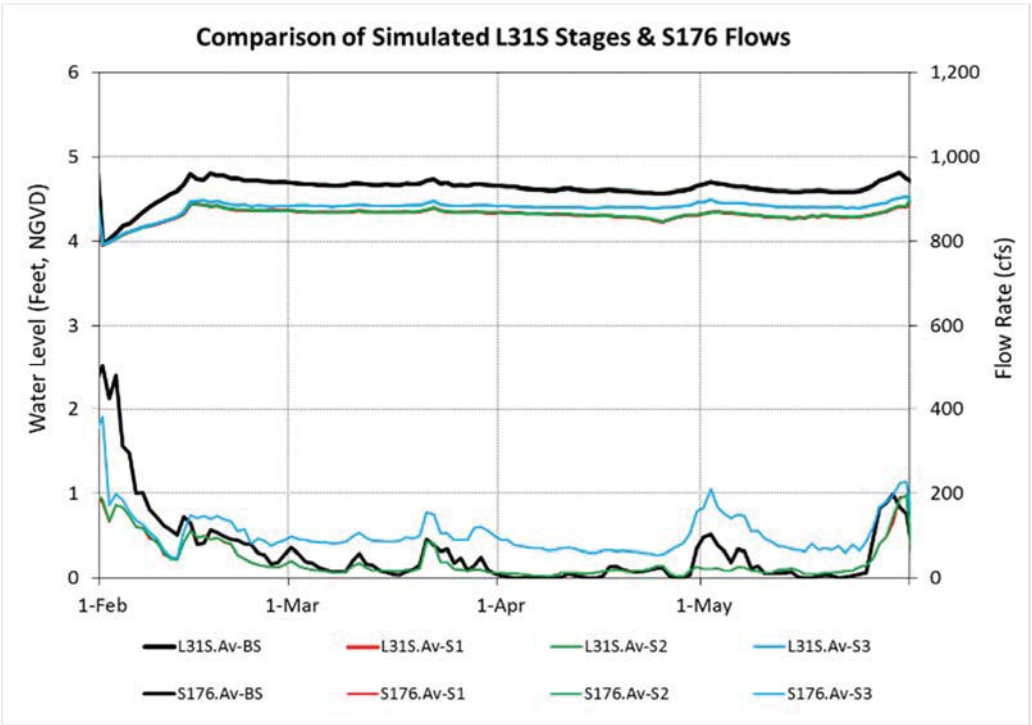


FIGURE 21. COMPARISON OF SIMULATED STAGES IN THE L-315 CANAL AND S-176 FLOWS. BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

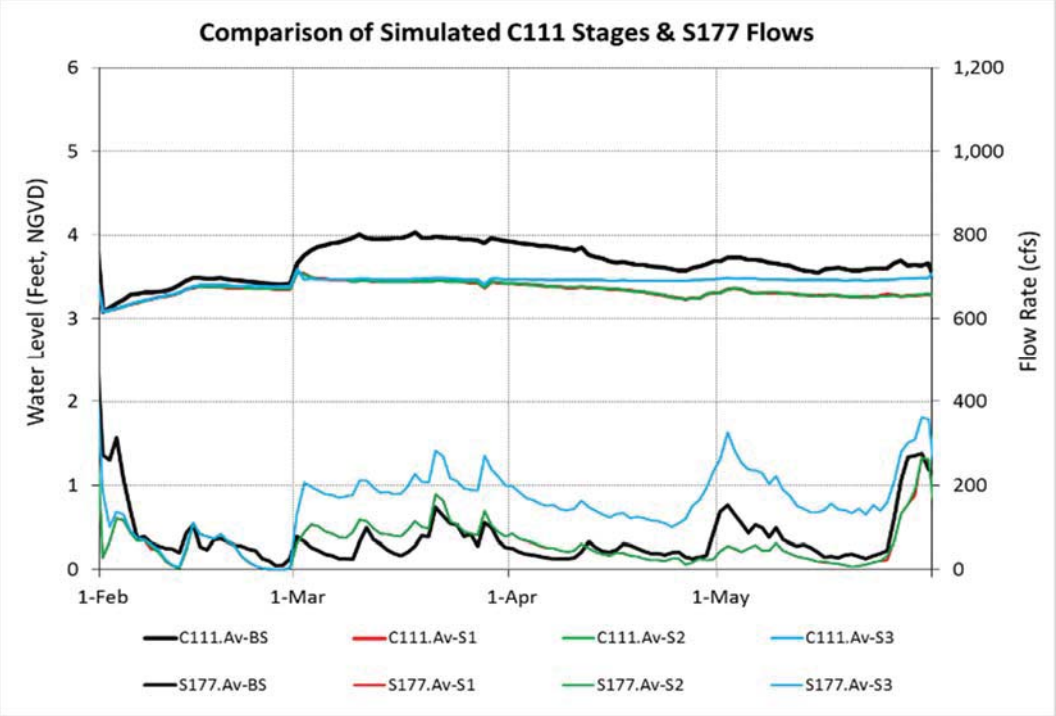


FIGURE 22. COMPARISON OF SIMULATED STAGES IN THE C-111 CANAL AND S-177 FLOWS. BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

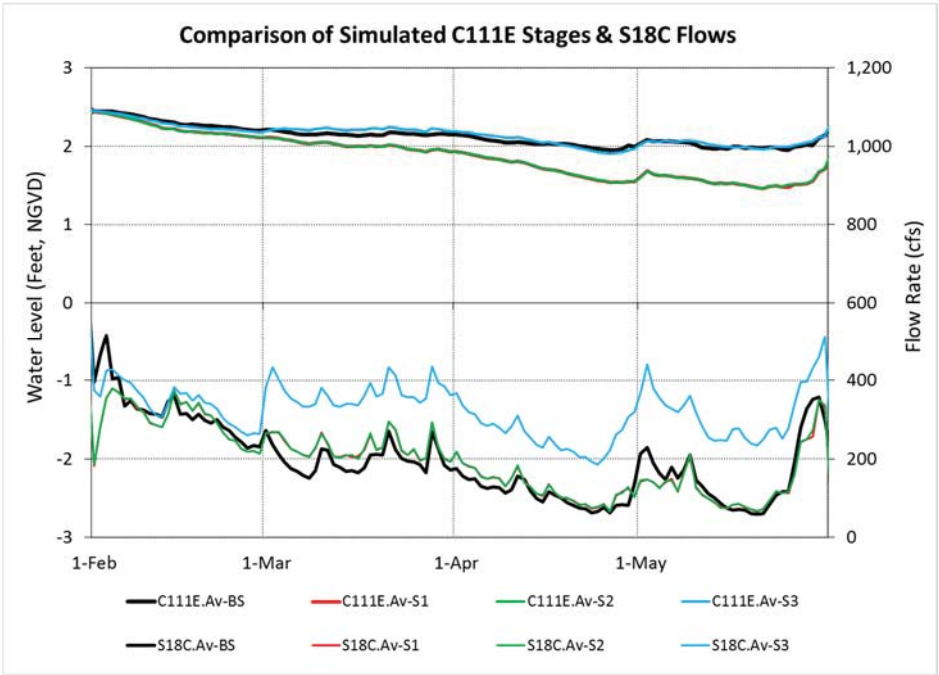


FIGURE 23. COMPARISON OF SIMULATED STAGES IN THE C-111 CANAL AND S-18C FLOWS. BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

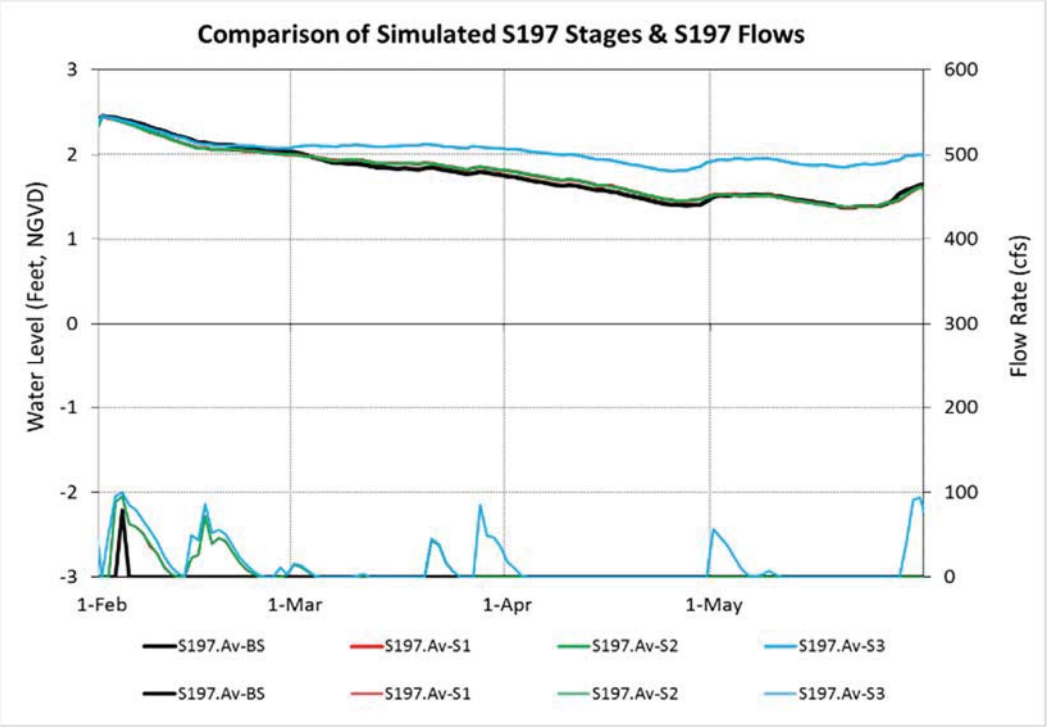


FIGURE 24. COMPARISON OF SIMULATED STAGES AT S-197AND S-197 FLOWS. BASE =NO ACTION, SENS1 = ALT B, SENS2 =ALT D, SENS3 = ALT C.

4.7 VEGETATIVE COMMUNITIES

The continued implementation of the No Action Alternative has the potential for negative impacts to occur on vegetation primarily within WCA 3A where high water levels and prolonged inundation periods are expected to continue. Prolonged periods of inundation are of particular concern for tree islands within WCA 3A. Tree island performance measures strive to keep high water peaks less than 10.8 feet NGVD, and strive to reach water levels less than 10.3 feet NGVD by December 31.

Vegetative communities within WCA 3A are expected to benefit with implementation of the Action Alternatives. Implementation of the Action Alternatives generally produced water levels decreases ranging from ~ 0.2 feet up to ~0.5 feet, over the period from February to May with Alternative C providing the greatest improvement in comparison to Alternatives B and D (Reference **Section 4.5**). A potential decrease in high water levels in WCA 3A may provide an overall net benefit for tree islands currently experiencing prolonged periods of inundation. Changes in vegetation are not anticipated within WCA 3B as S-152 will be used in conjunction with S-151 to release water from WCA 3A into WCA 3B to the extent that the trigger stage (measured at Site 71 of 8.5 feet NGVD) allows.

Flows through NESRS under current system compartmentalization and water management practices are greatly reduced when compared with pre-drainage conditions. Over-drainage within ENP has resulted in the conversion of slough/open-water marsh communities to shorter hydroperiod sawgrass marshes and wet prairies (Davis et al. 1994, Davis and Ogden 1997; Armentano et al. 2006; McVoy et al. 2011). Since 1942, a 55% decline in the extent and number of tree islands in SRS has also been observed due to intensive fires that migrate across the marshes and burn tree island peat soils leaving rocky outcroppings. Alternatives B, C and D improved stages relative to the No Action Alternative in NESRS, central SRS and the northern Rocky glades adjacent to S-332 B and C, with increased stages persisting through the dry season (Reference **Section 4.5**). Observed water levels were comparable amongst the Action Alternatives in each case. Implementation of Alternative D further improved overland flow in Taylor Slough and the Eastern Panhandle. A potential decrease in drying event severity would aid in restoration of historic wetland vegetation communities. Implementation of the Action Alternatives may have a temporary minor beneficial effect on wetland vegetation and tree islands; however, due to the short duration of the temporary emergency deviation, significant vegetation changes are not anticipated.

The estuarine communities of Florida and Biscayne Bays have been affected by upstream changes in freshwater flows through the Everglades and eastward across the Miami Rock Ridge. The estuarine communities of Biscayne Bay have been further affected by agricultural and urban development of the areas east of the current boundaries of ENP. A reduction in freshwater inflows into the southern estuaries and alterations of the normal salinity balance have affected mangrove community composition and may have contributed to a large-scale die-off of sea grass beds (USFWS 1999).

Implementation of the Federal Action is not expected to have significant effects on mangrove and sea grass beds within the southern estuaries. Mangrove communities occur within a range of salinities from 0 to 40 practical salinity units (psu). Jiang et al. (2012) developed a model to estimate the resilience of a system against a regime shift. Their model was applied to a halophytic

mangrove and glycophytic hardwood hammock ecotone to measure its resilience to storm surge. The boundary between these two vegetative types is typically distinct, with only slight changes in topography. The authors noted that a disturbance, such as an input of salinity to the soil from a storm event, could upset this ecotone boundary. This could possibly cause salinity-tolerant vegetation to migrate inland. For the model developed in this study, the authors found a pulse disturbance was not sufficient to cause a regime shift in the vegetative boundary. Any change in salinity would have to be held at a high level for some time for this type of boundary shift to occur (Jiang et al., 2012).

Increased flows at S-18C and S-197 were observed for the Action Alternatives relative to the No Action. S-197 discharges are relatively small in all cases, but most common with implementation of Alternative C. In addition, there is potential for increases in structural discharges from the L-31N Canal to central Biscayne Bay during the field test when conveyance capacity is available within the C-102 Canal (S-194) and/or the C-103 Canal (S-196) (Reference **Section 4.5**). Although the above referenced study by Jiang et al. (2012) provides only limited data on how mangrove habitats respond to salinity variations, it suggests that increased tidal discharges would not be sufficient to affect mangrove habitats within the coastal estuaries due to the short duration of the action and low volume releases anticipated. Furthermore, scouring of bottom sediments and significant increases in turbidity resulting in diminished light penetrations through the water column is not expected. Significant impacts to seagrass beds within the coastal estuaries are not expected due to the limited duration of operational changes being considered. Sea grasses can tolerate considerable short-term salinity fluctuations.

4.8 FISH AND WILDLIFE RESOURCES

The continued implementation of the No Action Alternative has the potential for negative impacts to occur on fish and wildlife resources primarily within WCA 3A where high water levels and prolonged inundation periods are expected to continue. Several species of wading birds nest during the dry season, and rely on the drying wetlands to concentrate prey items. However, frequent heavy rains during nesting can cause water levels to increase rapidly, reducing foraging opportunities. Abrupt increases in water levels during nesting, termed reversals, may cause wading bird nest abandonment, re-nesting, late nest initiation, and poor fledging success. Prolonged inundation periods are also of particular concern for mammals dependent on upland habitat, particularly for deer populations within northern WCA 3A that utilize tree islands for refugia.

Fish and wildlife resources within WCA 3A are expected to benefit with implementation of the Action Alternatives. Implementation of the Action Alternatives generally produced water levels decreases ranging from ~ 0.2 feet up to ~0.5 feet over the period from February to May with Alternative C providing the greatest improvement in comparison to Alternatives B and D (Reference **Section 4.5**). A potential decrease in high water levels and prolonged periods of inundation in WCA 3A may provide an overall net benefit for wading bird foraging suitability and nesting opportunities.

Fish and wildlife resources within NESRS and ENP are also expected to benefit under the Federal Action. Alternatives B, C and D improved stages relative to the No Action Alternative in NESRS, central SRS and the northern Rocky glades adjacent to S-332 B and C, with increased stages

persisting through the dry season (Reference **Section 4.5**). Crayfish are important components within the Everglades food web, serving as primary dietary components of higher trophic level species including fish, amphibians, alligators, wading birds and mammals such as raccoons and river otters (Kushlan and Kushlan 1979). Crayfish species composition and abundance within the Greater Everglades are linked to hydroperiod. Increases in hydroperiod associated with implementation of the Action Alternatives may provide temporary, minor beneficial effects to crayfish within areas of NESRS. 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.

Additional freshwater releases from S-197 and potential increases in structural discharges from the L-31N Canal considered under the Action Alternatives would not be sufficient to affect mangrove and seagrass habitats within the coastal estuaries (**Section 4.7**). Mangrove habitats provide food and refuge to a large variety of species. Seagrass habitats are heavily utilized by both juvenile and adult fishes and invertebrates for feeding and shelter. Potential minor adverse effects associated with salinity fluctuations would be temporary and spatially limited to nearshore areas within the southern estuaries. Significant effects to fish and wildlife resources within the southern estuaries are not anticipated as a result of the temporary emergency deviation.

4.9 THREATENED AND ENDANGERED SPECIES

4.9.1 Federally Protected Species

Effects determinations for federally threatened and endangered species within the project area are listed within **Table 3**. Informal consultation with the USFWS was initiated on March 1, 2016 with submission of a complete initiation package (**Appendix C**). These determinations are based on the short duration of the temporary emergency deviation and the generally beneficial nature of this action.

TABLE 3. 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 Affect	May Affect, Not Likely to Adversely Affect	No Effect
Mammals					
Florida panther	*Puma concolor coryi*	E			X
Florida manatee	*Trichechus manatus latirostris*	E, 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	
Piping plover	*Charadrius melodus*	T			X
Red-cockaded woodpecker	*Picoides borealis*	E			X

Roseate tern	*Sterna dougallii dougallii*	T			X
Wood stork	*Mycteria americana*	T		X	
Reptiles					
American Alligator	*Alligator mississippiensis*	T, SA			X
American crocodile	*Crocodylus acutus*	T, CH			X
Eastern indigo snake	*Drymarchon corais couperi*	T			X
Gopher tortoise	*Gopherus polyphemus*	C			X
Green sea turtle*	*Chelonia mydas*	E			X
Hawksbill sea turtle*	*Eretmochelys imbricate*	E			X
Kemp's Ridley sea turtle*	*Lipodochelys kempii*	E			X
Leatherback sea turtle*	*Dermochelys coriacea*	E			X
Loggerhead sea turtle*	*Caretta*	T			X
Fish					
Smalltooth sawfish*	*Pristis pectinata*	E			X
Invertebrates					
Bartram's hairstreak butterfly	*Strymon acis bartrami*	E		X	
Elkhorn coral*	*Acropora palmata*	T, CH			X
Florida leafwing butterfly	*Anaea troglodyta floridalis*	E		X	
Miami blue butterfly	*Cyclargus thomasi bethunebakeri*	E			X
Schaus swallowtail butterfly	*Heraclides aristodemus ponceanus*	E			X
Staghorn coral*	*Acropora cervicornis*	T, CH			X
Stock Island tree snail	*Orthalicus reses* (not incl. *nesodryas*)	T			X
Plants					
Crenulate lead plant	*Amorpha crenulata*	E			X
Deltoid spurge	*Chamaesyce deltoidea* spp. *deltoidea*	E		X	
Garber's spurge	*Chamaesyce garberi*	T		X	
Johnson's seagrass*	*Halophila johnsonii*	E, CH			X
Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeenis*	E			X
Small's milkpea	*Galactia smallii*	E		X	
Tiny polygala	*Polygala smallii*	E		X	
Big pine partridge pea	*Chamaecrista lineata* var. *keyensis*	Pr E		X	

Blodgett's silverbush	*Argythamnia blodgettii*	Pr T		X	
Cape Sable thoroughwort	*Chromolaena frustrata*	E, CH			X
Carter's small-flowered flax	*Linum carteri* var. *carteri*	E, CH		X**	
Everglades bully	*Sideroxylon reclinatum* spp. *austrofloridense*	C			X
Florida brickell-bush	*Brickellia mosieri*	E, CH		X**	
Florida bristle fern	*Trichomanes punctatum* spp. *floridanum*	E			X
Florida pineland crabgrass	*Digitaria pauciflora*	C			X
Florida prairie-clover	*Dalea carthagenensis* var. *floridana*	C			X
Florida semaphore cactus	*Consolea corallicola*	E, CH			X
Pineland sandmat	*Chamaesyce deltoidea* ssp. *pinetorum*	C			X
Sand flax	*Linum arenicola*	Pr E		X	

E=Endangered; T=Threatened; SA=Similarity of Appearance; CH=Critical Habitat; Candidate Species, Pr E = Proposed Endangered, Pr CH = Proposed Critical Habitat

** No effect to Critical Habitat as designations are outside project area

4.9.2 State Listed Species

Implementation of the Federal Action would not result in significant impacts to state listed species. State listed species determinations are provided in **Table 4**. Impacts to state listed species would be similar to those outlined for fish and wildlife resources in **Section 4.8**. Potential impacts to these species would be similar to those outlined for the wood stork in **Appendix C**.

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

Common Name	Scientific Name	Status	May Affect, Likely to Adversely Affect	May Affect, Not Likely to Adversely Affect	No Effect
Mammals					
Everglades mink	*Mustela vison evergladensis*	T			X
Florida mouse	*Podomys floridanus*	SC			X
Birds					
Snowy plover	*Charadrius alexandrinus*	T			X
American oystercatcher	*Haematopus palliates*	SC			X

Brown pelican	*Pelecanus occidentalis*	SC			X
Black skimmer	*Rynchops niger*	SC			X
Least tern	*Sterna antillarium*	T			X
White-crowned pigeon	*Columba leucocephalus*	T			X
Limpkin	*Aramus guarauna*	SC			X
Little blue heron	*Egretta caerulea*	SC		X	X
Tricolored heron	*Egretta tricolor*	SC		X	X
Snowy egret	*Egretta thula*	SC		X	X
Reddish egret	*Egretta rufescens*	SC			X
White ibis	*Eudocimus albus*	SC		X	
Roseate spoonbill	*Ajaja*	T			X
Fish					
Mangrove rivulus	*Rivulus marmoratus*	SC			X
Invertebrates					
Florida tree snail	*Liguus fasciatus*	SC			X
Plants					
Pine-pink orchid	*Bletia purpurea*	T			X
Lattace vein fern	*Thelypteris reticulate*	E			X
Eatons spikemoss	*Selaginella eatonii*	E			X
Wright's flowering fern	*Anemia wrightii*	E			X
Tropical fern	*Schizaea pennula*	E			X
Mexican vanilla	*Manilla mexicana*	E			X

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

4.10 ESSENTIAL FISH HABITAT

Implementation of the No Action and Action Alternatives are not expected to adversely affect Essential Fish Habitat.

Mangrove habitats provide food and refuge to a large variety of species (SAFM 1998). These species include: spiny lobsters, pink shrimp, snook (*Centropomus undecimalis*), goliath grouper (*Epinephelus itajara*), tripletail (*Lobotes surinamensis*), leatherjack (*Oligoplites saurus*), gray snapper (*Lutjanus griseus*), dog snapper (*L. jocu*), sailor's choice (*Haemulon parra*), bluestriped grunt (*H. sciurus*), sheepshead (*Archosargus probatocephalus*), black drum (*Pogonias cromis*) and red drum (SAFM 1998). Additional freshwater releases from S-197 considered under the Action Alternatives is not expected to significantly impact mangrove habitats within the coastal estuaries due to the limited duration of the temporary emergency deviation.

Seagrass habitats are heavily utilized by both juvenile and adult fishes and invertebrates for feeding and shelter (SAFM 1998). Species that depend on seagrass habitats include the penaeid pink and brown shrimp, and spiny lobster (SAFM 1998). Seagrass performs as an important nursery habitat for red drum, snook (*Centropomus undecimalis*), bonefish (*Albula vulpes*), tarpon (*Megalops atlanticus*) and several species of snapper and grouper, and is critical to the health of Biscayne Bay, Florida Bay, and a number of commercial and recreational fisheries (SAFM 1998). Significant impacts to seagrass beds as a result of additional freshwater releases from S-197 is not

expected due to the limited duration of the temporary emergency deviation. Furthermore, potential for increases in structural discharges from the L-31N Canal to central Biscayne Bay during the temporary emergency deviation are subject to available conveyance capacity within the C-102 Canal (S-194) and/or the C-103 Canal (S-196). Seagrasses have an optimum salinity range of 24 to 35 psu, but can tolerate considerable short-term salinity fluctuations.

There are no coral reefs or hard bottom communities located within the nearshore waters potentially affected by the project. Corals found within Florida Bay and Biscayne Bay are outside the area of potential effect.

4.11 WATER QUALITY

Relaxing the L-29 Canal constraint up to 8.5 feet NGVD will result in additional flows through the S-333 structure which will increase the total NESRS inflow which are included in the settlement agreement water quality compliance equation for SRS. Greater SRS inflows result in a lower Total Phosphorous (TP) compliance limit. Given that the expected concentration of flows at S-333 during the relaxation period is around 8 ppb, the relaxation flows are likely to represent no more than 10 to 15 percent of the total annual flow, and the lowest Long Term Limit is 7.6 ppb, it is unlikely that this action will result in a water quality exceedance for flows into NESRS. If an exceedance does occur this action could at most be a minor contributing factor to the exceedance. Phosphorus concentrations at the S-333 are at the seasonal low values for the water year (latest value, February 1, 2016 was 8 ppb) as we have recovered from the upstream dry season conditions and have experienced wet season conditions in the WCAs for the past several months. Phosphorus concentrations are expected to remain low (8 ppb range plus or minus 2, tending more towards the low side of that range) at the S-333 until dry season conditions are reestablished upstream of S-333 in the WCA's. Based on the current prediction for El Nino conditions to continue through April 2016 and if we have normal wet season rainfall, we may not see normal rise in phosphorus concentrations typically seen at the end of the normal "dry season" (May).

4.12 NATIVE AMERICANS

As part of this project, consultation has occurred and is ongoing between the Corps and appropriate federally recognized tribes. Informal coordination through phone calls and emails with staff members of the Miccosukee Tribe of Indians of Florida (Miccosukee) and the Seminole Tribe of Florida (STOF) was conducted February 11-12, 2016 for notification purposes and to solicit comments regarding the temporary emergency deviation and the potential effects of flood waters released from WCA 3A. Letters requesting consultation and a concurrence of the Corp's determination of effects on cultural resources were sent to both the Miccosukee and Seminole Chairmen on February 17, 2016 (See **Appendix C**).

Initial comments from staff members of the Miccosukee Tribe included concern for higher water levels on Tamiami Trail and the subsequent effect upon health and human safety issues. Concerns for the potential of flooding at Osceola Camp were also voiced. In order to address these concerns, the Corps reviewed a letter dated August 18, 2011 to Dan Kimball, Superintendent of ENP, which includes the elevation of ground and residential elevations of the Osceola Camp. The original purpose of this letter was to assure water operations would not adversely affect the camp. A review of that information demonstrates that a canal elevation of 8.5 feet NGVD will not flood the lowest bottom elevation of the camp. The Jacksonville Commander, Colonel Jason Kirk, spoke with the

Miccosukee Interim Chairman on February 12, 2016 and the Interim Chairman indicated that the Osceola and Tiger Tail camps are at sufficient levels to accommodate the increase in L-29 Canal. In a letter from Mr. James Erskine, the Acting Water Resources Director of the Miccosukee Tribe, to Lieutenant Colonel Jennifer Reynolds, Mr. Erskine recommended that the Corps should immediately begin maximizing the release of water from WCA 3A through the proposed emergency action to raise water levels in the L-29 Canal and continue exploring all possible alternatives to maximize the release of water from the conservation areas and minimize the ecological and cultural impacts due to the flooded condition of their ancestral lands and community camps. Pursuant to 36 CRF Part 800.12(b) (Emergency Situations) of the National Historic Preservation Act (NHPA), a letter requesting consultation and a concurrence of the Corp's determination of effects on cultural resources was sent to the Miccosukee Interim Chairman on February 17, 2016. No response to this letter was provided; however, consultation is ongoing.

Initial comments from staff members of the STOF echoed the Miccosukee appeal for consideration on the potential effects of flooding on Tamiami Trail. There was also concern that tribally sensitive tree islands would flood in SRS. The Jacksonville Commander initiated verbal government to government consultation with the Chairman on February 12, 2016. In lieu of returning the Commander's phone call, the Director of the STOF Environmental Resources Department, Ms. Cherise Maples, spoke with Jacksonville District's Deputy District Engineer for Programs and Project Management, Mr. Tim Murphy. Pursuant to 36 CRF Part 800.12(b) (Emergency Situations) of the NHPA; Part XIV, Deviations of the ERTP Programmatic Agreement (PA); and in accordance with the emergency procedures outlined in the Burial Resources Agreement between the Corps and the STOF; the Corps notified the STOF of the Federal Action and its determination of effects to cultural resources by email on February 12, 2016. A formal letter requesting consultation and a concurrence of the Corp's determination of effects was sent to the Seminole Chairman on February 17, 2016. In a letter dated February 22, 2016, the STOF Tribal Historic Preservation Office stated that they are unable to provide comments on the determination of effect due to the limited review period and lack of a comprehensive assessment of cultural resources within the affected area. However, government to government consultation is ongoing throughout this process to provide information and ongoing dialog with both tribes.

The Miccosukee and STOF rely upon the Everglades in its natural state to support their religious, subsistence, and commercial activities. Portions of both the Seminole Big Cypress Reservation and the Miccosukee Reservation are located within WCA 3A. The continued implementation of the No Action Alternative has the potential for negative impacts to occur on resources utilized by the tribes within WCA 3A where high water levels and prolonged inundation periods are expected to continue. While Implementation of the Action Alternatives would not specifically address all the Tribes' concerns with the release of water, it will act to reduce water levels within WCA3A. This reduction of El Nino associated high water levels will help to improve environmental conditions for many of the tree islands, plants, and animals that the Tribes rely on to practice traditional and commercial activities. Additionally, due to the temporary nature of the Action Alternatives, potential effects within ENP and SRS would be minimal.

4.13 CULTURAL RESOURCES

As part of this project, consultation has occurred and is ongoing between the Corps and the State Historic Preservation Officer (SHPO). Pursuant to 36 CRF Part 800.12(b) (Emergency Situations)

of the NHPA and Part XIV, Deviations of the Everglades Restoration Transition Plan Programmatic Agreement (PA), the SHPO and all PA signatories were notified of the Federal Action and its determination of effects to cultural resources by email on February 12, 2016. A formal letter requesting consultation and a concurrence of the Corp's determination of effects was sent to the SHPO February 17, 2016. The SHPO concurred with the Corps determination of no adverse effect in an email dated February 12, 2016 (**Appendix C**). Consultation was sought with the Bureau of Indian Affairs, the Advisory Council on Historic Preservation, and Everglades National Park as signatories of the ERTP PA; however, no response has been provided.

Since water levels within the Everglades have historically fluctuated on a seasonal, annual, and interannual basis, it is likely that cultural resources within the project area have been previously exposed to natural hydrological conditions that may be experienced under the current condition. However, continued increasing high water levels associated with the El Nino weather pattern as observed in the No Action Alternative has the potential for negative impacts on some cultural resources within WCA 3A where high water levels and prolonged inundation periods are expected to continue. Implementation of the Action Alternatives would reduce water levels in WCA 3A and help to control flooding at cultural resources locations.

Implementation of the Action Alternatives would increase flows to SRS. Results of the modeling generally indicate higher water levels just south of the L-29 Canal with progressively lower water stages as the flow moves south. While tree islands within SRS and ENP may experience high water levels, general archaeological predictive models indicates that the presence of archaeological sites are indicative of a preference of higher elevations for habitation uses within tree islands. Water levels while currently high, are still lower than maximum water levels that have been experienced in the past as indicated by water level averages experienced under the last ten years of IOP (Everglades Depth Estimation Network [EDEN]). In addition, the temporary nature and short duration of the project would also preclude adverse effects to historic properties within the project area. Therefore, increased water levels during the temporary Action Alternatives is not anticipated to adversely affect historic properties listed or eligible for listing in the NRHP.

4.14 AIR QUALITY

Air quality conditions within the project area are in compliance under the No Action Alternative. Increased air emissions would occur from the increased operation of S-331, S-332B, S-332C and S-332D (diesel powered pump stations) under Alternative C. Increased air emission are not expected to cause non-compliance with any air quality standards. Sources of air emissions during operation would include diesel exhaust. Diesel exhaust includes gaseous compounds (*e.g.*, carbon dioxide, oxygen, nitrogen, water vapor, carbon monoxide, nitrogen compounds, sulfur compounds, and numerous low molecular-weight hydrocarbons) and contains fine particulate matter, $PM_{2.5}$. Potential impacts due to implementation of the Action Alternatives on air quality would be negligible and are not expected to cause negative effects to human health.

4.15 HAZARDOUS, TOXIC OR RADIOACTIVE WASTES (HTRW)

Implementation of the No Action Alternative and Action Alternatives would not result in the discovery of HTRW since there is no excavation or other construction activities associated with the temporary emergency deviation. The project has a very low risk for increased mobilization of

existing HTRW where it might exist within the study area. Increased operation of C&SF Project features will increase the frequency of diesel fuel delivery to pump stations.

4.16 NOISE

Noise levels within the project area would not be expected to change from current conditions with implementation of the No Action Alternative. Noise levels within the area are expected to increase as a result of increased operation of the S-331, S-332B, S-332C and S-332D (diesel powered pump stations) under Alternative C. Such impacts would be limited to the immediate vicinity of the associated pump stations which are located in remote rural areas. Sound levels would decrease with distance from pump stations due to attenuation. Increased noise levels are not expected to cause negative effects to human health. Potential impacts due to implementation of the Action Alternatives on noise levels would be negligible.

4.17 AESTHETICS

Aesthetics within the project area would not be expected to change from current conditions with implementation of the No Action Alternative. The Action Alternatives, consists of an operational change to the current Water Control Plan and does not include construction of permanent structures or structural modifications to existing C&SF Project features. As such, the existing landscape profile would not be altered. Alternatives B, C, and D improved stages in WCA 3A relative to the No Action Alternative. Implementation of the Action Alternatives generally produced water levels decreases ranging from ~ 0.2 feet up to ~0.5 feet over the period from February to May with Alternative C providing the greatest improvement in comparison to Alternatives B and D. Reductions in high water levels and decreased periods of prolonged flooding within WCA 3A is expected to provide benefits to vegetation fish and wildlife resources, positively contributing to maintaining a healthy and aesthetically pleasing ecosystem.

4.18 SOCIOECONOMICS

Socioeconomics within the project area would not be expected to change from current conditions with implementation of the No Action Alternative. The Florida Fish and Wildlife Conservation Commission (FWC) has closed access to the WCAs within the project area leading to economic losses within the region and impacts on local businesses (airboat concessionaires etc.). The Miccosukee Indian Tribe of Florida have several businesses adjacent to Tamiami Trail west of S-333 including airboat concessionaires. Implementation of the Action Alternatives would alleviate potential impacts to economic losses by alleviating high water levels in WCA. Reference **Section 4.5**.

Several private entities currently own real estate within the project area adjacent to Tamiami Trail and within ENP (**Figure 6**). Because the Corps and National Park Service are ultimately responsible for acquiring permanent interests in these private ownerships as part of the MWD Project and are currently engaged in the acquisition process, the SFWMD coordinated with both agencies to obtain the available real estate information from the MWD Project. SFWMD has relied on the information provided by the agencies and on its own expedited review conducted by the Jacksonville District's real estate division. Based on this information, SFWMD proceeded with acquiring the temporary flowage authorizations and SFWMD has now acquired all the temporary rights necessary to raise water levels in the L-29 Canal up to 8.5 feet NGVD. The FWC and

SFWMD are currently visiting all properties along the potentially affected area adjacent to the L-29 Canal. Site visits are occurring daily to identify and address issues as a result of implementation of the Federal Action.

4.19 AGRICULTURE

Agriculture within the project area would not be expected to change from current conditions with implementation of the No Action Alternative. Comparison of the Action Alternatives to the No Action identified similar or lowered canal water levels along the L-31 Canal and SDCS. Increased flows at S-331, S-176, and S-177 were observed for Alternative C relative to Alternatives B, D, and the No Action. Increased flows at S-332B, S-332C, and S-332D were also observed for Alternative C relative to both the No Action Alternative and Alternatives B and D. Water management operations under the temporary emergency deviation may result in increased seepage to the L-31N Canal south of the S-331 pump station, prior to the construction and operation of the C-111 South Dade Project NDA. Since not all flood mitigation and seepage management features envisioned in the MWD and C-111 South Dade Projects are constructed, the operational strategy includes additional water management operating criteria for features of the SDCS to mitigate for potential risks to flood protection for areas within South Dade which may be affected. Increased flows at S-18C and S-197 were observed for the Action Alternatives relative to the No Action. S-197 discharges are relatively small in all cases, but most common with implementation of Alternative C. Reference **Section 4.5**.

Conversion of Prime and Unique Farmland as a result of the Federal Action is not anticipated based on the expected change in hydrology and short duration of the temporary emergency deviation. Reference **Section 4.26.8** for compliance with the Farmland Protection Policy Act and correspondence with the United States Department of Agriculture and Natural Resources Conservation Service (USDA-NRCS). Implementation of the Action Alternatives would not result in significant impacts to agriculture.

4.20 RECREATION

High water levels are currently limiting access to recreational opportunities (hunting, fishing, frogging, boating, camping, and off-road vehicle use etc) within the project area. Water levels in northern WCA 3A remain above the established criterion for public access closure due to high water conditions (Reference **Figure 25** for High Water Closure Criteria). Due to high water conditions and subsequent wildlife concerns, special regulations have been in effect since January 30, 2016, restricting public access within the Everglades and Francis S. Taylor, Holey Land, and Rotenberger Wildlife Management Areas. Impacts to recreation would remain with continued implementation of the No Action Alternative. Alternatives B, C, and D improved stages in WCA 3A relative to the No Action Alternative. Implementation of the Action Alternatives generally produced water levels decreases ranging from ~ 0.2 feet up to ~0.5 feet over the period from February to May with Alternative C providing the greatest improvement in comparison to Alternatives B and D. Implementation of the Action Alternatives would help to lessen potential impacts to recreation by alleviating high water levels in WCA 3.

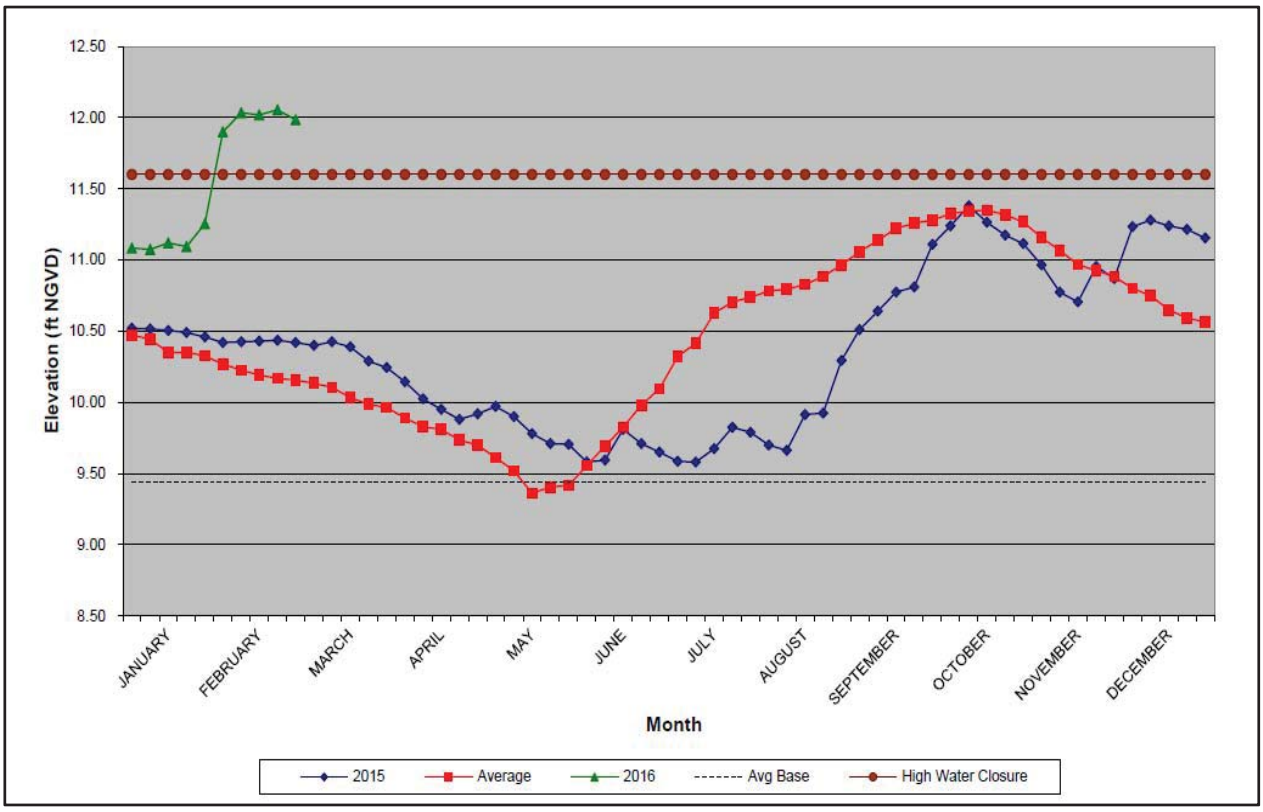


FIGURE 25. MEAN STAGE LEVEL (62 AND 63 GAGES) FOR WCA 3A NORTH, WEEKLY INTERVALS FOR YEAR 2015 AND 2016, AND AVERAGE WEEKLY LEVELS FOR 1980-2015. MEAN STAGE LEVEL (SITE 62 AND 63 GAGES) FOR WCA 3AN, WEEKLY INTERVALS FOR YEAR 2015 AND 2016, AND AVERAGE WEEKLY LEVELS FOR 1980-2015.

4.21 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 5**). The general environmental effect of the Federal Action would be beneficial and any downstream impacts would be of short duration.

TABLE 5. PAST, PRESENT, AND REASONABLY FORESEEABLE ACTIONS AND PLANS AFFECTING 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 Restoration Strategies Project - MWD Closeout - C-111 South Dade Project (Contracts 8 and 9)
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 2015 - Increment 1 2015 to present	- LORS 2008 to be replaced by revised Lake Okeechobee Regulation 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: - Biscayne Bay Coastal Wetlands Project - Broward County Water Preserve Areas Project - Caloosahatchee River (C-43) West Basin Storage Reservoir - C-111 Spreader Canal Western Project. Congressional Authorization Received and Construction in Progress: - Indian River Lagoon-South Project - Picayune Strand Restoration Project - Site 1 Impoundment Project	- Future CERP Projects

4.22 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The Preferred Alternative consists of an operational change to the current C&SF Project operations and does not include construction of permanent structures or structural modifications to existing C&SF Project features. The Federal Action would not cause the permanent removal or consumption of any natural resources.

4.23 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Environmental effects for each resource are discussed in **Section 4.0**. Potential adverse environmental effects associated with implementing the Federal Action are expected to be minimal based on the short duration and the generally beneficial nature of the action.

4.24 CONFLICTS AND CONTROVERSY

Over the lifetime of the C&SF Project, considerable interest has been generated among local and regional stakeholders. The Corps continually strives to include all interested parties in its decision making process and will continue to consider all issues that arise. Residents within the 8.5 SMA have expressed concern during implementation of the temporary emergency deviation due to observed increases in ground and surface water. A single temporary diesel pump has been installed by the SFWMD south of the 8.5 SMA to help maintain normal water levels within the area during the period of the temporary emergency deviation. Reference Section 2.1. Additional pumps may be installed by the SFWMD if deemed necessary. In addition, the SFWMD may construct temporary plugs in the drainage swales located north and south of Richmond Drive to further assist with potential flood protection concerns for the Las Palmas Community adjacent to 8.5 SMA. S-334 may also be used, consistent with the water control plan, to pass flows to the SDCS to alleviate observed conditions. The temporary emergency deviation will maintain the authorized purposes of the C&SF Project, which include to provide flood control, water supply for municipal, industrial, and agricultural uses, prevention of saltwater intrusion, water supply for ENP, and protection of fish and wildlife.

4.25 ENVIRONMENTAL COMMITMENTS

The Corps commits to avoiding, minimizing or mitigating for adverse effects. All practicable means to avoid or minimize environmental effects were incorporated into the Federal Action. Protective and implementable operational criteria to compensate for the sustained increased flow to NESRS associated with raising the L-29 Canal stage limit from 7.5 to 8.5 feet NGVD are included in this action.

The monitoring plan developed for Increment 1 (G-3273 Constraint Relaxation/S-356 Field Test and S-357N Operational Strategy) of the COP for the operation of the water management infrastructure connected to the MWD to ENP and C-111 South Dade Projects (USACE 2015), will be used during the temporary emergency deviation and is hereby incorporated by reference. Please refer to Appendix C of the EA and FONSI dated May 27, 2015. The monitoring plan includes hydrologic, ecologic, water quality, and cultural resource components within NESRS, the SDCS, Manatee Bay and Barnes Sound, and Florida Bay. Monitoring information is disseminated to Federal and state agencies, tribal members, and members of the general public by accessing the Increment 1 website:

(http://www.saj.usace.army.mil/Missions/Environmental/EcosystemRestoration/G3273andS356PumpStationFieldTest.aspx).

Regularly scheduled project delivery team meetings for Increment 1 of the COP occur four times per year. Additional meetings (*i.e.* WCA 3 Periodic Scientist Calls as discussed within the ERTP Final EIS (USACE 2011) and/or workshops are conducted on an as-needed basis based upon ongoing or anticipated conditions within WCAs, ENP, and/or the SDCS.

Cultural resource monitoring tools established under the ERTP Final EIS (USACE 2011) and the associated ERTP PA are being utilized in the Increment 1 monitoring plan and will continue to be utilized during the temporary emergency deviation to understand how the Federal Action performs in relation to relative water depths located adjacent to known archeological resources and tree islands within ENP. Active monitoring will occur utilizing the EDEN tree island application for reporting tree island stage elevations to the Tribes, the SHPO, ENP, and the Advisory Council per the ERTP PA. The EDEN tree island application can be accessed at the following website

(http://sofia.usgs.gov/eden/water_level_percentiles_map.php).

Additional monitoring tools not included within Appendix C of the Increment 1 Monitoring Plan, which are beneficial to the Federal Action include the U.S. Geological Survey's (USGS) CSSS Viewer for purposes of monitoring water depths in CSSS habitats A through F. EDEN provides daily water-level and water-depth surfaces for the freshwater Everglades for the period 1991 to current. The CSSS Viewer was developed to use these surfaces to estimate and evaluate water levels and water depths in CSSS habitat on a real-time basis. An animated viewer shows flooded areas and calculates 1) the percent area that is dry, 2) the percent area having water depth less than or equal to six inches of water, and 3) the percent area that has been dry for 90 days for more (baby birds are fledged from the nest in about 90 days), each day by subpopulation areas. Wildlife-resource scientists and managers can use the CSSS Viewer to assess impacts on nesting success. The CSSS Viewer can be accessed at the following website (http://sofia.usgs.gov/eden/csss/).

For the duration of the Final Emergency Order, TP concentrations and flows will be monitored at the S-152 structure. This monitoring regime has been coordinated with and accepted by the FDEP.

4.26 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.26.1 National Environmental Policy Act of 1969

Environmental information on the project has been compiled in a prior EA, this Supplemental EA has been prepared and is being coordinated for public, state, and Federal agency review. The Federal Action is in compliance with the NEPA.

4.26.2 Endangered Species Act of 1973

Upon completion of a biological assessment for species under NMFS purview it was determined that the Federal Action would have no effect on these species; therefore, consultation with NMFS was not necessary (**Appendix C**). 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 the USFWS by letter dated February 19, 2016. Informal consultation was

initiated with the USFWS on March 1, 2016 with submission of a complete initiation package (**Appendix C**). The Federal Action is being fully coordinated under the Endangered Species Act and will be in full compliance with the Act.

4.26.3 Fish and Wildlife Coordination Act of 1958, as amended

The Federal Action has been fully coordinated with the USFWS and FWC. In response to the requirements of the Act, the Corps has and will continue to maintain continuous coordination with the USFWS. The Federal Action is in full compliance with the Act.

4.26.4 National Historic Preservation Act of 1966

The Federal Action is in compliance with Section 106 of the National Historic Preservation Act, (Public Law 89-665), as amended. 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 through ongoing consultation with the Archaeological and Historic Preservation Act (Public Law 93-29), as amended, Archeological Resources Protection Act (Public Law 96-95), American Indian Religious Freedom Act (Public Law 95-341), Native American Graves Protection and Repatriation Act (NAGPRA) (Public Law 101-701), Executive Order 11593, 13007, and 13175, the Presidential Memo of 1994 on Government to Government Relations and appropriate Florida Statutes. Additionally, the Federal Action is in compliance with Part XIV, Deviations of the ERTP PA and consultation with the STOF be has been consistent with the emergency procedures discussed within the Burial Resources Agreement between the Corps and the STOF. Consultation with the Florida SHPO, appropriate federally recognized tribes, and other interested parties has been initiated. The SHPO has concurred with the determination of no adverse effect. . The Miccosukee Tribe of Indians of Florida have declined to comment on the determination of no adverse effect. The STOF' Tribal Historic Preservation Office stated that they are unable to provide comments on the determination of effect due to the limited review period and lack of a comprehensive assessment of cultural resources within the affected area. However, coordination with both tribes is ongoing.

4.26.5 Clean Water Act of 1972

The Federal Action is in compliance with this Act. The FDEP issued a final emergency order waiving water quality certification for this Federal Action. This waiver is for a period of 90 days starting February 11, 2016. Please refer to Appendix B of the EA and FONSI signed on March 1, 2016 to support a temporary emergency deviation to C&SF Project operations for purposes of providing high water relief in WCA 3A.

4.26.6 Clean Air Act of 1972

The Federal Action is being coordinated with the State of Florida. The Federal Action is in compliance with Section 176 of the Clean Air Act, known as the General Conformity Rule. The project will not cause or contribute to violations of the National Ambient Air Quality Standards.

4.26.7 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 B**. NEPA documentation to support the temporary emergency deviation was

completed on February 12, 2016 with signing of a FONSI incorporating an EA. The objective of this Supplemental EA and Proposed FONSI is to provide further documentation of the potential environmental effects resulting from the alternatives considered and the action taken. The Florida State Clearinghouse previously determined that the Federal action is consistent with the Florida Coastal Management Program. Please refer to Appendix B of the EA and FONSI signed on February 12, 2016 for referenced correspondence from the State Clearinghouse.

4.26.8 Farmland Protection Policy Act of 1981

Correspondence with the USDA-NRCS occurred on February 17, 2016 (**Appendix C**). Correspondence was received on February 19, 2016. Significant portions of the project area have not been mapped and are exempted from a Farmland Designation. Most areas remain in a native plant communities. On the portion of the project area that has been soil mapped (See **Appendix C** for Everglades Farmland Classification Map), NRCS has determined that there are a few delineations of Important Farmland soils (Soils of Unique Farmland status) within the scope of the Federal Action. Conversion of Prime and Unique Farmland as a result of the Federal Action is not anticipated based on the expected change in hydrology and short duration of the temporary emergency deviation.

4.26.9 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.

4.26.10 Marine Mammal Protection Act of 1972

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

4.26.11 Estuary Protection Act of 1968

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

4.26.12 Federal Water Project Recreation Act of 1965, as amended

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

4.26.13 Fishery Conservation and Management Act of 1976

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

4.26.14 Submerged Lands Act of 1953

Significant effects to fish and wildlife resources and vegetative communities within submerged lands of the State of Florida are not expected. No construction is proposed. The Federal Action is in compliance with the Act.

4.26.15 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 Federal Action. These Acts are not applicable.

4.26.16 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 Federal 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 Federal Action has a very low risk for increased mobilization of existing HTRW where it might exist within the study area. The Federal Action is in compliance with these Acts.

4.26.17 Rivers and Harbors Act of 1899

The Federal Action would not obstruct navigable waters of the United States. The Federal Action is in full compliance.

4.26.18 Safe Drinking Water Act of 1974, As Amended

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

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

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

4.26.20 Anadromous Fish Conservation Act

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

4.26.21 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 Federal Action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The Federal Action will not pursue, hunt, take, capture, kill or sell migratory birds. The Federal Action is in compliance with these Acts.

4.26.22 Marine Protection, Research and Sanctuaries Act

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

4.26.23 Magnuson-Stevens Fishery Conservation and Management Act

No Essential Fish Habitat would be impacted by this action. Therefore the Federal Action is in compliance with this Act.

4.26.24 E.O. 11990, Protection of Wetlands

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

4.26.25 E.O. 11988, Floodplain Management

This E.O. instructs Federal agencies to avoid development in floodplains to the maximum extent possible. The Federal Action is an operational change to existing infrastructure; therefore, no construction is proposed within this action. This action is consistent with the intent of this E.O. and is in compliance.

4.26.26 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 Federal Action would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The Federal Action is in compliance with this E.O.

4.26.27 E.O. 13089, Coral Reef Protection

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

4.26.28 E.O. 13112, Invasive Species

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

4.26.29 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 Federal Action is in compliance.

4.26.30 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 Federal Action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The Federal Action is in compliance with the goals of this E.O.

4.26.31 Memorandum on Government-to-Government Relations with Native American Tribal Governments 1994

This Presidential Memorandum directs the Federal government to operate within a government-to-government relationship with federally recognized Native American tribes. The head of each executive department and agency shall be responsible for ensuring that the department or agency operates within a government-to-government relationship with federally recognized tribal governments. Each executive department and agency shall apply the requirements of the E.O. 12875 ("Enhancing the Intergovernmental Partnership") and E.O. 12866 ("Regulatory Planning and Review") to design solutions and tailor Federal programs, in appropriate circumstances, to address specific or unique needs of tribal communities. The Corps has consulted with the Miccosukee Indian Tribe of Florida and the Seminole Tribe of Florida during the NEPA process for the Federal Action. The Federal Action is in compliance with the goals of this memorandum.

5.0 LIST OF PREPARERS

TABLE 6. TABLE OF PREPARERS

Name	Organization	Role in EA
Melissa Nasuti	USACE	Biologist
Olice Williams	USACE	Water Manager
Jim Riley	USACE	Water Quality
Meredith Moreno	USACE	Archeologist

6.0 PUBLIC INVOLVEMENT

6.1 SCOPING AND EA

Please refer to **Section 1.7**.

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.

6.3 LIST OF RECIPIENTS

Recipients of the notice of availability for this Supplemental EA and Proposed FONSI were 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 and Proposed FONSI were posted to the internet at the following address:

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

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