U.S. Army Corps of Engineers
Jacksonville District

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Interim Operational Plan (IOP)
for Protection of the Cape Sable Seaside Sparrow

Abstract: This Final Supplemental Environmental Impact Statement (FSEIS) supplements the 2002 Final Environmental Impact Statement (FEIS) for the Interim Operational Plan (IOP) for protection of the Cape Sable seaside sparrow (CSSS), and responds to comments received on the 2006 Draft Supplemental Environmental Impact Statement (DSEIS) coordinated with agencies and the public between July 3 and August 17, 2006. Alternative 7R was the alternative recommended in the 2002 IOP FEIS, coordinated May 4-June 3, 2002. The Record of Decision (ROD) selecting Alternative 7R was signed in July 2002, and the system has been operating under IOP since August 2002. Hydrologic modeling of Alternative 7R was completed in October 2002, after the FEIS and ROD. Because operations under Alternative 7R were similar to those modeled under Alternative 7, agencies generally endorsed Alternative 7R pending later review of model outputs, which were expected to confirm the analysis of impacts. Model results for Alternative 7R were posted to a U.S. Army Corps of Engineers (Corps or USACE) website following the ROD in 2002, but the FEIS was not supplemented at that time. By an order issued in March 2006 by the United States District Court for the Southern District of Florida, Miami Division, resolving a lawsuit by the Miccosukee Tribe regarding the National Environmental Policy Act (NEPA) compliance and other matters related to IOP, the Corps was required to issue a supplement to its 2002 FEIS. This FSEIS discusses IOP Alternative 7R model output, structural features of Alternative 7R, and actual operations since IOP began in 2002. Structural features unique to Alternative 7R include pump stations S-356 and S-332C, degrading 4 miles of L-67 levee extension, and three new impoundment basins at S-332B, C, and D. Construction features of Alternative 7R were first authorized under the Modified Water Deliveries (MWD) Project as described in the 1992 General Design Memorandum (GDM) and Environmental Impact Statement (EIS), and under the C-111 Project as described in the 1994 Integrated General Reevaluation Report and EIS (GRR/EIS). Construction features differ somewhat from the conceptual designs in the referenced reports. The new pump stations were built as interim structures for use in protecting sparrow habitat during the wet seasons, subject to further design in conjunction with associated seepage reservoirs that are being constructed. Alternative 7R incorporated the system operations of Alternative 7 and the Water Control Plan (WCP) for WCA-3A, providing for emergency operations in anticipation of high rainfall events. In conjunction with this supplemental NEPA documentation, the Corps has re-initiated consultation under Section 7 of the U.S. Endangered Species Act (ESA) with the U.S. Fish and Wildlife Service (FWS) for endangered species, including the snail kite and CSSS and received a Biological Opinion (BO) November 17, 2006. In the BO, the FWS concluded that continued operation of IOP Alternative 7R is not likely to jeopardize the continued existence of the CSSS, Everglade snail kite, or wood stork and is not likely to destroy or adversely modify designated critical habitat for the CSSS or Everglade snail kite.

Send your comments to the District Engineer by:
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For further information on this statement, please contact:
Dr. Jon Moulding
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019
Telephone: 904-232-2286
E-mail: iopcomments@saj02.usace.army.mil

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EXECUTIVE SUMMARY

Background. On February 19, 1999, the U.S. Fish and Wildlife Service (FWS) issued a Final Biological Opinion (BO) under provisions of the Endangered Species Act of 1973, as amended, for actions required to assure the survival of the endangered Cape Sable Seaside Sparrow (CSSS), as affected by operation of components of the Central and Southern Florida (C&SF) Project in Miami-Dade County. The BO required rapid implementation of structural and operational changes to existing operations of the constructed portions of the Modified Water Deliveries (MWD) Project and the Canal-111 (C-111) Project, then operating under Test 7 of the Experimental Program of Water Deliveries to Everglades National Park (ENP). The BO concluded that continuation of Test 7, Phase I operations would cause adverse modification of CSSS critical habitat and would jeopardize its continued existence. The BO presented a Reasonable and Prudent Alternative (RPA) that would avoid jeopardizing the CSSS. The RPA recommended that the following hydrological conditions be met for protection of the CSSS: (1) a minimum of 60 consecutive days of water levels at or below 6.0 feet NGVD would have to be achieved at the NP-205 gauge (sparrow subpopulation "A") between March 1 and July 15; (2) the Corps would have to ensure that 30%, 45%, and 60% of required regulatory releases crossing Tamiami Trail enter ENP east of the L-67 extension in 2000, 2001, and 2002, respectively, or produce hydroperiods and water levels in the vicinity of subpopulations C, E, and F that meet or exceed those produced by the 30%, 45%, and 60% targets; and (3) produce hydroperiods and water levels in the vicinity of subpopulations C, E, and F that equal or exceed conditions that would be produced by implementing the exact provisions of Test 7, Phase II operations (USACE 1995), and implement the entire MWD Project no later than December 2003.

Emergency deviations from Test 7 were authorized in 1998, 1999, 2000, and 2001 by the President's Council on Environmental Quality (CEQ) to allow the Corps to conduct water control operations to protect the CSSS (USACE 1999b, USACE 1999c, and USACE 2000). These Interim Structural and Operational Plans (ISOP) enabled the Corps to maintain water levels, particularly in the western CSSS populations, that would maximize breeding seasons for the sparrow. The 'Structural' part of the ISOP operations included building an interim pump station and a 140-acre impoundment (S-332B west impoundment). Operational changes under ISOP included closing the S-12A, B, and C structures (gates at the southern end of WCA-3A that send water into ENP west of the L-67 extension) sequentially from west to east beginning in November (late rainy season) each year to avoid flooding sparrow breeding habitat of subpopulation "A". To compensate for the closures and prevent excessively high stages in WCA-3A, operational changes were made to allow conveyance of some of the water through the S-333 structure into the L-29 canal and thence down the L-31 North (L-31N) canal and into the new impoundment, from which it could overflow or seep into ENP lands near eastern CSSS populations. This "loop" flow was conceived as a temporary expedient that would not be necessary once the 8.5 Square Mile Area (SMA) and Tamiami Trail features of the MWD Project were built and operational, then expected by the end of 2003.

During implementation of the ISOP, the Corps received confirmation from FWS that producing the hydrologic equivalent of the 30%, 45%, and 60% conditions, as opposed to the actual release percentages, would also meet the FWS RPA conditions until the implementation of MWD. The implemented IOP alternative discussed in this SEIS allows the Corps to meet or provide the hydrologic equivalent of the FWS RPA conditions while managing the system for other C&SF Project authorized purposes including flood control, Everglades restoration, water supply, and recreation. In its Amended BO dated March 28, 2002, FWS agreed that IOP met the intention of the RPA. Section 7 consultation on the CSSS, snail kite, and wood stork was re-initiated with FWS in conjunction with this supplemental NEPA documentation, and formal consultation began on June 30, 2006. A Final BO was issued by FWS on November 17, 2006. This BO replaces the 1999 and 2002 BOs.

After Alternative 7R was selected in 2002, the Miccosukee Tribe filed a lawsuit challenging the Corps' decision to implement IOP, alleging violations of NEPA, ESA, the Administrative Procedures Act (APA), the Fifth Amendment, federal common law (nuisance), the Indian trust doctrine, and the Federal Advisory Committee Act, and also alleging improper delegation of agency authority. Among other objections, the Tribe noted that no model runs for Alternative 7R were available at the time Alternative 7R was recommended in the FEIS, or at the time the ROD was signed. The Tribe also objected to incorporation of elements of the C-111 and MWD Projects without a full description of these structural elements as planned for IOP and the impacts of their construction.

On April 28, 2003, Magistrate Judge O'Sullivan issued a Report and Recommendation recommending dismissal of the Tribe's due process, federal common law nuisance, and Indian Trust Doctrine claims. The Magistrate Judge found that the Administrative Procedure Act provides an effective statutory remedy that precluded the Tribe from bringing a due process claim directly under the U.S. Constitution. The Magistrate Judge also found that the Tribe failed to raise its nuisance claims in accordance with the Federal Tort Claims Act and that there is no waiver of sovereign immunity for Plaintiff to bring a nuisance claim based on federal common law. Lastly, the Magistrate Judge found that the Tribe's Indian Trust Doctrine claim was barred by collateral estoppel. In a previous case, the Court held that "the Indian Trust Doctrine cannot support a substantive claim; rather it provides a basis for determining whether Defendants' alleged conduct constitutes the breach of a duty, which arises from statute, regulation, treaty or other agreement." Judge Moore issued an order adopting the Report and Recommendation on August 6, 2003.

The court ruled in favor of the Corps on the ESA, APA, and FACA claims, but against the Corps with regard to NEPA. While the court did not enjoin the Corps from implementing Alternative 7R, it did order the Corps to supplement its NEPA analysis of Alternative 7R by May 15, 2006, but granted extensions until September 18, and subsequently, December 22.

Alternatives. Beginning in 1999 and continuing through early 2002, a team comprised of representatives from the Corps, South Florida Water Management District (SFWMD), FWS, ENP, Miami-Dade Department of Environmental Resource Management (DERM), Florida Department of Environmental Protection (FDEP), Florida Fish and Wildlife Conservation

Commission (FFWCC), and others developed and evaluated IOP operational alternatives. Both 1995 Base (95Base) conditions and the ISOP 2001 operations were used as bases for comparison.

Six alternative plans were developed and analyzed in the (February 2001) Draft IOP EIS. Following release of the Draft EIS, the Council on Environmental Quality (CEQ), and the Institute for Environmental Conflict Resolution (IECR) facilitated a collaborative interagency team from the Corps, FWS, SFWMD, and ENP to formulate an alternative that met the criteria in the BO while providing for maximum protection of the resource concerns of the interested parties. The plan proposed during this process, Alternative 7, consisted of two different modes of water management operation for SDCS and a structural modification of the L-67 extension levee. The first mode was "No WCA 3A regulatory releases to SDCS" operation in which L-31N canal would be maintained at Test 7, Phase I level when there were no WCA 3A regulatory releases. Citing a concern that maintaining L-31N canal at ISOP level would impact ENP resources, a "No WCA 3A regulatory releases to SDCS" operation was proposed that essentially reverted back to Test 7, Phase I canal level when no regulatory releases were routed through S-333 and S-334 to SDCS. The Corps and SFWMD agreed to incorporate this operation as part of Alternative 7.

The second mode of operations was "WCA 3A regulatory releases to SDCS" operation in which L-31N canal would be lowered to minimize potential flood impacts in SDCS and, at the same time, provide necessary downstream gradient to move WCA 3A regulatory releases through S-333 and S-334. The purpose of routing of regulatory releases (releases needed to lower WCA 3A stages when they exceed that water body's regulation schedule) from WCA 3A to SDCS with lower canal stage in L-31N was to provide sufficient water to be delivered via S-332B to the habitats of sparrow subpopulations E and F, and at the same time minimize potential flooding impacts to 8.5 SMA and agricultural areas adjacent to L-31N canal.

Alternative 7 included a 215-acre retention basin at the S-332B structure, increasing capacity from 140 acres of retention to 355 acres, and operations of this area intended to re-hydrate adjacent CSSS habitat inside ENP were modified to avoid pumping to overflow except under unusual and uncommon circumstances.

Modifications to Alternative 7 were developed in response to comments submitted by the public and cooperators during the 2001 NEPA comment period. The stakeholders, including SFWMD and agricultural interests, commented that the existing capability for flood control in the agricultural and residential areas potentially affected by the project might be adversely affected and must be maintained. With the existing water management infrastructure, the higher L-31N canal stages that would occur under Alternative 7 might not, under certain meteorological conditions, allow for sufficient draw-down of groundwater levels in advance of significant impending storms to meet this criterion. Consequently, Alternative 7 would potentially result in an increased risk of flooding over the then current conditions.

To address this concern, Alternative 7 was adjusted and was described as Alternative 7R. Additional features included in Alternative 7R are components of the C-111 project (S-332B North Seepage Reservoir; S-332B to S-332D Seepage Reservoir; S-332B West Seepage

Reservoir; S-332C Seepage Reservoir; S-332B/C Partial Connector; and Frog Pond Seepage Reservoir) and the MWD project (S-356 Pump Station; and removal of the L-67 Extension Levee). It provided increased capability to draw down groundwater levels while retaining all the sparrow protection features of Alternative 7. The increased capability was obtained by constructing an additional interim pump station (S-332C) and seepage reservoirs along the L-31N canal to supplement the capacity of S-332B to lower canal and groundwater levels. The pump stations draw water out of the canal, thus lowering adjacent groundwater levels. The water is pumped into reservoirs along the eastern boundary of the park. Some of the pumped water would return to the canal, but there is a net gain in lowering canal stages. During non-storm conditions, the pump stations are operated at reduced capacity to maintain a water depth in the reservoirs necessary to create a continuous hydraulic ridge along the park boundary for seepage control. This hydraulic ridge concept was developed in the authorized C-111 project. The pumping would be adjusted seasonally to maintain the desired water conditions in sparrow habitat within ENP conducive to breeding and habitat maintenance. In conjunction with these features along L-31N, the authorized S-356 pump station, a MWD Project feature, was included as part of Alternative 7R. The pump would be constructed in the Tamiami Canal (L-29) at the location shown in the MWD report, where it would be used to collect seepage from ENP along the reach of the L-31N canal, which extends from S-335 to G-211, by pumping water west behind the existing S-334 structure and thence into L-29 and NESRS when conditions permit. Table ES-1 displays the operating parameters for Alternative 7R.

The Corps did not treat the Alternative 7R structural elements, which were authorized features of the MWD and C-111 Projects, as proposed features of Alternative 7R. However, their construction was scheduled in conjunction with evaluation of Alternative 7R, and their construction and operation were addressed in the 2002 FEIS and are addressed in this 2006 Supplement. Pump capacity and systems operations will further be assessed under the Combined Structural and Operational Plan (CSOP) now under development and expected to be implemented upon completion of construction of the MWD Project in 2011.

Environmental Consequences of the Recommended Alternative. The recommended alternative (Alternative 7R) affects hydrology of Northeast Shark River Slough (NESRS), western SRS (WSRS), and WCAs 3A and 3B. The hydrology of WCAs 2A and 2B is also affected, but only to the same degree as it was previously under ISOP. Hydrological effects (better CSSS breeding conditions) are beneficial in NESRS and WSRS as recommended in the FWS BO. Minor adverse effects due to raised water levels may have occurred in the vicinity of tree islands in the southern portions of WCAs 3A and 3B. In addition Alternative 7R has benefited the hydrology of Taylor Slough.

Impacts to vegetation under the recommended alternative are similar to those of the ISOP. Increased ponding depths and hydroperiods in NESRS provide the desired consequence of approaching natural hydrologic conditions more closely, excluding exotic nuisance species, and encouraging natural wetland species. A reduction in annual flooding duration in WSRS is beneficial to native vegetative species. Very slightly increased modeled flood stage and duration in WCAs 2A and 3A appear nearly insignificant in comparison to natural fluctuations and previous operations, except in southern WCA 3A, where some slight increase in stages and durations was predicted. However, the regulation schedule for WCA 3A has not

been changed, and alternative routes were identified and used to route water out of WCA 3A when regulatory releases were called for, without opening the S-12A, B, and C structures during the CSSS nesting season. The Corps notes that undesirably high stages in this area were cited in the large C&SF *Restudy* Report of 1999 as a problem related to compartmentalization of the system that would need resolution under CERP as well as in the MWD Project. Construction of the S-332B seepage reservoir impacted Florida panther habitat, but the nature of the impact and the quality of the habitat are both minimal.

Under complete build-out of the recommended alternative and C-111 Project, no overflows would occur at the S-332B structure once construction of the S-332B north seepage reservoir and the partial S-332B/S-332C connector is complete and when it is practical to do the construction necessary to raise the western levee. Construction of the additional C-111 seepage reservoirs, and their operation under the modified operational plan in conjunction with the existing seepage reservoir, has reduced the potential for overflow in the region and additional construction will further reduce that potential. Since the implementation of IOP in August 2002, there have been four overflow events at the S-332B detention area (two events in 2003 and two events in 2005), but none of the events were considered significant in terms of phosphorus loading.

Areas of Controversy and Unresolved Issues. Few issues remain unresolved with various commenting agencies and other non-governmental groups regarding the proposed project. Potential impacts to tree islands have been minimized to the greatest practicable extent, as have potential water quality impacts due to releases entering ENP. Flooding impacts to residential and agricultural lands above previous levels have not occurred and are not likely to occur in the future with the recommended alternative.

Comments were received from a number of stakeholders regarding the use of the South Florida Water Management Model (SFWMM) for the hydrologic analysis, which uses 2-mile-square grids. This model does not allow for a detailed assessment of small, localized areas that may be affected by the project. However, no better model was available for use during the time frame of development of this project. The Corps is working with the other agencies to implement models that are capable of the resolution appropriate for site-specific analysis. In addition, actual hydrologic data collected during IOP implementation have confirmed the previous modeling predictions.

Pre-storm/storm/storm recovery operations have accounted for only 4% of the total time from IOP implementation in 2002 through 2005 (Appendix C). Initiation of these operations depends on a number of conditions that are determined on a case-by-case basis. The antecedent conditions that trigger storm-related operations include, but are not limited to, pending rainfall events, groundwater table elevation, and canal elevations at the time of the pending rainfall event.

Water managers from the Corps and SFWMD currently coordinate operations on a daily basis or more frequently. In addition, the Corps coordinates as needed with other parties that may be affected by operational decisions. The water managers use actual real-time hydrologic data and weather forecasts to determine appropriate operations.

The U.S. Army Corps of Engineers, Jacksonville District uses the Corps-wide standard software and database structure for real-time water control developed by the Hydrologic Engineering Center (HEC) in Davis, California. Time series hydrometeorologic data are stored, retrieved, and displayed using HEC Data Storage System (DSS) databases and programs.

The Jacksonville District receives data from data collection platforms (DCPs). DCPs are devices installed at remote gauging stations that measure real-time data including surface and ground water elevations, stream stages, reservoir elevations, cumulative precipitation, wind speed and direction, and barometric pressure. Data are transmitted from the DCP via Geostationary Operational Environmental Satellite (GOES) to an earth downlink receiver operated by NOAA/NESDIS in Wallops Island, Virginia.

Automated timed processes also provide provisional near-real-time data needed for operations. Additional data are received through an interagency data exchange program between SFWMD, St. Johns River Water Management District (SJRWMD), Southwest Florida Water Management District (SWFWMD), United States Geological Survey (USGS) and ENP.

A direct link to the National Weather Service, Southeast River Forecast Center is maintained to provide real-time text and graphics products generated by National Weather Service offices. Information includes weather and flood forecasts and warnings, tropical storm information, NEXRAD radar rainfall, graphical weather maps, and more. Selected products are disseminated to area offices in Clewiston, Florida and San Juan, Puerto Rico and posted to internet homepages. Satellite images are also important in making and implementing water management decisions.

A World Wide Web homepage was set up to disseminate hydrologic information and can be accessed at http://www.saj.usace.army.mil/h2o/. In addition, IOP-related documentation can be accessed at http://hpm.saj.usace.army.mil/issueweb/Sparrow/Sparrow_Page.htm.

The Corps continues to monitor the project performance and, after consultation with FWS, ENP and SFWMD will continue to modify operational parameters as required until the full C-111 and MWD Projects are implemented. Monitoring of vegetative communities, water quality, and fish and wildlife communities is ongoing, and any new data will be used to refine water management operations.

This IOP will be superseded after the Record of Decision for the CSOP is signed and when all elements of the MWD Project and the C-111 project are built and capable of operating. Currently, the MWD Project elements are scheduled to be constructed by the end of 2011, and the CSOP Water Control Plan (WCP) is scheduled for Record of Decision in early 2008.

Table ES-1. Alternative 7R Operations.

	No WCA-3A Regulatory Releases to SDCS or Shark River Slough	WCA-3A Regulatory Releases to SDCS
Regulation Schedule	Deviation schedule for WCA-3A (Figure 9), November 2000 WCA-3A interim regulation schedule as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation proposed in WCA-2A regulation schedule.	Deviation schedule for WCA-3A (Figure 9), November 2000 WCA-3A interim regulation schedule as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation proposed in WCA-2A regulation schedule.
S-343 A/B and S-344	Closed Nov 1 to July 15 independent of WCA-3A levels.	Closed Nov 1 to July 15 independent of WCA-3A levels.
S-12 A/B/C/D Sandbag culverts under Tram Road by February 1 if necessary.	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C closed Feb 1 to Jul 15; S-12D no closure dates. Follow WCA-3A regulation schedule after Jul 15. Note: If closure requires regulatory releases to SDCS then switch to operations for regulatory releases to SDCS.	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C closed Feb 1 to Jul 15; S-12D no closure dates. Follow WCA-3A regulation schedule after Jul 15.
S-333: G-3273 <6.8' NGVD Degrade the lower 4 miles of the L-67 extension	55% of the rainfall plan target to NESRS and 45% through the S-12 structures When WCA-3A is in Zone E1 or above, maximum practicable through S-333 to NESRS per WCA-3A deviation schedule.	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed through S-334 and subject to capacity constraints, which are 1350 cfs at S-333, L-29 maximum stage limit, and canal stage limits downstream of S-334. When WCA-3A is in Zone E1 or above, maximum practicable through S-333 to NESRS per WCA-3A deviation schedule.
S-333: G-3273 >6.8' NGVD	Closed	Match S-333 with S-334 flows.
L-29 constraint	9.0 feet	9.0 feet
S-355A and S-335B	Follow the same constraints as S-333. Open whenever gradient allows southerly flow.	Follow the same constraints as S-333. Open whenever gradient allows southerly flow.
S-337	Water supply	Regulatory releases as per WCA-3A deviation schedule.
S-151	Water supply	Regulatory releases as per WCA-3A deviation schedule.
S-335	Water supply The intent is to limit the volume of water passed at S335 to pre-ISOP conditions and not use S332B, S332C, or S332D or other triggers to pass additional flows. Note: It is recognized that under these conditions operations of S-335 would be infrequent.	When making regulatory releases through S-151, limit S-335 outflows to not exceed inflows from the S-151/S-337 path. Use S-333/S-334 before S-151/S-337/S-335
S-334	Water supply	Pass all or partial S-333 flows depending on stage at G-3273.
S-338	Open 5.8 feet Close 5.5 feet	Open 5.8 feet Close 5.4 feet
G-211 Tailwater constraint 5.3	Open 6.0 feet Close 5.5 feet	Open 5.7 feet Close 5.3 feet

	No WCA-3A Regulatory Releases to SDCS or Shark River Slough	WCA-3A Regulatory Releases to SDCS
S-331	Angel's Criteria – If Angel's well is <5.5 feet, then no limit on S-331 hw level. If Angel's well is 5.5-6.0 feet, S-331 avg. daily is between 5.0 – 4.5 If Angel's well is above 6.0 feet, S-331 avg. daily is between 4.5 – 4.0 until Angel's well is 5.7 feet	Angel's Criteria – If Angel's well is <5.5 feet, then no limit on S-331 hw level. If Angel's well is 5.5-6.0 feet, S-331 avg. daily is between 5.0 – 4.5 If Angel's well is above 6.0 feet, S-331 avg. daily is between 4.5 – 4.0 until Angel's well is 5.7 feet
S-332B Note 1: There will be two 125-cfs pumps and one 75-cfs pump directed to the west seepage reservoir. The remaining two 125-cfs pumps will be directed to the north seepage reservoir. Note 2: A new indicator will be established for Sub-population F. Operations will be modified as necessary to achieve desired habitat conditions consistent with the restoration purposes outlined in the C-111 GRR.	Pumped up to 575 cfs* On 5.0 feet Off 4.7 feet** *Pump to capacity if limiting conditions within the Sparrow habitat are not exceeded. There will be no overflow into ENP when the project (i.e., the S-332B north seepage reservoir and the partial S-332B/S-332C connector) is complete and when it is practical to do the construction necessary to raise the western levee. There may be overflow during emergency events until the project is complete and the western levee is raised. **If, after the first 30 days of operation, there is no observed drawdown at the pump, this stage level will be raised to 4.8 feet	Pumped up to 575 cfs* On 4.8 feet Off 4.5 feet *Pump to capacity if limiting conditions within the Sparrow habitat are not exceeded. There will be no overflow into ENP when the project (i.e., the S-332B north seepage reservoir and the partial S-332B/S-332C connector) is complete and when it is practical to do the construction necessary to raise the western levee. There may be overflow during emergency events until the project is complete and the western levee is raised.
S-332B North Seepage Reservoir	The north reservoir is the new 240-acre reservoir located to the north of the pump station with a weir discharging to the east. Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet when possible.	The north reservoir is the new 240-acre reservoir located to the north of the pump station with a weir discharging to the east. Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet when possible.

	No WCA-3A Regulatory Releases to SDCS or Shark River Slough	WCA-3A Regulatory Releases to SDCS
S-332B West Seepage Reservoir	The west reservoir is the existing 160-acre reservoir and is to the west of the pump station. There will be no overflow into ENP when the project (i.e., the S-332B north seepage reservoir and the partial S-332B/S-332C connector) is complete and when it is practical to do the construction necessary to raise the western levee. There may be overflow during emergency events until the project is complete and the western levee is raised. Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet.	The west reservoir is the existing 160-acre reservoir and is to the west of the pump station. There will be no overflow into the park when the project (i.e., the S-332B north seepage reservoir and the partial S-332B/S-332C connector) is complete and when it is practical to do the construction necessary to raise the western levee. There may be overflow during emergency events until the project is complete and the western levee is raised. Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet.
S332C The S-332C pump capacity is temporary. A new indicator will be established and a new gauge will be installed in the Rocky Glades. Operations will be modified as necessary to achieve desired habitat conditions consistent with the restoration of Taylor Slough based on the C-111 GRR.	Pumped up to 575 cfs* On 5.00 feet Off 4.70 feet** *Pump to capacity unless habitat conditions are not being achieved within the Rocky Glades. There will be no overflow into ENP. **If, after the first 30 days of operation, there is no observed drawdown at the pump, this stage level will be raised to 4.8 feet	Pumped up to 575 cfs* On 4.8 feet Off 4.5 feet *Pump to capacity unless habitat conditions are not being achieved within the Rocky Glades. There will be no overflow into ENP.
S-332C Seepage Reservoir	300 acres with overflow to the east Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet.	300 acres with overflow to the east Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet.

	No WCA-3A Regulatory Releases to SDCS or Shark River Slough	WCA-3A Regulatory Releases to SDCS
S-332B/S-332C Connector	141 acres partial 206 acres full 1,262 acres the land swap Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the water depth would be increased to 4.0 feet The Corps, FWS, ENP, and SFWMD will jointly develop a rule for emergency operations that is consistent with C-111 project purposes before the land swap B/C connector is used.	141 acres partial 206 acres full 1,262 acres Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the water depth would be increased to 4.0 feet. The Corps, FWS, ENP, and SFWMD will jointly develop a rule for emergency operations that is consistent with C-111 project purposes before the land swap B/C connector is used.
S-332D	Pumped up to 500 cfs from Jul 16 (or the end of the breeding season, as confirmed by FWS) to Nov 31; 325 cfs from Dec 1 to Jan 31; and 165 cfs* from Feb 1 to Jul 15. Meet Taylor Slough Rainfall formula consistent with marsh restoration (No L-31W constraint) On 4.85 feet Off 4.65 feet *New information will be sought to evaluate the feasibility of modifying the 165 cfs constraint	Pumped up to 500 cfs from Jul 16 (or the end of the breeding season, as confirmed by FWS) to Nov 31; 325 cfs from Dec 1 to Jan 31; and 165 cfs* from Feb 1 to Jul 15. Meet Taylor Slough Rainfall formula consistent with marsh restoration (No L-31W constraint) On 4.7 feet Off 4.5 feet *New information will be sought to evaluate the feasibility of modifying the 165 cfs constraint
Frog Pond Seepage Reservoir	810 acres with overflow into Taylor Slough Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to a maximum of 4.0 feet. However, a depth of 4.0 feet in the Frog Pond is not possible at this time due to the constraint of the S-332D pump station outlet elevation.	810 acres with overflow into Taylor Slough Normal operations will be targeted to achieve marsh restoration and phased in over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if Corps determines a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to a maximum of 4.0 feet. However, a depth of 4.0 feet in the Frog Pond is not possible at this time due to the constraint of the S-332D pump station outlet elevation.
S-332	Closed	Closed

	No WCA-3A Regulatory Releases to SDCS or Shark River Slough	WCA-3A Regulatory Releases to SDCS
S-175	Closed	Closed
S-194	Open 5.5 feet Close 4.8 feet	Operated to maximize flood control discharges to coast Open 4.9 feet Close 4.5 feet
S-196	Open 5.5 feet Close 4.8 feet	Operated to maximize flood control discharges to coast Open 4.9 feet Close 4.5 feet
S-176	Open 5.0 feet Close 4.75 feet	Open 4.9 feet Close 4.7 feet
S-177	Open 4.2 feet (see S-197 open) Close 3.6 feet	Open 4.2 feet (see S-197 open) Close 3.6 feet
S-18C	Open 2.6 feet Close 2.3 feet	Open 2.25 feet Close 2.00 feet
S-197	If S-177 headwater is greater than 4.1 feet or S-18C headwater is greater than 2.8 feet, open 3 culverts. If S-177 headwater is greater than 4.2 feet for 24 hours or S-18C headwater is greater than 3.1 feet, open 7 culverts. If S-177 headwater is greater than 4.3 feet or S-18C headwater is greater than 3.3 feet, open 13 culverts. Close gates when all the following conditions are met: 1. S-176 headwater is less than 5.2 feet and S-177 headwater is less than 4.2 feet 2. Storm has moved away from the basin 3. After Conditions 1 and 2 are met, keep the number of S-197 culverts open necessary only to match residual flow through S-176. All culverts should be closed if S-177 headwater is less than 4.1 feet after all conditions are satisfied.	If S-177 headwater is greater than 4.1 feet or S-18C headwater is greater than 2.8 feet, open 3 culverts. If S-177 headwater is greater than 4.2 feet for 24 hours or S-18C headwater is greater than 3.1 feet, open 7 culverts. If S-177 headwater is greater than 4.3 feet or S-18C headwater is greater than 3.3 feet, open 13 culverts. Close gates when all the following conditions are met: 1. S-176 headwater is less than 5.2 feet and S-177 headwater is less than 4.2 feet 2. Storm has moved away from the basin 3. After Conditions 1 and 2 are met, keep the number of S-197 culverts open necessary only to match residual flow through S-176. All culverts should be closed if S-177 headwater is less than 4.1 feet after all conditions are satisfied.
S-356	When conditions permit (i.e., G-3273 and L-29 constraints), discharges from S-356 will go into L-29. Pumping will be limited to the amount of seepage into L-31N in the reach between S-335 and G-211. A technical team will evaluate pumping limits and operations. The pumps will be operated accordingly.	When conditions permit (i.e., no S-334 regulatory releases and G-3273 and L-29 constraints), discharges from S-356 will go into L-29. Pumping will be limited to the amount of seepage into L-31N in the reach between S-335 and G-211. A technical team will evaluate pumping limits and operations. The pumps will be operated accordingly.

Note: Pre-storm drawdown will be the same as in the October 01 SDEIS with the additional language.

Operations for other than named events: SFWMD will monitor antecedent conditions, groundwater levels, canal levels, and rainfall. If these conditions indicate a strong likelihood of flooding, SFWMD will make a recommendation to the Corps to initiate pre-storm operations. The Corps will review the data, advise ENP and FWS of the conditions, consult with the Miccosukee Tribe, and make a decision whether to implement pre-storm drawdown or otherwise alter system wide operations from those contained in the table.

Note: The Chairman of the Miccosukee Tribe of Indians of South Florida or his designated representatives will monitor the conditions in WCA-3A and other tribal lands and predicted rainfall. If the Tribe determines these conditions indicate jeopardy to the health or safety of the Tribe, the Chairman will make a recommendation to the Corps to change the operations of the S-12 structures or other parts of the system. The Corps will review the data and advise appropriate agencies of the conditions, and the District Commander will personally consult with the Chairman prior to making a decision whether to implement changes to the S-12 operations.

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APPENDICES

LIST OF FIGURES

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LIST OF ACRONYMS

BMP	Best Management Practices
BO	Biological Opinion
C-x	Canal
C&SF	Central and Southern Florida Project
CAR	Coordination Act Report
CEQ	Council on Environmental Quality
cfs	Cubic Feet per Second
Corps	U.S. Army Corps of Engineers (see also USACE)
CSSS	Cape Sable Seaside Sparrow
CSOP	Combined Structural and Operational Plan
DEIS	Draft Environmental Impact Statement
DERM	Department of Environmental Resources Management
DOI	U.S. Department of the Interior
DSEIS	Draft Supplemental Environmental Impact Statement
EA	Environmental Assessment
EAA	Everglades Agricultural Area
EIS	Environmental Impact Statement
ENP	Everglades National Park
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEIS	Final Environmental Impact Statement
FFWCC	Florida Fish and Wildlife Conservation Commission
FONSI	Finding of No Significant Impact
FSEIS	Final Supplemental Environmental Impact Statement
FWS	U.S. Fish and Wildlife Service
G-x	Gauging Station or Culvert Structure
GDM	General Design Memorandum
GRR	General Re-evaluation Report
HTRW	Hazardous, Toxic, and Radioactive Waste
IECR	Institute for Environmental Conflict Resolution
IOP	Interim Operational Plan
ISOP	Interim Structural and Operational Plan
L-x	Levee
LEC	Lower East Coast
MWD	Modified Water Deliveries (to ENP)
NEPA	National Environmental Policy Act
NESRS	Northeast Shark River Slough
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	National Park Service
PL	Public Law
ROD	Record of Decision
RPA	Reasonable and Prudent Alternative
S-x	Pump Station, Spillway, or Culvert
SDCS	South Dade Conveyance System (ENP)
SDEIS	Supplemental Draft Environmental Impact Statement
SFWMD	South Florida Water Management District
SFWMM	South Florida Water Management Model
SMA	Square Mile Area
SRS	Shark River Slough
STA	Stormwater Treatment Area
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WCA	Water Conservation Area
WCP	Water Control Plan
WQ	Water Quality
WQC	Water Quality Certification
WSRS	Western Shark River Slough

1.0 PURPOSE AND NEED FOR THE CONSIDERED ACTION

1.1 Project Authorization

A minimum schedule of water deliveries from the Central and Southern Florida (C&SF) Project to the Everglades National Park (ENP) was authorized by Congress in 1969 in Public Law (PL) 91-282. Section 1302 of the Supplemental Appropriations Act of 1984 (PL 98-181), passed in December 1983, authorized the U.S. Army Corps of Engineers (Corps), with the concurrence of the National Park Service (NPS) and the South Florida Water Management District (SFWMD), to deviate from the minimum delivery schedule for 2 years in order to conduct an Experimental Program of water deliveries to improve conditions within the ENP. Section 107 of PL 102-104 amended PL 98-181 to allow continuation of the Experimental Program until modifications to the C&SF Project authorized by Section 104 of the ENP Protection and Expansion Act of 1989 (PL 101-229) were completed and implemented. PL 101-229 eventually led to the Modified Water Deliveries (MWD) Report and project that was authorized by PL 101-229 in 1989 (USACE 1992). The last feature of the MWD Project (Tamiami Trail) is currently scheduled to be completed in 2011, and will provide for increased water deliveries to the park through a route that more closely approximates the original historic flow-way down the center of Northeast Shark River Slough (NESRS).

The Modified Water Deliveries to Everglades National Park General Design Memorandum (MWD GDM) and FEIS (Final Environmental Impact Statement) were published in July 1992. The MWD FEIS includes a discussion of the location, capacity, and environmental impacts of the S-356 pump station and degradation of the L-67 levee extension south of Tamiami Trail, along with other recommended features. The Canal-111 (C-111) South Dade County 1994 Integrated General Re-evaluation Report (GRR) and EIS was published in May 1994. This report described a conceptual plan for five pump stations and levee-bounded retention/detention areas to be built west of the L-31N canal between the 8.5 Square Mile Area (SMA) and the Frog Pond to control seepage out of Everglades National Park while providing flood mitigation to agricultural lands east of C-111. The original and current configuration of these structural features is further discussed in the description of IOP Alternative 7R.

Test Iteration 7 of the Experimental Program of Modified Water Deliveries to ENP [herein referenced as the 1995 Base (95Base)] was initiated in October 1995 (USACE 1995). In February 1999, the U.S. Fish and Wildlife Service (FWS) issued a Final Biological Opinion (BO) under provisions of the Endangered Species Act (ESA), which concluded that Test 7, Phase I was jeopardizing the continued existence of the Cape Sable seaside sparrow (CSSS). They further concluded that ultimate protection for the species would be achieved by implementing the MWD Project (PL 101-229) as quickly as possible. In the opinion of FWS, the FWS BO presented a Reasonable and Prudent Alternative (RPA) to Test 7, Phase I of the Experimental Program that would avoid jeopardizing the CSSS during the interim period leading up to completion of the MWD Project. The FWS RPA recommended that certain hydrologic conditions be maintained in the sparrow's breeding habitat to avoid jeopardizing

the continued existence of the species. In January 2000, the Experimental Program was terminated, and in March 2000, Test 7, Phase I was replaced by the Interim Structural and Operational Plan (ISOP) (USACE 2000). The ISOP was designed to meet the conditions of the FWS RPA included in the FWS BO from March 2000 until implementation of the Interim Operational Plan (IOP) in 2002. The Record of Decision (ROD) for IOP was signed in July 2002, and IOP was implemented to continue FWS RPA protective measures for the CSSS until implementation of the Combined Structural and Operational Plan (CSOP). Because of the need to have an operational plan in place prior to the CSSS breeding season, the IOP EIS and ROD were finalized prior to completion of modeling for Alternative 7R. Pursuant to a March 14, 2006 order by the United States District Court for the Southern District of Florida, the Corps is now supplementing its 2002 IOP EIS (Appendix A).

1.2 Project Location

The C&SF system-wide project is located in South Florida and includes portions of several counties as well as portions of the ENP, Big Cypress National Preserve, and adjacent areas (Figure 1). The Corps' June 1992 General Design Memorandum (GDM) titled "Modified Water Deliveries to ENP" defines the project boundary as Shark River Slough and that portion of the C&SF Project north of S-331 to include Water Conservation Area 3 (WCA 3). The major project components of the MWD and C-111 Projects are shown in Figure 2.

1.3 Project Purpose

On February 19, 1999, FWS issued a Final FWS BO for the MWD Project, Experimental Water Deliveries Program, and C-111 Project under provisions of the Endangered Species Act of 1973, as amended. The FWS BO concluded that continuation of Test 7, Phase I operations would cause adverse modification of CSSS critical habitat and would jeopardize the continued existence of the CSSS. Currently, six such CSSS population clusters are known and are distributed within the southernmost portion of the C&SF Project area (Figure 3). The operating criteria for Test 7 were defined in a concurrency agreement between the Corps, ENP, and SFWMD in October 1995 (Figure 4; Table 2.1). Test 7 was to be implemented in two phases. Phase I consisted of operating the structures in place at that time until Phase II structures could be completed. The ultimate goal of Test 7 was to improve the timing, volume, and location of water deliveries to ENP to more closely reflect natural pre-development flows. The FWS BO also concluded that ultimate protection for the CSSS would be achieved by the rapid completion and implementation of the MWD Project. ISOP was designed to take the place of Test 7 until completion and implementation of the IOP. The IOP would avoid jeopardizing the CSSS during the interim period (then anticipated to be 2002 to 2009) leading up to full MWD implementation now expected to be in 2011.

On November 17, 2006, the FWS issued a new BO on IOP. The intent and overall effect of the 2006 BO for the IOP is two-fold: (1) it supersedes the original 1999 final BO for the Corps' Modified Water Deliveries to Everglades National Park project, the Experimental Water Deliveries Program, and the Canal 111 project, and (2) it also supersedes the 2002 amended final BO for the Corps' IOP for protection of the Cape Sable seaside sparrow.

In the opinion of FWS, the FWS 1999 BO presents a RPA to the Experimental Program that would avoid jeopardizing the CSSS. The FWS RPA recommends that the following hydrological conditions be met for protection of the CSSS: (1) A minimum of 60 consecutive days of water levels at or below 6.0 feet NGVD at gauge NP 205 between March 1 and July 15; (2) Ensure that 30%, 45%, and 60% of required regulatory releases crossing Tamiami Trail enter ENP east of L-67 extension, or produce hydroperiods and water levels in the vicinity of subpopulations C, E, and F that meet or exceed those produced by the 30%, 45%, and 60% targets; and (3) Produce hydroperiods and water levels in the vicinity of subpopulations C, E, and F that equal or exceed conditions that would be produced by implementing the exact provisions of Test 7, Phase II operations (USACE 1995). During implementation of the ISOP, the Corps received confirmation from FWS that producing the hydrologic equivalent of the 30%, 45%, and 60% conditions, as opposed to the actual release percentages, would also meet the FWS RPA conditions. Alternative 7R, which was implemented, allows the Corps to meet the FWS RPA conditions and minimize impacts to other natural and human resources, while managing the system for purposes authorized under the C&SF Project.

1.4 Related Environmental Documents

A number of actions relevant to the proposed action have been implemented since the 1983 Experimental Program was authorized. The following list identifies milestones leading up to the proposed action. Some of the key environmental documents relevant to the proposed action are the Final ISOP EA, Final SEIS on the 8.5 SMA, and Test 7 Summary. The Final Environmental Assessment (EA) for the ISOP was issued in March 2000. The Corps is currently operating under the IOP. A critical component to implementing the actions recommended in the FWS BO is the protection of the 8.5 SMA, a residential area located to the east of NESRS and west of L-31N. A Final SEIS was prepared and coordinated in August 2000 for implementation of a preferred alternative that consists of perimeter and interior levees as well as a seepage canal. A new proposed pump station (S-357) located at the southern terminus of the seepage canal will discharge seepage water into a treatment area located south of Richmond Drive in the C-111 project area. The ROD for the 8.5 SMA SEIS was signed on December 6, 2000. After legislative reconsideration and re-authorization of Alternative 6 for the 8.5 SMA in 2003, a second ROD identifying Alternative 6 as the selected plan was signed in 2003. Flood mitigation features of the 8.5 SMA are under construction and are expected to be complete in 2007.

As part of the interagency agreement that accompanied approval of Test Iteration 7 of the Experimental Program of Water Deliveries to ENP, the Corps participated in a monitoring program to determine the ecological and hydrologic benefits of the program. The monitoring program evaluated changes in hydrologic conditions beginning in November 1995 through May 2000. In addition, ecological factors that included freshwater fish and macroinvertebrates, mangrove resident fish, wading birds, CSSS, and American crocodile were monitored to determine the effects of the Test 7 Experimental Program on natural resources in the ENP.

At the December 17, 1999 emergency meeting of the SFWMD Governing Board, the Corps presented the ISOP, which was prepared to modify hydrologic conditions in ENP to avoid jeopardizing the CSSS. In a letter to the Corps dated January 20, 2000, SFWMD stated:

"The ISOP explicitly represents a departure from Test Iteration 7 of the Experimental Program of Water Deliveries to Everglades National Park operating criteria: consequently, the three-party concurrency agreement established for Test Iteration 7 cannot adequately facilitate implementation of the ISOP. Based upon your briefing that the requirements of the biological opinion for the CSSS now supersede the management objectives of the Experimental Program, we realize the Experimental Program has been effectively terminated."

Date	Action
1983	Authorization of the Experimental Program
1989	ENP Protection and Expansion Act of 1989
1990	Draft General Design Memorandum (GDM) on Modified Water Deliveries
1990	Biological Opinion on Modified Water Deliveries
1992	Final GDM on Modified Water Deliveries
1993	Implement Test 6 of the Experimental Program
1994	C-111 General Reevaluation Report
1995	Biological Opinion Test 6, Experimental Program
1995	Extension of Test 6
1995	Implement Test 7, Phase I of the Experimental Program
1995	Initiate Test 7 Hydrologic and Ecological Monitoring
1997	FWS Request Corps to Reinitiate Section 7 Consultation
1998	Implement 1998 Emergency Deviation from Test 7, Phase I
1999	BO on the Experimental Program, Modified Water Deliveries, and C-111 Project
1999	Implement Emergency Deviation from Test 7, Phase I
2000	Implement ISOP 2000 Emergency Deviation
2000	8.5 SMA Plan Final SEIS and ROD
2001	Completion of Test 7 Hydrologic and Ecological Monitoring Report
2001	Implementation of ISOP 2001 Emergency Deviation
2001	Draft EIS for the IOP for Protection of the Cape Sable Seaside Sparrow
2001	Supplemental Draft for the IOP for Protection of the Cape Sable Seaside Sparrow
2002	Amended BO on IOP
2002	Final EIS for the IOP for Protection of the Cape Sable Seaside Sparrow
2002	ROD for the IOP for Protection of the Cape Sable Seaside Sparrow
2003	8.5 SMA Plan 2nd ROD for Alt 6D
2005	Final Revised GRR and SEIS for Tamiami Trail Modifications
2006	Draft SEIS for the IOP for Protection of the Cape Sable Seaside Sparrow
2006	New BO on IOP

At that point, Test Iteration 7 of the Experimental Program was terminated and replaced by the ISOP. An EA was prepared for ISOP 2000, which provided a plan for operations to meet the requirements of the BO during 2000. ISOP 2001 provided for operations of water deliveries to ENP until it was replaced in August 2002.

The Corps issued a Draft EIS for the IOP for the protection of the CSSS in February 2001, which assessed six alternatives. Due to the number of issues that were still unresolved after public coordination of the DEIS, the Corps was directed by the President's Council on Environmental Quality (CEQ) to work collaboratively with the various agencies to formulate a consensus plan that would meet the BO requirements while satisfying other authorized C&SF Project purposes. At the suggestion of the CEQ, the Corps engaged the services of the U.S. Institute for Environmental Conflict Resolution (IECR) to facilitate the development of an improved plan to address FWS concerns. A number of facilitated meetings and teleconferences were held between FWS, ENP, and SFWMD from May through August 2001 to resolve issues regarding the IOP. As a result of this process, an additional alternative (Alternative 7) was developed for review under the NEPA process, and a Supplemental DEIS was issued in October 2001.

During the review process and based on letters from various stakeholders, it was decided to further develop Alternative 7 to provide additional flood control capacity because it appeared that Alternative 7 might result in an increased risk of flooding in agricultural areas located east of the L-31 levee in comparison to present conditions. The Corps, in consultation with FWS, ENP, and SFWMD, determined that construction of previously authorized components of the MWD and C-111 projects would provide flexibility to the system operations to maintain current flood protection capacity, although modeling results for the modified Alternative 7 were not complete, and the preferred alternative evaluated in the Supplemental DEIS, Alternative 7, was adjusted to utilize these components. The modified alternative, Alternative 7R was identified as the recommended plan in the Final EIS. A ROD was signed in July 2002 selecting Alternative 7R as the IOP, which was implemented in August 2002.

After Alternative 7R was selected in 2002, the Miccosukee Tribe filed a lawsuit challenging the Corps decision to implement IOP alleging violations of NEPA, ESA, the Administrative Procedures Act (APA), the Fifth Amendment, federal common law (nuisance), the Indian trust doctrine, the Federal Advisory Committee Act and also alleging improper delegation of agency authority. Among other objections the Tribe noted that no model runs for Alternative 7R were available at the time Alternative 7R was recommended in the FEIS, or at the time the ROD was signed. The Tribe also objected to incorporation of elements of the C-111 and MWD Projects without a full description of these structural elements as constructed and the impacts of their construction. The Court ruled in favor of the Corps on the ESA, APA, and FACA claims but against the Corps with regard to NEPA. While the court did not enjoin the Corps from implementing Alternative 7R, it did order the Corps to supplement its NEPA analysis of Alternative 7R by May 15, 2006, but granted an extension until September 18, and subsequently, December 22, 2006.

A Notice of Intent (NOI) to prepare a Supplemental Draft Environmental Impact Statement (SDEIS) for the IOP was published in the Federal Register (71 Fed. Reg. 26478, May 5,

2006). A Scoping Letter was issued to various stakeholders and interested parties on May 10, 2006 and comments were received through June 10, 2006. Four comments were received from private individuals during scoping. Copies of the scoping documents, comment letters, and mailing list are included in Appendix B.

A Draft Supplemental EIS (DSEIS) was prepared, and a Notice of Availability (NOA) was published in the Federal Register (71, Fed. Reg. 40096, July 3, 2006). The DSEIS was distributed to the public and comments were received until August 17, 2006. A copy of the comment letters and the Corps' response to the comments are included in Appendix I. The Corps re-initiated formal consultation with FWS regarding the CSSS, Everglade snail kite, and wood stork on July 10, 2006, and FWS issued a BO on November 17, 2006.

1.5 Decision to be Made

The Corps is supplementing its previous analysis of Alternative 7R and considering whether to continue operations under Alternative 7R or to implement another alternative.

2.0 ALTERNATIVES

2.1 Background

Under the SEIS, the Corps is considering the previously identified alternatives which were developed by the Corps with input from FWS, Florida Fish and Wildlife Conservation Commission (FFWCC), ENP, SFWMD, Miami-Dade Department of Environmental Resource Management (DERM), Florida Department of Environmental Protection (FDEP), and Florida Department of Agriculture and Consumer Services (FDACS).

RPA Hydrologic Condition Requirements

As discussed in the 2002 EIS, the FWS BO has specific RPA requirements for western and eastern habitats of the CSSS. For the western habitat, it stated that the Corps must prevent water levels at NP 205 from exceeding 6.0 feet NGVD for a minimum of 60 consecutive days between March 1 and July 15 during 80% of all years. For the eastern habitat, the BO requires that the Corps must implement actions that would produce hydroperiods and water levels in the vicinity of CSSS subpopulations C, E, and F equal to or greater than those that would be produced by implementing the exact provisions of Test 7, Phase II. In addition, it specified that the Corps must provide that at least 30%, 45%, and 60% of all regulatory water releases crossing Tamiami Trail enter ENP east of the L-67 extension in 2000, 2001, and 2002, respectively.

With these RPA requirements, the Corps developed RPA100, RPA101, and RPA102 model runs to represent the conditions required by the BO for 2000, 2001, and 2002. These RPAs were replaced by RPA00, RPA01, and RPA02 because of improved operations of S-12 structures, the use of S-355A&B, and adjustment to WCA-2 and WCA-3A regulation schedules. Operational assumptions used in the modeling of these RPAs are listed in Table 2.2.

2.2 Description of Alternatives

Six plans were evaluated in the 2002 EIS, and Alternative 7R was selected. Alternative 7R was an improvement of Alternative 7 which included operation of components of previously approved C-111 and MWD projects to provide additional operational flexibility and was included in the FEIS in 2002. In addition, descriptions and operational components of the ISOP 2000 and ISOP 2001 plans were provided for comparison in the SDEIS (Tables 2.2 and 2.3, respectively). The ISOP 2000 and ISOP 2001 were included to provide a basis of comparison as well as to include an analysis of these plans in the EIS.

Other alternatives have been suggested including returning to Test 7 operations and starting a captive breeding program for the CSSS. These alternatives were considered early in the IOP development process but not supported by the Department of the Interior, the agency with primary responsibility for endangered land species. As determined by the FWS, a return to

Test 7 operations would not be legal as specified in the FWS 1999 BO. A captive breeding program, as suggested by Miccosukee Tribe consultant Will Post, is not supported by other scientists and experts on the CSSS. The Corps notes that captive breeding efforts failed to save the extinct dusky seaside sparrow in spite of heavy investment of resources.

2.2.1 Alternative 1

Alternative 1 (also known as ISOP9dR) represents the model run for ISOP 2001 (Figure 5). The goal of Alternative 1 is to meet the RPA requirements for 2001. The plan is to provide water levels at NP-205 below 6.0 feet NGVD for a minimum of 60 consecutive days between March 1 and July 15, and, at the same time, produce hydrologic equivalence to the RPA hydroperiods that would be produced by implementing Test 7, Phase II in SDCS and discharging increasing percentages of all regulatory releases crossing Tamiami Trail to enter ENP east of the L-67 extension. Operational assumptions used in the modeling of Alternative 1 are listed in Table 2.4. Modeling results indicate that Alternative 1 meets and exceeds the RPA hydroperiod requirements for the eastern sparrow habitat, specifically under the hydroperiod frequencies performance measure. The operational plan for Alternative 1 is described as follows.

In Alternative 1, basic water management operations for flood control and water supply in SDCS have not changed significantly from 95Base (Test 7, Phase I). Canal levels in the northern reach of L-31N from S-331 up to S-334, L-30 from S-335 to S-337, and C-4 are unaffected by operational changes in this alternative. The new components that set Alternative 1 apart from 95Base (Test 7, Phase I) are the regulation schedule deviation for WCA-3A; closure dates for the S-12A, S-12B, S-12C, S-343A, S-343B, and S-344; two new pump stations, S-332B and S-332D; and lower canal levels along the L-31N reach between S-331 and S-176.

To meet the requirement for ensuring that water level stays at or below 6.0 feet NGVD at gauge NP-205 for at least 60 consecutive days, the Corps determined through regional modeling that staggered closures at S-343A and S-343B; S-344; and S-12A, S-12B, and S-12C from November 1 through February 1 and returning these structures to normal operation after July 15 would maximize the potential for nesting success for sparrow subpopulation A. Gauge NP-205 is located in the western marl prairies and is the key station for monitoring water levels in the WSRS.

To achieve the hydrologic equivalence to the hydroperiods required by the FWS BO for the eastern marl prairies (sparrow subpopulation C, E, and F habitats) and at the same time, maintain C&SF Project goals and responsibilities, the Corps proposed to route regulatory releases from WCA-3A, that normally would be discharged directly through the western structures, through S-333 and S-334 structures, down L-31N canal, and into a 160-acre seepage reservoir through S-332B pump. According to the regional modeling using the South Florida Water Management Model (SFWMM), when capacity is available, S-332B must be pumped up to 325 cfs in order to meet the RPA requirements. The routing of WCA-3A waters through SDCS would require the lowering of L-31N canal from S-331 to S-176 and maximizing excess discharges to tide.

2.2.2 Alternative 2

Alternative 2 (Table 2.5) was developed to further improve conditions in the eastern sparrow populations compared to Alternative 1, while also improving environmental conditions within other affected regions of the project area. It was decided that IOP alternatives must be formulated in two phases: Phase 1 of Alternative 2 would be in effect prior to completion of the 8.5 SMA Project, and Phase 2 would take effect once construction of the 8.5 SMA was completed. For the modeling of the IOP, it was assumed that as a result of the implementation of the 8.5 SMA solution, the G-3273 trigger was no longer in effect.

Phase 1 of Alternative 2 (IOP 2b) differs from Alternative 1 in the following ways: IOP 2b includes a deviation to the WCA-2A regulation schedule; the S-343 A and B and S-344 structures would close 2 months later on January 1; S-12A would close 1 month later on December 1; S-12D would close from February 1 to July 15; the schedule for S-333 would vary; and the pumping schedules for S-332B and S-332D would change.

Phase 2 of Alternative 2 (IOP 2) differs from Alternative 1 by allowing S-333 to deliver water to NESRS via L-29 at a rate up to its structural capacity when the G-3273 gauge is higher than 6.8 feet, closing the S-334 structure during regulatory releases from S-333, and incorporating the same changes as Phase 1 (IOP 2b) at S-332B and S-176.

2.2.3 Alternative 3

Alternative 3 (Table 2.6) also has two phases for the same purpose as Alternative 2, with Phase 1 being implemented prior to the 8.5 SMA Project completion and Phase 2 being implemented after completion of the 8.5 SMA Project.

Phase 1 of Alternative 3 (IOP 2a) is similar to Phase 2 of Alternative 2 (IOP 2) with one exception: S-333 would be closed when the G-3273 gauge is higher than 6.8 feet. Phase 2 of Alternative 3 (IOP 2) is the same as Phase 2 for Alternative 2.

2.2.4 Alternative 4

Alternative 4 (Table 2.7) (IOP 3 and IOP 3a) is also implemented in two phases and is similar to Alternative 2 (IOP 2 and IOP 2a) with the exception that the S-12 structures A, B, C, and D and the S-343A and B, and S-344 structures would be closed earlier in the year, from November 1 through July 15. IOP 3a would be implemented as Phase 1, and IOP 3 would be implemented as Phase 2.

2.2.5 Alternative 5

Alternative 5 (Table 2.8) (IOP 4 and IOP 4a) resembles Alternative 1 to a greater degree than do either Alternative 2 or Alternative 3 since this alternative was developed after ISOP9dR

was produced. Phase 1 of Alternative 5 and Alternative 1 differ only regarding the S-332B pumping schedule and the S-176 schedule. Phase 2 also includes the removal of the G-3273 trigger.

2.2.6 Alternative 6

Alternative 6 (Table 2.9) is identical to Alternative 5 with two exceptions: an additional 215-acre seepage reservoir was added with an emergency overflow weir designed to flow east towards L-31N canal and maximum pumping is limited to 250 cfs at the S-332B pump station (Figure 4). The purpose of adding a new 240-acre reservoir is to minimize direct weir overflow into ENP. By reducing pumping from 325 cfs to 250 cfs, potential weir overflow would be reduced. According to the regional modeling from SFWMM version 3.8, pumping up to 250 cfs at S-332B would still meet and exceed RPA hydroperiod requirements for subpopulations E and F. The size of the first seepage reservoir is approximately 140 acres. Field data suggest that in the dry season, the existing 140-acre seepage reservoir can seep up to 190 cfs, and in the wet season, the seepage rate is reduced to about 120 cfs. Based on these field data and limited and preliminary sub-regional modeling, the combined 355-acre seepage reservoir was projected to be able to seep over 250 cfs of discharge from S-332B without direct weir overflow into the park from normal operations. Once the new seepage reservoir was built, a more accurate rate of seepage would be obtained. The additional seepage reservoir location was north of the current seepage reservoir. It was designed with an overflow weir on the east side to allow for potential overflow back into L-31N canal. Although the existing seepage reservoir could be affected by the combined operation at these two seepage reservoirs, the north-south orientation of the new reservoir would be more conducive to seepage to ENP. Furthermore, the depth of the new reservoir is more than twice that of the existing reservoir. A table comparing SFWMM cell size and the current and proposed seepage reservoirs is shown below.

	Area (acres)
2-mile x 2-mile cell	2,560
1st seepage reservoir	140
2nd seepage reservoir	215

The seepage reservoirs were not modeled explicitly because of the limitation of the SFWMM version 3.8. However the amount of water being delivered to the modeled cell is correct. According to the model algorithm, SFWMM basically spreads inflow from S-332B pump over an entire grid cell. In terms of evaluating long-term hydrologic impacts associated with overland flow, the model is an appropriate tool to use in the determination of water management operations that would produce hydroperiods that would meet the RPA requirements. Modeling results indicate that Alternative 6 would meet and exceed the RPA hydroperiod requirements for the eastern sparrow habitat. Detailed operational assumptions used in the regional water management modeling of Alternative 6 are listed in Table 2.9.

2.2.7 Alternative 7

Alternative 7 (Table 2.10) represents the IOP consensus proposal from the Corps, ENP, USFWS, and SFWMD collaborative process. Its most important feature that sets it apart from other alternatives is the dual mode of water management operations. In addition, Alternative 7 has three structural modifications.

Dual Mode of Operations

The dual mode of operations was derived by recognizing some fundamental operational issues in the plan. When the S-12 discharges are seasonally restricted in order to decrease impacts to western sparrow habitats, the potential exists to increase water levels in WCA-3A. The ISOP addressed this by moving some of the regulatory releases that cannot be passed through S-12D into the SDCS via the L-29 borrow canal rather than directly onto western sparrow habitats. To mitigate for the increased inflow to the SDCS, the ISOP canal stages in the SDCS are lowered relative to Test 7, Phase I of the Experimental Water Deliveries. However, in the ISOP, these mitigation actions are implemented regardless of whether or not flow from WCA-3A is entering the SDCS. According to the Department of the Interior (Coordination Act Report, p.126-129), these continuously lowered canal stages adversely impacted wetlands near L-31N. Alternative 7 addresses this concern by mitigating for the increased flow into the SDCS only when that action is occurring. This operational philosophy results in the operational rule set in Table 2.10.

The first mode of the operation rule set of Alternative 7 is designated as “No WCA-3A regulatory releases to SDCS” operation. During these times, the L-31N canal would be maintained at Test 7, Phase I level when there are no WCA-3A regulatory releases. This operation was proposed to address the concern from the U.S. Department of the Interior (DOI) that maintaining L-31N canal at ISOP level would impact park resources in NESRS.

The second set of operational rules that would apply when water is flowing from WCA-3A down and around the SDCS is called "WCA-3A regulatory releases to SDCS." During this operational phase, levels in L-31N canal would be lowered to minimize potential flood impacts in SDCS and at the same time provide necessary downstream gradient to move some of WCA-3A regulatory releases through S-333/S-334, down through L-31N canal and to the S-332B pump station. The purpose of routing the regulatory releases from WCA-3A to S-332B seepage reservoir is to produce the hydrologic equivalence to the RPA hydroperiods in the habitats of sparrow subpopulations C, E, and F to provide adequate hydration in these habitats until MWD is operational. Because the SFWMM cannot simultaneously simulate two different modes of water management operations that depend on hydrologic conditions in WCA-3A, Alternative 7 was modeled in two separate runs. Hence, the model run simulating the "No WCA-3A regulatory releases to SDCS" is ALT7a and the "WCA-3A regulatory releases to SCDS" is ALT7b.

New Structural Features

The structural modifications in Alternative 7 include degrading the lower 4 miles of the L-67 extension levee and constructing an additional 215-acre seepage reservoir at S-332B.

The degradation of the lower 4 miles of the L-67 extension levee would allow water from NESRS to flow into the northern part of Shark River Slough and the northern habitat area of sparrow subpopulation E. According to the DOI, degrading the lower section of the L-67 extension would enhance hydroperiods in CSSS subpopulation E and water flows and volumes in Shark River Slough and its estuaries. Various lengths of the degradation were proposed and only 2-, 4-, and 6-mile sections were evaluated. Degrading a 4-mile section was selected based on the results of the modeling that show a potential hydroperiod improvement in the western part of NESRS with minimum impact to ground water level in and around 8.5 SMA.

Building an additional seepage reservoir of 215 acres at S-332B would avoid direct overflow into ENP. The current seepage reservoir (in 2002) was about 140 acres and had an average seepage rate of about 120 cfs during the wet season and about 190 cfs during the dry season. Cumulatively, both the existing 140-acre seepage reservoir and the new 215-acre detention (total of 355 acres) are 2.5 times larger than the existing seepage reservoir, and the new seepage reservoir is more than twice as deep as the original reservoir. It is reasonable to estimate that the combined seepage reservoirs of 355 acres would seep at least 250 cfs more than the amount needed to meet the RPA targets without direct weir overflow. In addition, the new seepage reservoir weir would be constructed to overflow to the east, not into the ENP. With the additional seepage reservoir and the reduction of pumping at S-332B from 325 cfs to 250 cfs, the potential for and frequency of weir overflow into the park during normal operations would be significantly reduced. Overflow into ENP under pre-storm/storm/storm recovery operation would depend on several factors whose recurrence frequency cannot be predicted reliably. These factors include but are not limited to:

- Rainfall recurrence probability;
- Antecedent stages in canals;
- Groundwater or surface water levels;
- Antecedent rainfall.

Although the Corps can estimate the recurrence frequency of a given rainfall event based on long-term meteorological records, it cannot predict the other three conditions with confidence. Therefore, it is difficult to project the frequency or duration of such overflow events. However, during the 31-year period of record, there were 44 tropical storms that could have triggered the pre-storm operations, but only if other antecedent conditions were appropriate. The pre-storm operation was not modeled in the regional simulation of Alternatives 7a and 7b, but the modeling results indicate that during the 31-year period of record, the L-31N canal stage above S-174 would exceed 5.1 feet 2% of the time, at which time S-332B would be triggered to pump up to 500 cfs, causing weir overflow into the park.

The current S-333 structure can pass 1,350 cfs, and no modifications to the structure are currently anticipated. During development of Alternative 7 as described in the 2002 FEIS, a modification to the S-333 structure was proposed that would increase the capacity to 2,000 cfs to allow more water into NESRS. Due to the proposed elimination of this station with future restoration measures, the modifications were subsequently removed. The operational constraints are still the 6.8 feet NGVD trigger at G-3273 and 9.0 feet NGVD canal level in L-29. However, the 6.8-foot level at G-3273 tends to override the 9.0-foot canal level in L-29. The highest level reached in the canal was 7.92 feet NGVD on June 20, 2005, caused primarily by unusually excessive rainfall for that time of the year. Detailed operational assumptions used in the water management simulation of Alternatives 7a and 7b are shown in Table 2.10.

As an integral part of IOP Alternative 7, S-335 would continue its primary function as a supplemental water delivery structure with no change in operational triggers from Test 7, Phase I of the Experimental Water Deliveries Program except when making S-151 regulatory releases. This operational decision should be based on first meeting the priority given to S-334 and then matching flow through S-335 with inflows from S-151 and S-337. Stage and flow hydrographs at S-335 for the period of record from January 1984 to June 2001 are shown on page A-93 of the SDEIS Engineering Appendix. From reviewing and analyzing these hydrographs, the interagency team recognized that capacity for flow from S-335 into SDCS has not increased and concluded that any change in capacity would be designated for routing WCA-3A regulatory releases.

2.2.8 Alternative 7R

Because Alternative 7R is the current operational plan, implemented after the ROD was signed in 2002, it is the default No Action alternative. A return to Test 7 operations, as suggested by the Miccosukee Tribe in the past is not an alternative because it would result in jeopardy to the CSSS. Alternative 7R (Figure 6; Table 2.11) evolved to overcome concerns regarding Alternative 7. Alternative 7, while trying to meet environmental objectives, has the primary goal of routing regulatory releases from WCA-3A through SDCS to the sparrow habitats on the eastern side of the ENP. Construction of the S-356 pump station adds flexibility into the IOP operations. The flexibility includes the ability to return ENP seepage back to NESRS, as well as help manage high canal levels. The operation first proposed (and modeled) was turning on the pump when the tailwater stage (i.e., L-31N) reached 5.8 feet, and turning it off at a tailwater elevation of 5.5 feet. The pumping was also limited to periods when the stages at G-3273 were below the flood protection level. Even though the regional modeling for South Florida is limited to a single mode of operation, Alternative 7 had to be simulated in two separate runs to bracket the range of hydrological impacts to WCA, ENP, and SDCS.

As a result of discussions addressing comments received regarding IOP Alternative 7, the agency principals agreed to recommend an action plan that would incorporate adaptive management, planning-to-construction engineering, and flexible water management operations. The key element that would allow this new method of solving problems in South

Florida would require construction of the S-356 pump station (an authorized MWD project) and the S-332C seepage reservoir (authorized C-111 project). The S-356 pump station location was adjusted slightly to minimize wetland impacts and impacts to fiber optic cable in the L-29 levee right-of-way associated with the original location specified in MWD General Design Memorandum. Its primary function in this IOP is to collect seepage in L-31N canal north of G-211 and discharge it into L-29 canal only when G-3273 is below 6.8 feet NGVD. This seepage management plan would reduce flooding impacts to South Dade agricultural and urban areas due to the movement of seepage water from ENP into L-31N canal. In addition, the agricultural stakeholders expressed a desire to continue the use of S-356 when G-3273 is above 6.8 feet NGVD. This poses a problem to the residents of the 8.5 SMA because, when G-3273 is above 6.8 feet NGVD, any additional water to L-29 could adversely affect the area.

Building additional seepage reservoirs (S-332B N, S-332B to S-332D, and Frog Pond) would avoid direct overflow into ENP. The current seepage reservoir (constructed in 2000) was about 140 acres and had an average seepage rate of about 120 cfs during the wet season and about 190 cfs during the dry season. Cumulatively, the new detentions (approximately 3,765 acres) are more than 10 times larger than the previous seepage reservoir. Therefore, the potential for and frequency of weir overflow into ENP during normal operations would be significantly reduced. Overflow into the park under pre-storm/storm/storm recovery operation would depend on several factors whose recurrence frequency cannot be predicted reliably. These factors include but are not limited to:

- Rainfall recurrence probability;
- Antecedent stages in canals;
- Groundwater or surface water levels;
- Antecedent rainfall.

Although the Corps can estimate the recurrence frequency of a given rainfall event based on long-term meteorological records, it cannot predict the other three conditions with confidence. Therefore, it is difficult to project the frequency or duration of such overflow events. During the 31-year period of record, there were 44 tropical storms that could have triggered the pre-storm operations, such as but not limited to high groundwater levels, but only if other antecedent conditions were present. The pre-storm operation was not modeled in the regional simulation of Alternative 7R, but the modeling results indicate that during the 31-year period of record, the L-31N canal stage above S-174 would exceed 5.1 feet 2% of the time, at which time S-332B would be triggered to pump up to 500 cfs, causing weir overflow into the park.

The current S-333 structure design discharge capacity is 1,350 cfs. No modifications to the structure are currently anticipated. During development of Alternative 7R, a modification to the S-333 structure was proposed that would have increased the design discharge capacity to 2,000 cfs to allow more water into NESRS. Due to the proposed elimination of this structure with future restoration measures, the modifications were subsequently removed. The operational constraints are still the 6.8 feet NGVD trigger at G-3273 and 9.0 feet NGVD canal level in L-29. However, the 6.8-foot level at G-3273 tends to override the 9.0-foot canal level in L-29. The highest level reached in the canal was 7.92 feet NGVD on June 20, 2005, caused primarily by unusually excessive rainfall for that time of the year.

As an integral part of IOP Alternative 7R, S-335 would continue its primary function as a supplemental water deliveries structure with no change in operational triggers from Test 7, Phase I of the Experimental Water Deliveries Program except when making S-151 regulatory releases. This operational decision should be based on first meeting the priority given to S-334 and then matching flow through S-335 with inflows from S-151 and S-337. Stage and flow hydrographs at S-335 for period of record from January 1984 to June 2001 are shown on page A-93 of the SDEIS Engineering Appendix. From reviewing and analyzing these hydrographs, the interagency team recognized that capacity for flow from S-335 into SDCS has not increased and concluded that any change in capacity would be designated for routing WCA-3A regulatory releases.

New Structural Features

C-111 Features

The seepage reservoirs (C-111 components) were designed to be pumped to a maximum depth of 2 feet except in flood emergencies, when the depth could be increased to 4 feet. Once complete, there would be no direct overflow to ENP. Normal operations of the S-332B, S-332C, and S-332D pump stations would be targeted to achieve marsh restoration with the proposed east-west gradient once all land acquisition, construction, and testing have been completed and final gradient parameters have been determined.

Construction of the C-111 detention/retention area reservoirs on all available lands that had been acquired for the C-111 Project was accelerated in 2002 to provide for increased capability to maintain flood control in the C-111 basin in conjunction with the operational changes for protection of the CSSS included in Alternative 7R (IOP) (Figure 7). The increased capability is provided by the S-332B and S-332C pump stations and associated seepage reservoirs along the L-31N canal to lower canal and groundwater levels east of the borrow canal. The pump stations draw water out of the canal, thus lowering adjacent groundwater levels. The water is pumped into reservoirs along the eastern boundary of the park. Some of the pumped water would return to the canal, but there is expected to be a net gain in lowering canal stages. During non-storm conditions, the pump stations would be operated at reduced capacity to maintain a water depth in the reservoirs necessary to create a continuous hydraulic ridge along the park boundary for seepage control. This hydraulic ridge concept was developed in the authorized C-111 Project, and use of the C-111 Project features in this manner under Alternative 7R are consistent with the C-111 authorized project design and purposes.

S-332B North Seepage Reservoir. The north reservoir is the new 215-acre reservoir located to the north of the pump station with a weir discharging to the east. Two 125-cfs pumps will be directed into this reservoir. Normal operations will be targeted to achieve marsh restoration over a period of years. However, this provision does not include a requirement to maintain water levels in the reservoirs during dry conditions by bringing water in from outside the drainage basin. This seepage reservoir will have a normal maximum water depth

of 2.0 feet. If the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to 4.0 feet when possible.

S-332B to S-332D Seepage Reservoir. This reservoir would incorporate the S-332B West Seepage Reservoir and extend south tying into the L-31W levee in the northern part of the Frogpond (1,262 acres). This feature required the Congressional approval of the land swap of lands owned by ENP with the SFWMD. A contingency plan was developed in case the land swap did not happen in time. This contingency plan would use available lands and incrementally build this seepage reservoir.

S-332B West Seepage Reservoir. The west reservoir is the existing 140-acre reservoir and is to the west of the pump station. Two 125-cfs pumps and one 75-cfs pump will be directed into this reservoir. There will be no overflow into the park when the project (i.e., the S-332B north seepage reservoir and the partial S-332B/S-332C connector) is complete and when it is practical to do the construction necessary to raise the western levee. There may be overflow during emergency events until the project is complete and the western levee is raised. Normal operations are the same as with S-332B West.

S-332C Seepage Reservoir. The S-332C Seepage Reservoir is 278 acres with overflow to the east. The S-332C pump capacity is temporary. A new indicator will be established and a new gauge will be installed in the Rocky Glades. Operations will be modified as necessary to achieve desired habitat conditions consistent with the restoration of Taylor Slough based on the C-111 GRR. Normal operations are the same as with S-332B West.

S-332 B/C Partial Connector. The S-332B/C partial connector will consist of 182 acres. Currently, the Corps has constructed 124 acres of a partial offset connector (Figure 7). To-date, real estate issues prevented the entire 182-acre offset connector from being constructed, but issues have since been resolved and construction will be completed in 2008. Normal operations are the same as with S-332B West.

Frog Pond Seepage Reservoir. The Frog Pond Seepage Reservoir is 2,200 acres with overflow into Taylor Slough. The S-332D pump station would be directed into the north end of the Frog Pond reservoir. This station pumps up to 500 cfs from July 16 (or the end of the breeding season, as confirmed by FWS) to November 30; 325 cfs from December 1 to January 31; and 165 cfs* from February 1 to July 15. Discharge is set to meet the Taylor Slough rainfall formula consistent with marsh restoration (No L-31W constraint). The pump triggers are 4.85 feet on, 4.65 feet off. New information will be sought to evaluate the feasibility of modifying the 165-cfs constraint. Normal operations are the same as with S-332B West. This seepage reservoir will have a normal maximum water depth of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name" storm, the depth of water would be increased to a maximum of 4.0 feet. A depth of 4.0 feet in the Frog Pond is not possible at this time due to the constraint of the S-332D pump station outlet elevation.

Marsh Operations

One of the operational features developed during the IOP plan formulation process and included in Alternative 7R is what is now referred to as "marsh operations" and defines operating parameters for the S-332B North and West seepage reservoirs, the S-332C seepage reservoir, the S-332B/S-332C Connector, and associated pump stations. This feature was included to achieve a balance between flood control, restoration of marsh habitat in ENP, and meeting the RPA criteria in the FWS B.O. It should be noted that deviations from the 2' default for marsh operations were developed after the IOP was implemented in 2002.

Under the current plan, operation of these reservoirs will be targeted to achieve marsh restoration and will have maximum depths of 2.0 feet. However, if the Corps determines that a flood emergency exists similar to an event like the "No Name storm", the depth of water would be increased to a maximum of 4 feet. The S-332B pump station will pump to capacity (575 cfs) if limiting conditions within the sparrow habitat are not exceeded. Once the S-332B North Seepage Reservoir and S-332B/S-332C Connector were completed, there would be no overflow into the Park.

The Corps considered "marsh operation criteria" to include operation at the 2-foot default reservoir depth, as well as the flexibility to vary from this depth as testing and new parameters are developed by the interagency team. The development and evaluation of new information is intended to assist the Corps and interagency team in determining the marsh operation component of the next operating plan, the Combined Structural and Operational Plan (CSOP).

Staff from ENP initially provided the Corps proposed criteria to be considered for marsh operations. Further evaluation through the interagency CSOP team resulted in necessary refinements to the initially proposed criteria. The tentatively preferred marsh operations developed through the CSOP interagency team relax the IOP's 2-foot maximum depth criteria for the detention areas and raises it up to 2.5 feet. This is in conjunction with proposed operations under normal conditions that allow S-332B and S-332C pump stations to pump into the detention areas based on the gradient and water levels between the marsh in ENP and the detention areas. The target gradient is based on measured water levels ¼ mile and 4 miles from the detention areas. The gradient, or change in water level, should be less than 0.4 feet per mile. Pumping into the detention area can be continued until this gradient is exceeded. At this point, pumping would be reduced to a level that would maintain the target gradient or stages exceed 2.5 feet in the detention areas. The tentatively preferred operations developed in the CSOP process also includes an override for these marsh operations based upon levels in the canal to provide for continued pumping into the detention areas in order to maintain flood control in the developed areas east of the canal and to reduce discharges south through the C-111 into Barnes Sound. The Corps intends to begin field testing these proposed operational criteria to provide the information necessary to extrapolate model output to more accurately reflect actual conditions produced in the system under these operations. The Corps is currently operating the C-111 detention areas at the 2-foot maximum depth and has installed the monitoring gages in the ENP required to test these operations. To monitor marsh effects of stage changes in the detention areas, the Corps, in coordination with other agencies, plans to begin testing at stages varying from the 2-ft default and working towards the operational criteria developed in CSOP while targeting the 0.4 foot per mile gradient between the detention areas and adjacent marsh. This testing will be coordinated and congruent with the

build out of the full detention areas included in Alt7R. Completion of the build out of the C-111 detention areas included in Alt7R is contingent on Congressional funding and is currently scheduled for construction after FY 2008.

"Mod Waters" Features

Two features previously developed as part of the "Mod Waters" project are important components of the IOP plan: the S-356 pump station and degradation of the lower 4 miles of the L-67 extension levee. These components were described in the 1992 GDM for Mod Waters.

Removal of L-67 Extension Levee. The Mod Waters report proposed to degrade a section of the L-67 extension levee to allow free flow of water from WSRS into NESRS. This would restore full interaction between WSRS and NESRS, restoring the area to a more natural state. The lower 4 miles of the L-67 extension were degraded and the resulting fill material was placed in the borrow canal.

Under IOP, the degradation of the lower 4 miles of the L-67 extension levee would allow water from NESRS to flow into the northern part of Shark River Slough and northern habitat area of sparrow subpopulation E. According to DOI, degrading the lower section of the L-67 extension would enhance hydroperiods in CSSS subpopulation E and water flows and volumes in Shark River Slough and the Shark River Slough estuaries. Various lengths of the degradation were proposed and only 2-, 4-, and 6-mile sections were evaluated. Degrading a 4-mile section was selected based on the results of the modeling that show a potential hydroperiod improvement in the western part of NESRS with minimum impact to ground water level in and around the 8.5 SMA.

S-356 Pump Station. The S-356 pump station was designed to pump water from the L-31N canal into the L-29 canal, thereby returning seepage water that would have entered L-31N from park lands west of L-31N from L-29 southward to the flood mitigation area. Higher stages in NESRS would increase seepage into the L-31N canal, adversely affecting flood control in the adjacent basin and downstream. The S-356 pump station was designed to maintain the L-31N canal reach from Tamiami Trail south to the S-331 pump station. S-356 was initially designed to pump up to 988 cfs because it would also have moved increased seepage into the 8.5 SMA area resulting from increased flows to NESRS up L-31N and west into L-29 canal to return this seepage to NESRS. Under the 1992 selected plan, the 1992 Mod Waters GDM visualized utilizing S-356 to draw water pumped from the 8.5 SMA by S-357 into the L-31N canal, from where it could be pumped by S-356 back into the L-29 canal and the NESRS south of Tamiami Trail. After relocation of the 8.5 SMA S-357 pump station to a site south of Richmond Drive, with drainage of 8.5 SMA seepage water to the south, the remaining capacity or need was estimated to be reduced to 500 cfs.

Under IOP, S-356 would collect seepage (primarily from the west - WCA-3B and NESRS) along the reach of the L-31N canal that extends from structures S-335 to G-211, and the L-30 canal (WCA-3B and the Pennsuco Wetlands) by pumping water west into L-29 borrow canal

and NESRS when conditions permit. The groundwater gradient in this area is predominantly from NESRS towards the east. To ensure urban stormwater would not be pulled in from the east (C-4 basin) by the S-356 into ENP, its operation would be limited to times when the G-211, S-336, S-335, etc. are closed. During modeling for IOP, only a capacity of 500 cfs was determined necessary. The function of the S-356 pump station under IOP is consistent with the authorized purpose of managing seepage into the reach of L-31N from Tamiami Trail to the S-331 structure.

S-356 pump station operational guidance is based on the modeling output recommendations. The SFWMM model simulates the collection/return of seepage lost to the east through L-31N by estimating the seepage rate using an empirical relationship based on stage differences across the levee. S-356 pumping rates in the model are based upon this empirical calculation using a daily time step. This type of empirically based seepage calculation cannot be directly translated to operational criteria for the field. Consequently, additional information is necessary to further develop the relationship between the data available for hydrologic parameters and seepage losses, as needed for operational criteria that can be utilized by field personnel. Field tests were identified as an additional tool to assist in the determination of the appropriate pumping rates under various conditions. As additional understanding of the hydrologic system response to S-356 pump operations is developed, operational flexibility will be exercised as needed.

Operational guidance for S-356 will use the recommended plan operational criteria as a starting point, and field tests will be conducted to further define and refine such criteria. Consequently, a series of tests during the dry and wet season are necessary to aid refining these criteria. Test details will be developed by the S-356 Team, who will be responsible to implement and analyze test results, accordingly. The S-356 Team will develop the objectives and criteria for each test. The S-356 Team will collaborate to implement at least one test during FY-07. The S-356 Team Chair will be the Corps and will include the following agencies and stakeholders: SFWMD, USFWS, ENP, FDEP, FDOT and Miccosukee Tribe. The team will meet on an as needed basis. The Corps, as Chair, will be responsible to setup conference call number or meetings as necessary to fulfill the goal. Anticipated constraints must be addressed early and effectively by the team prior test being implemented. Unanticipated constraints to a test already developed and/or under implementation must be resolved by the team in a timely manner prior making a decision.

During the implementation of each test, the team will meet on a daily basis or as necessary to discuss status and preliminary results. Adjustments to the test during implementation may be needed and may be made as determined by the team.

After implementation of each test, the team will gather the data obtained, perform analysis and a final report be issued. In the report, a recommendation will be made for implementation of refined operational guidance or further testing.

The recommendation in the report should include the relationship between the data available for hydrologic parameters and seepage losses that will govern operations for the S-356 pump station. This report should also include if seasonal adjustments are warranted.

It is anticipated that use of total capacity of the S-356 pump station will result in larger change of elevations but the magnitude of the change will be uncertain until field tests are performed. Full coordination between the entire S-356 Team must continue and rates of changes will be monitored to ensure there will be no adverse effects on the C&SF project authorized purposes and potential endangered species nesting.

2.3 Selection of Recommended Alternative

The currently recommended alternative (Alternative 7R) was selected during the collaborative conflict resolution process by the Corps, SFWMD, USFWS, and ENP based on its ability to satisfy the project purpose to the greatest degree while providing flexibility in reducing other potential impacts to the human environment. Alternative 7R was selected in 2002 when the ROD was signed.

2.4 Status of the Recommended Alternative

Current Status of C-111 Project Features

The C-111 Project modifications were authorized as an addition to the C&SF Project in WRDA 1996 to protect the natural values associated with ENP while maintaining flood damage reduction within the C-111 basin east of L-31N and C-111. The authorized plan outlined in the 1994 C-111 GRR consisted of both structural and non-structural components. Non-structural components of the plan included acquisition of more than 11,866 acres of land within the Frog Pond and Rocky Glades areas. Structural components of the plan consisted of the construction or modification of nine canals and construction of a continuous detention/retention area to be constructed along the L-31N canal along with a series of pump stations. The 1994 plan included a detention/retention area that would be utilized for temporary storage of excess flood water before discharge to Taylor Slough. The 1994 plan called for a series of pump stations, the S-332's (S-332 at 165 cfs and S-332A, B, C, and D at 300 cfs capacity each, and S-332E at 50 cfs). S-332 would discharge directly into Taylor Slough from the L-31W borrow canal. S-332A would discharge west of the S-332D Tieback levees directly into ENP. S-332B, C, and D would pump into the detention/retention area that lies between the agricultural areas on the east and ENP on the west. S-332E would be in the lower part of the C-111 basin and be used to re-hydrate the Southern Glades lands. A battery of culverts and an overflow spillway were to be constructed along the western levee of the detention/retention area. Pumping of water into the detention/retention area would reduce the slope of the groundwater gradient from the high water conditions within ENP and the L-31N canal, thereby reducing seepage losses from the adjacent wetlands within ENP and providing for higher stages and longer hydroperiods in the area north of Taylor Slough and the Rocky Glades area west of L-31N. The re-direction of water to Taylor Slough through the detention/retention area was also designed to reduce discharges through the S-176 structure to the lower C-111 and out to tide at Barnes Sound. The C-111 plan included other project features to improve conditions in Taylor Slough and the eastern panhandle of ENP, such as replacement of the State Road 9336 bridge over Taylor Slough within ENP, a canal

connection from C-111 to the L-31W BC just north of S-175 to provide flows to S-332, plugging of canals C-109 and C-110, and removal of the C-111 canal spoil mounds on the south side of the canal along its most southerly reach.

Construction of the C-111 Project modifications has been underway since the initial authorization in 1996 in accordance with the pace of authorized land acquisition required for the project and funding from Congress. The Taylor Slough Bridge replacement was the first feature constructed. The bridge replacement was designed to achieve a more even spatial distribution of the increased water flow to Taylor Slough to be provided by the C-111 Project modifications (S-332 series of pump stations). Removal of the C-111 spoil mounds was subsequently completed to allow water to overflow the canal bank in the panhandle area and contribute towards reductions in the frequency of S-197 openings. Backfilling of C-109 was accomplished by FDOT as mitigation for their widening of US-1. Construction of pump station S-332D was competed in 199 and discharged directly into the L-31W borrow canal.

Current Status of Marsh Operations

The Corps is currently implementing marsh operations and operating the C-111 reservoirs at the 2-foot default depth. Monitoring equipment has been installed at the wells constructed for this purpose. Conditions will be observed under various hydrologic conditions under the 2-foot operating parameters. Monitoring will continue as the operating criteria are adjusted and evaluated for system response as we move toward the proposed CSOP operational criteria with a maximum depth of 2.5 feet while targeting the 0.4-foot per mile gradient between the detention areas and the adjacent marsh. The Corps will monitor the effects of marsh operations on water levels in the ENP in coordination with the other agencies. The testing will use adaptive management and flexible water management operations to evaluate various pumping rates and water levels.

Not all of the features of the C-111 reservoirs have been constructed, due to real estate issues. The northern and southern sections of the S-332B/S-332C Connector have been built, but the real estate for the middle section has only recently been acquired by the local sponsor. The SFWMD is required to certify adequate real estate interests for construction of the federal project, but they were unable to certify lands for certain portions of the project until Congressional action in 2006 allowed for the transfer of lands from the ENP to SFWMD.

Monitoring well installation was delayed due to difficulties in acquiring special use permits for installation. Although the wells were finally installed in February-March 2004, the subsequent hurricane seasons of 2004 and 2005 prevented the SFWMD from installing the monitoring equipment. The Corps worked along with the USGS and had the monitoring equipment installed by July 1, 2006, and testing protocol is being developed currently. The testing will be coordinated with the build out of the detention basins (to be completed in 2011). The results of the testing will determine the marsh operations criteria under the remainder of IOP and determine if any changes would be appropriate for CSOP.

The Corps, along with the interagency team, will work to develop and evaluate operational guidance based on field tests. This testing will be developed by the team, who will be

responsible to implement and analyze test results. The team will develop the objectives and criteria for each test. The team will meet on as needed basis. Adjustments to the tests during implementation may be needed and may be made as determined by the team.

It is recognized that new technical information may be developed as this plan is implemented and that observed results may differ from predicted results. Considering this, it may be necessary to adjust operations to address the new information or observed results to achieve better performance for environmental restoration and protection, to ensure the health, safety, and well being of the general public.

Current Status of the "Mod Waters" Components

The S-355 A/B pump structures were built in approximately 1995 but have not yet been operated. FDEP approval for the S-355 A/B operations was originally issued under a FDEP program that was phased out and replaced with another program. The Corps is in the process of getting FDEP approval under the new program. As described in the 1992 GDM, structures S-335 A/B would enable water to be pumped out of WCA-3B into NESRS and constructed to allow east-west vehicular traffic, particularly from the Miccosukee Tribe, access across the spillway bridge. The structures would be adjusted to pass 55% of the total computed water deliveries to NESRS in conjunction with S-333 operations. Their role under the IOP operating plan remains the same.

The lower 4 miles of the L-67 levee extension was removed in 2002. The 1992 GDM authorized the removal of the entire extension with the purpose of restoring the hydrologic connection between SRS and ENP. Under IOP, this hydrologic connection enhances hydroperiods in CSSS subpopulation E as well. When the L-67 structural details and operations are finalized, the Corps will apply for FDEP approval to operate those structures.

The S-356 pump station was built approximately at the location specified in MWD GDM (the footprint was adjusted to minimize wetland impacts and minimize impacts to fiber optic cable located in the L-29 levee right-of-way). The Corps initially applied for operational authorization from FDEP to operate the S-356 pump station in accordance with the operational parameters included in the IOP 2002 FEIS that when conditions permit (i.e., no S-334 regulatory releases and G-3273 and L-29 constraints), discharges from S-356 will go into L-29, pumping would be limited to the amount of seepage into L-31N in the reach between S-335 and G-211, and a technical team would evaluate pumping limits and operations. FDEP responded with a draft request (December 2002) for additional information (RAI) primarily concerned with hydrology issues. The draft RAI resulted in a series of ongoing technical discussions concerning the S-356 operations, and the proposed operations table was revised to address most of the water source concerns identified in the draft FDEP RAI. The proposed operational adjustments conceptually addressed most of the DOI concerns about water quality, but FDEP required reasonable assurance that water quality conditions would not be degraded by operation of the S-356 pump station. The concern is that over-pumping (beyond recycling ENP/WCA seepage water) of S-356 could draw urban runoff water from the east into the relatively pristine ENP. Tests of the S-356 pump station are necessary during the wet season to refine and/or confirm the effectiveness of the proposed operational constraints to

ensure that undesirable (water quality) urban runoff water or groundwater is not drawn into S-356 and subsequently discharged into ENP. Wet season pump tests cannot be conducted until the 8.5 SMA flood mitigation feature is constructed and operational. Until that time, some dry season tests will be conducted to gain more information on this issue. Dry season tests cannot provide the reasonable assurance necessary for FDEP to issue operational water quality certification (WQC), but will provide other useful information concerning the operation of this pump station.

Since early 2005, there have been several attempts to perform an S-356 pump test. Details of the S-356 test protocol are included in Appendix C. The first pumping test was initiated on August 1, 2006 and continued until August 8, 2006. The Corps is currently processing and evaluating the data from this effort. Preliminary results show that the observed maximum change in elevation in L-29 canal and L-31N canal was approximately 0.3 feet and 0.5 feet, respectively. In addition, the observed maximum change in elevation in NESRS was approximately 0.1 feet. The maximum allowed pump capacity for this test was 250 cfs, which is nearly half of the total capacity of the pump station.

2.4 Comparison of Alternatives

The alternatives were previously compared in Section 4.0, "Environmental Consequences" of the 2002 Final EIS. Evaluation is this document is limited to the Recommended Alternative 7R and effects of the recommended plan to date.

Table2. 1 Description of 95 Base Simulation

	95Base Modified 2 (Test 7, Phase I)
Regulation Schedule	C&SF regulation schedules prior to ISOP.
S-343 A/B and S-344	Per the above WCA-3A regulation schedule
S-12 A/B/C/D	Operated according to current regulation schedule, which includes rainfall plan target. Split 10/20/30/40 percent west to east
S-333: G-3273 <6.8'	S-333 open to deliver 55 percent of Shark River Slough target flows as per rainfall plan target (rainfall formula + WCA-3A regulatory discharge)
S-333: G-3273 >6.8'	S-333 closed
L-29 constraint	8.0 ft
S-355A&B	Regulatory releases are constrained by L-29 and G-3273 triggers. Dry Wet Open 8.50 8.50 Close 6.50 6.50
S-337	Water supply only
S-151	Per the above WCA-3A regulation schedule
S-334	Closed
S-332B	Non-existent
S-332B Seepage Reservoir	Non-existent
S-332D	Non-existent
S-332	Operated according to Taylor Slough rainfall plan with 465-cfs capacity, subject to 165-cfs limitations from Mar 1 to Jul 15
S-175	Dry Wet Open 4.7 4.7 Close 4.3 4.3
S-194	Dry Wet Open 5.3 5.3 Close 4.8 4.8
S-196	Dry Wet Open 5.3 5.3 Close 4.8 4.8
S-176	Dry Wet Open 5.00 5.00 Close 4.75 4.75
S-18C	Dry Wet Open 2.6 2.6 Close 2.3 2.3

Notes:

1. South Florida Water Management Model (SFWMM) version 3.8 was used in continuous simulation mode (31-year simulation using 1965 to 1995 climatic data set) to simulate 95Base Modified 2.

2. No changes to operational criteria of 95Base Modified 2 (includes Test 7, Phase I criteria) for structures not listed in the table above.

Table 2. 2 Description of Reasonable and Prudent Alternatives

	RPA 00	RPA 01	RPA 02
Regulation Schedule	Deviation schedule for WCA-3A as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation in WCA-2A regulation schedule.	Deviation schedule for WCA-3A as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation in WCA-2A regulation schedule.	Deviation schedule for WCA-3A as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation in WCA-2A regulation schedule.
S-343 A/B and S-344	Closed Nov 1 to July 15 independent of WCA-3A levels.	Closed Nov 1 to July 15 independent of WCA-3A levels.	Closed Nov 1 to July 15 independent of WCA-3A levels.
S-12A/B/C/D	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12 C closed Feb 1 to Jul 15; S-12D operated normally according to WCA-3A schedule. For the remainder of the year, S-12A, B, and C followed the same schedule.	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C closed Feb 1 to Jul 15; S-12D operated according to WCA-3A schedule. Remainder of the year, S-12A, B, and C followed the same schedule.	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C closed Feb 1 to Jul 15; S-12D operated according to WCA-3A schedule. Remainder of the year, S-12A, B, and C followed the same schedule.
S-333: G-3273 <6.8'	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed through S-334; and subject to capacity constraints, which are 1350 cfs at S-333, L-29 max. stage limit and canal stage limits downstream of S-334.	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed via S-334; and subject to capacity constraints, which are 1350 cfs at S-333, L-29 maximum stage limit, and canal stage limits downstream of S-334.	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed via S-334; and subject to capacity constraints, which are 1350 cfs at S-333, L-29 maximum stage limit, and canal stage limits downstream of S-334.
S-333: G-3273 >6.8'	Pass 30% of regulatory discharge through S-333 subject to S-333 design capacity (1350 cfs)	Pass 45% of regulatory discharge through S-333 subject to S-333 design capacity (1350 cfs)	Pass 60% of regulatory discharge through S-333 subject to S-333 design capacity (1350 cfs)
L-29 constraint	9.0 ft	9.0 ft	9.0 ft
S-355A&B	Regulatory releases are constrained by L-29 and G-3273 triggers. Dry Wet Open 8.50 8.50 Close 6.50 6.50	Regulatory releases constrained by L-29 and G-3273 triggers. Dry Wet Open 8.50 8.50 Close 6.50 6.50	Regulatory releases constrained by L-29 and G-3273 triggers. Dry Wet Open 8.50 8.50 Close 6.50 6.50
S-337	Water supply only	Water supply only	Water supply only
S-151	Per WCA-3A regulation schedule.	PerWCA-3A regulation schedule.	PerWCA-3A regulation schedule.
S-334	Water supply only	Water supply only	Water supply only
S-332D	Pumped up to 500 cfs design capacity from Aug 1 to Jan 31 and to 165 cfs from Feb 1 to Jul 31. Dry Wet On 5.00 5.00 Off 4.80 4.80	Pumped to 500 cfs design capacity from Aug 1 to Jan 31; 165 cfs from Feb 1 to Jul 31. Dry Wet On 5.00 5.00 Off 4.80 4.80	Pumped up to 500 cfs design capacity from Aug 1 to Jan 31; to 165 cfs from Feb 1 to Jul 31. Dry Wet On 5.00 5.00 Off 4.80 4.80
S-332	Closed	Closed	Closed
S-175	Closed	Closed	Closed
S-194	Dry Wet Open 5.3 5.3 Close 4.8 4.8	Dry Wet Open 5.3 5.3 Close 4.8 4.8	Dry Wet Open 5.3 5.3 Close 4.8 4.8
S-196	Dry Wet Open 5.5 5.5 Close 4.8 4.8	Dry Wet Open 5.5 5.5 Close 4.8 4.8	Dry Wet Open 5.5 5.5 Close 4.8 4.8
S-176	Dry Wet Open 5.2 5.2 Close 5.0 5.0	Dry Wet Open 5.2 5.2 Close 5.0 5.0	Dry Wet Open 5.2 5.2 Close 5.0 5.0
S-18C	Dry Wet Open 2.6 2.6 Close 2.3 2.3	Dry Wet Open 2.6 2.6 Close 2.3 2.3	Dry Wet Open 2.6 2.6 Close 2.3 2.3

Table 2. 3 Description of ISOP 2000

	ISOP-9d (ISOP 2000)
Regulation Schedule	Deviation schedules for WCA-2A (S-11A, B, C structures closed) and WCA-3A as specified by USACE
S-343 A/B and S-344	Closed Jan 1 to Jul 15 independent of WCA-3A levels
S-12 A/B/C/D	S-12A closed Dec 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C,D closed Feb 1 to Jul 15; Follow WCA-3A regulation schedule as in 95 Base for remainder of year
S-333: G-3273 <6.8'	Maximum possible discharge subject to S-333 design capacity (1350 cfs) and limited to sum of NESRS rainfall plan targets plus outflow through S-334
S-333: G-3273 >6.8'	Maximum possible discharge subject to S-333 design capacity (1350 cfs) and limited to outflow through S-334
L-29 Constraint	9.0 ft
S-355A&B	Not modeled
S-337	Regulatory releases as per WCA-3A deviation schedule
S-151	Per the above WCA-3A regulation schedule
S-334	Passes S-333 regulatory release to SDCS
S-332B	Pumped up to 325 cfs Dry Wet On 4.70 4.70 Off 4.20 4.20
S-332B Seepage Reservoir	Not modeled
S-332D	Pumped up to 500 cfs from Jul 16 to Nov 31; 325 cfs from Dec 1 to Jan 31; and 165 cfs from Feb 1 to Jul 15 Dry Wet On 5.00 4.50 Off 4.80 4.00
S-332	Closed
S-175	Closed
S-194	Operated to maximize flood control discharges to coast Dry Wet Open 4.70 4.70 Close 4.20 4.20
S-196	Operated to maximize flood control discharges to coast Dry Wet Open 4.70 4.70 Close 4.20 4.20
S-176	Dry Wet Open 4.70 4.70 Close 4.50 4.50
S-18C	Dry Wet Open 2.25 2.25 Close 2.00 2.00

Table 2. 4 Description of Alternative 1 - ISOP 2001

	ISOP-9dR (ISOP 2001)
Regulation Schedule	Deviation schedule for WCA-3A as specified by USACE including raising Zone D to Zone C from Nov 1 to Feb 11. No deviation in WCA-2A regulation schedule.
S-343 A/B and S-344	Closed Nov 1 to Jul 15 independent of WCA-3A levels
S-12 A/B/C/D	S-12A closed Nov 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12C closed Feb 1 to Jul 15; S-12D was operated normally according to WCA-3A schedule. For the remainder of the year, S-12A, B, and C followed the same regulation schedule.
S-333: G-3273 <6.8'	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed through S-334; and subject to capacity constraints, which are 1350 cfs at S-333, L-29 maximum stage limit, and canal stage limits downstream of S-334.
S-333: G-3273 >6.8'	No discharge to NESRS; release 55% of the rainfall plan target, plus as much of the remaining 45% that the S-12s can't discharge through S-333 and S-334, subject to capacity constraints.
L-29 Constraint	9.0 ft
S-355A&B	Not modeled
S-337	Regulatory releases as per WCA-3A deviation schedule
S-151	Per the above WCA-3A regulation schedule
S-334	Same as in 95Base except that it also may pass all or part of S-333 releases to the SDCS, depending on stage at G-3273
S-332B	Pumped up to 325 cfs from Jun through Jan; and 125 cfs from Feb through May Dry Wet On 4.70 4.70 Off 4.20 4.20
S-332B Seepage Reservoir	160 acres with emergency overflow
S-332D	Pumped up to 500 cfs from Jul 16 to Nov 31; 325 cfs from Dec 1 to Jan 31; and 165 cfs from Feb 1 to July 15 Dry Wet On 5.00 4.50 Off 4.80 4.00
S-332	Closed
S-175	Closed
S-194	Operated to maximize flood control discharges to coast Dry Wet Open 4.70 4.70 Close 4.20 4.20
S-196	Operated to maximize flood control discharges to coast. Dry Wet Open 4.70 4.70 Close 4.20 4.20
S-176	Dry Wet Open 4.70 4.70 Close 4.50 4.50
S-18C	Dry Wet Open 2.25 2.25 Close 2.00 2.00

Table 2. 5 Description of Alternative 2

	Alternative 2	
Treatment	**Phase 1**	**Phase 2**
	IOP 2b	**IOP 2**
Regulation Schedule	Deviation schedules for WCA-2A (S-11 A,B,C structures closed) and 3A as specified by USACE	Deviation schedules for WCA-2A (S-11 A,B,C structures closed) and 3A as specified by USACE
S-343 A/B S-344	Closed Jan 1 to July 15 independent of WCA-3A levels	Closed Jan 1 to July 15 independent of WCA-3A levels
S-12 A/B/C/D	S-12A closed Dec 1 - Jul 15; S-12B closed Jan 1 - Jul 15; S-12 C,D closed Feb 1 - Jul 15; Follow WCA-3A regulation schedule as in 95 Base for remainder of year	S-12A closed Dec 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12 C,D close Feb 1 to Jul 15; Follow WCA-3A regulation schedule as in 95 Base for remainder of year
S-333: G-3273 <6.8'	55% of the rainfall plan target to NESRS, plus as much of the remaining 45% that the S-12s can't discharge to be passed through S-334 and subject to capacity constraints, which are 1350 cfs at S-333, L-29 maximum stage limit, and canal stage limits downstream of S-334.	S-333 open to deliver 55% of Shark River Slough target flows as per rainfall plan target (rainfall formula + WCA-3A regulatory discharge).
S-333: G-3273 >6.8'	No discharge to NESRS; release 55% of the rainfall plan target, plus as much of the remaining 45% that the S-12s can't discharge through S-333 and S-334, subject to capacity constraints.	Maximum possible discharge subject to S-333 design capacity (1350 cfs) with G3273 trigger removed.
L-29 Constraint	9.0 ft	9.0 ft
S-337	Regulatory releases as per WCA-3A deviation schedule	Regulatory releases as per WCA-3A deviation schedule
S-151	Regulatory releases as per WCA-3A deviation schedule	Regulatory releases as per WCA-3A deviation schedule
S-334	Passes S-333 regulatory release to SDCS	Closed
S-332B	Pumped up to 375 cfs On at 4.7, Off at 4.2	Pumped up to 325 cfs; On at 4.5, Off at 4.0
S-332B Seepage Reservoir	160 acres with emergency overflow	160 acres with emergency overflow
S-332D	Pumped up to 500 cfs design capacity from Aug 1 to Nov 30; 325 cfs from Dec 1 to Dec 31; 165 cfs from Jan 1 to Jul 31. Dry-On at 5.0, Off at 4.8; Wet-On at 4.5, Off at 4.0.	Pumped up to 500 cfs design capacity from Aug 1 to Nov 30; 325 cfs from Dec 1 to Jan 31; 165 cfs from Feb 1 to Jul 31. Dry-On at 5.0, Off at 4.8; Wet-On at 4.5, Off at 4.0.
S-332	Closed	Closed
S-175	Closed	Closed
S-194 S-196	Operated to maximize flood control discharges to coast; Dry- Open at 4.7, Close at 4.2; Wet- Open at 4.7, Close at 4.2.	Operated to maximize flood control discharges to coast; Dry- Open at 4.7, Close at 4.2; Wet- Open at 4.7, Close at 4.2.
S-176	Dry-Open at 4.7, Close at 4.5; Wet-Open at 4.7, Close at 4.5.	Dry-Open at 5.0, Close at 4.75; Wet-Open at 5.0, Close at 4.75.
S-18C	Dry-Open at 2.25, Close at 2.0; Wet-Open at 2.25, Close at 2.0.	Dry-Open at 2.25, Close at 2.0; Wet-Open at 2.25, Close at 2.0.

Table 2. 6 Description of Alternative 3

	Alternative 3	
Treatment	**Phase 1**	**Phase 2**
	IOP 2a	**IOP 2**
Regulation Schedule	Deviation schedules for WCA-2A (S-11 A,B,C structures closed) and 3A as specified by USACE.	Deviation schedules for WCA-2A (S-11 A,B,C structures closed) and 3A as specified by USACE.
S-343 A/B S-344	Closed Jan 1 to July 15 independent of WCA-3A levels.	Closed Jan 1 to July 15 independent of WCA-3A levels.
S-12 A/B/C/D	S-12A closed Dec 1 to Jul 15; S-12B closed Jan 1 to Jul 15; S-12 C,D close Feb 1 to Jul 15; Follow WCA-3A regulation schedule as in 95 Base for remainder of year	S-12A closed Dec 1 - Jul 15; S-12B closed Jan 1 - Jul 15; S-12 C,D closed Feb 1 - Jul 15; Follow WCA-3A regulation schedule as in 95 Base for remainder of year
S-333: G-3273 <6.8'	S-333 open to deliver 55% of Shark River Slough target flows as per rainfall plan target (rainfall formula + WCA-3A regulatory discharge).	S-333 open to deliver 55% of Shark River Slough target flows as per rainfall plan target (rainfall formula + WCA-3A regulatory discharge).
S-333: G-3273 >6.8'	S-333 closed	Maximum possible discharge subject to S-333 design capacity (1350 cfs) with G3273 trigger removed.
L-29 Constraint	9.0 ft	9.0 ft
S-337	Regulatory releases as per WCA-3A deviation schedule	Regulatory releases as per WCA-3A deviation schedule
S-151	Regulatory releases as per WCA-3A deviation schedule	Regulatory releases as per WCA-3A deviation schedule
S-334	Closed	Closed
S-332B	Pumped up to 325 cfs; On at 4.5, Off at 4.0	Pumped up to 325 cfs; On at 4.5, Off at 4.0
S-332B Seepage Reservoir	160 acres with emergency overflow	160 acres with emergency overflow
S-332D	Pumped up to 500 cfs design capacity from Aug 1 to Nov 30; 325 cfs from Dec 1 to Jan 31; 165 cfs from Feb 1 to Jul 31. Dry-On at 5.0, Off at 4.8; Wet-On at 4.5, Off at 4.0.	Pumped up to 500 cfs design capacity from Aug 1 to Nov 30; 325 cfs from Dec 1 to Jan 31; 165 cfs from Feb 1 to Jul 31. Dry-On at 5.0, Off at 4.8; Wet-On at 4.5, Off at 4.0.
S-332	Closed	Closed
S-175	Closed	Closed
S-194 S-196	Operated to maximize flood control discharges to coast; Dry- Open at 4.7, Close at 4.2; Wet-Open at 4.7, Close at 4.2.	Operated to maximize flood control discharges to coast; Dry- Open at 4.7, Close at 4.2; Wet-Open at 4.7, Close at 4.2.
S-176	Dry-Open at 5.0, Close at 4.75; Wet-Open at 5.0, Close at 4.75.	Dry-Open at 5.0, Close at 4.75; Wet-Open at 5.0, Close at 4.75.
S-18C	Dry-Open at 2.25, Close at 2.0; Wet-Open at 2.25, Close at 2.20.	Dry-Open at 2.25, Close at 2.0; Wet-Open at 2.25, Close at 2.20.