ENDANGERED SPECIES ACT BIOLOGICAL ASSESSMENT

Planned Temporary Deviation

Prepared by
Department of the Army
Jacksonville District Corps of Engineers

JULY 2017

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1 INTRODUCTION

The purpose of a Biological Assessment is to evaluate the potential effects of a Federal action on both listed species and those proposed for listing, including designated and proposed critical habitat, and determine whether the continued existence of any such species or habitat is likely to be adversely affected by the Federal action. The Biological Assessment is also used in determining whether formal consultation or a conference is necessary [Federal Register 51 (106): Section 402.1 (f), pg. 19960, 3 June 1986]. This is achieved by:

- Reviewing the results of an on-site inspection of the area affected by the Federal action to determine if listed or proposed species are present or occur seasonally.
- Reviewing the views of recognized experts on the species at issue, along with relevant literature.
- Analyzing the effects of the Federal action on species and habitat, including consideration of cumulative effects and the results of any related studies.
- Analyzing alternative actions considered by the Federal agency for the proposed action.

2 CONSULTATION SUMMARY

On June 30, 2009, Everglades Restoration Transition Plan (ERTP) team members of U.S. Army Corps of Engineers (USACE) met with representatives of U.S. Fish and Wildlife Service (FWS) to discuss effects of the Interim Operational Plan for Protection of the Cape Sable Seaside Sparrow (IOP) from 2002 to 2009 on threatened and endangered species and their designated critical habitat and develop a scope for ERTP. USACE and FWS, along with members from Everglades National Park (ENP), South Florida Water Management District (SFWMD), and the Miccosukee Tribe of Indians of Florida conducted weekly or bi-weekly meetings from July 2009 through April 2010 to review empirical hydrological, meteorological, and ecological data from IOP operations, in order to define an array of water management actions to improve conditions for snail kite (*Rostrhamus sociabilis*) and wood stork (*Mycteria americana*), while maintaining protection of Cape Sable seaside sparrow (CSSS) (*Ammodramus maritimus mirabilis*). In addition, monthly meetings (September 2009-January 2010) were held with other governmental agencies, including Florida Fish and Wildlife Conservation Commission (FWC), Florida Department of Environmental Protection (FDEP), Florida Department of Agriculture, Consumer FWSs, and the Miami-Dade Department of Environmental Resources Management. After January 2010, these agencies were invited to participate in all ERTP team meetings. After April 2010, USACE continued to consult with FWS on proposed ERTP operations through October 2010.

USACE originally consulted with FWS by letter dated January 21, 2010 on federally listed threatened and endangered species that may be present in the ERTP action area. In a letter dated March 8, 2010, FWS provided partial concurrence with USACE finding of listed species that may be encountered or adjacent to the action area and provided a list of other federally threatened and endangered species, along with candidate species, potentially likely to occur within the action area. In 2010, federally threatened and endangered species that

may occur within the ERTP action area included Florida panther (*Puma concolor coryi*), the Florida population of West Indian Manatee (Florida manatee) (*Trichechus manatus*), CSSS, snail kite, red-cockaded woodpecker (*Picoides borealis*), roseate tern (*Sterna dougallii dougallii*), wood stork, American alligator (*Alligator mississippiensis*), American crocodile (*Crocodylus acutus*), Eastern indigo snake (*Drymarchon corais couperi*), crenulate lead-plant (*Amorpha crenulata*), deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*), Garber's spurge (*Chamaesyce garberii*), Okeechobee gourd (*Cucurbita okeechobeensis* ssp. *okeechobeenis*), Small's milkpea (*Galactia smallii*), tiny polygala (*Polygala smallii*), Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*), and Stock Island tree snail (*Orthalicus reses* [not incl. *nesodryas*]). In addition, the ERTP action area contains designated critical habitat for American crocodile, snail kite, CSSS, and Florida manatee.

On June 16, 2015, USACE consulted with FWS by letter to reconfirm listed species within the ERTP action area. By letter dated July 16, 2015, FWS amended the list of species to include those identified within **Table 4**. As a result of this reconfirmation, additional species were added to the list of species that have the potential to occur within the ERTP action area. These additional species include Florida bonneted bat (*Eumops floridanus*), Miami blue butterfly (*Cyclargus thomasi bethunebaker*), Bartram's hairstreak butterfly (*Strymon acis bartrami*) and its designated critical habitat, Florida leafwing butterfly (*Anaea troglodyta floridalis*) and its designated critical habitat, and Cape Sable thoroughwort (*Chromolaena frustrata*) and its designated critical habitat. In the same July 16, 2015 letter, FWS removed piping plover (*Charadrius melodus*), crenulate lead plant, deltoid spurge, Small's milkpea, tiny polygala, Big Pine partridge pea (*Chamaecrista lineata* var. *keyensis*), Carter's small-flowered flax (*Linum carteri* var. *carteri*), Florida brickell-bush (*Brickellia mosieri*), Florida prairie clover (*Dalea carthagenensis*), Florida semaphore cactus (*Opuntia corallicola*), and sand flax (*Linum arenicola*) from the USACE June 16, 2015 proposed list. Due to the fact that within the 2010 ERTP Biological Assessment USACE concluded that ERTP implementation may affect deltoid spurge, Garber's spurge, Small's milkpea, and tiny polygala, an effects determination for these species has also been included within this Supplemental Biological Assessment.

Federally listed species under the purview of National Marine Fisheries FWS (NMFS) include green sea turtle (*Chelonia mydas*), hawksbill sea turtle (*Eretmochelys imbricata*), Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), loggerhead sea turtle (*Caretta caretta*), smalltooth sawfish (*Pristis pectinata*), elkhorn coral (*Acropora palmata*), staghorn coral (*Acropora cervicornis*), and Johnson's seagrass (*Halophila johnsonii*). USACE coordinated with NMFS pertaining to potential action effects on listed species under their purview (March 2010, July 2015). In addition, the action study area contains designated critical habitat for green sea turtle, leatherback sea turtle, smalltooth sawfish, elkhorn coral, staghorn coral, and Johnson's seagrass.

The USACE provided a Draft Biological Assessment to FWS in June 2010 and a Final Biological Assessment October 15, 2010 (**Appendix A**). Based upon information contained within the USACE Biological Assessment, FWS provided a BO on November 17, 2010, concluding formal consultation on ERTP. A subsequent BO Amendment was provided

March 2, 2012 to specifically address USACE concerns with wood stork incidental take triggers as expressed by USACE verbally and by email January 24, 2011. A full consultation history on water management activities to protect CSSS is contained within the 2010 ERTP Biological Assessment, 2010 ERTP BO, and 2011 ERTP Final Environmental Impact Statement (FEIS), and is hereby incorporated by reference.

In 2012, USACE implemented an accelerated planning process to improve conditions within the central Everglades. The Central Everglades Planning Project (CEPP), a component of the CERP, is designed to improve quantity, quality, timing, and distribution of water flow throughout the central Everglades to include WCA-3A, WCA-3B, and ENP. This project, once implemented, will restore the historical flow path to the extent practicable through WCA-3B and NESRS given other project constraints, e.g. flood mitigation. However, during CEPP ESA consultation, it was noted that restoration of historical flow into ENP could have potentially adverse impacts on CSSS due to rehydration of wetlands resulting in greater depths and longer periods of inundation. Adverse effects were noted for subpopulations A, C, D, and E; however, CEPP modeling also revealed areas in which habitat conditions would be suitable for future colonization by CSSS in areas adjacent to current subpopulation locations.

In addition, during ESA Consultation on CEPP, a number of actions were identified that could help improve the ability to estimate CSSS abundance, enhance CSSS habitat, and promote stability across CSSS subpopulations. As a result, the Department of the Interior, including FWS, ENP, and the United States Geological Survey, have implemented a CSSS Memorandum of Understanding (MOU). This MOU outlines steps that Department of the Interior agencies will undertake to better understand the biology of CSSS and to implement strategies to improve CSSS resiliency in the light of future hydrological conditions from implementation of CERP projects, as well as sea level rise. For additional information, please refer to 2013 CEPP BO (FWS 2013a).

USACE reinitiated ESA consultation on ERTP on November 17, 2014 as a result of an exceedance of an Incidental Take Reinitiation Trigger from the November 17, 2010 ERTP BO. The 2010 ERTP BO Incidental Take Reinitiation Trigger states "*If the annual CSSS population estimate falls below 2,915 sparrows [Mean population estimate 2001-2009 = 3,145 $\pm$ 230]), reinitiation of consultation must occur.*" Based upon preliminary data collected by ENP as part of the 2014 CSSS range-wide survey, it appears that the annual population estimate of CSSS has fallen below the reinitiation trigger defined within the November 17, 2010 ERTP BO. Therefore, pursuant to requirements of the 2010 ERTP BO, USACE formally requested reinitiation of consultation in a letter to FWS dated November 17, 2014.

In a letter dated December 12, 2014, FWS acknowledged receipt of the USACE reinitiation request and stated that "*it has become apparent to the FWS that further modifications to the current water management regime are needed to conserve and recover sparrows*". The December 12, 2014 letter also included comments from the Water Year 2013 ERTP Annual Assessment. On January 26, 2015, USACE responded to FWS December 12, 2014 letter stating that USACE is committed to looking for reasonable and prudent measures to further protect CSSS to the extent practicable through water management operations; but also clarifying that it is widely recognized that ERTP, and its predecessor, the 2002-2012 IOP, were

not designed to recover CSSS, but instead, as measures to protect the subspecies during its breeding season from unfavorable water levels. The letter also addressed specific FWS comments on the Water Year 2013 ERTP Annual Assessment. On March 3, 2015, FWS responded with a list of potential conservation measures to explore, along with a request to increase the number of consecutive dry days from 60 to 90 or more consecutive dry days throughout a large portion of CSSS habitat in successive years, along with average annual hydroperiod of 90-210 days in CSSS habitat. USACE acknowledged during several informal meetings with FWS that it would use its operational flexibility under ERTP to promote conditions favorable for CSSS nesting and hydroperiod requirements. In addition, in light of FWS March 3, 2105 letter, USACE requested reaffirmation of FWS support for the MWD Increment 1 Field Test, as well as use of ERTP operational flexibility in a March 27, 2015 letter. FWS provided reaffirmation of support for the MWD Increment 1 Field Test as well as use of operational flexibility under ERTP in a letter dated May 22, 2015. Operational flexibility will be used to promote an increased number of consecutive dry days within CSSS habitat, as requested by FWS, to allow increased potential for breeding. In addition, this flexibility will be used to promote a 90-120 day discontinuous hydroperiod within CSSS habitat.

Once USACE reinitiated consultation, several technical team meetings were held with FWS and other DOI agencies including ENP, USGS, and BCNP. In addition, USACE also consulted with the Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, SFWMD, and the local sponsor for the C&SF Project, along with other State agencies to address reasonable and prudent alternatives measures to protect CSSS. During the consultation process, several near-term (6-12 months), mid-term (2-5 years), and long-term (greater than 5 years) reasonable and prudent measures were identified that could potentially be undertaken by USACE and other Federal and state agencies that would protect and enhance CSSS populations. These reasonable and prudent measures require a concerted effort on behalf of state and Federal agencies to implement reasonable and prudent measures under their agency's authorities.

As part of the informal consultation process following USACE reinitiation request of November 17, 2014, FWS requested that USACE further restrict S-12A and S-12B operations to protect CSSS-A. In order to analyze the potential effects of the FWS request on water management operations and water elevations within WCA-3A in particular, USACE evaluated four different S-12A, S-343A, S-343B, S-344, and S-12B closure periods as illustrated in **Table 1**. The evaluations estimated the potential effect of each operational scenario on historical WCA-3A stages for each water year during historical IOP and ERTP operations; water years 2003-2015. The evaluations assumed the flow volumes that were historically released from the WCA-3A outlet structures (S-12A, S-12B, S-343A, S-343B, and S-344) during the extended closure periods identified for each scenario were instead retained within the WCA-3A storage volume. Although potential effects on WCA-3A stages varied in response to annual hydrologic conditions, all four scenarios demonstrated multiple years with WCA-3A stage increases greater than 0.2-0.3 feet; for relative comparison, it is critical to note that the WCA-3A stage reductions resulting from the WCA-3A Regulation Schedule changes during ERTP were also estimated at 0.2-0.3 feet during normal to wet conditions.

Based upon the results of this evaluation, it was concluded that due to potential high water concerns within WCA-3A and the fact that the BAMM WCA flood routing analysis has not

been completed, USACE could not commit to additional mandated closure periods that may act to increase the peak stage, frequency, and duration of high water conditions within WCA-3A. Alternatively, USACE can use existing operational flexibility inherent within ERTP in order to minimize use of the S-12A, S-12B, S-343A, S-343B, and S-344 structures as conditions permit. A full evaluation of FWS-requested operational scenarios was provided to FWS on March 26, 2015, with further evaluation provided to FWS on April 29, 2015.

TABLE 1: STRUCTURE CLOSURE PERIODS EVALUATED AT FWS REQUEST

Operational Scenario	Structural Changes
1: Structures Close 1 month early	S-12A, S-343A, S-343A, S-344 close October 1; S-12B close December 1
2: Structures Open 1 month later	S-12A, S-12B, S-343A, S-343B, S-344 open August 15
3: Structures close 1 month early AND open 1 month late	S-12A, S-343A, S-343B, S-344 close October 1 AND open August 15; S-12B close December 1 AND open August 15
4: Structures closed all year	S-12A, S-12B, S-343A, S-343B and S-344 closed year round

The USACE concluded ESA consultation with FWS on July 22, 2016, with FWS providing a revised BO for ERTP. The 2016 ERTP BO addresses the USACE' 2012 Water Control Plan, a document that guides how the USACE manages water for WCA 3A, ENP, and the SDCS to meet flood control, and other C&SF Project purposes, while avoiding and minimizing adverse effects to threatened and endangered species. Developed in formal ESA consultation with the USACE, the BO contains the FWS opinion that the USACE proposed continued operation of ERTP would jeopardize the endangered CSSS by reducing appreciably its likelihood of survival and recovery. The 2016 ERTP BO also transmits the FWS conclusion that ERTP, as proposed, will not destroy or adversely modify CSSS critical habitat, nor will it jeopardize the endangered Everglades snail kite (or its designated critical habitat), or the threatened wood stork.

For the CSSS, the 2016 ERTP BO presents a recommendation for a Reasonable and Prudent Alternative (RPA), with numerous elements, to the USACE proposed ERTP action. Main elements of the RPA are:

- Habitat Performance Targets
- Actions to Move Water East
- Surveys and Studies
- Adaptive Management

To summarize the discussion below, the USACE is taking specific actions to comply with the 2016 ERTP BO's terms and conditions and implementing its RPA.

Habitat Performance Targets. Among its several elements, the 2016 ERTP BO identifies a set of habitat performance targets in Section 7.1.1. that the FWS believes will improve conditions for the CSSS and contribute toward the survival and recovery of the species. These

include targets for consecutive dry days during the CSSS nesting season and ranges for a discontinuous hydroperiod within the CSSS marl prairie habitat. Based on current model output, the FWS acknowledges in the BO that these targets are FWS goals for CSSS habitat to achieve over time, and are not technologically feasible for all subpopulations in every year at present (2016 ERTPBO at Table 34). These modeling results are based on implementation of Increment 2 stages within the L-29 with no seasonal stage constraints (BO target date is March 2018) and closure by ENP of the culvert within ENP along the old Tamiami Trail borrow canal at the junction with the ENP Tram Road, which was originally recommended as part of the USACE' 2011 ERTP Environmental Impact Statement.

As the 2016 ERTP BO also acknowledges, reaching the BO's "desired targets will require the work of various agencies and construction of additional infrastructure to accomplish." Additional habitat conservation actions by others identified in the BO include vegetation management and additional real estate and construction actions. The USACE will continue to work with FWS to identify non-hydrological habitat improvement initiatives that can be implemented by partners in concert with our water management actions. The specific actions that FWS believes USACE can take as a Federal water manager within southern Florida to help achieve these goals are discussed below.

Actions to Move Water East. In Section 7.1.2(1), the 2016 ERTP BO identifies several actions to reduce the amount of water that currently flows over CSSS-A and to shift those flows to the east while still maintaining the eastern subpopulations. First, the 2016 ERTP BO identifies an expanded closure period of October 1 through July 15 for the S-12A, S-12B, S-343A/B, and S-344 structures. Consistent with this action, the USACE conducted a National Environmental Policy Act (NEPA) assessment for MWD Increment 1 Plus to analyze a set of alternatives including the 2016 ERTP BO proposed operational changes for the WCA 3A water control structures and the expanded operational ranges within the SDCS. The MWD Increment 1 Plus Environmental Assessment and Finding of No Significant Impact (EA/FONSI) was signed February 16, 2017, implementing the 2016 ERTP BO closure periods on these structures.

The USACE also remains committed to close coordination with FWS and SFWMD to continue to implement operational flexibilities existing within our current water management operations to promote FWS's targets while maintaining other C&SF Project purposes. On a present basis, the USACE is maximizing and prioritizing flows from east to west to minimize flow through the S-12A and S-12B and, as appropriate, continuing to assess opportunities to utilize preemptive releases and additional existing flexibility. For example, flexibility provided in the 2016 Emergency Deviation Transitional Period allowed the USACE to delay opening the S-12A, S-12B, S-343A, and S-343B structures past July 15, 2016, as requested by the FWS. During the 2015-2016 seasonal closure period, the following closure periods were provided for these structures: S-12A was closed October 31, 2015 through August 11, 2016 (gates were partially opened to avoid gate overtopping from February 22 through March 10, in accordance with the current Water Control Plan); S-12B was closed January 1, 2016 through August 9, 2016; and S-343A and S-343B were closed October 30, 2015 through August 15, 2016. The FWS believes this delayed opening may have benefitted nesting sparrows in CSSS-A. This delayed opening was directly tied to the additional flexibility permitted by the 2016 Emergency

Transition Period, given the current hydrologic conditions following the 2016 Emergency Deviation.

Second, Section 7.1.2(1) contains actions for increased water levels at the L-29 Canal. Consistent with this action, USACE completed an EA/FONSI on February 16, 2017 to incrementally raise water level stages in L-29 under MWD Increment 1 Plus (including consideration of raising L-29 Canal levels up to 7.8 feet NGVD), and is planning a NEPA analysis for MWD Increment 2 (including consideration of raising levels up to 8.5 feet NGVD). The MWD Increment 1 Plus EA/FONSI was signed February 16, 2017, allowing stages in the L-29 Canal to reach 7.8 feet NGVD. As identified within the MWD Increment 1 Plus EA/FONSI, raising of the L-29 Canal maximum operating limit above 7.5 feet NGVD up to 7.8 feet NGVD is contingent upon compliance with all of the following conditions: (1) acquisition of required real estate interest and any associated improvements for the private ownership along Tamiami Trail including receipt of Tamiami Trail Bridge and roadway channel and flowage easements from the Florida Department of Transportation; (2) completion of the C-358 Canal (Richmond Drive Seepage Collection Canal) and installation of S-357N (C-358 control structure); (3) completion of sufficient portions of Contracts 8 (construction of the C-111 NDA L-315 western levee and the L-357W Extension levee between Richmond Drive and the 8.5 SMA Detention Cell) and completion of the Contract 8A berms inside the 8.5 SMA Detention Cell.

Pending the completion of critical features necessary to operate the North Detention Area construction contracts and the acquisition of real estate interests, we expect to raise the L-29 Canal maximum operating limit to 7.8 feet NGVD by October 2017. On a present basis, construction within C-111 South Dade and 8.5 SMA project is still ongoing. In addition, USACE acquired a flowage easement from the Airboat Association in September 2016 and expects to have the required flowage easement from the Florida Department of Transportation by October 2017. The additional parcels along Tamiami Trail necessary to raise the L-29 stage constraint have been purchased by DOI, however, USACE still needs a real estate instrument to allow USACE to flow water across these properties. This instrument is anticipated to be acquired prior to October 2017. As FWS has acknowledged in the 2016 ERTP BO, eastern CSSS subpopulations, most notably CSSS-E, are likely to be negatively affected under MWD Increment 2 water management operations that shift more water east to the L-29 Canal and away from CSSS-A. The FWS further iterates that the eastern subpopulations will need to be monitored closely and adaptive operations, including seasonal limitations on water levels in the L-29 Canal, may need to be considered during the transitional period.

Third, Section 7.1.2(1) would have USACE utilize the S-333 structure for increased pre-emptive releases from WCA-3A, while continuing to operate the statutorily-constrained temporary features comprising the Decomp Physical Model (DPM) through FY 2018. With regard to S-333, the USACE is able to continue making preemptive releases consistent within the flexibilities of our current Water Control Plan.

With regard to the DPM, USACE agrees that additional testing would provide useful information to support future design efforts while providing incidental benefits to the CSSS. The USACE has received SFWMD's agreement for supporting extended DPM testing for the

next three years, and is working collaboratively with SFWMD, USGS, and a multiagency team to prepare for additional testing and complete any necessary permitting and NEPA requirements. This work will build upon recent testing efforts by the USACE. Since November 2013, USACE has operated the S-152 as documented in the 2010 EA and Design Test Documentation Report and the 2012 FDEP permit. Although the 2010 EA defines an operational window of October 1 through January 31, the FDEP permit truncated the testing window to November-December 2013 and November –January in 2014-2015 and 2015-2016 due to water quality concerns. In 2016, a temporary emergency deviation to the 2012 Water Control Plan enabled utilization of the S-152 structure for purposes of alleviating high water conditions within WCA 3A. During this time period, S-152 was operated from February 19 through February 23 and from March 9 through May 3 of 2016. Use of S-152 during the deviation provided opportunities to test dry season flows and USACE was able to convey 37,000 acre-feet from WCA-3A into WCA-3B during this time period.

The USACE has worked with partner agencies to better understand and investigate the ability to utilize this structure outside the defined testing period. However, additional NEPA and an FDEP permit modification will be required for these actions. A Draft EA and Proposed FONSI will be available in July 2017 for public review and comments. This EA examines alternative modes of operations for the DPM with the preferred alternative identified as year-round operations. The DPM is of a time-limited nature, and this effort will remain in full compliance with the Water Resources and Development Act of 2000, P.L. 106-541, Section 601(b)(2)(D)(iv), which specifically prohibits appropriations for construction of decompartmentalization projects until the completion of the Modified Waters Deliveries project.

Surveys and Studies. The 2016 ERTP BO RPA also contains the FWS's opinion on a number of surveys, studies, and monitoring reports that it believes the USACE should implement to aid the FWS's understanding of how hydrologic conditions relate to the CSSS and its habitat. Within Section 7.1.1 ("Targets"), this includes an analysis of daily water-level surfaces and ground elevations in certain Everglades transects (Section 7.1.1(3)), and an analysis of the S-332 Detention Areas to determine how operations of these facilities influence habitats for the eastern CSSS subpopulations during the nesting season (Section 7.1.1(3) (a)). The USACE is prepared to perform these studies and analysis using the technical methods identified in the 2016 ERTP BO. On a present basis, the USACE is working with USGS to refine the CSSS Sparrow Viewer to include the FWS metrics. The USACE continues to collect data as per the 2010 ERTP BO. Daily hydrologic information can be accessed at: http://w3.saj.usace.army.mil/h2o/inc1/reports.htm.

Further studies and analyses are identified in Section 7.1.2. These include an analysis of the potential effects of western flows on CSSS-A (Section 7.1.2(3) (i)) and, if necessary, a western flows seepage study analysis (Section 7.1.2(3) (i)). The USACE is in the early stages of working with ENP and FWS to identify survey methods in response, and is exploring potential procurement opportunities to leverage existing studies. We also intend to explore opportunities within the USACE' Western Everglades Restoration Project (WERP) to determine how WERP project features may assist in the effort of moving toward attaining the FWS's desired habitat targets. In addition, the Terms and Conditions Section of the Incidental Take Statements for

the Everglades Snail Kite and Wood Stork also refer to a number of additional tests, surveys, and studies for the USACE to undertake on behalf of those latter two species. The USACE is currently implementing each of those items.

On August 16-17, and 23, 2016 the USACE held interagency meetings to discuss initial planning efforts for WERP. Presently, the USACE has contracts with University of Florida for both snail kite (Dr. Robert Fletcher) and wood stork (Dr. Peter Frederick) monitoring. The USACE has been actively monitoring snail kites range-wide since 1992 and wading birds since the late 1980's. The USACE also recently contracted with Dr. Ken Meyer (ARCI) and Dr. Phil Darby (University of West Florida) to implement an apple snail monitoring program and with Dr. Jay Sah (Florida International University) to complete the required vegetation analyses within CSSS habitat.

Adaptive Management. Finally, the USACE agrees with FWS that the 2016 ERTP BO RPA hinges upon a commitment to adaptive management. As outlined in Section 7.1.3(4), the BO's envisioned adaptive management process would serve as a way to keep the RPA on track to achieve its objectives while flexibly responding to new information. One attribute of this process would be to ensure that potential post-BO changes in USACE operations that may be necessary at a later date, and which are determined as unlikely to cause effects on the CSSS, wood stork, or snail kite different from or additional to those already considered in the BO, would not necessarily require a reinitiation of consultation for our agencies to address. In the interests of enabling this process, the USACE and FWS convened a January 26, 2017 ERTP Meeting in Vero Beach where USACE and FWS jointly decided that Leadership Group meetings would be held annually in mid-February and late September. At the January 26, 2017 meeting it was suggested that the 2017 meeting be held in March 2017. The ERTP Leadership Group Meeting was scheduled for March 2017 in South Florida, subsequently rescheduled until May 2017, and then finally June 2, 2017. Unfortunately on May 30, 2017, FWS requested that the June 2, 2017 ERTP Leadership Group meeting be cancelled due to other FWS priorities. The USACE remains committed to the actions outlined in the 2016 ERTP BO RPA and thus requested via letter on June 1, 2017 that FWS provide additional dates for the ERTP Leadership Group meeting. To date, FWS has not provided additional dates for this meeting.

As the 2016 ERTP BO acknowledges, implementing each of the actions of the RPA "is subject to various contingencies, including real estate acquisitions by DOI and the USACE, timely completion of several ongoing and planned construction projects, and complying with NEPA, some of which the USACE does not control (e.g., non-USACE land acquisition, tribal consultation, state CZMA evaluation)." The RPA actions are also subject "to the administrative and Congressional budget process, appropriations, the Federal Acquisition Regulations and Competition in Contracting Act, and the actions of third parties, which may delay or otherwise require changes to their execution." The USACE commits to coordinate with FWS as these contingencies are addressed and resolved in accordance with law. If, at a later date, processes such as NEPA result in any preferred alternative actions that may affect the CSSS in a manner, or to an extent not considered in the BO, the USACE will reinitiate formal consultation.

On June 22, 2017, USACE sent a letter requesting FWS concurrence to open the S-12A, S-12B, S-343A, S-343B, and S-344 structures at the earliest opportunity prior to July 15, 2017 to reduce stages in WCA 3A. In addition, USACE further requested to remove the 250 cubic feet per second (cfs) constraint on the S-332D pump station and allow pumping up to 500 cfs prior to July 15, 2017 to further facilitate reduction in stages in WCA 3A. On June 22, USACE requested emergency ESA consultation to further address high water concerns within WCA 3A. In our emergency ESA consultation, USACE made the following species effects determinations as related to the three species identified within the 2016 ERTP BO. Specifically, USACE determined that the proposed planned temporary deviation may affect, but is not likely to adversely affect, the endangered CSSS, endangered Everglade snail kite, or threatened wood stork. By letter dated June 27, 2017, the FWS concurred with USACE determinations for the Everglade snail kite and wood stork, but did not concur with the USACE determination for CSSS. Therefore, in accordance with the ESA, USACE is initiating formal ESA consultation and assessing potential effects on CSSS via this Biological Assessment for the 2017 Planned Temporary Deviation.

3 ACTION DESCRIPTION

3.1 ACTION AUTHORITY

The Central and Southern (C&SF) Project for Flood Control and Other Purposes was initially authorized by the Flood Control Act of 1948, Public Law 80-858, approved June 30, 1948. The remaining works of the Comprehensive Plan were authorized by the Flood Control Act of 1954, Public Law 83-780, approved September 3, 1954. There have been numerous modifications to the original C&SF Project authority. Examples of these modifications specific to this action include the 1992 Modified Water Deliveries to Everglades National Park General Design Memorandum and Environmental Impact Statement and the 1994 C&SF Project General Reevaluation Report and Environmental Impact Statement.

3.2 DESCRIPTION OF PROPOSED ACTION

The C&SF Project currently functions, and was originally authorized to function, as a multi-purpose water management system. The congressionally-authorized purposes of the C&SF Project include flood control, agricultural irrigation, municipal and industrial water supply, preservation of fish and wildlife, water supply to ENP, preservation of ENP, prevention of saltwater intrusion, drainage and water control, groundwater recharge, recreation, and navigation. Operations in the project area are currently governed by the Modified Water Deliveries to Everglades National Park (MWD) Project: G-3273 Constraint Relaxation/S-356 Field Test and S-357N Revised Operational Strategy Increment 1 Plus (Increment 1.1 and 1.2); hereafter referred to as MWD Increment 1 Plus, which is a deviation to the 2012 Water Conservation Areas (WCAs), Everglades National Park (ENP) and the ENP to South Dade Conveyance System (SDCS) Water Control Plan (hereafter referred to as the 2012 Water Control Plan). The EA and Finding of No Significant Impact (FONSI) for MWD Increment 1 Plus is dated February 16, 2017.

The USACE is seeking a temporary deviation from the 2012 Water Control Plan and the Modified Water Deliveries to Everglades National Park Project Increment 1 Plus Operational Strategy in order to provide relief from high water stages within Water Conservation Area (WCA) 1, WCA-2A, and WCA-3A until the WCA-3A 3-station gauge average falls below Zone A of the WCA 3A Regulation Schedule.

A series of early wet season storms that have occurred since June 5, 2017 have caused hydrologic conditions within the C&SF Project to change very rapidly from very dry conditions to very wet conditions within South Florida, with the WCAs along with the Everglades Agricultural Area (EAA) accumulating most of the rainfall. **Table 2** and **Figure 1** illustrate the extraordinary quantity of precipitation experienced across the WCAs and the EAA. WCA-3A alone received 17.57 inches in precipitation since June 1, which is almost 300% of the average for this time of year.

TABLE 2: TOTAL PRECIPITATION EXPERIENCED WITHIN C&SF PROJECT ACTION AREA BETWEEN JUNE 1, 2017 AND JUNE 23, 2017

Area	Precipitation	% of Average
East EAA	14.33inches	260% (average 5.51 inches)
WCA-1 & WCA-2	17.65 inches	320% (average 5.51 inches)
WCA-3	17.57 inches	280% (average 6.28 inches)

All areas of South Florida are inundated with water, restricting the ability to safely move water to mitigate the effects of flooding. Immediate action is necessary to deviate from permitted water management practices to move flood water out of the WCAs and subsequently provide opportunities to move more water south out of the WCAs. Therefore, the USACE is initiating a planned temporary deviation from the approved Water Control Plan for purposes of alleviating high water conditions within the project area. The proposed action is expected to mitigate for severe ecologic and economic losses that could result from prolonged high water levels. Loss of natural resources directly affects fisheries and fishing, seafood harvesting, and ecotourism.

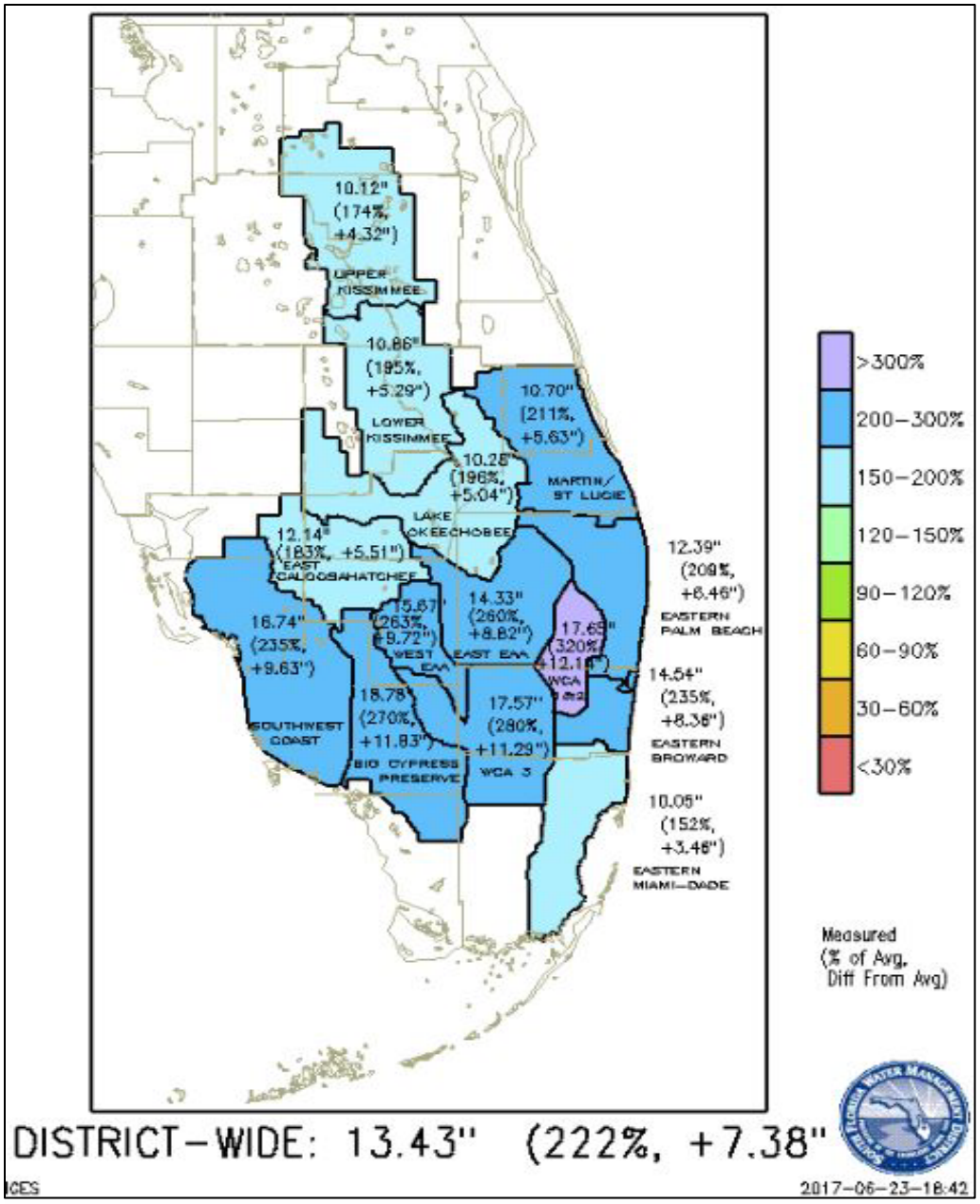


FIGURE 2: PRECIPITATION MAP WITHIN THE PROJECT AREA BETWEEN JUNE 2 AND JUNE 23, 2017 (MAP COURTESY OF SOUTH FLORIDA WATER MANAGEMENT DISTRICT).

Due to this unprecedented rainfall during the month of June 2017, WCA 1, WCA 2A, and WCA 3A are all above Zone A of their respective regulation schedules (**Table 3**). In addition, the EAA, which is located directly north of the WCAs and sends excess water south into the WCAs, has also received a significant amount of rainfall, further exacerbating the sharp rate of rise in the WCAs in June 2017.

TABLE 3*:* WCA STAGES COMPARED TO REGULATION SCHEDULE (DATA REFLECTS STAGES ON JUNE 23, 2017).

Area	Current Stage (feet NGVD)	Regulation Schedule (feet NGVD)	Deviation from Regulation Schedule (feet)
WCA-1	16.68	15.75	0.93
WCA-2A	14.30	11.00	3.30
WCA-3A	11.05	9.35	1.70 (1.4 ft. above Zone A)

The stages within WCA 3A are the most concerning because construction, environmental constraints, and current system capacity limit the volume of water that can be moved out of the system. Its regulation schedule is currently above the maximum regulation schedule as shown in **Figure 3** and the maximum exceedance elevation for this time of the year, as shown in **Figure 4**.

Based on consideration of the current approved levee screening risk assessments for WCA-3A, USACE, Engineering Division recommends evaluating and implementing all available and appropriate water management options to immediately lower WCA-3A high water stages when the WCA-3A 3 gage average stage is forecast to exceed 12.7 feet NGVD. The WCA-3A average stage of 12.7 feet NGVD corresponds to approximately 12.0 feet NGVD at the 3-65 gage location (3A-28), which triggers initiation of semi-weekly high water inspections by the SFWMD along the L-28 and L-29 levee segments which border WCA-3A. The WCA-3A average stage of 12.7 feet NGVD also coincides with the period-of-record (1962-2017) high water stage in WCA-3A, and exceedance of this elevation will encroach into the required 2.5 feet of levee freeboard at the low point (el. 14.3 ft., NGVD29) of the L-29 levee along southern WCA-3A (L-29 Section 2).

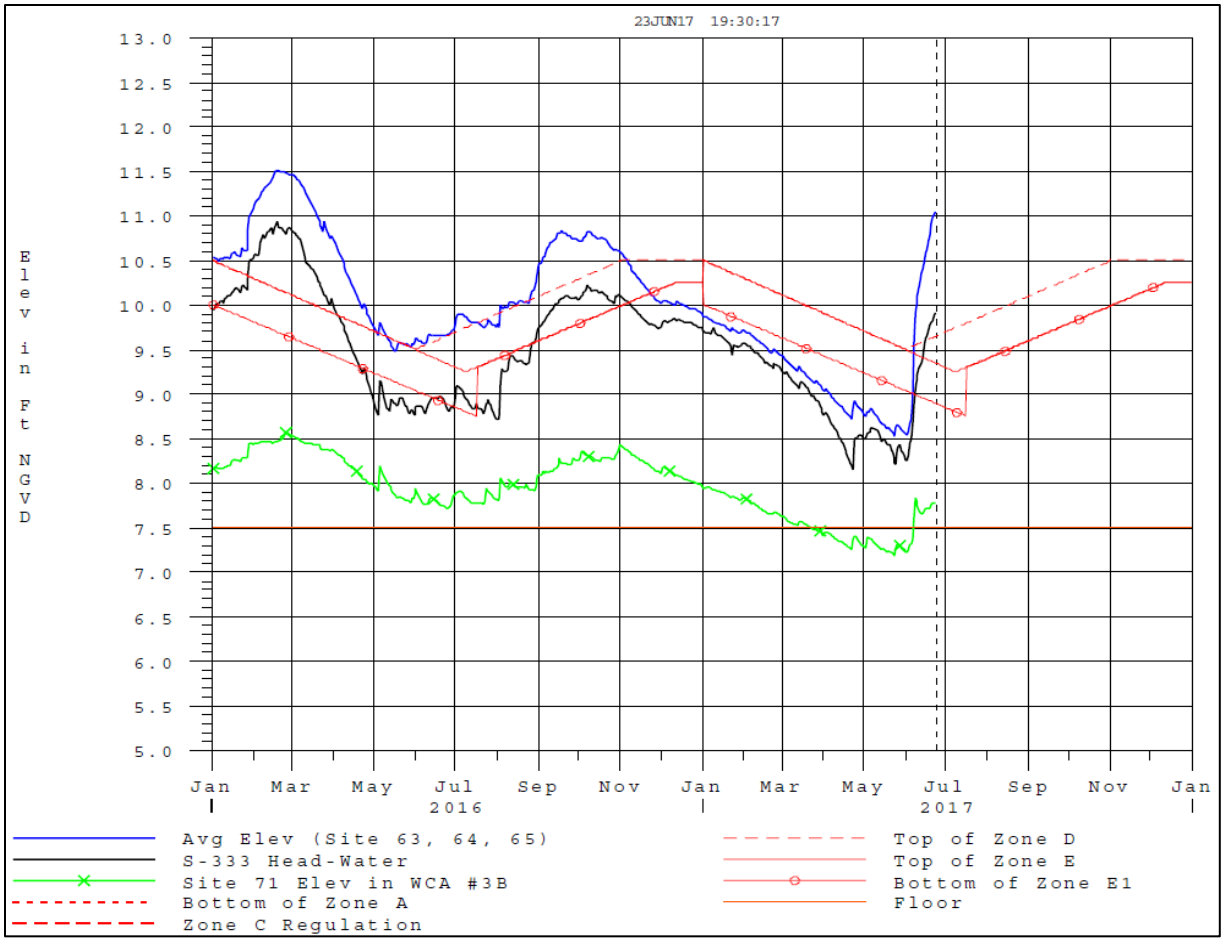


FIGURE 3*:* WCA-3A STAGE HYDROGRAPH AND REGULATION SCHEDULE

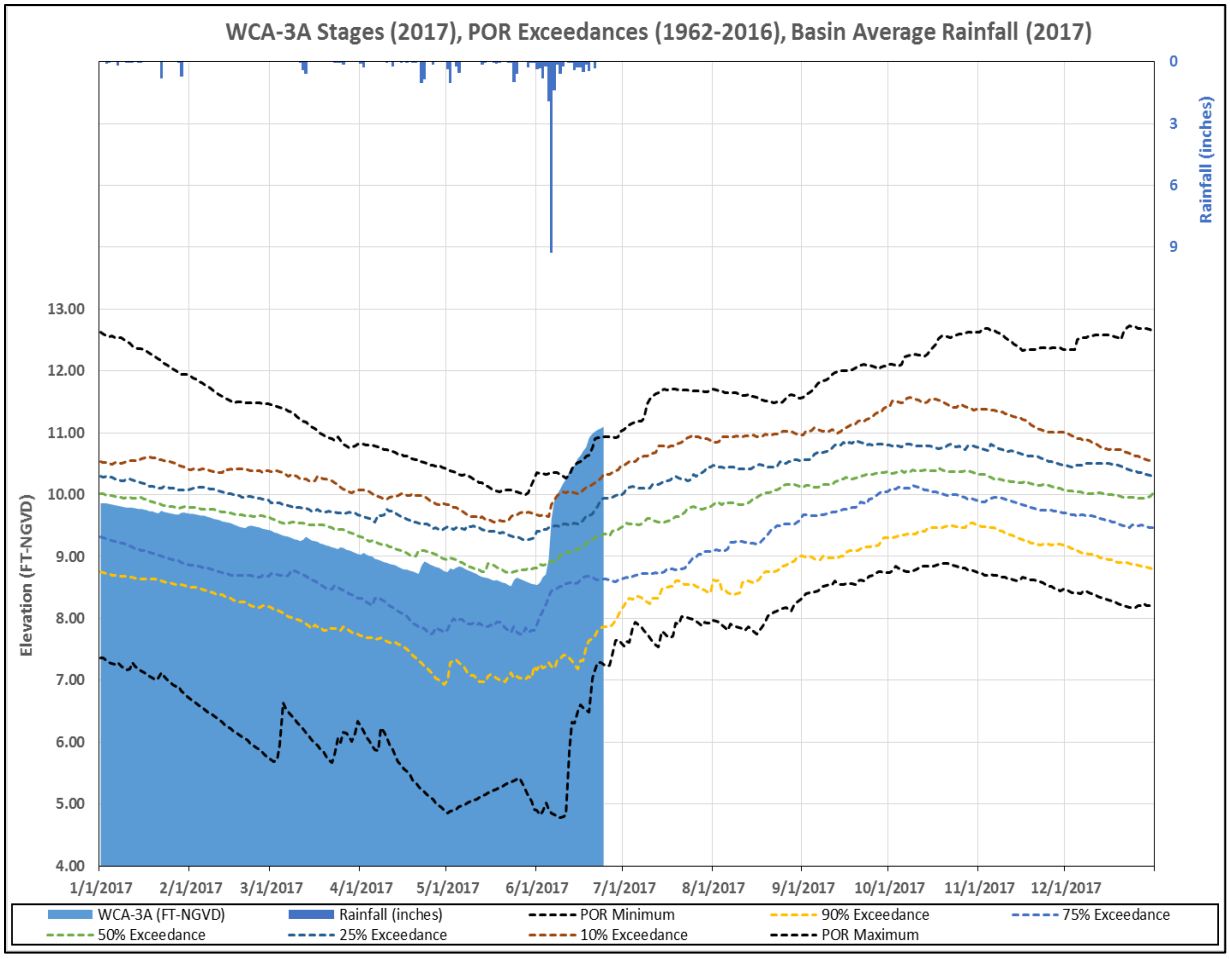


FIGURE 4*:* WCA-3A COMPARED TO 1962-2016 EXCEEDANCE STATISTICS (JUNE 25, 2017)

This planned temporary deviation is envisioned to reduce water stages within WCA 3A to the extent practicable given the current infrastructure, as well as downstream system constraints to include ongoing construction, flood mitigation, and environmental considerations including threatened and endangered species. The alternatives described in the 2017 Planned Temporary Deviation EA/FONSI **(Appendix A, Section 2)** were formulated, considered, and evaluated based on the achievement of project purpose and need and compliance with project constraints (**Appendix A, Section 1.3**). Potential effects on the human environment were also evaluated (**Appendix A**, **Section 4.0**).

3.3 ACTION LOCATION

The water management operating criteria relating to the proposed action affects an area within the C&SF Project located in South Florida and includes Lake Okeechobee, the Caloosahatchee and St. Lucie Estuaries, Water Conservation Area 3 (WCA 3), Everglades National Park (ENP), and adjacent areas. Features of the proposed action are located in Broward and Miami-Dade Counties (**Figure 4**).

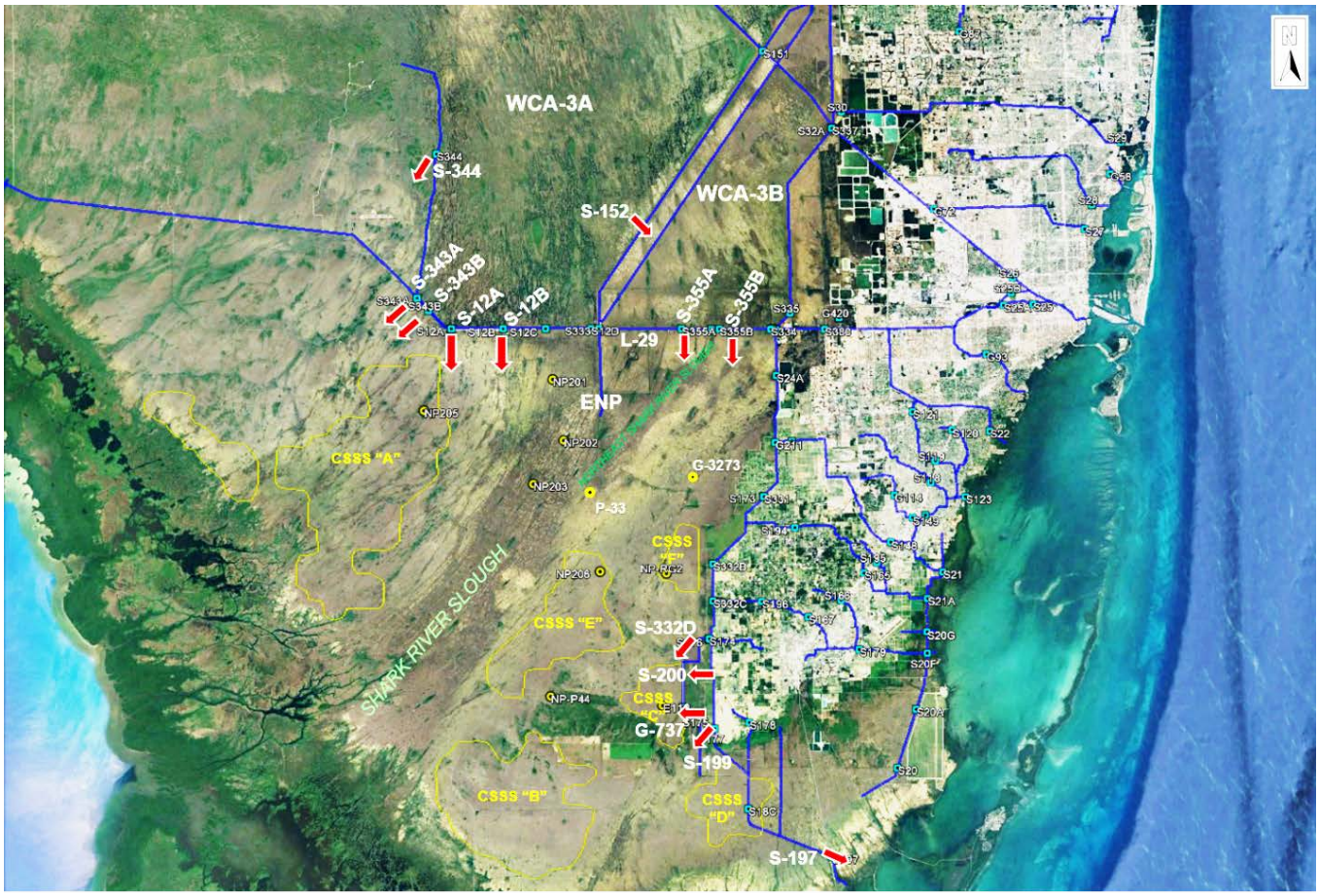
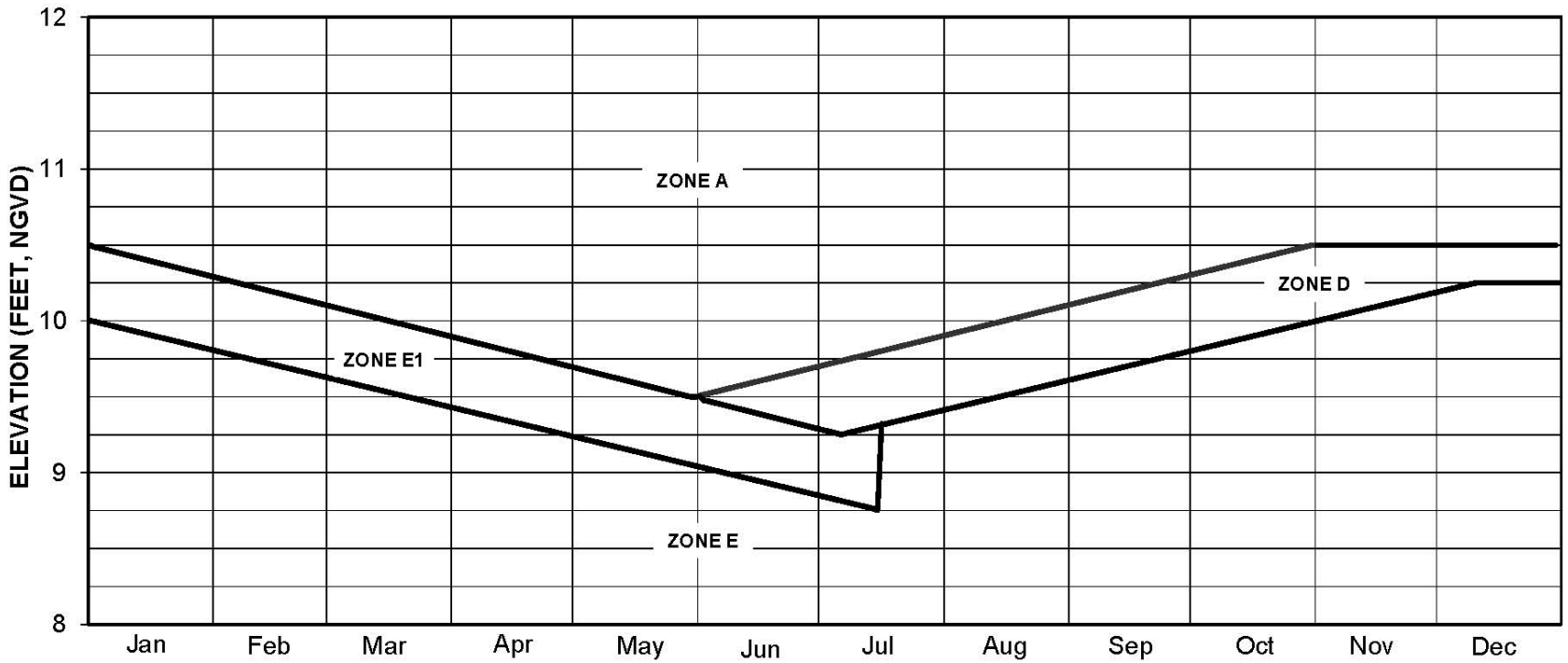


FIGURE 5: PROJECT LOCATION AND RELEVANT C&SF PROJECT FEATURES OF THE MWD PROJECT AND C-111 PROJECTS

4 RECOMMENDED PLAN ELEMENTS

The Proposed Action consists of four major components to include 1) opening of the S-12A, S-12B, S-343A, S-343B, and S-344 structures prior to the official opening date of July 15, 2017; 2) opening of S-152 to discharge water from WCA 3A to WCA 3B; 3) increasing discharges at S-332D from 250 cubic feet per second (cfs) to 500 cfs to increase discharge from WCA 3A to the South Dade Conveyance System using the S-333 and S-334, if needed; and 4) increasing discharge at S-197 from 400 cfs to 2,400 cfs to accommodate additional flows from WCA 3A to the South Dade Conveyance System using S-333 and S-334 while retaining capacity to manage local basin run off. These deviations are expected to continue until the WCA-3A 3-station gage average falls below Zone A of the regulation schedule (**Figure 5**).



Notes: Zones B and C do not exist. Use 3-gage average elevation (Sites 63, 64, and 65). If 3-gage average is in Zone D from 1 June through 14 July, Zone E1 operating criteria may be utilized.

Zone A: Up to maximum releases at S-12A, S-12B, S-12C, S-12D, S-333, S-334, S-343A, S-343B, S-344, and S-151 subject to attached Part C and WCA-3A, ENP, and ENP-SDCS Water Control Plan.

Zones D, E: Goal is to release 45% and 55% at S-12s and S-333, respectively, of the computed flow for Shark River Slough, subject to attached Part C and WCA-3A, ENP, and ENP-SDCS Water Control Plan.

Zone E1: Up to maximum releases at S-12C, S-12D, S-142, S-151, S-31, S-337, S-335, S-333, S-355A, S-355B and S-334 subject to attached Part C and WCA-3A, ENP, and ENP-SDCS Water Control Plan. The goal of Zone E1 is to address the reduction of WCA-3A releases due to CSSS-A structure closure periods.

CENTRAL AND SOUTHERN FLORIDA PROJECT

WATER CONSERVATION AREA NO. 3A INTERIM REGULATION SCHEDULE

PART A

DATED: March 2012
US ARMY ENGINEER DISTRICT
JACKSONVILLE, FLORIDA

FIGURE 6: ERTP WATER CONSERVATION AREA 3A INTERIM REGULATION SCHEDULE

5 DESCRIPTION OF LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

5.1 AFFECTED ENVIRONMENT

The action area includes NESRS, Western Shark River Slough, WCA-1, WCA-2 and WCA-3, Taylor Slough, the Lower East Coast area, 8.5 SMA, and Biscayne and Florida bays. The 2012 ERTP FEIS provides a full description of the affected environment within the action area and is incorporated into this document by reference. This information is available for review at: http://141.232.10.32/pm/program_docs/ertp.aspx. Additional information on existing conditions can be found within the 2017 Planned Temporary Deviation EA/FONSI (**Appendix A**).

5.1.1. VEGETATIVE COMMUNITIES

The Everglades landscape is dominated by a complex of freshwater wetland communities that includes open water sloughs and marshes, dense grass- and sedge-dominated marshes, forested islands, and wet marl prairies. The primary factors influencing the distribution of dominant freshwater wetland plant species of the Everglades are soil type, soil depth, and hydrological regime (FWS 1999). These communities generally occur along a hydrological gradient with the slough/open water marsh communities occupying the wettest areas (flooded more than nine months per year), followed by sawgrass marshes (flooded six to nine months per year), and wet marl prairie communities (flooded less than six months per year) (FWS 1999). The freshwater wetlands of the Everglades eventually grade into intertidal mangrove wetlands and subtidal seagrass beds in the estuarine waters of Florida Bay.

Development and drainage over the last century have dramatically reduced the overall spatial extent of freshwater wetlands within the Everglades, with approximately half of the pre-drainage 1.2 million hectares of wetlands being converted for development and agriculture (Davis and Ogden 1997). Alteration of the normal flow of freshwater through the Everglades has also contributed to conversions between community types, invasion by exotic species, and a general loss of community diversity and heterogeneity. Vegetative trends in ENP have included a substantial shift from the longer hydroperiod slough/open water marsh communities to shorter hydroperiod sawgrass marshes (Davis and Ogden 1997; Armentano et al. 2006). In addition, invasion of sawgrass marshes and wet prairies by exotic woody species has led to the conversion of some marsh communities to forested wetlands (Gunderson et al 1997).

Vegetative communities of the WCAs have suffered from both overdrainage and prolonged periods of inundation associated with the stabilization of water levels (USACE 1999a). Increased flooding and water depths in WCA-2A have resulted in the loss of wet prairie communities, drowning of tree islands, and loss of sawgrass marshes along slough edges. Major plant communities of WCA-2A now consist of remnant (drowned) tree islands, open water sloughs, and large expanses of sawgrass and sawgrass-cattail marshes. The increase in cattails in WCA-2A is attributed to increased nutrient loading associated with agricultural runoff. WCA-2B has suffered from lowered water levels resulting in heavy melaleuca (*Melaleuca quinquenervia*) infestations throughout the area. Increased deliveries of water to

WCA-2B, associated with drawdowns of WCA-2A in the 1980s, has helped somewhat to slow the advance of melaleuca.

Many areas of WCA-3A still contain relatively good wetland habitat consisting of a complex of tree islands, sawgrass marshes, wet prairies, and aquatic sloughs. Water lilies (*Nymphaea alba*) were originally widespread in sloughs throughout many areas of WCA-3A (McVoy et al. 2011). Reduced freshwater inflow and drainage by the Miami Canal have overdrained the northern portion of WCA-3A, resulting in increased fire frequency and the associated loss of tree islands, wet prairie, and aquatic slough habitat. Northern WCA-3A is currently dominated largely by mono-specific sawgrass stands with large areas of shrubs and monotypic cattail. In addition, northern WCA-3A lacks the diversity of communities that exists in southern WCA-3A. In southern WCA-3A, Wood and Tanner (1990) documented the trend toward deep water lily dominated sloughs due to impoundment. In approximately 1991, the hydrology of southern WCA-3A shifted to the deeper water and extended hydroperiods of the new, wet hydrologic era resulting in a northward shift in slough vegetation communities within the WCA-3A impoundment (Zweig and Kitchens 2008). Typical Everglades' vegetation, including tree islands, wet prairies, sawgrass marshes, and aquatic sloughs also occur throughout WCA-3B. However, within WCA-3B, the ridge and slough landscape has been severely degraded by the virtual elimination of overland sheetflow due to the L-67 Canal and levee system. WCA-3B experiences very little overland flow and has become primarily a rain-fed system predominated by shorter hydroperiod sawgrass marshes with relatively few sloughs or tree islands remaining. Water levels in WCA-3B are also too low and do not vary seasonally, contributing to poor ridge and slough patterning. Loss of sheetflow to WCA-3B has also accelerated soil loss, reducing elevations of the remaining tree islands in WCA-3B and making them vulnerable to high water stages.

Vegetative trends in ENP have included a substantial shift from the longer hydroperiod slough/open water marsh communities to shorter hydroperiod sawgrass marshes (Davis and Ogden 1997, Armentano et al. 2006). Flows through Shark River Slough under current system compartmentalization and water management practices are greatly reduced when compared with pre-drainage conditions. The result has been lower wet season depths and more frequent and severe dry downs in sloughs and reduction in extent of shallow water edges (McVoy et al. 2011). Overdrainage in the peripheral wetlands along the eastern flank of (NESRS) has resulted in shifts in community composition, invasion by exotic woody species, and increased susceptibility to fire. Areas within the eastern marl prairies along the boundary of ENP suffer from overdrainage, reduced water flow, exotic tree invasion, and frequent human-induced fires (Lockwood et al. 2003; Ross et al. 2006). In addition, invasion of sawgrass marshes and wet prairies by exotic woody species has led to the conversion of some marsh communities to forested wetlands (Gunderson et al. 1997).

The estuarine communities of Florida Bay have also been affected by upstream changes in freshwater flows through the Everglades. A reduction in freshwater inflows into Florida Bay and alterations of the normal salinity balance have affected mangrove community composition and may have contributed to a large-scale die-off of seagrass beds (FWS 1999).

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

5.1.2. SLOUGH/OPEN WATER MARSH

The slough/open water marsh community occurs in the lowest, wettest areas of the Everglades. This community is a complex of open water marshes containing emergent, floating aquatic, and submerged aquatic vegetation components. The emergent marsh vegetation is typically dominated by spikerushes (*Eleocharis cellulosa* and *E. elongata*), beakrushes (*Rhynchospora tracyi* and *R. inundata*), and maidencane (*Panicum hemitomon*). Common floating aquatic dominants include fragrant water lily (*Nymphaea odorata*), floating hearts (*Nymphoides aquatica*), and spatterdock (*Nuphar lutea*); and the submerged aquatic community is typically dominated by bladderwort (*Utricularia foliosa*) and periphyton. As shown by Davis et al. (1997), vegetative trends in the ENP have included the conversion of slough/open water marsh communities to shorter hydroperiod sawgrass marshes.

5.1.3. SAWGRASS MARSH

Sawgrass marshes are dominated by dense to sparse stands of *Cladium jamaicense*. Sawgrass marshes occurring on deep organic soils (more than one meter) form tall, dense, nearly monospecific stands. Sawgrass marshes occurring on shallow organic soils (less than one meter) form sparse, short stands that contain additional herbaceous species such as spikerush, water hyssop (*Bacopa caroliniana*), and marsh mermaid weed (*Proserpinaca palustris*) (Gunderson et al. 1997). The adaptations of sawgrass to flooding, burning, and oligotrophic conditions contribute to its dominance of the Everglades vegetation. Sawgrass-dominated marshes once covered an estimated 300,000 acres of the Everglades. Approximately 70,000 acres of tall, monospecific sawgrass marshes have been converted to agriculture in the EAA. Urban encroachment from the east and development within other portions of the Everglades has consumed an additional 79,000 acres of sawgrass-dominated communities (Davis and Ogden 1997).

5.1.4. WET MARL PRAIRIE

Wet marl prairies occur on marl soils and exposed limestone and experience the shortest hydroperiods of the slough/marsh/prairie wetland complex. Marl prairie is a sparsely vegetated community that is typically dominated by muhly grass (*Muhlenbergia capillaris*) and short-stature sawgrass. Additional important constituents include black sedge (*Schoenus nigricans*), arrowfeather (*Aristida purpurascens*), Florida little bluestem (*Schizachyrium rhizomatum*), and Elliot's lovegrass (*Eragrostis elliottii*). Periphyton mats that grow loosely attached to the vegetation and exposed limestone also form an important component of this community. Marl prairies occur in the southern Everglades along the eastern and western periphery of SRS. Approximately 146,000 acres of the eastern marl prairie have been lost to urban and agricultural encroachment (Davis and Ogden 1997). Pollen data indicate that the marl prairies

west of SRS are not a natural feature of the Everglades landscape, but developed after twentieth century hydrologic modification of the system reduced flow to the region (Bernhardt and Willard 2006). Prior to the modifications, plant communities at the sites analyzed by Bernhardt and Willard (2006) in western SRS consisted of sawgrass marshes. The authors concluded that "the current spatial distribution and community composition of marl prairies are a response to water management and land cover changes of the twentieth century; and further sampling of modern marl prairie communities and adjacent communities is necessary to document the pre- and post-drainage distribution of marl prairie" (Bernhardt and Willard 2006).

5.1.5. TREE ISLANDS

Tree islands occur within the freshwater marshes in areas of slightly higher elevation relative to the surrounding marsh. The lower portions of tree islands are dominated by hydrophytic, evergreen, broad-leaved hardwoods such as red bay (*Persea palustris*), sweetbay, dahoon holly (*Ilex cassine*), and pond apple (*Annona glabra*). Tree islands typically have a dense shrub layer that is dominated by coco-plum (*Chrysobalanus icaco*). Additional constituents of the shrub layer commonly include buttonbush and large leather fern (*Acrostichum danaeifolium*). Elevated areas on the upstream side of some tree islands may contain an upland tropical hardwood hammock community dominated by species of West Indian origin (Gunderson et al. 1997), with species composition shifting toward the north toward more temperate hardwood hammock species. Extended periods of flooding may result in tree mortality and conversion to a non-forested community. In the overdrained areas of WCA-3A, historic wildfires have consumed tree island vegetation and soils. Overall, the spatial extent of tree islands in WCA-3 declined by 61% between 1940 and 1995 (Patterson and Finck 1999). Portions of the WCAs have been flooded to the extent that many forested islands have lost all tropical hardwood hammock trees. Tree islands are considered an extremely important contributor to habitat heterogeneity and overall species diversity within the Everglades ecosystem because they provide nesting habitat and refugia for birds and upland species and serve as hotspots of plant species diversity within the Greater Everglades (Sklar and van der Valk 2002, FWS 1999). Tree islands also contain extraordinarily high levels of total phosphorus in their soil suggesting that they may play a major role in the biogeochemical cycles of nutrients in the Everglades (Troxler and Childers 2010; Wetzel et al. 2009, 2011). Wetzel et al. (2011) found that soil total phosphorus levels within WCA-3A and WCA-3B tree islands were approximately 4 times higher than the surrounding marsh total phosphorus levels. Tree islands within WCA-3B may help to capture and focus nutrients, assisting to minimize potential effects on sawgrass and wet prairie communities within this region (Wetzel et al. 2011).

5.1.6. MANGROVES

Mangrove communities are forested wetlands occurring in intertidal, low-wave-energy, estuarine, and marine environments. Within the action area, extensive mangrove communities occur in the intertidal zone of Florida Bay. Mangrove forests have a dense canopy dominated by four species: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). Mangrove communities occur within a range of salinities from 0 to 40 parts per thousand (ppt). Florida Bay experiences salinities in excess of 40 ppt on a seasonal basis. Declines in freshwater flow through the Everglades have altered the salinity balance and species composition of mangrove

communities within Florida Bay. Changes in freshwater flow can lead to an invasion by exotic species such as Australian pine (*Casuarina equisetifolia*) and Brazilian pepper (*Schinus terebinthifolius*).

5.1.7. SEAGRASS BEDS

Seagrasses are submerged vascular plants that form dense rooted beds in shallow estuarine and marine environments. This community occurs in subtidal areas that experience moderate wave energy. Within the action area, extensive seagrass beds occur in Florida Bay. The most abundant seagrasses in south Florida are turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), and shoal grass (*Halodule wrightii*). Additional species include star grass (*Halophila engelmannii*), paddle grass (*Halophila decipiens*), and Johnson's seagrass (*Halophila johnsonii*). Widgeon grass may also occur in seagrass beds in areas of low salinity. Seagrasses have an optimum salinity range of 24 to 35 ppt, but can tolerate considerable short term salinity fluctuations. Large-scale seagrass die-off has occurred in Florida Bay since 1987, with over 18% of the total bay area affected. Suspected causes of seagrass mortality include high salinities and temperatures during the 1980s and long-term reductions of freshwater inflow to Florida Bay (RECOVER 2009).

5.1.8. ROCKLAND PINE FOREST

Pine rocklands within the action area occur on the Miami Rock Ridge and extend into the Everglades as Long Pine Key. Pine rocklands occur on relatively flat terrain with moderately to well-drained soils. Most sites are wet for only short periods following heavy rains (Florida Natural Areas Inventory 1990). Limestone bedrock is close to the surface and the soils are typically shallow accumulations of sand, marl, and organic material. Pine rockland is an open, savanna-like community with a canopy of scattered south Florida slash pine (*Pinus elliottii* var. *densa*) and an open, low-stature understory. This is a fire-maintained community that requires regular burns to maintain the open shrub/herbaceous stratum and to control hardwood encroachment (Gunderson 1997). The overstory is comprised of scattered South Florida slash pines. The shrub layer is comprised of a diverse assemblage of tropical and temperate species. Common shrubs include cabbage palm (*Sabal palmetto*), coco-plum (*Chrysobalanus icaco*), myrsine (*Rapanea punctata*), saw palmetto (*Serenoa repens*), southern sumac (*Rhus copallinum*), strangler fig (*Ficus aurea*), swamp bay (*Persea palustris*), wax myrtle (*Myrica cerifera*), white indigo berry (*Randia aculeata*), and willow-bustic (*Sideroxylon salicifolium*). The herbaceous stratum is comprised of a very diverse assemblage of grasses, sedges, and forbs. Common herbaceous species include crimson bluestem (*Schizachyrium sanguineum*), wire bluestem (*Schizachyrium gracile*), hairy bluestem (*Andropogon longiberbis*), bushy bluestem (*Andropogon glomeratus* var. *pumilis*), candyweed (*Polygala grandiflora*), creeping morning-glory (*Evolvulus sericeus*), pineland heliotrope (*Heliotropium polyphyllum*), rabbit bells (*Crotolaria rotundifolia*), and thistle (*Cirsium horridulum*) (FWS 1999). This community occurs on areas of relatively high elevation and consequently, has been subject to intense development pressure. In addition, fragmentation, fire suppression, invasion by exotic species, and a lowered water table have negatively affected the remaining tracts of pine rockland (FWS 1999).

5.1.9. TROPICAL HARDWOOD HAMMOCK

Tropical hardwood hammocks occur on upland sites where limestone is near the surface. Tropical hardwood hammocks within the action area occur on the Miami Rock Ridge, along the northern shores of Florida Bay, and on elevated outcrops on the upstream side of tree islands. This community consists of a closed canopy forest dominated by a diverse assemblage of hardwood tree species, a relatively open shrub layer, and a sparse herbaceous stratum. This community is dominated by West Indian species and contains numerous species whose entire United States distribution is limited to tropical hammocks of South Florida. Common canopy species include gumbo-limbo (*Bursera simaruba*), paradise tree (*Simarouba glauca*), pigeon-plum (*Coccoloba diversifolia*), strangler fig, wild mastic (*Sideroxylon foetidissimum*), willow-bustic, live oak (*Quercus virginiana*), short-leaf fig (*Ficus citrifolia*), and wild tamarind (*Lysiloma bahamense*). Common understory species include black ironwood (*Krugiodendron ferreum*), inkwood (*Exothea paniculata*), lancewood (*Ocotea coriacea*), marlberry (*Ardisia escallonoides*), poisonwood (*Metopium toxiferum*), satinleaf (*Chrysophyllum oliviforme*), and white stopper (*Eugenia axillaris*). Common species of the sparse shrub/herbaceous layer include shiny-leaf wild-coffee (*Psychotria nervosa*), rouge plant (*Rivinia humilis*), false mint (*Dicliptera sexangularis*), bamboo grass (*Lasciacis divaricata*), and woods grass (*Oplismenus hirtellus*). This community occurs on areas of relatively high elevation and consequently, has been subject to intense development pressure. Fragmentation of remaining tracts, invasion by exotic species, and alterations of water table elevations have also had negative impacts on this community. Tropical hardwood hammocks on the Miami Rock Ridge have been affected by a lowered water table associated with the reduction of freshwater flow through the Everglades. In contrast, tree islands in the WCAs have been flooded to the extent that many have lost all tropical hardwood hammock trees.

5.2 FEDERALLY LISTED SPECIES

USACE has coordinated the existence of federally listed species with FWS and NMFS, as appropriate. Specifically, coordination with NMFS includes listed fish and sea turtles at sea. Coordination with FWS includes other listed plants and animals (FWS 2010). Twenty-nine federally listed threatened and endangered species are either known to exist or potentially exist within the action area and, subsequently, may be affected by the proposed action (**Table 4**). Many of these species have been previously affected by habitat impacts resulting from wetland drainage, alteration of hydroperiod, wildfire, and water quality degradation.

Federally listed species that are known to exist or potentially exist within the action area are listed in **Table 4**. In addition, as also noted in **Table 4**, a number of candidate animal species are also known to exist or potentially exist within ERTP action area. Adverse effects to federally listed candidate species are not anticipated due to implementation of the 2017 Planned Temporary Deviation.

As noted in **Section 2**, this Biological Assessment is only being prepared for CSSS. On June 26, 2017, USACE requested emergency ESA consultation to address high water concerns within WCA 3A. In our emergency ESA consultation, USACE made the following species effects determinations as related to the three species identified within the

2016 ERTP BO. Specifically, USACE determined that the Planned Temporary Deviation may affect, but is not likely to adversely affect, endangered CSSS, endangered Everglade snail kite, or threatened wood stork. By letter dated June 27, 2017, FWS concurred with our determinations for the Everglade snail kite and wood stork but did not concur with our determination for CSSS. Therefore, in accordance with the ESA, USACE is initiating formal ESA consultation and assessing potential effects on CSSS via this Biological Assessment for the 2017 Planned Temporary Deviation.

TABLE 4: STATUS OF THREATENED AND ENDANGERED SPECIES LIKELY TO BE AFFECTED BY 2017 PLANNED TEMPORARY DEVIATION AND USACE'S AFFECT DETERMINATION

Common Name	Scientific Name	Status	May Affect	No Effect
Mammals				
Florida panther	*Puma concolor coryi*	E		X
Florida manatee	*Trichechus manatus latirostris*	E, CH		X
Florida bonneted bat	*Eumops floridanus*	E		X
Birds				
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	E, CH	X	
Snail kite	*Rostrhamus sociabilis plumbeus*	E, CH	X	
Red-cockaded woodpecker	*Picoides borealis*	E		X
Roseate tern	*Sterna dougallii*	T		X
Wood stork	*Mycteria americana*	T	X	
Reptiles				
American Alligator	*Alligator mississippiensis*	T, SA		X
American crocodile	*Crocodylus acutus*	T, CH		X
Eastern indigo snake	*Drymarchon corais couperi*	T		X
Gopher tortoise	*Gopherus polyphemus*	C		X
Green sea turtle*	*Chelonia mydas*	E		X
Hawksbill sea turtle*	*Eretmochelys imbricata*	E		X
Kemp's Ridley sea turtle*	*Lipodochelys kempii*	E		X
Leatherback sea turtle*	*Dermochelys coriacea*	E		X
Loggerhead sea turtle*	*Caretta*	E		X
Fish				
Smalltooth sawfish*	*Pristis pectinata*	E, CH		X
Invertebrates				
Bartram's hairstreak butterfly	*Strymon acis bartrami*	E, CH		X
Elkhorn coral*	*Acropora palmata*	T, CH		X
Florida leafwing butterfly	*Anaea troglodyta floridalis*	E, CH		X
Miami blue butterfly	*Cyclargus thomasi bethunebakeri*	E		X
Schaus swallowtail butterfly	*Heraclides aristodemus ponceanus*	E		X
Staghorn coral*	*Acropora cervicornis*	T, CH		X
Stock Island tree snail	*Orthalicus reses* (not incl. *nesodryas*)	T		X
Plants				
Deltoid spurge	*Chamaesyce deltoidea* spp. *Deltoidea*	E		X
Garber's spurge	*Chamaesyce garberi*	T		X
Johnson's seagrass*	*Halophila johnsonii*	E, CH		X
Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeenis*	E		X
Small's milkpea	*Galactia smallii*	E		X
Tiny polygala	*Polygala smallii*	E		X
Blodgett's silverbush	*Argythamnia blodgettii*	T		X
Cape Sable thoroughwort	*Chromolaena frustrata*	E, CH		X
Everglades bully	*Sideroxylon reclinatum* spp. *austrofloridense*	C		X
Florida bristle fern	*Trichomanes punctatum* spp. F*loridanum*	E		X
Florida pineland crabgrass	*Digitaria pauciflora*	C		X

Florida prairie clover		E		X
Crenulate Lead Plant		C		X
Carter's small flowered flax		E, CH		X
Florida Brickell- bush		E, CH		X
Florida semaphore cactus		E, CH		X
Sand flax		E		X
Pineland sandmat	*Chamaesyce deltoidea* ssp. *Pinetorum*	C		X

*Marine species under the purview of NMFS
E=Endangered; T=Threatened; SA=Similarity of Appearance; CH=Critical Habitat; C=Candidate Species, PE: Proposed endangered

5.3 DESIGNATED CRITICAL HABITAT

In addition to threatened and endangered species, the action area also includes or is adjacent to designated critical habitat for Florida manatee, CSSS (**Figure 6**), snail kite, American crocodile, Bartram's hairstreak butterfly, Florida leafwing butterfly, Cape Sable thoroughwort, Carter's small flowered flax, Florida Brickell-bush. Florida semaphore cactus, smalltooth sawfish, elkhorn coral, staghorn coral, and Johnson's seagrass. Please note that smalltooth sawfish, elkhorn coral, staghorn coral, and Johnson's seagrass fall under the purview of NMFS.

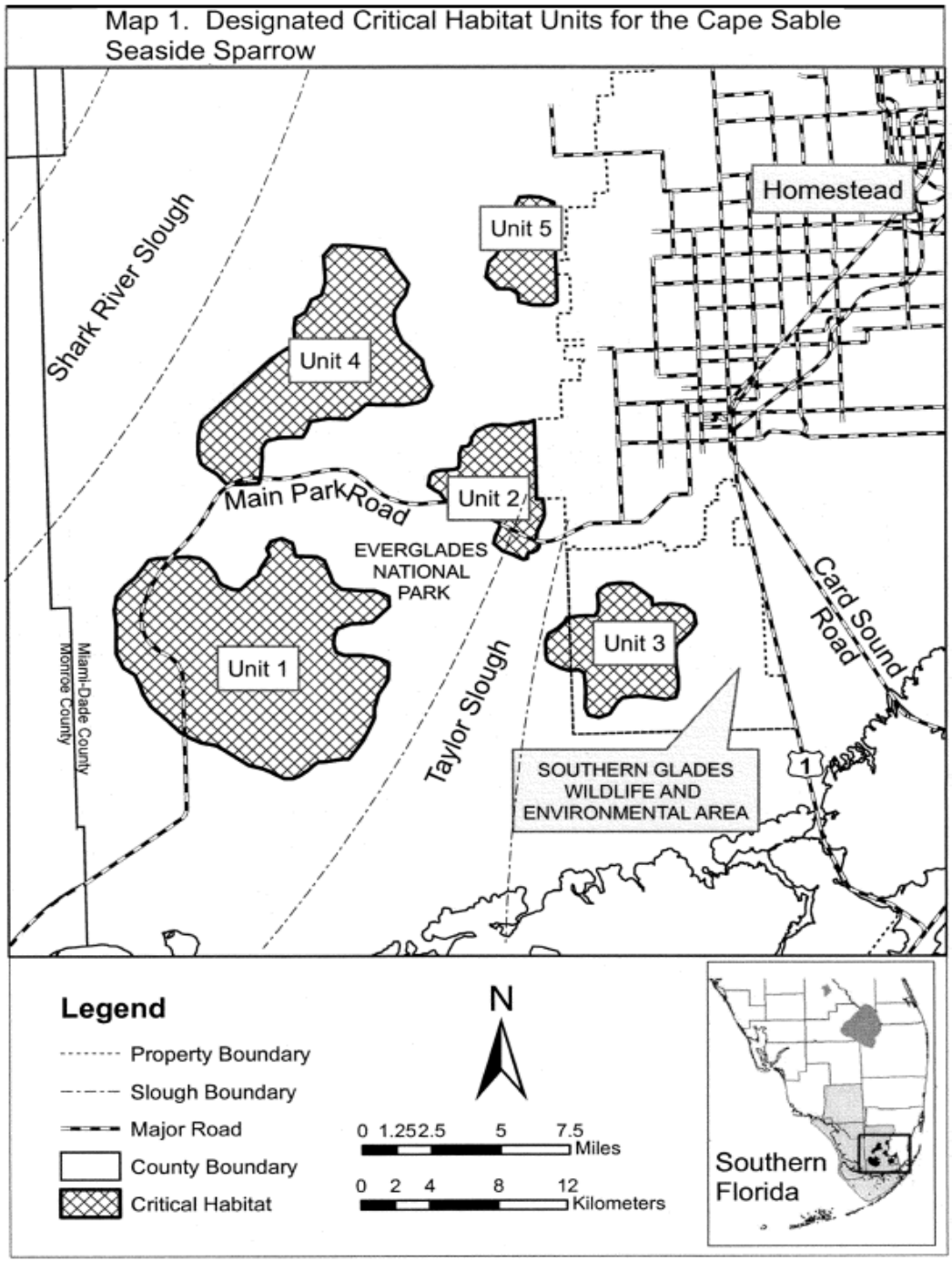


FIGURE 6: CRITICAL HABITAT FOR THE CAPE SABLE SEASIDE SPARROW

Designated critical habitat for the Cape Sable seaside sparrow include areas of land, water, and airspace in the Taylor Slough vicinity of Collier, Dade, and Monroe counties, with the following components: those portions of ENP within T57S R36E, T57S R36E, T57S R37E, T58S R35E, T58S R36E, T58S R37E, T58S R35E, T58S R36E, T59S R35E, T59S R36E, T59S R37E. Areas outside of ENP within T55S R37E Sec. 36; T55S R38E Sec. 31, 32; T56S R37E Sec. 1, 2, 11-14, 23-26; T56S R38E Sec. 5-7, 18, 19; T57S R37E Sec. 5-8; T58S R38E

Sec. 27, 29-32; T59S R38E Sec. 4 (CFR Vol. 72, No. 214 / 11-6-07). All of the designated CSSS critical habitat lies within the ERTP action area.

5.4 "MAY AFFECT" DETERMINATION

Under Emergency ESA consultation on June 26, 2017, USACE determined that the 2017 Planned Temporary Deviation may affect, but is not likely to adversely affect, the endangered Everglade snail kite and threatened wood stork. FWS concurred with these determinations via letter dated June 27, 2017. The FWS however, did not concur with our effect determination for the endangered CSSS and thus USACE initiated formal consultation via transmittal of this Biological Assessment.

5.5 CAPE SABLE SEASIDE SPARROW AND "MAY EFFECT" DETERMINATION

Measuring 13-14 centimeters in length, CSSS is one of nine subspecies of seaside sparrows (Werner 1975). CSSS are non-migratory residents of freshwater to brackish marshes and their range is restricted to the lower Florida peninsula. They were originally listed as endangered in 1969 due to their restricted range (FWS 1999). Subsequent changes in their habitat have further reduced their range and continue to threaten this subspecies with extinction.

CSSS appear to prefer mixed marl prairie communities that include muhly grass (*Muhlenbergia filipes*) for nesting (Stevenson and Anderson 1994). These short-hydroperiod (the period of time during which a wetland is covered by water) prairies contain a mosaic of moderately dense, clumped grasses, interspersed with open space that permit ground movements by the sparrows (FWS 1999). According to previous literature, (Werner 1975; Bass and Kushlan 1982), CSSS are generally not found in communities dominated by dense sawgrass, cattail (*Typha* spp.) monocultures, long-hydroperiod wetlands with tall, dense vegetative cover, spikerush marshes, and sites supporting woody vegetation. However, recent research has revealed that CSSS within the Dogleg North plot sub-population B (CSSS-B) were successfully nesting in "very thick, tall sawgrass" (Virzi and Davis 2013; Slater et al. 2014). Curnett and Pimm (1993) indicated that CSSS also avoid sites with permanent water cover; however, more recent evidence has shown that CSSS successfully nested in areas in which "water levels were extremely high…approaching knee-deep at times with 100% coverage the entire summer" (Virzi and Davis 2013). The combination of hydroperiod and periodic fire events are critical in the maintenance of suitable mixed marl prairie communities for the CSSS (Kushlan and Bass 1983).

CSSS nest in the spring when the marl prairies are dry. While the majority of nesting activities have been observed between March 1 and July 15 when Everglades marl prairies are dry, (Lockwood et al. 1997, 2001), nesting has been reported as early as late February (Werner 1975), and as late as early August (Dean and Morrison 2001). Males will establish breeding territories in early February (Balent et al. 1998) and defend these territories throughout the

breeding season (FWS 1999). Male sparrows vocalize to attract females and this particular breeding activity has been shown to decrease with increased surface water conditions (Nott et al. 1998; Curnutt and Pimm 1993).

Successful CSSS breeding requires that breeding season water levels remain at or below ground level in the breeding habitat. Nott et al. (1998) cited a "10-centimeter (cm)" rule for maximum water depth over which the CSSS will initiate nesting. This conclusion was based upon observations within the ENP range-wide survey in which no singing males were heard when water depths exceeded that level. However, Dean and Morrison (1998) demonstrated that nesting may occur when average water depths exceed this rule. In addition, more recent evidence has shown that not only were CSSS able to successfully breed in areas with standing water that was "approaching knee deep at times"; but also that they were able to successfully produce multiple broods (3) in the Dogleg Plot of CSSS-B "despite heavy rains that began in early-May and deep water levels that persisted throughout the breeding season in the study plot" (Virzi and Davis 2013; Slater et al. 2014).

CSSS construct their nests relatively close to the ground in clumps of grasses composed primarily of muhly, beakrushes (*Rhynchospora* spp.), and Florida little bluestem (*Schizachyrium rhizomatum)* (Pimm et al. 2002). The average early season nest height is 17 centimeters (6.7 inches) above ground, while the average late season nest height is 21 centimeters (8.3 inches) above ground (Lockwood et al. 2001). The shift in average nest height after the onset of the wet season rainfall pattern, which typically begins in early June (Lockwood et al. 2001), appears to be an adaptive response to rising surface water conditions. In general, the CSSS will raise one or two broods within a season; however, if weather conditions permit, a third brood is possible (Kushlan et al. 1982; FWS 1983). A new nest is constructed for each successive brood. The end of the breeding season is triggered by the onset of the rainy season when ground water levels rise above the height of the nest off the ground (Lockwood et al. 1997).

CSSS will lay three to four eggs per clutch (Werner 1978; Pimm et al. 2002) with a hatching rate ranging between 0.66 and 1.00 (Boulton et al. 2009b). The nest cycle lasts between 34 and 44 days in length and includes a 12-13 day incubation period, 9-11 day nestling period and 10-20 days of post-fledgling care by both parents (Sprunt 1968; Trost 1968; Woolfenden 1956, 1968; Lockwood et al. 1997; Pimm et al. 2002). Nest success rate varies between 21 and 60 percent, depending upon timing of nest initiation within the breeding season (Baiser et al. 2008; Boulton et al. 2009a). Substantially higher nest success rates occur within the early portion of the breeding season (approximately 60% prior to June 1) followed by a decline in success as the breeding season progresses to a low of approximately 21% after June 1(Baiser et al. 2008; Boulton et al. 2009a; Virzi et al. 2009). In most years, June 1 is a good division between the early high success period and the later, lower success period (Dr. Julie Lockwood email correspondence to FWS, October 15, 2009). Nearly all nests that fail appear to fail due to predation, and predation rates appear to increase as water level increases (Lockwood et al. 1997, 2001; Baiser et al. 2008). A complete array of nest predators has not been determined. However, raccoons *(Procyon lotor*), rice rats *(Oryzomys palustri*s), and snakes, including exotic pythons, may be the chief predators (Lockwood et al. 1997; Dean and Morrison 1998; Post 2007).

A dietary generalist, CSSS feed by gleaning food items from low-lying vegetation (Ehrlich et al. 1992; Pimm et al. 2002). Common components of their diet include soft-bodied insects such as grasshoppers, spiders, moths, caterpillars, beetles, dragonflies, wasps, marine worms, shrimp, grass, and sedge seeds (Stevenson and Anderson 1994). The importance of individual food items appears to shift in response to their availability (Pimm et al. 2002).

CSSS are non-migratory with males displaying high site fidelity, defending the same territory for two to three years (Werner 1975). CSSS are capable of both short-distance and longer-range movements, but appear to be restricted to short hydroperiod prairie habitat (Dean and Morrison 1998). Large expanses of deep water or wooded habitat act as barriers to long-range movements (Dean and Morrison 1998). Recent research by Julie Lockwood, Ph.D. of Rutgers University and her students have revealed substantial movements between subpopulations east of Shark River Slough (Lockwood et al. 2008; Virzi et al. 2009), suggesting that CSSS has considerable capacity to colonize unoccupied suitable habitat (Sustainable Ecosystems Institute 2007).

In the 1930s, Cape Sable was the only known breeding range for CSSS (Nicholson 1928). Areas on Cape Sable that were occupied by CSSS in the 1930s have experienced a shift in vegetative communities from freshwater vegetation to mangroves, bare mud flats, and salt-tolerant plants, such as turtleweed (*Batis maritima*) and bushy seaside tansy (*Borrichia frutescens*) (Kushlan and Bass 1983). As a result, CSSS no longer use this area. More recently, continued alterations of CSSS habitat have occurred as a result of changes in the distribution, timing, and quantity of water flows in South Florida. Water flow changes and associated shifts in vegetation appear to be the leading contributor to the decline in CSSS population, which subsequently threaten the subspecies with extinction. Competition and nest also threatens CSSS.

Presently, the known distribution of CSSS is restricted to two areas of marl prairies east and west of Shark River Slough in the Everglades region (within ENP and BCNP) and the edge of Taylor Slough in the Southern Glades Wildlife and Environmental Area in Miami-Dade County. ENP staff first undertook a comprehensive survey of CSSS in 1981 to identify all areas where sparrows were present. This survey, hereafter referred to as the range-wide survey, resulted in the first complete range map for CSSS (Bass and Kushlan 1982; Kushlan and Bass 1983). The survey design consisted of a one-kilometer survey grid over any suspected CSSS habitat. As much of CSSS habitat is inaccessible, a helicopter was employed and landed at the intersection of each grid line (*i.e.* every 1 kilometer). At each site, the researchers would record every CSSS seen or heard (singing males) within an approximate 200 meter radius of their landing location (Curnutt et al. 1998). From the resulting range map, Curnutt et al. (1998) divided CSSS into six separate subpopulations, labeled as A through F (**Figure 7**), with subpopulation A (CSSS-A) as the only subpopulation west of Shark River Slough.

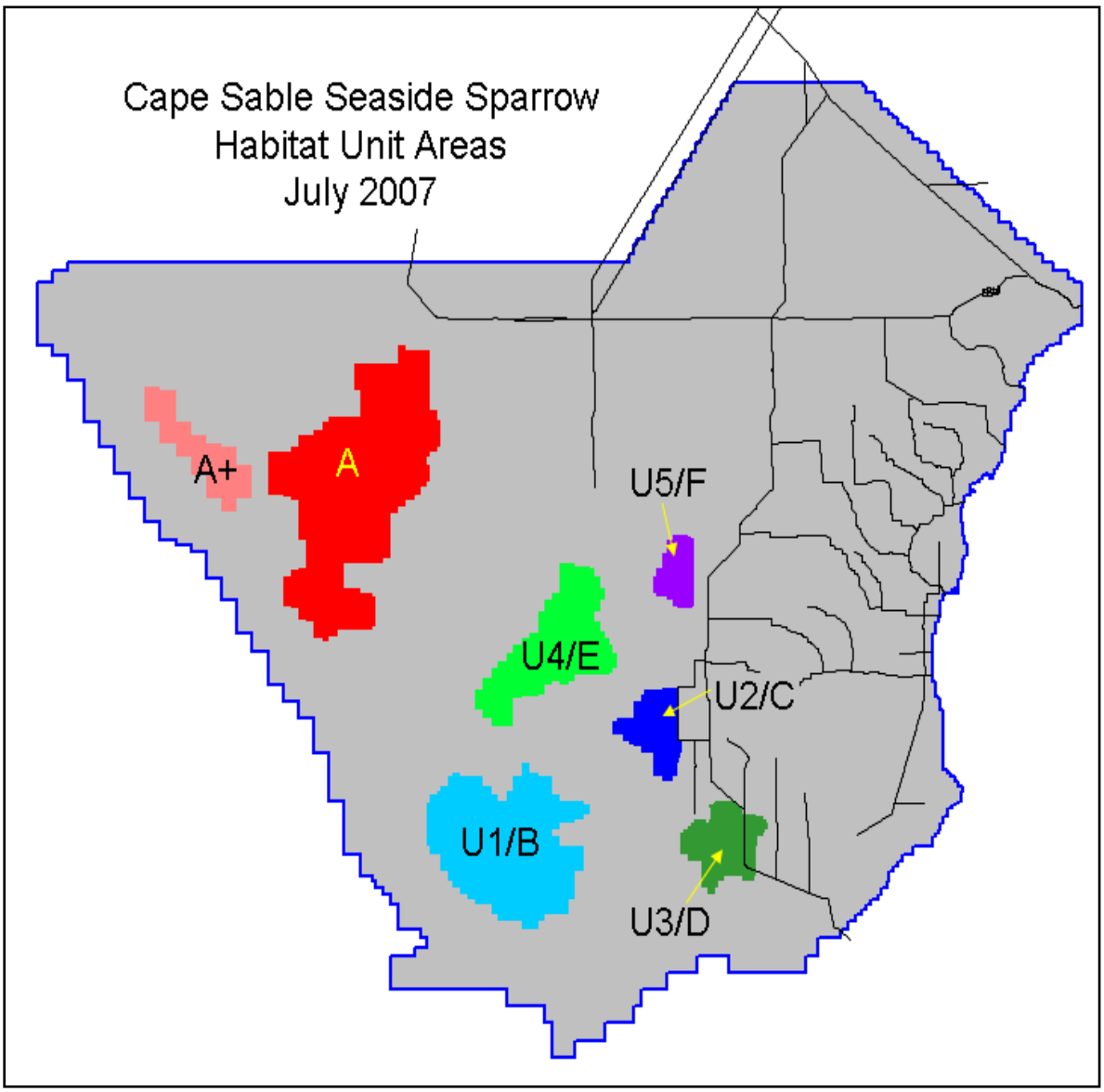


FIGURE 7: CAPE SABLE SEASIDE SPARROW SUBPOPULATIONS (A-F) AND DESIGNATED CRITICAL HABITAT UNITS (U1-U5)

After the 1981 survey, the population was not surveyed again until 1992. The range-wide survey has been performed annually since 1992, although the number of survey locations has changed from a high of over 850 sites in 1992 to a low of 250 sites in 1995 (Cassey et al. 2007).

Bass and Kushlan (1982) also devised a methodology of translating the range-wide survey results into an estimate of population size. To account for females (only males sing) and CSSS outside the audio detection range, the number of birds counted is multiplied by a factor of sixteen (15.87 rounded to 16). In order to confirm the validity of this estimation factor, Curnutt et al. (1998) compared the bird counts from the range-wide survey with actual mapped territories on intensive study plots and found it to be adequate given normal population fluctuations. More recent research indicates that this estimation factor may be overestimating

population abundance within the smaller CSSS subpopulations (*i.e.* CSSS-A, C, D, F) due to the presence of floater males and a male-biased sex ratio (Boulton et al. 2009a). During CEPP ESA consultation, it was noted that a new population estimation methodology was necessary to more accurately assess small CSSS populations in light of this evidence. As a result, FWS has included within its CSSS MOU a provision for development of a new CSSS population estimation tool.

Based on the range-wide surveys, total CSSS populations have declined from approximately 6,600 individuals during the period from 1981-1992, to approximately 3,216 in 2015 (**Table 5**). Although populations decreased significantly during the early part of that time period, they have remained relatively constant since 1993 (**Figure 8**). Recognizing the limitations of the range-wide survey in detecting fine-scale changes in population abundance related to management actions (Walters et al. 2000; Lockwood et al. 2006), Cassey et al. (2007) translated the results of the range-wide survey into presence/absence data and then converted it into a measure of occupancy. In their study, occupancy was defined as the fraction of the area occupied by the species in any one year as employed by MacKenzie et al. (2002). Their results show that the proportion of CSSS range occupied decreased between 1981 and 1992, particularly in CSSS-C, CSSS-D, and CSSS-F; with a second period of decline between 1992 and 1996, most notably within CSSS-A. After 1996, overall occupancy has remained relatively constant (Cassey et al. 2007).

TABLE 4: CAPE SABLE SEASIDE SPARROW BIRD COUNT AND POPULATION ESTIMATES BY YEAR AS RECORDED BY THE EVERGLADES NATIONAL PARK RANGE-WIDE SURVEY

Subpopulation	A		B		C		D		E		F		TOTAL	
Year	BC	Pop Est*	BC	Pop Est*	BC	Pop Est*	BC	Pop Est*	BC	Pop Est*	BC	Pop Est*	BC	Pop Est*
1981	168	2688	147	2352	27	432	25	400	42	672	7	112	416	6656
1992	163	2608	199	3184	3	48	7	112	37	592	2	32	411	6576
1993	27	432	154	2464	0	0	6	96	20	320	0	0	207	3312
1994	5	80	139	2224	NS	NS	NS	NS	7	112	NS	NS	151**	2416**
1995	15	240	133	2128	0	0	0	0	22	352	0	0	170	2720
1996	24	384	118	1888	3	48	5	80	13	208	1	16	164	2624
1997	17	272	177	2832	3	48	3	48	52	832	1	16	253	4048
1998	12	192	113	1808	5	80	3	48	57	912	1	16	191	3056
1999	25	400	128	2048	9	144	11	176	48	768	1	16	222	3552
1999b	12	192	171	2736	4	64		0	60	960	0	0	247	3952
2000	28	448	114	1824	7	112	4	64	65	1040	0	0	218	3488
2000b	25	400	153	2448	4	64	1	16	44	704	7	112	234	3744
2001	8	128	133	2128	6	96	2	32	53	848	2	32	204	3264
2002	6	96	119	1904	7	112	0	0	36	576	1	16	169	2704
2003	8	128	148	2368	6	96	0	0	37	592	2	32	201	3216
2004	1	16	174	2784	8	128	0	0	40	640	1	16	224	3584
2005	5	80	142	2272	5	80	3	48	36	576	2	32	193	3088
2006	7	112	130	2080	10	160	0	0	44	704	2	32	193	3088
2007	4	64	157	2512	3	48	0	0	35	560	0	0	199	3184
2008	7	112	NS	NS	3	48	1	16	23	368	0	0	34**	544**
2009	6	96	NS	NS	3	48	2	32	27	432	0	0	38**	608**
2010	8	128	119	1904	2	32	4	64	57	912	1	16	191	3056
2011	11	176	NS	NS	11	176	1	16	37	592	2	32	62**	992**
2012	21	336	NS	NS	6	96	14	224	46	736	4	64	91**	1456**
2013	18	288	112	1792	8	128	1	16	45	720	1	16	185	2960
2014	4	64	114	1824	7	112	2	32	42	672	1	16	170	2720
2015	13	208	120	1920	7	112	4	64	55	880	2	32	201	3216
2016	3	48	114	1824	7	112	5	80	24	384	0	0	153	2448
2017	1	16	121	1936	3	48	4	64	75	1200	1	16	205	3280

BC: Bird Count; EST: Estimate; NS: Not Surveyed
* Population Estimate = Bird Count (BC) x 16
** Estimated totals in these years are not based on complete surveys of all subpopulations, and should not be directly compared with other years

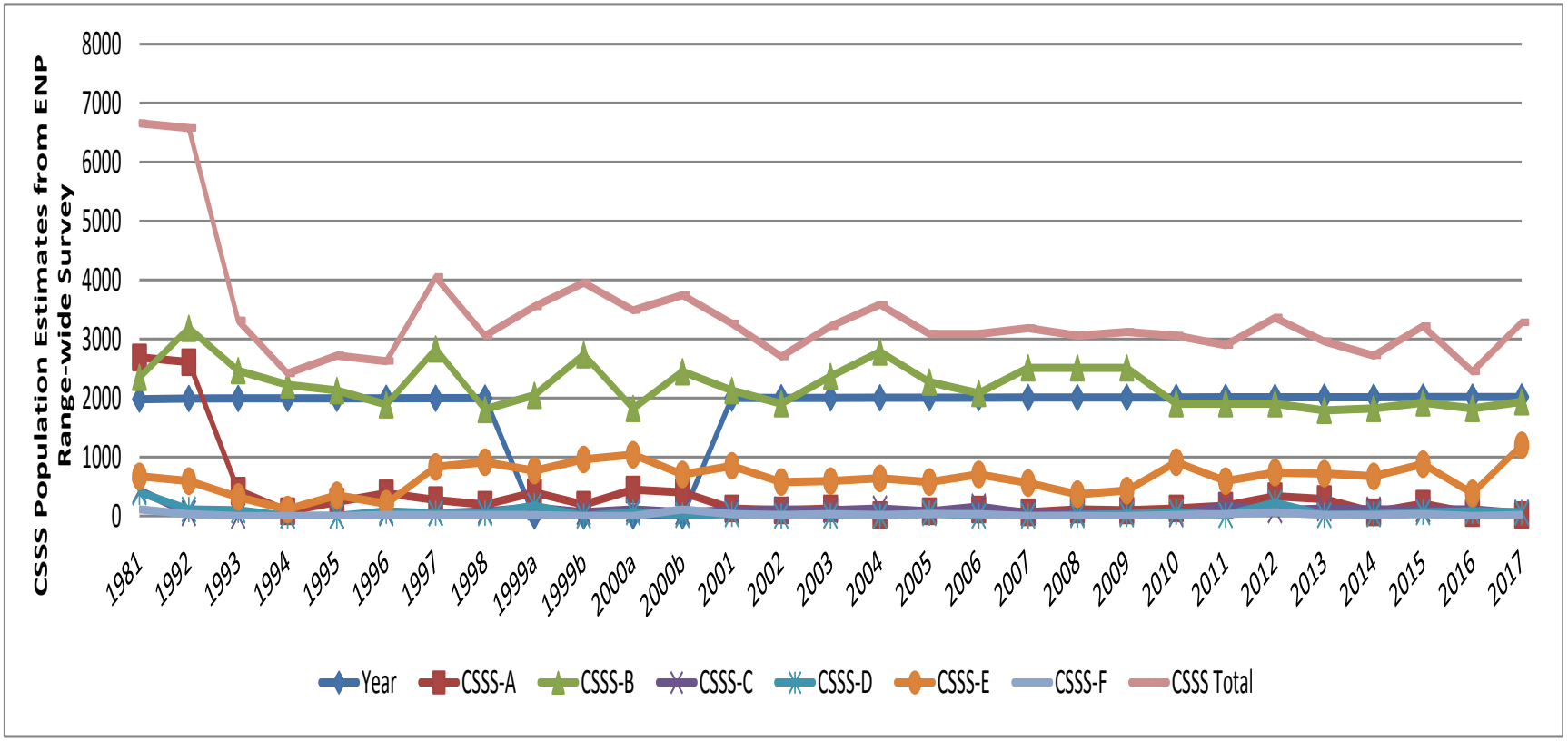


FIGURE 8: CAPE SABLE SEASIDE SPARROW POPULATION ESTIMATES WITHIN EACH SUBPOPULATION AS REPORTED FROM THE EVERGLADES NATIONAL PARK RANGE-WIDE SURVEYS

CSSS-A, once thought to be critical to the existence of CSSS, is located in western Shark River Slough, south of water discharges out of WCA-3A through the S-12 structures. Unusually intense and unseasonable rainy periods during the winter of 1992/93 and again in 1993/94 and 1994/95 caused prolonged flooding in CSSS-A, sufficient enough that the high water levels may have nearly precluded breeding in 1993 and 1995 (Walters et al. 2000). In addition, little or no breeding was possible during the 1994 and 1996 breeding seasons, due to the limited availability of suitable dry habitat. The flooding of the habitat by direct rainfall was compounded by discharges of water through the S-12 structures needed to meet the regulation schedule for WCA-3A. With an average life span of two to three years, several consecutive years with little or no reproduction could significantly affect population size. This is reflected in the reduction of sparrows detected in subsequent surveys in CSSS-A, in addition to the reduction in occupancy reported by Cassey et al. (2007) for the time period between 1992 and 1996. As a consequence, FWS issued a BO in 1999 providing recommendations to USACE on how water levels should be controlled within CSSS-A nesting habitat so that the existence of the CSSS would not be jeopardized. USACE responded by developing changes in water management operations through emergency deviations in 1998 and 1999, two iterations of ISOP in 2000 and 2001, culminating in IOP in 2002 and 2006, and then replaced in 2012 by ERTP, in order to address other endangered species concerns. ERTP has been in effect since October 2012. ISOP/IOP/ERTP goals were to keep subpopulations (particularly CSSS-A) dry during the breeding season and to also keep the habitat for subpopulations B, C, D, E, and F (CSSS-B, CSSS-C, CSSS-D, CSSS-E, and CSSS-F) from excessive drying in order to prevent adverse habitat change from unseasonable fire frequencies.

The primary objective in implementing IOP and maintaining CSSS water management operational restrictions under ERTP was to reduce high water levels within CSSS habitat west of Shark River Slough (*i.e.* CSSS-A). Water management operations designed to protect CSSS to the maximum extent possible during the nesting season in order to achieve FWS RPA to provide an improved opportunity for nesting by maintaining water levels below ground level for a minimum of 60 consecutive days between March 1 and July 15, corresponding to the CSSS breeding season. In addition, a secondary purpose of IOP was to allow CSSS habitat to recover from prolonged flooding during the mid-1990s. It is recognized in the 1999 FWS BO that there could be times when unseasonable rainfall events could overwhelm the ability of the water management system to provide the necessary dry conditions. Following implementation of IOP, the FWS recommendations for protection of the CSSS in CSSS-A were met in 2002, 2004, 2006, 2008, and 2009. Direct rainfall on CSSS-A prevented attainment of FWS RPA requirements for 2003, 2005 and 2007. Since 2010 FWS BO for ERTP, FWS recommendations for protection of CSSS-A were met in 2010, 2011, 2012, 2014, 2015, 2016 and 2017. Direct rainfall on CSSS-A in 2013 prevented meeting FWS RPA requirement of 60 consecutive dry days as measured at NP-205 between March 1 and July 15. As reported from the range-wide survey (**Table 5**), the estimated total CSSS population during IOP and ERTP has remained between 2,704 birds (2002) and 3,584 birds (2004). CSSS-A population estimates during IOP and ERTP ranged from a low of 16 (1 bird counted) in 2004 to a high of 336 (21 birds counted) in 2012. The population estimates for CSSS-A may be inflated due to the potential inaccuracy of the estimation factor in smaller subpopulations as suggested by recent research (Boulton et al. 2009a). In addition, it should also be noted that the estimates

for a particular year have relevance for potential breeding that year, but this would not be reflected in the population estimates until the following year.

Another factor in lack of recovery is the change in vegetative structure resulting from physical alterations during the high water events of 1993 through 1995 and a shift in the vegetative community dominants away from previous species. This phenomenon was studied by Michael Ross, Ph.D. and Jay Sah, Ph.D. of Florida International University, along with James Synder of the United States Geological Survey (USGS) in a 2003-2009 monitoring study funded by USACE (Ross et al. 2003, 2004, 2006; Sah et al. 2007, 2008, 2009). Based upon several years of vegetation studies within CSSS habitat, the researchers concluded that the direction and magnitude of short-term vegetation change within marl prairie is dependent upon the position of the habitat within the landscape. Efforts to regulate operations of S-12 structures under ISOP/IOP/ERTP to protect CSSS-A and its habitat west of Shark River Slough have resulted in lower water depths during the sparrow breeding season as measured at Gauge NP-205. However, the persistence of wetter vegetation within the vicinity of gauge P-34 may have limited the recovery of CSSS-A within this part of its habitat. This suggests water flow from the northwest (*i.e.* western flows) and/or from changes in groundwater related to sea level rise may have resulted in deeper water levels and longer hydroperiods within this portion of CSSS-A habitat. This is one factor underlying the need for the Water Flow Analysis Test, as well as exploring options for the L-28 Borrow Canal. As shown in **Table 5,** CSSS-A has not recovered under IOP/ERTP operations, but has remained relatively stable since its implementation. Recent research suggests that sparrow populations are slow to recover, or cannot recover, once they reach very small population sizes, due to low adult and juvenile recruitment, many unmated males, biased sex ratios, lower hatch rates, and other adverse effects associated with small population size (*i.e.* the Allee effect) (Boulton et al. 2009a; Virzi et al. 2009). Virzi and Davis (2013) and Slater et al. (2014) have documented highly skewed sex ratios in favor of males within smaller CSSS populations studied (*i.e.* CSSS-A and CSSS-D) along with lower nest success rates. This, in addition to low return rate for males within CSSS-A, led Virzi and Davis (2013) to suggest that CSSS-A may be dropping below a critical threshold necessary to attract settling males due to lack of conspecific cues.

Vegetation change is mediated by the interaction of fire and hydrology. Studies by Sah et al. (2009) revealed that not only did post-fire flooding delay the vegetation recovery process, but also caused it to follow a different trajectory in terms of species composition. This in turn, could potentially impede recolonization by CSSS (Sah et al. 2009). The transition from one vegetation type to another (e.g. prairie to marsh) in response to hydrology may take place in as little as three to four years (Armentano et al. 2006), however, the transition from marsh to prairie may take longer (Ross et al. 2006, Sah et al. 2009). Vegetation studies within CSSS habitat (Ross et al. 2004) have shown that CSSS occupy prairies with a hydroperiod ranging between 90 and 240 days. ERTP ET 2 addresses this hydroperiod requirement. However, solely attaining this hydroperiod requirement may not be enough to promote a transition from marsh to prairie habitat, as this likely requires the process of fire (Ross et al. 2006, Sah et al. 2009). Recent research by Slater et al. (2014) noted the presence of apparently suitable sparrow habitat within the Lower Meadow of CSSS-A that had burned in 2009. This area had supported numerous breeding territories prior to the burn (La Puma et al. 2007); however in 2014 it remained unoccupied. Slater et al. (2014) speculate that there may not be enough

surplus birds to recolonize this habitat, underscoring the hypothesis that CSSS-A may have reached a critical threshold due to small population size and may be unable to recover without intervention (e.g.. translocation).

5.6 POTENTIAL EFFECTS TO CAPE SABLE SEASIDE SPARROW

USACE recognizes that there are few opportunities within the current constraints of the C&SF system to completely avoid impacts to listed species. However, ERTP represents a transition from the single species management embodied within IOP to multi-species management to better meet the requirements of multiple species, including other endangered bird species. ERTP superseded IOP with the goal of providing favorable hydrological conditions for multiple wildlife species and the habitats upon which they depend, while continuing to provide a nesting window for the CSSS, particularly within CSSS-A. The purpose of this planned temporary deviation from MWD Increment 1 Plus and the 2012 Water Control Plan (ERTP) is to provide high water relief for WCA 1, 2A and 3A until the WCA 3A 3-station gage average falls below Zone A of the WCA 3A Regulation Schedule (**Figure 5**). The WCAs are flooding in a manner that inundates tree islands and other wildlife habitat, and if sustained will negatively impact birds and mammals dependent on that habitat. If the rate of rise is not mitigated to limit the prolonged duration of high water conditions, there is potential for these high water levels to pose greater risks to valuable natural resources, public health, safety or welfare as the wet season and hurricane season continue due to reduced flood storage.

Components of this planned temporary deviation that potentially may affect CSSS subpopulations include 1) opening of S-12A, S-12B, S-343A, S-343B and S-344 structures prior to the official opening date of July 15, 2017 and increasing discharges at S-332D from 250 cfs to 500 cfs to increase discharge from WCA 3A to the SDCS using the S-333 and S-334, if needed. Other action components of the 2017 Planned Temporary Deviation that will have little impact on the CSSS include opening of S-152 to discharge water from WCA 3A to WCA 3B; and increasing discharge at S-197 from 400 cfs to 2,400 cfs to accommodate additional flows from WCA 3A to the South Dade Conveyance System using S-333 and S-334 while retaining capacity to manage local basin run off.

5.6.1. OPENING OF S-12A, S-12B, S-343A, S-343B, AND S-344 PRIOR TO JULY 15, 2017

The S-12A, S-12B, S-343A, S-343B, and S-344 are all closed until July 15 annually for protection of the endangered CSSS as outlined within the July 22, 2016 FWS ERTP BO. In that BO, FWS determined that unless alternatives to current water operational practices are explored and implemented, continued implementation of ERTP is likely to jeopardize the continued existence of the CSSS. The July 22, 2016 BO presented a RPA that would avoid jeopardizing the CSSS. The RPA identified operational modifications and expediting restoration initiatives for some of the structures in the southern portion of the Everglades ecosystem to provide suitable nesting habitat for the endangered CSSS. One main element of the RPA was additional seasonal closures to outlet structures within WCA 3A (i.e. S-12A, S-12B, S-343A, S-343B, S-344), with the flexibility to open under high water conditions between

October and November. Under the MWD Increment 1 Plus EA/FONSI (signed February 16, 2017), the USACE implemented the additional closure periods.

As previously stated, due to current high water conditions within WCA 3A, USACE proposes to open these structures earlier than the July 15 date within the 2016 ERTP BO RPA. Based upon the USACE' analyses of current and forecasted conditions, USACE has determined that the S-12A and S-12B structures would probably overtop on or before July 8, 2017. In order to avoid overtopping, which will trigger a limited gate opening sufficient to prevent the gate overtopping condition for the applicable structure(s), USACE would need to open these structures prior to the projected July 8, 2017 date. An overtopping date of July 8, 2017 represents an earlier opening period of approximately 6 days. The projected flow through the S-12A and S-12B structures is estimated at 30,000 acre feet between June 27 and July 15, 2017. This volume of water is anticipated to increase stages at NP-205 by approximately 5.49 centimeters (2.17 inches). USACE has currently maximized outflows from WCA 3A, as well as limited inflows to the extent practicable given conditions within the upstream basins. Other steps USACE is implementing to reduce stages in WCA 3A include maximizing discharge through S-12C, S-12D, S-333, S-334, and S-151, and maximizing discharges to tide from each of the WCAs. Despite implementation of these steps WCA 3A is projected to continue to rise and reach the top of the S-12A and S-12B slide gates at elevation 11.0 feet NGVD around July 8, 2017.

The USACE believes that the effects on the CSSS-A nesting habitat downstream of S-12A and S-12B will be minimal. As mentioned in the FWS June 27, 2017 letter, the target of water levels being below ground surface for 90 days was met this year within CSSS-A, where 14 young have fledged. The June 28, 2017 CSSS monitoring update indicates that 30% of the study site; a small portion of CSSS-A, was inundated and there were three active nests. The monitoring team will revisit the site again on June 30, 2017. The CSSS monitors noted in their update that they expect a solid breeding effort into July in CSSS-A, similar to what they have witnessed for the last several years. The 2016 ERTP BO indicates that CSSS nests are typically 21 centimeters (8.3 inches) above ground surface during the June to August portion of the nesting season. The NP 205 gauge peaked around June 11, 2017 at 6.75 feet NGVD at almost 9 inches above ground surface due to high rainfall. This is above the average wet season nest threshold. NP 205 has since steadily decreased to 6.13 feet NGVD, or 1.5 inches above ground surface, well below wet season nest thresholds. The projected flow through the S-12A and S-12B structures is estimated at 30,000 acre feet between June 27 and July 15, 2017. This volume of water is anticipated to increase stages at NP-205 by approximately 5.49 centimeters (2.17 inches). Since the average CSSS nest high during the wet season is 21 centimeters (8.3 inches), USACE does not anticipate that opening of the structure prior to the projected opening date of July 15 will adversely affect nesting CSSS.

Successful CSSS breeding requires that breeding season water levels remain at or below ground level in the breeding habitat. Nott et al. (1998) cited a "10-centimeter (cm)" rule for maximum water depth over which the CSSS will initiate nesting. This conclusion was based upon observations within the ENP range-wide survey in which no singing males were heard when water depths exceeded that level. However, Dean and Morrison (1998) demonstrated that nesting may occur when average water depths exceed this rule. In addition, more recent

evidence has shown that not only were CSSS able to successfully breed in areas with standing water that was "approaching knee deep at times at times with 100% coverage the entire summer"; but also that they were able to successfully produce multiple broods (3) in the Dogleg Plot of CSSS-B "despite heavy rains that began in early-May and deep water levels that persisted throughout the breeding season in the study plot" (Virzi and Davis 2013; Slater et al. 2014). Based upon this evidence, USACE concludes that the amount of water that would reach CSSS-A between July 8, 2017 when the S-12A and S-12B are anticipated to overtop and July 15, 2017 when the gates no longer have CSSS restrictions, would not pose significant adverse effects even to the three active nests documented by FWS on June 27, 2017.

Furthermore, Lockwood et al. (2001) noted the average early season nest height is 17 centimeters (6.7 inches) above ground, while the average late season nest height is 21 centimeters (8.3 inches) above ground (Lockwood et al. 2001). The shift in average nest height after the onset of the wet season rainfall pattern, which typically begins in early June (Lockwood et al. 2001), appears to be an adaptive response to rising surface water conditions. According to FWS, there was documented nesting within CSSS-A between June 2 and June 16 and the average water depths within CSSS-A were approximately 9 inches above ground. Those nests appear to have successfully fledged.

The 2016 ERTP BO also included hydrological targets to include 90 dry days in CSSS habitat during the CSSS nesting season defined as March 1 through July 15. It is important to note that USACE met the 2016 ERTP BO nesting window target during the 2017 CSSS breeding season. Furthermore, the EDEN Sparrow Viewer indicates that less than 3.2% of CSSS-A habitat is available for breeding, and SFWMD positional analysis projections for stage levels at NP-205 (IOP/ERTP gauge in CSSS-A) indicate a zero percent probability of water stages receding below ground for the remainder of the 2017 wet season, based on the historical simulated rainfall period.

Finally, it is also the end of the CSSS nesting season and previous research has indicated that nests are most successful prior to June 1. Published data and analyses by Baiser et al. (2008) and Virzi et al. (2009), along with input from Dr. Lockwood, (email correspondence to FWS, October 15, 2009) have identified April and May as the most critical time frames for successful CSSS breeding. Based upon intensive nest survey data from CSSS-B and CSSS-E, the CSSS breeding season can be divided into two segments corresponding to different levels of nest success. Prior to June 1, approximately 60% of CSSS nests are successful as compared with approximately 21% after June 1 (Baiser et al. 2008; Boulton et al. 2009a; Virzi 2009; FWS 2010). For the purposes of ERTP, it was assumed that sparrows within CSSS-A experience a similar pattern of nest success, with more successful nesting occurring earlier in the breeding season and a decline in nest success after June 1. Since 2008, intensive nest surveys have been conducted within CSSS-A (Boulton et al. 2009a; Virzi et al. 2009), representing the first time such intensive searching has been performed since 2000 within this subpopulation. Data obtained through their ongoing efforts will be incorporated in future management decisions. Operational changes under ERTP were designed to provide the appropriate hydrologic conditions earlier in the CSSS breeding season when CSSS experience the greatest nest success. Timing of nest initiation and nest success rates were used to better define the most critical portion of the CSSS nesting window on which to base water management decisions.

Timing of nest initiation is thought to be primarily dictated by an internal biological cue rather than habitat conditions, such as water depths (Dr. Lockwood email correspondence to FWS, October 15, 2009). Nott et al. (1998) cited a "10-cm" rule for maximum water depth over which the CSSS will initiate nesting. This conclusion was based upon observations within the range-wide survey in which no singing males were heard when water depths exceeded that level. However, Dean and Morrison (1998) demonstrated that nesting may occur when average water depths exceed this rule. In a 1997 paper, Lockwood et al. (1997) indicated that water depths delay the onset of breeding. However, more recently Dr. Lockwood (email correspondence to FWS, October 15, 2009) stated she believes the internal biological cue is the trigger for nest initiation and she truly does not think water is delaying the start of breeding. As nest initiation is most likely dictated by some internal cue (biological clock) rather than by habitat conditions (*e.g.* water depths), Dr. Lockwood indicated that "just making it drier earlier likely will not free them up to nest any earlier" (email correspondence to FWS, October 15, 2009).

The earliest nest initiation dates identified within the 14-year period between 1996 and 2009 were March 11 through March 15 (Baiser et al. 2008; Virzi 2009). These numbers are based upon intensive nest surveys, primarily in CSSS-B and CSSS-E (**Figure 9**). There is no nest initiation or nest survival data from CSSS-A during the IOP time period, with the exception of 2008 and 2009 (Boulton et al. 2009a; Virzi et al. 2009). Research by Dr. Lockwood and her students indicates that the greatest number of nests are initiated between March 25 and April 15, with fewer nests initiated in middle March and June as depicted in **Figure 10**.

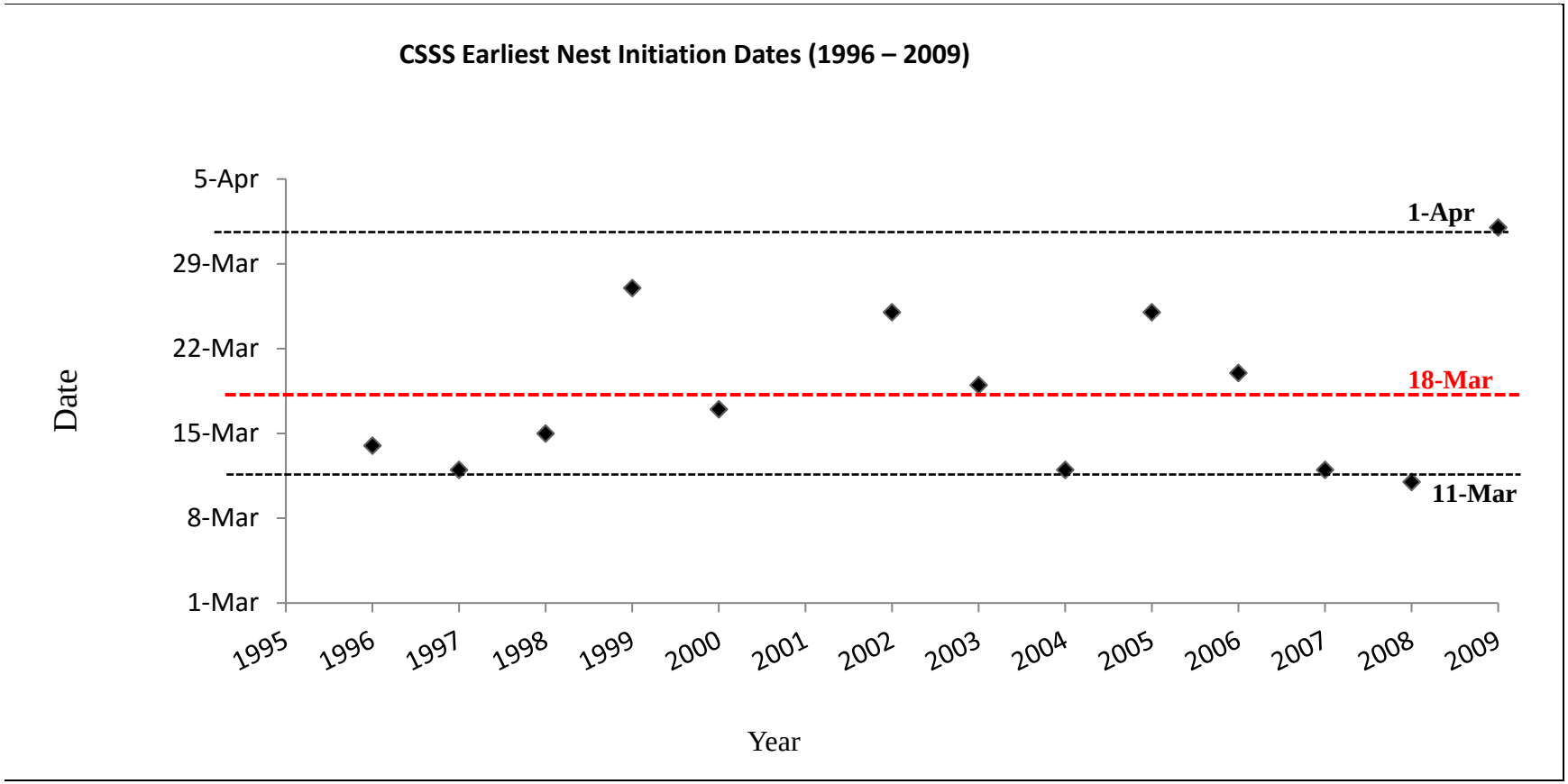


FIGURE 9: EARLIEST CAPE SABLE SEASIDE SPARROW NEST INITIATION DATES BETWEEN 1996 AND 2009

Source: Data and figure courtesy of Virzi (2009)
Note: March 18 represents the average date of nest initiation in March

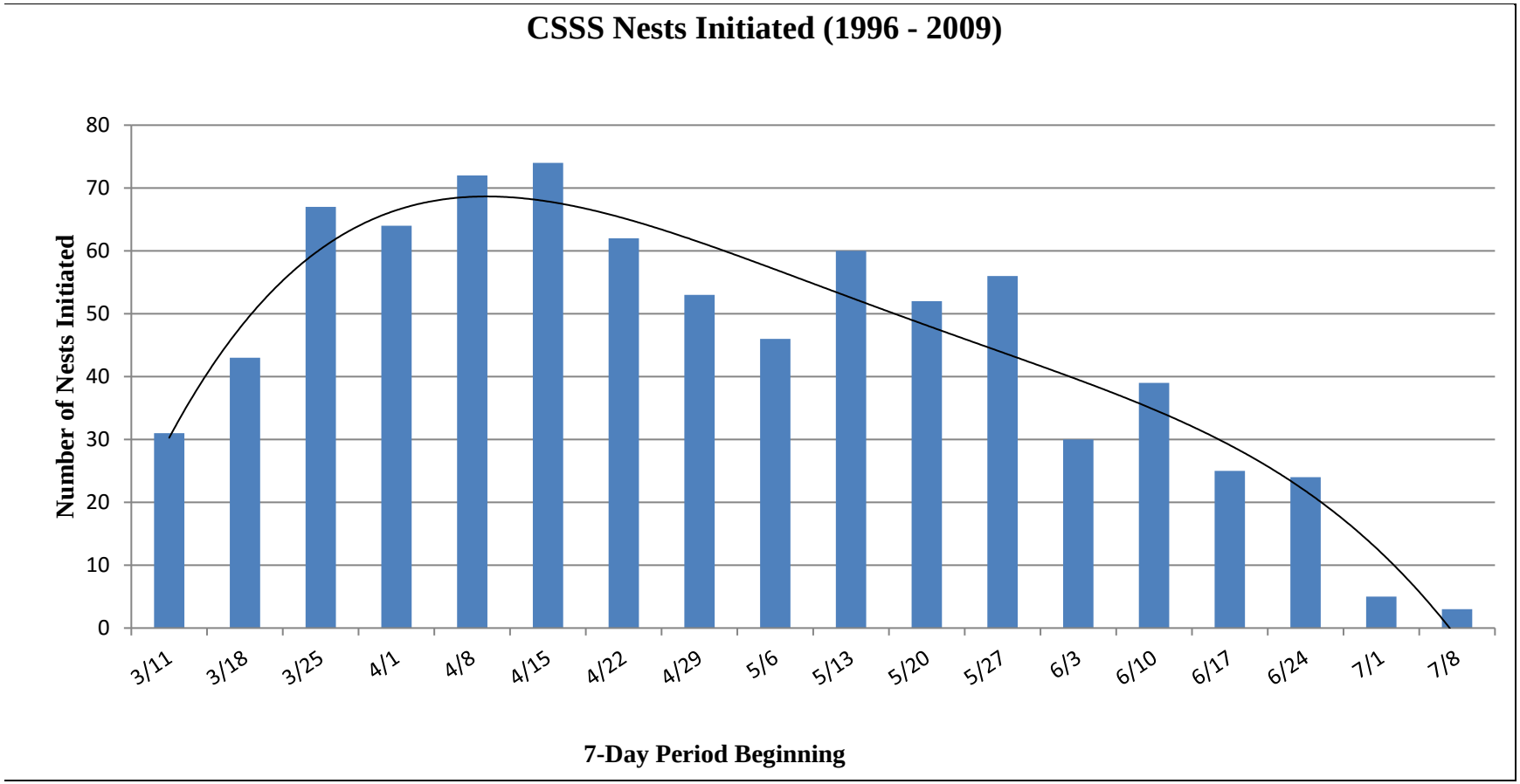


FIGURE 7: NUMBER OF CAPE SABLE SEASIDE SPARROW NESTS INITIATED DURING EACH 7-DAY PERIOD BETWEEN 1996 AND 2009

Source: Data and figure courtesy of Virzi (2009)

Under ERTP, the S12A, S-12B, S343A, S-343B, and S-344 structures are mandated to be closed each year until July 15 in order to meet the FWS RPA of a minimum of 60 consecutive dry days as measured at NP-205 between March 1 and July 15. As shown in **Table 6,** in many years during the IOP and ERTP time periods (2002-2014), S-12A and S-12B structures were opened later than July 15. In eight of the last thirteen years, S-12A opened later than July 15; and in nine of the last thirteen years, S-12B opened later than July 15, allowing, on average, 26 additional days without flow through S-12A (range 1-101 days); and, on average, 24 additional days without flow through S-12B (range of 1-57 days).

TABLE 5: DATES OF S-12 OPENINGS AND DISCONTINUOUS HYDROPERIOD IN CSSS-A.

Calendar Year	S-12A				S-12B				NP-205 Discontinuous Hydroperiod (Days Wet)	Number of Dry Days with CSSS Nesting Window	CSSS-A Population Estimate
	Open	Number of Days post FWS Restricted Opening Date (July 15)	Close	Number of Days post FWS Mandated Closure Date (November 1)	Open	Number of Days post FWS Restricted Opening Date (July 15)	Close	Number of Days prior to FWS Mandated Closure Date (January 1)			
2002		---	1-Nov	0		---	14-Nov	47	273	68	96
2003	22-Jul	7	1-Nov	0	16-Jul	1	1-Jan	0	285	26	128
2004	26-Aug	43	2-Nov	1	27-Aug	44	7-Dec	25	275	79	16
2005	22-Jun	-23	16-Nov	-15	22-Jun	-23	30-Dec	2	230	46	80
2006	24-Aug	41	1-Nov	0	2-Aug	19	4-Nov	57	246	112	112
2007	26-Sep	72	1-Nov	0	4-Oct	80	8-Dec	24	232	25	64
2008	24-Aug	41	2-Nov	-1	17-Jul	2	24-Dec	8	183	160	112
2009	16-Jul	1	29-Oct	2	16-Jul	1	31-Dec	1	255	108	96
2010	15-Jul	0	1-Nov	0	11-Aug	28	2-Dec	30	260	53	128
2011	25-Oct	101	1-Nov	0	25-Oct	101	23-Dec	9	189	117	176
2012	15-Jul	0	2-Nov	-1	15-Jul	0	27-Dec	5	255	66	336
2013	15-Jul	0	2-Nov	-1	15-Jul	0	14-Dec	18	276	54	288
2014	13-Aug	30	1-Nov	0	12-Aug	29	14-Nov	47	248	83	64

With respect to a correlation between structure closures, number of dry days at NP-205 within the nesting period, and CSSS population estimates for the following year, there does not appear to be a direct correlation. For example, as shown in **Table 6** during the 2007 breeding season, S-12A closed November 1, 2006 and remained closed until September 26, 2007 (72 days longer than FWS restricted opening date of July 15). However, during 2007, there were only 25 consecutive dry days measured at NP-205 during the FWS CSSS breeding window of March 1 through July 15. As previously stated, the number of dry days during the breeding season would be reflected in CSSS population estimates the following year, and in 2008, the population estimate for CSSS-A was 112 birds. During the 2008 CSSS breeding season, S-12A closed November 1, 2007 and remained closed until August 24, 2008 In contrast to 2007, in 2008 there were 160 consecutive dry days within FWS CSSS breeding window, but the 2009 CSSS-A population estimate was 96 birds. In contrast to the longer windows without flow through S-12A experienced during 2007 and 2008, during the 2009 CSSS breeding season S-12A closed November 2, 2008 and remained closed until July 16. Despite this shorter window without S-12A flow (as compared with 2007 and 2008), a total of 108 consecutive dry days were measured at NP-205 during FWS CSSS breeding window. The 2010 CSSS-A population estimate was 128 birds. As a final comparison underscoring this apparent lack of direct correlation, during the 2010 CSSS-A breeding season, S-12A closed October 29, 2009 and remained closed until July 15, 2010. During 2010, only 53 consecutive dry days were measured at NP-205 during FWS CSSS breeding window. Despite the shorter breeding window, the 2011 CSSS-A population estimate was 176 birds. This apparent lack of direct correlation underscores the need to investigate alternate sources of water flow within CSSS-A habitat (e.g. western flow, sea level rise), as well as the need for a more holistic approach (e.g. United States Geological Survey Sparrow Tool) to measuring habitat availability within CSSS-A as opposed to the single measurement at NP-205.

The CSSS nesting season is effectively terminated when water levels rise to sufficient depths to result in direct flooding of nests (Lockwood et al. 1997; Nott et al. 1998; Pimm et al. 2002; Baiser et al. 2008). In general, this coincides with the start of the wet season in South Florida. The onset of the wet season shows interannual variability but generally occurs in early June. Nest success after June 1 declines sharply to approximately 21% (Baiser et al. 2008; Boulton et al. 2009a; Virzi 2009; FWS 2010). **Table 7** provides the dates that water first rose above ground level at NP-205 between the years of 2001 and 2009. In eight of the nine years, water depths were above ground surface elevation prior to June 21. In seven of the nine years, water depths were above ground prior to June 7. Water depths continued to rise after these dates and did not fall below ground surface level during the remainder of the FWS RPA CSSS nesting window termination date of July 15. Lockwood et al. (1997) reported nest flooding at 14 centimeters and 22 centimeters above ground. The water depths at NP-205 were translated into water depth in centimeters for comparison with the average CSSS nesting height of 17 centimeters.

TABLE 6: DATE AT WHICH WATER DEPTH GREATER THAN 6.0 FEET NGVD AS IS MEASURED AT NP-205 FOR EACH YEAR FROM 2001 TO 2014

Year	First day water depth at NP-205 is > 6.0 feet NGVD	Surface Water Depth (NP-205 Depth- GSE) (feet, centimeters^)
2001	04 June	0.34'; 10.36 cm
2002	21 May	0.19'; 5.79 cm
2003	30 Apr	0.31'; 9.45 cm
2004	6 June	0.26'; 7.92 cm
2005	2 June	0.15'; 4.57 cm
2006	2 July	0.29'; 8.84 cm
2007	2 June	0.18'; 5.49 cm
2008	20 June	0.30'; 9.14 cm
2009	26 May*	0.27'; 8.23 cm
2010	27 April	0.28'; 8.53 cm
2011	26 June	0.12'; 3.66 cm
2012	6 May	0.04'; 1.22 cm
2013	30 April	0.27'; 8.23 cm
2014	25 June	0.02'; 0.61 cm

* No data is available from Gauge NP-205 from January 16, 2009 until May 26, 2009 when NP-205 = 6.13 feet NGVD.

^ CSSS nest on average 17 cm above ground, thus despite surface water conditions, nests may not have been directly flooded.

In general, June 1 also separates first from second clutch attempts. Pimm et al. (2002) have indicated that most pairs must breed at least twice and most nests must be successful (including late-season nests) to allow recovery from population declines. However, low water levels may not be the sole factor necessary for CSSS to multi-brood (Virzi and Davis 2013). Recent research by Virzi and Davis (2013) revealed that 27% of birds within CSSS-B were able to successfully raise a second brood. The researchers also noted that "interestingly, water levels were perhaps highest in subpopulation B throughout most of the breeding season and sparrows were able to multi-brood despite the high water levels" (Virzi and Davis 2013). Virzi and Davis (2013) speculate that other factors such as an unrecognized Allee effect in small sparrow subpopulations (e.g. CSSS-A) may be leading to a lack of multi-brooding. Further research is needed to better understand this trend. Although water levels were above the ground surface by mid to late June in the majority of IOP/ERTP years, the July 15 structural opening date for S12A-B, S-343A-B, and S-344 structures remain unchanged under the 2016 ERTP BO. In addition, USACE will utilize the existing operational flexibility inherent within ERTP to delay the opening of the structures when conditions permit. Based upon the information detailed above, USACE has determined that early opening of the S-12A, S-12B, S-343A, S-343B, and S-344 structures will not significantly impact late season nesters within CSSS-A.

5.6.2. INCREASING DISCHARGES AT S-332D FROM 250 CFS TO 500 CFS TO INCREASE DISCHARGE FROM WCA 3A TO THE SDCS USING THE S-333 AND S-334, IF NEEDED.

The 1994 C-111 SD Project General Reevaluation Report and EIS authorized construction of a series of pump stations and detention areas along the eastern boundary of ENP. This detention system was constructed to maintain a hydrologic ridge between ENP and the developed portions of Miami-Dade County to the east, thereby reducing seepage from ENP and rehydrating the marshes along the ENP boundary. Prior to construction of the C-111 SD Project, water was delivered to Taylor Slough by releasing water through S-174. Subsequently this water was lifted from L-31W Canal into Taylor Slough via the S-332 pump station. The S-332 pump station had a maximum capacity of approximately 165 cubic feet per second (cfs).

The S-332D pump station and S-332D Detention Area (aka S-332D Flow-way) were constructed under ISOP and IOP and are located along the west side of the C-111 Canal between S-176 and S-177 (**Figure 3**). The S-332D pump station became operational on August 31, 1999 and the S-332D Detention Area became operational in June 2002. The S-332D structure discharges to a downstream high head cell and detention area flow-way, ultimately delivering surface water flows into Taylor Slough near the historical location of S-332.

Under the Experimental Program, the pump capacity of S-332 was increased by approximately 300 cfs, thereby allowing approximately 465 cfs to be directly delivered to Taylor Slough. The 1999 FWS Jeopardy Opinion on CSSS occurred during the Experimental Program and resulted in termination of the testing phase. The amount of water that could be delivered to Taylor Slough without impacting CSSS, subpopulation C (CSSS-C) was never evaluated under the Experimental Program. The 465 cfs was thought to have an impact on CSSS-C while the original 165 cfs was not thought to have an impact (1999 FWS BO). In order to err on the side of conservatism to protect the species, the original S-332 pump capacity of 165 cfs was implemented under IOP during CSSS breeding season. As a result, pumping at S-332D is limited to 165 cfs from February 1 through July 15 in order to maintain nesting season requirements for CSSS-C. The 2006 IOP FSEIS, Table ES-1, includes the statement that information would be sought to evaluate the feasibility of modifying this constraint.

Field data from the Experimental Program and data from 2008 and 2009 revealed that a significant volume of water pumped into S-332D flows as seepage to the C-111 Canal. Limiting S-332D discharges to 165 cfs results in considerably less water reaching Taylor Slough than when S-174 and S-332 were used. As a result, under ERTP, pumping at S-332D was increased from 165 cfs to 250 cfs between February 1 and July 16 (or the end of the CSSS nesting season as determined by FWS). The S-332D pump restriction was retained within the 2016 ERTP BO.

In a letter dated December 12, 2014, FWS provided an assessment of operations within the C-111SD Project area to include detention cells and project components of the CERP C-111 Spreader Canal Western Project. It is important to note that operations of the CERP C-111 Spreader Canal Western Project are currently under the sole operation of SFWMD under an FDEP and USACE Regulatory Permit. Operations of the CERP C-111 Spreader Canal Western Project are governed by a separate ESA consultation and FWS BO. In addition, any adjustments to the operation of the

CERP C-111 Spreader Canal Western Project may require modifications to existing permits. Finally, USACE will work collaboratively with Federal and state partners to reassess S-332B, S-332C, and S-332D operations as part of the MWD Increment 2 Field Test. The order of S-332B, S-332C, and S-332D pumping will be prioritized based on coordination with the FWS, SFWMD, and ENP.

Habitat of varying suitability occurs within CSSS-C. Long-hydroperiod marshes occur south of the S-332 pumping station, while areas to the north are overdrained and prone to frequent fires. The most recent fire occurred in March 2007 when the Frog Pond fire swept through this area. The habitat has yet to fully recover (Sah et al. 2008, Virzi et al. 2009). The variable habitat conditions are thought to be a consequence of the 1980 construction of the S-332 pumping station, located at the boundary of ENP and Taylor Slough. CSSS-C holds relatively few CSSS (**Table 5**). Recent research has indicated that CSSS-C is suffering from the ill-effects of small population size including fewer breeding individuals, male-biased sex ratios, lower hatch rates, and lower juvenile return rates (Boulton et al. 2009a; Virzi et al. 2009). The 2017 Planned Temporary Deviation includes removing the S-332D pump constraint. Under the 2016 ERTP BO, the S-332D structure is limited to pumping 250 cfs between March 1 and July 15 annually in consideration of nesting CSSS. Under the 2017 Planned Temporary Deviation, this restriction would be eliminated and S-332D could pump up to 500 cfs. This 250 cfs increase in pumping at S-332D between June 30 and July 15, 2017 is not expected to alter any of the primary constituent elements within Unit 2 or affect the status of CSSS-C. Based upon the USGS Sparrow Viewer, as of June 28, 2017, there was approximately 40.3% of habitat available for nesting. The additional 250 cfs of pumping at the S-332D structure between June 27 and July 15 is not anticipated to significantly affect this unit.

Since 1981, when an estimated 400 CSSS resided within CSSS-D, this subpopulation has experienced a continual decline in population size (**Table 5**; Cassey et al. 2007). CSSS-D is a small, dynamic subpopulation that fluctuates annually, occupancy is low, and detection probability is highly variable. Thought to be functionally extirpated in 2007 (Lockwood et al. 2008), CSSS were again encountered within this area in 2009 when Virzi et al. (2009) encountered four males and two females. In 2013, Virzi and Davis (2013) documented three males and two females and five singing males were documented in 2016. Vegetation within CSSS-D is largely unsuitable for CSSS breeding. Since 2000, high water levels and longer hydroperiods have prevailed, resulting in a sawgrass-dominated community interspersed with patches of muhly grass at higher elevations (Ross et al. 2003). The 2017 Planned Temporary Deviation includes removing the S-332D pump constraint. Under the 2016 ERTP BO, the S-332D structure is limited to pumping 250 cfs between March 1 and July 15 annually in consideration of nesting CSSS. Under the 2017 Planned Temporary Deviation, this restriction would be eliminated and S-332D could pump up to 500 cfs. This 250 cfs increase in pumping at S-332D between June 30 and July 15, 2017 is not expected to alter any of the primary constituent elements within Unit 3 or affect the status of CSSS-D. Based upon the USGS Sparrow Viewer, as of June 28, 2017, there was approximately 20.7% of habitat available for nesting. The additional 250 cfs of pumping at the S-332D structure between June 27 and July 15 is not anticipated to significantly affect this unit.

5.7 CAPE SABLE SEASIDE SPARROW SPECIES EFFECT DETERMINATION

Section 7(a) (2) of the Endangered Species Act provides as follows:

> Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency (hereinafter in this section referred to as an "agency action") is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action by the Committee pursuant to subsection (h) of this section. In fulfilling the requirements of this paragraph each agency shall use the best scientific and commercial data available.

Based upon the information presented within Section 5.6, USACE has determined that the 2017 Planned Temporary Deviation may affect, but is not likely to adversely affect, CSSS. The USACE commits to monitoring as described in the USFWS submittal dated June 27, 2018 based on previous discussions with your agency and development of an after action analysis report to demonstrate any effects on CSSS habitat and the ecosystem in general.

5.8 CAPE SABLE SEASIDE SPARROW CRITICAL HABITAT

Critical habitat for the CSSS was designated on August 11, 1977 (42 FR 42840) and revised on November 6, 2007 (72 FR 62735 62766). Currently, the critical habitat includes areas of land, water, and airspace in the Taylor Slough vicinity of ENP in Miami-Dade and Monroe counties, Florida. Primary constituent elements include suitable soil, vegetation, hydrologic conditions, and forage base. The designated area encompasses approximately 156,350 acres (63,273 hectares) and includes portions of CSSS-B through CSSS-F (**Figure 6**). CSSS-A is the only area occupied by sparrows that does not have associated designated critical habitat.

Because the majority of designated critical habitat lies within ENP, there have been relatively few impacts. However, about 471.5 acres (190.8 hectares) of critical habitat were altered during construction of the S-332 B detention areas and a portion of the B-C connector. No other permanent alteration of critical habitat is known. Degradation of critical habitat has resulted from flooding within the area of CSSS-D and frequent fires and woody vegetation encroachment in overdrained areas near CSSS-C and CSSS-F. Degradation of these habitats is not permanent and they may improve through restoration efforts.

The C-111 Spreader Canal Western Project has the potential to affect up to approximately 1,606 acres of habitat within Critical Habitat Unit 3 (CSSS-D). In an average year, Unit 3 would experience extended hydroperiods across 1,606 acres in an average year and 1,421 acres in a wet year. Increased hydroperiods are anticipated to degrade primary constituent element 2 (see description below) by potentially altering the vegetative density or diversity of preferred grasses used by CSSS. However, the changes are not expected to be so severe as to eliminate the preferred grass species (PCE 2) across this acreage in Unit 3. Therefore, the functions for which Critical Habitat Unit 3 was designated for the conservation of the species would not be appreciably altered.

USACE notes that the C-111 Spreader Canal Western Project is covered under a separate BO and Terms and Conditions are implemented by SFWMD.

In order to predict the action-related effects on CSSS, one must consider those physical and biological features that are essential to the conservation of the species and their habitat. These include, but are not limited to, space for individual and population growth and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing (or development) of offspring; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. These requirements, which are based on the biological needs of this species, are described in the final critical habitat designation published in the Federal Register on November 6, 2007 (FR Vol. 72, No. 214).

Primary constituent elements are physical and biological features that have been identified as elements essential to the conservation of the species. As described in the Federal Register (FR Vol. 72, No. 214), the primary constituent elements include:

- Soils that are widespread in the Everglades' short-hydroperiod marshes and support the vegetation types that the CSSS rely on;
- Plant species that are characteristic of CSSS habitat in a variety of hydrologic conditions that provide structure sufficient to support CSSS nests and that comprise the substrate that CSSS utilize when there is standing water;
- Contiguous open habitat because CSSS require large, expansive, contiguous habitat patches with sparse woody shrubs or trees;
- Hydrologic conditions that would prevent flooding sparrow nests, maintain hospitable conditions for CSSS occupying these areas, and generally support the vegetation species that are essential to CSSS; and
- Overall, the habitat features that support the invertebrate prey base the CSSS rely on and the variability and uniqueness of habitat.

Evaluations of action effects to the primary constituent elements are discussed below:

CALCITIC MARL SOILS

Marl soils are characteristic of the short-hydroperiod freshwater marl prairies of the southern Everglades and support the vegetation community on which CSSS depend. Presently, soils in the marl prairie landscape within CSSS habitat vary in physical and chemical characteristics due to the variation in topography, hydrology, and vegetation (Sah et al. 2007). Alteration of soil characteristics due to action operations would be difficult to detect in the short term.

HERBACEOUS VEGETATION

Greater than 15 percent combined cover of live and standing dead vegetation of one or more of the following species: muhly grass, Florida little bluestem, black sedge, and cordgrass (*Spartina bakeri*). These plant species are largely characteristic of areas where CSSS occur. They act as cover and substrate for foraging, nesting, and normal behavior for sparrows during a variety of

environmental conditions. Although many other herbaceous plant species also occur within CSSS habitat (Ross et al. 2006), and some of these may have important roles in the life history of the CSSS, the species identified in the primary constituent relationship consistently occur in areas occupied by sparrows (Sah et al. 2007). With a trend indicating longer hydroperiods affecting the vegetative community composition in CSSS critical habitats, it may be difficult to separate action level effects from other factors (e.g. sea level rise).

CONTIGUOUS OPEN HABITAT

CSSS subpopulations require large, expansive, contiguous habitat patches with few or sparse woody shrubs or trees. The components of this primary constituent element are largely predicated on a combination of hydroperiod and periodic fire events. Fires prevent hardwood vegetation from invading these communities and prevent the accretion of dead plant material, both of which decrease the suitability of this habitat type for CSSS. Implementation of the proposed action could extend hydroperiods, causing a minimal effect on the occurrence of natural fires in the area. The proposed water management strategy, however, is designed to control excessive hydroperiods, thus minimizing significant changes in vegetative composition.

HYDROLOGIC REGIME-NESTING CRITERIA

As stated, favorable nesting habitat requires short hydroperiod vegetation characteristic of mixed marl prairie communities. A measure of the potential for CSSS nesting success is the number of consecutive days between March 1 and July 15 that water levels are below ground surface. Preferable annual discontinuous hydroperiod durations range from 60 to 180 days, and 40 to 80 consecutive dry days during the nesting season is considered favorable (Pimm et al. 2002).

In order to maintain suitable vegetative composition conducive for successful nesting, it is important that water depth, as measured from the water surface down to the soil surface, does not exceed 7.9 inches (20 centimeters) more than 30 days during the period from March 15 to June 30 at a frequency of more than two out of every ten years. Water depths greater than 7.9 inches (20 centimeters) during this period will result in elevated nest failure rates (Lockwood et al. 2001; Pimm et al. 2002). If these water depths occur for short periods during nesting season, CSSS may be able to re-nest within the same season. These depths, if they occur for sustained periods (more than 30 days) within CSSS nesting season, will reduce successful nesting to a level that will be insufficient to support a population if they occur more frequently than two out of every ten years. This has occurred within portions of the CSSS range.

5.9 POTENTIAL EFFECTS TO CAPE SABLE SEASIDE SPARROW CRITICAL HABITAT

CRITICAL HABITAT UNIT 1/CSSS-B

As shown in **Table 5,** Critical Habitat Unit 1 represents the largest CSSS subpopulation and has remained relatively stable since implementation of IOP operations in 2002. Wet prairie vegetation predominates within this unit (Ross et al. 2006). Due to its location downstream of the elevated pine rocklands, Unit 1 is relatively well protected from the managed water releases under IOP.

Consequently, implementation of the 2017 Planned Temporary Deviation is not expected to alter any of the primary constituent elements within Unit 1 or affect the status of CSSS-B.

CRITICAL HABITAT UNIT 2/ CSSS-C

Habitat of varying suitability occurs within Unit 2. Long-hydroperiod marshes occur south of the S-332 pumping station, while areas to the north are overdrained and prone to frequent fires. The most recent fire occurred in March 2007 when the Frog Pond fire swept through this area. The habitat has yet to fully recover (Sah et al. 2008, Virzi et al. 2009). The variable habitat conditions are thought to be a consequence of the 1980 construction of the S-332 pumping station, located at the boundary of ENP and Taylor Slough. Unit 2 holds relatively few CSSS (**Table 5**). During intensive nest surveys in 2008, Virzi et al. (2009) documented four females and five males, nine nest attempts, and reported nest survival as 22.8%. Previous research has indicated that habitat is unsuitable for CSSS for two to three years after it burns, so intensive nest surveys in 2010 within this subpopulation may reveal changes in utilization by sparrows. Recent research has indicated that within Unit 2, CSSS-C is suffering from the ill-effects of small population size including fewer breeding individuals, male-biased sex ratios, lower hatch rates, and lower juvenile return rates (Boulton et al. 2009a; Virzi et al. 2009). The 2017 Planned Temporary Deviation includes removing the S-332D pump constraint. Under the 2016 ERTP BO, the S-332D structure is limited to pumping 250 cfs between March 1 and July 15 annually in consideration of nesting CSSS. Under the 2017 Planned Temporary Deviation, this restriction would be eliminated and S-332D could pump up to 500 cfs. This 250 cfs increase in pumping at S-332D between June 30 and July 15, 2017 is not expected to alter any of the primary constituent elements within Unit 2 or affect the status of CSSS-C. Based upon the USGS Sparrow Viewer, as of June 28, 2017, there was approximately 40.3% of habitat available for nesting. The additional 250 cfs of pumping at the S-332D structure between June 27 and July 15 is not anticipated to significantly affect this unit.

CRITICAL HABITAT UNIT 3/CSSS-D

Since 1981, when an estimated 400 CSSS resided within Unit 3, this subpopulation has experienced a continual decline in population size (**Table 5**; Cassey et al. 2007). CSSS-D is a small, dynamic subpopulation that fluctuates annually, occupancy within Unit 3 is low, and detection probability is highly variable. Thought to be functionally extirpated in 2007 (Lockwood et al. 2008), CSSS were again encountered within this area in 2009 when Virzi et al. (2009) encountered four males and two females. In 2013, Virzi and Davis (2013) documented three males and two females. Vegetation within this critical habitat unit is largely unsuitable for CSSS breeding. Since 2000, high water levels and longer hydroperiods have prevailed, resulting in a sawgrass-dominated community interspersed with patches of muhly grass at higher elevations (Ross et al. 2003). The 2017 Planned Temporary Deviation includes removing the S-332D pump constraint. Under the 2016 ERTP BO, the S-332D structure is limited to pumping 250 cfs between March 1 and July 15 annually in consideration of nesting CSSS. Under the 2017 Planned Temporary Deviation, this restriction would be eliminated and S-332D could pump up to 500 cfs. This 250 cfs increase in pumping at S-332D between June 30 and July 15, 2017 is not expected to alter any of the primary constituent elements within Unit 3 or affect the status of CSSS-D. Based upon the USGS Sparrow Viewer, as of June 28, 2017, there was approximately 20.7% of habitat available for nesting. The additional 250 cfs of pumping at the S-332D structure between June 27 and July 15 is not anticipated to significantly affect this unit.

CRITICAL HABITAT UNIT 4/CSSS-E

Located along the eastern edge of Shark River Slough, Critical Habitat Unit 4 encompasses approximately 66 square kilometers. The Rocky Glades separate Unit 4 and CSSS-E from the other eastern subpopulations. Unit 4 holds the second greatest number of CSSS among all subpopulations. Due to its location (**Figure 6**), Unit 4 is relatively well protected from the managed water releases. Consequently, implementation of the 2017 Planned Temporary Deviation is not expected to alter any of the primary constituent elements within Unit 4 or affect the status of CSSS-E.

CRITICAL HABITAT UNIT 5/CSSS-F

The most easterly of all CSSS critical habitat units, Unit 5 is located at ENP boundary in proximity to agricultural and residential development. Habitat within this critical habitat unit suffers from overdrainage, reduced water flow, exotic tree invasion, and frequent human-induced fires (Lockwood et al. 2003; Ross et al. 2006). To alleviate the perpetual drier conditions and its associated problems, increased water flows within this area are required. Unit 5 consists of approximately 14 square kilometers, and, thus, is the smallest of all the units. Recent surveys have detected few or no CSSS within this unit (**Table 5**). Consequently, implementation of the 2017 Planned Temporary Deviation is not expected to alter any of the primary constituent elements within Unit 5 or affect the status of CSSS-F.

5.10 CAPE SABLE SEASIDE SPARROW CRITICAL HABITAT DETERMINATION

Among its several elements, the 2016 ERTP BO identifies a set of habitat performance targets in Section 7.1.1. that the FWS believes will improve conditions for the CSSS and contribute toward the survival and recovery of the species. These include ranges for a discontinuous hydroperiod within the CSSS marl prairie habitat. Based on current C&SF Project infrastructure, the FWS acknowledges in the BO that these targets are FWS goals for CSSS habitat to achieve over time, and are not technologically feasible for all subpopulations in every year at present (2016 ERTP at Table 34). Based upon the information described above, USACE has determined that the 2017 Planned Temporary Deviation may affect, but is not likely to adversely affect, CSSS critical habitat.

6 CONCLUSION

USACE recognizes the commitments made within the 2016 ERTP BO and remains committed to implementation of the Reasonable and Prudent Alternative (RPA). One such commitment is to complete construction of the Canal 111 (C-111) South Dade and 8.5 Square Mile Area projects. Completion of these critical construction components will allow implementation of the 2016 BO RPA to include the Modified Water Deliveries (MWD) Increment 2 and MWD Increment 3 Combined Operations Plan in accordance with the schedule identified in the RPA. In order to facilitate ongoing construction efforts through July 2017 to the maximum extent practical, USACE will maintain water elevations within the C-111 South Dade and 8.5 Square Mile Area construction footprints, at or below stage levels corresponding to the Increment 1.1 maximum operating limit of 7.5 feet NGVD in the L-29 Canal. In light of this constraint, the remaining options to further reduce stages within WCA

3A are to remove the seasonal closure constraints on the S-12A, S-128, S-343A, S-3438, S-344, and S-332D structures. USACE commits to hydrologic monitoring as recommended by FWS in your June 28, 2017 Draft Monitoring Plan (**Appendix B**) as well as providing an after action assessment based upon the data collected.

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