



REPLY TO
ATTENTION OF

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

CESAJ-PD-ES (ER 200-2-2)

FEB 22 2019

MEMORANDUM FOR RECORD

SUBJECT: Lake Okeechobee Regulation Schedule Additional Operational Flexibility
Justification and National Environmental Policy Act Coverage Determination

1.0 INTRODUCTION:

The purpose of this Memorandum for the Record (MFR) is to document the National Environmental Policy Act (NEPA) compliance for the Jacksonville District, U.S. Army Corps of Engineers (USACE) decision to use additional operational flexibility (AOF) within the 2008 Lake Okeechobee Regulation Schedule (LORS) water control plan for Lake Okeechobee. This action is being implemented to help allow the estuaries to recover from several years of ecologically harmful extremes (both low and high) in salinities due to El Niño, hurricanes, and La Niña; reduce the probability of higher lake stages in the 2019 wet season that, combined with high nutrient levels, increase the likelihood of harmful algal blooms (HABs) in Lake Okeechobee, and help increase the recovery of submerged aquatic vegetation in Lake Okeechobee. As of 11 February 2019, Lake Okeechobee is at 12.70 feet, in the Base Flow sub-band, and there is an El Niño forecasted for Spring 2019 (February through April, 74% likelihood of El Niño) and a high probability of above average rainfall for May through July. Strong El Niño events increase the chance of undesirable high lake stages in the dry season (November through May). When combined with above average rainfall in the following wet season, high lake stages can have undesirable effects for the human environment. Accordingly, Jacksonville District USACE recommends utilization of the AOF to assist in continued lowering of Lake Okeechobee stage through the end of May, when the wet season typically begins. LORS Part D guidance currently recommends up to 450 cubic feet per section (cfs) out of S-79 and up to 200 cfs out of S-80 (with the ability to distribute flows east or west as needed). LORS Part C guidance currently recommends up to maximum practical releases to the Water Conservation Areas (WCAs). The USACE will utilize AOF to release more water from the lake than is called for in Parts C and D to assist a continued lake level recession from February through May.

Documents related to this MFR include the following:

- *Lake Okeechobee Regulation Schedule Study Final Supplemental Environmental Impact Statement and Record of Decision, U.S. Army Corps of Engineers, Jacksonville District, 2008.*

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- Operational Strategy for February 2019 Additional Operational Flexibility. USACE-SAJ-EN-W.

2.0 PROJECT AUTHORITY:

The Central and Southern Florida (C&SF) Project, as described in House Document 643, 80th Congress, Second Session, was initially authorized by the Flood Control Act of 1948, Public Law 80-858. The remaining works of the C&SF Project, including all works in the WCAs, were authorized by the Flood Control Act of 1954, Public Law 83-780. The Flood Control Act of 1954 recognized that the plan of improvement may require refinement and that modifications within the scope and purpose of the authorization could be made at the discretion of the Chief of Engineers. Section 310(l) of the Water Resources Development Act of 1992, Public Law 102-580 reads in part: " ... (1) CENTRAL AND SOUTHERN FLORIDA (C&SF) - The Chief of Engineers shall review the report of the Chief of Engineers on central and southern Florida, published as house Document 643, 80th Congress, 2nd Session, and other pertinent reports, with a view to determining whether modifications to the existing project are advisable at the present time due to significantly changed physical, biological, demographic, or economic conditions, with particular reference to modifying the project or its operations for improving the quality of the environment, improving protection of the aquifer, and improving the integrity, capability, and conservation of urban water supplies affected by the project or its operation." This provides authority to for the Lake Okeechobee Regulation Schedule study.

The 2008 (LORS) and Supplemental Environmental Impact Statement (SEIS) were developed to address a need to manage Lake Okeechobee at a lower lake schedule for two main reasons: 1) to address deterioration of Lake Okeechobee's littoral zone and the Caloosahatchee and St. Lucie estuaries caused by high lake stages and inflexible release guidance, and 2) to address integrity issues with the Herbert Hoover Dike (HHD) levee system that surrounds Lake Okeechobee and protects surrounding communities from flood damage.

3.0 PROJECT LOCATION

Lake Okeechobee is located in south central Florida, and occupies portions of Glades, Hendry, Martin, Okeechobee, and Palm Beach counties (**Figure 1**). Lake Okeechobee has an area of approximately 730 square miles with its approximate center near 26° 56' 55" north latitude and 80° 56' 34" west longitude. The area that may be affected by the lake regulation schedule includes much of south Florida and includes Lake Okeechobee ecology, particularly within the littoral and marsh areas of the lake, and major downstream estuaries including the St. Lucie and Caloosahatchee estuaries. To a lesser degree, other areas considered to be affected are within the Everglades Agricultural Area, in the northern WCAs, including WCA 3A north of I-75, WCA 2A, and the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA 1), and the Lake Worth Lagoon.

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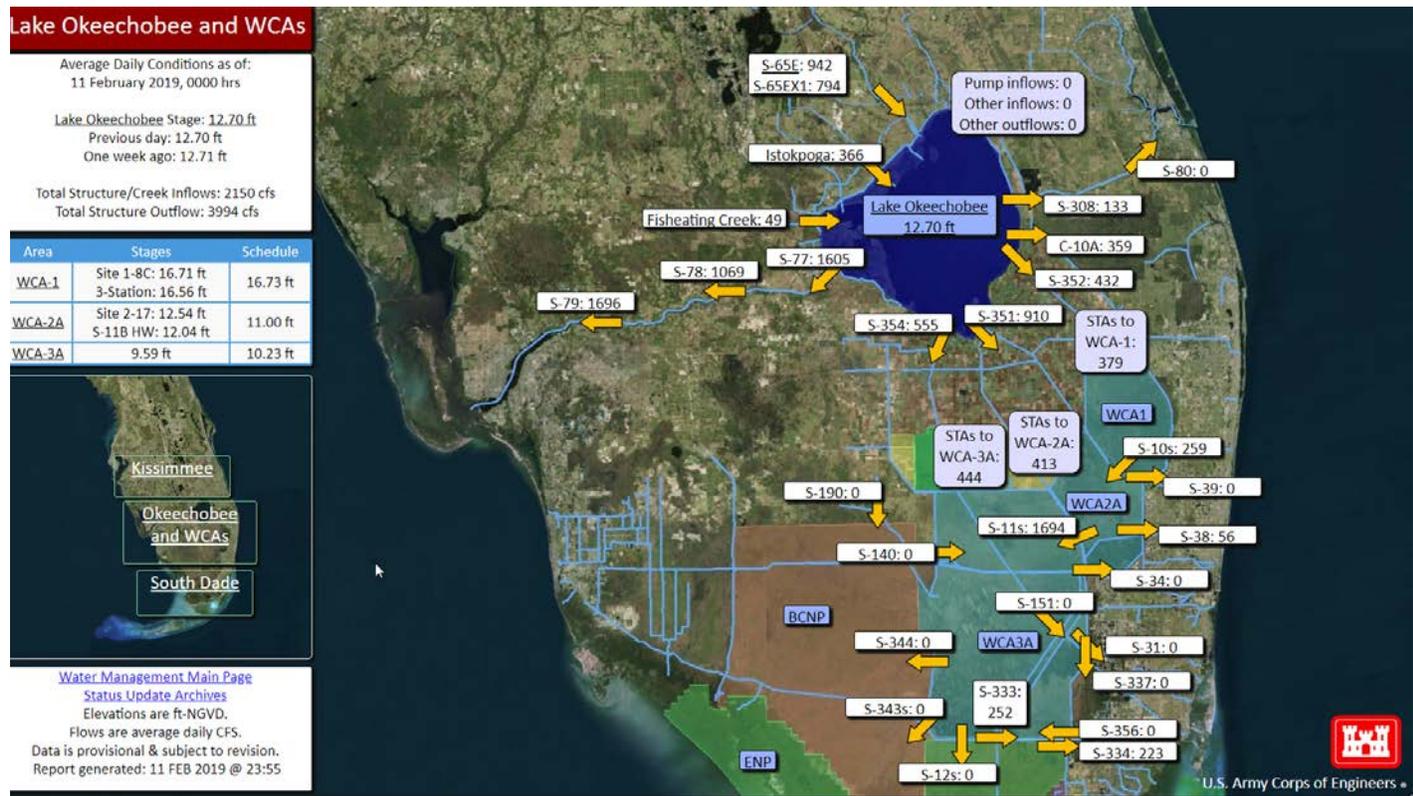


Figure 1 – Map of Lake Okeechobee Regulation Schedule Primary Affected Areas

4.0 PROJECT DESCRIPTION AND BACKGROUND

The agency goal for LORS is to ensure public health and safety while improving the ecological health of Lake Okeechobee and the St. Lucie and Caloosahatchee estuaries, with minimal or no impact to the competing project purposes. LORS objectives consistent with this include: a) ensure public health and safety; b) manage Lake Okeechobee at optimal lake levels to allow recovery of the lake's environment and natural resources; c) reduce high volume regulatory releases to the estuaries; d) continue to meet Congressionally authorized project purposes including, flood control, water supply, navigation, fish and wildlife enhancement, and recreation.

The water management operational criteria described in the water control plan establishes the allowable quantity, timing, and duration of releases from Lake Okeechobee to the WCAs and to tide (estuaries). Water management decisions utilize the 2008 LORS Parts A through D for guidance on releases from Lake Okeechobee. Information shown on Part A and Part B is utilized to compare the Lake elevation and the corresponding band and sub-band, respectively. Information shown on Part C and Part D is utilized to establish the recommended releases to the WCAs and the recommended releases to tide (estuaries), respectively see **Figures 2** and **3**.

Figure 2 – Part C of 2008 LORS Establishes Allowable Lake Okeechobee Releases to Water Conservation Areas.

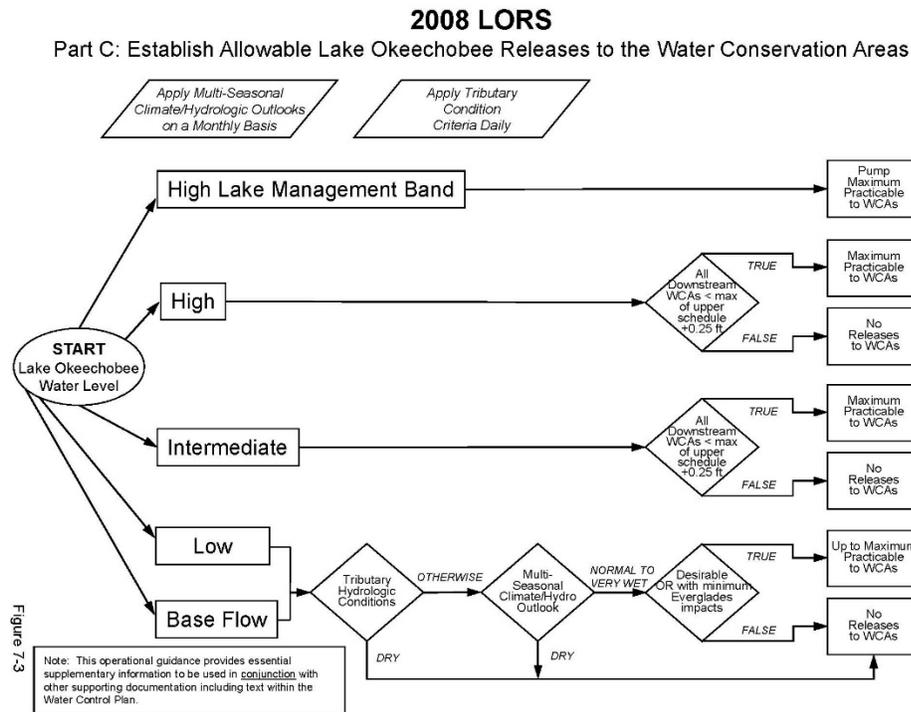
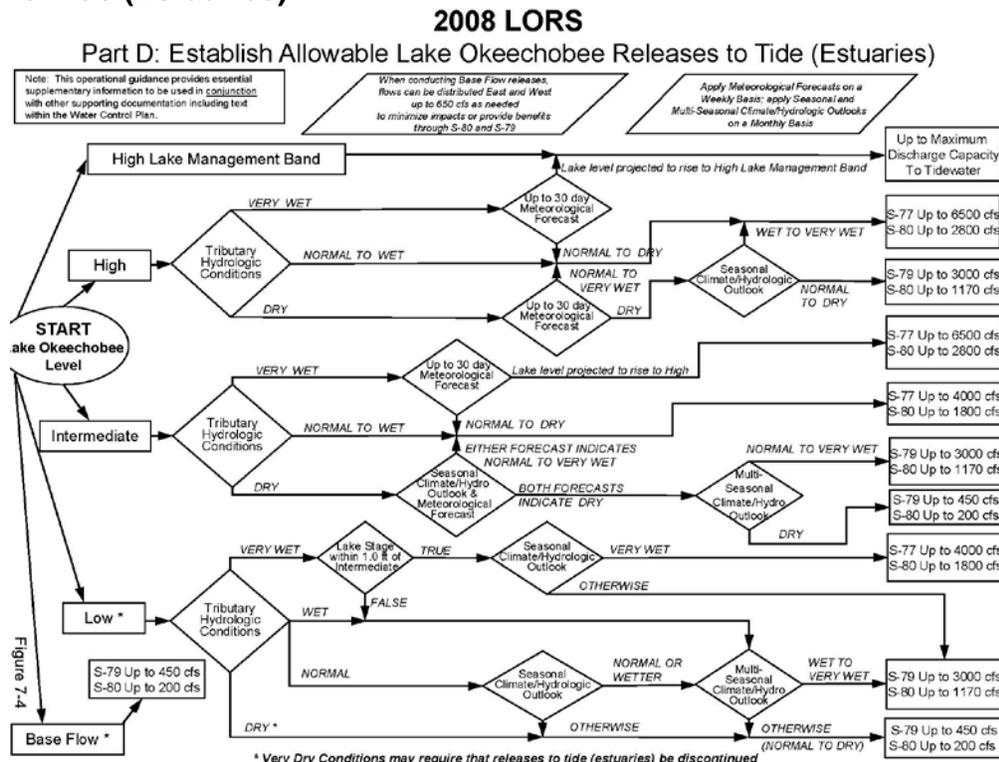


Figure 3 – Part D of 2008 LORS Establishes Allowable Lake Okeechobee Releases to Tide (Estuaries).



The decision-making process for Lake Okeechobee water management operations considers all Congressionally-authorized project purposes. The decision-making process to determine quantity, timing, and duration of the potential release from Lake Okeechobee include consideration of, but is not necessarily limited to: C&SF Project conditions, historical lake levels, estuary conditions/needs, lake ecology conditions/needs, WCA water levels, Stormwater Treatment Area (STA) available capacity, current climate conditions, climate forecasts, hydrologic outlooks, projected lake level rise/recession, and water supply conditions/needs.

2008 LORS contains the provision for “Additional Operational Flexibility” (refer to Section 3.6; pages 84-87 of the 2008 LORS Final SEIS as well as in Section 7-16; pages 7-29 - 7-31 of 2008 LORS Water Control Plan). The 2008 LORS was not developed to optimize performance of any single project purpose, but rather to attempt to balance the performance of multiple project purposes. During 2008 LORS plan formulation varying lake regulation schedules were simulated using a Period of Record (POR) Model (1965-2000). It was anticipated that that future events similar to those experienced under the POR would be effectively managed by 2008 LORS. In addition, 2008 LORS was also simulated for the 2001-2005 period and deemed effective for managing high lake stages under this set of conditions. However, during the formulation of 2008 LORS it was recognized that occasionally AOF would be used to address circumstances that were not collectively evaluated for the POR. Examples of such circumstances include hydrologic conditions, lake levels, algal blooms, spawning in the estuaries and downstream runoff, HHD construction, among others. AOF provides water managers the ability to consider releases from Lake Okeechobee to the WCAs and to tide (estuaries) to minimize damages or to meet project purposes when the 2008 LORS Parts A through D are not effective at managing lake levels. Each event to be addressed by AOF is unique and releases to be implemented will be defined by a desired outcome or time-period. Low volume lake releases are supported at lake levels above the water shortage management band in order to: prevent high lake levels and possible future high discharges to estuaries (LORS Water Control Plan section 7-06c), reduce high turbidity levels in the lake and possible future high volume discharges of turbid water to the estuaries (LORS Water Control Plan section 7-06c), and benefit fish and wildlife within the lake and downstream (LORS Water Control Plan section 7-07). The following factors describe the current (*i.e.* February 2019) south Florida water management operations and ecosystem status that support the decision for pursuing AOF provided within 2008 LORS.

- *4.1 Climate Oscillations and Tropical Events* – Very strong El Niño conditions were present during winter of 2015/2016 causing rainfall to be 12 inches above normal for south Florida for the dry season. This resulted in high flows to the estuaries during an environmentally sensitive time (March-April, which are peak oyster and fish spawning times), followed by wide spread HABs on Lake Okeechobee and in the St. Lucie and Caloosahatchee Estuaries. This was followed by an above POR rainfall event in June 2017 (160% of average rainfall over the lake), which caused USACE to enact three deviations from water control plans to reduce high water levels in the WCAs. In September 2017,

Hurricane Irma brought 200% above normal rainfall for the month and increased lake stages to 17.2 ft. and the lake remained above 15.5 ft. for 3 months, impacting the lake's water quality (increased nutrients and turbidity) and decreased submerged aquatic vegetation within the lake. La Niña conditions then followed in the winter of 2017/2018 which aided decreasing Lake Okeechobee stage by 4.5 ft. However, an extreme rainfall event in May 2018 (300% of normal) brought the lake up to 14.2 ft. at the start of the wet season and required high flow releases to the estuaries once again, as another harmful algal bloom occurred on the lake. The frequency of El Niño events was not considered in the LORS 2008 period of record. This oscillation between El Niño and La Niña has only occurred a few other times since 1965 (2008 LORS Period of record for analysis was 1965 through 2005). Since 1965 there has only ever been one other very strong El Niño condition, which was in 1997 and was followed by three consecutive years of La Niña conditions. The very strong El Niño condition in 1997 was defined by the Oceanic Niño Index of +2.4 at the highest, compared to 2015 index of +2.6. During the period of record there has not been a case similar to 2018.

- *4.3 Environmental Health* – Lake stage has been above 15.5 ft. (top of preferred lake stage ecology band) four times over the past four years, and above 16.0 ft for over 60 days once (harm threshold) in 2017. This has impacted Lake Okeechobee water quality (Total Phosphorus load increased to 1046 metric tons from 450 metric tons, turbidity increased). In addition, Lake Okeechobee submerged aquatic vegetation (SAV) has been reduced to approximately 11% of its 2013 acreage and emergent aquatic vegetation (EAV) is also in poor condition. HABs occurred on Lake Okeechobee and in the downstream estuaries twice (2016 and 2018), which impacted not only the surrounding communities that are dependent on tourism, but also posed risk to human health and safety. The St. Lucie and Caloosahatchee estuaries experienced high flow events from Lake Okeechobee releases and basin run off for 147 days above 2,000 cfs and 493 days above 2,800 cfs, respectively. This has impacted oyster and seagrass communities in the estuaries due to long periods of depressed salinities (lower than 10 practical salinity units). In the dry season in 2018, the Caloosahatchee salinities increased above the 26 practical salinity units (PSU) threshold for oysters and 10 PSU threshold for tapegrass (*Valisineria spp.*) even with flows from S-79 at 650 cfs. These conditions limited recovery of estuary resources in the Caloosahatchee before the next high flow event in the wet season of 2018.

The forecast calling for an El Niño this 2019 spring brings a higher risk of above normal rainfall during the dry season, followed by a forecast for above average rainfall in the wet season, could lead to higher Lake Okeechobee stages, increased risk to Lake ecology (submerged and emergent aquatic vegetation) increased risk of harmful algal blooms, and high flows to the estuaries during the spring and summer of 2019. As of 11 February 2019, Lake Okeechobee is at 12.70 ft., in the Base Flow sub-band. AOF identified in LORS is needed to avoid continued impacts to Lake Okeechobee and estuarine ecology as well as reduce the risk of potential future HABs during the wet

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season and additional harm to the south Florida communities and economies that depend on a healthy lake and estuaries. USACE will evaluate conditions continuously to determine the recommended lake releases. The recommended flows, while utilizing this AOF will be within the LORS water control plan guidance for low flow volumes (up to 2,000 cfs out of S-79 and 730 cfs to the St. Lucie Estuary), see LORS SEIS section 3.6.c on Low Volume Releases. These low volume releases are intended to continue the lake recession that started in 26 October 2018 while taking into account the lake and estuary ecology. This action resulted in 0.13 ft Lake Okeechobee stage decrease. Factors that will be evaluated in deciding the volume of the releases include but are NOT limited to: LORS Part D guidance, current and projected lake levels, coordination with agency and stakeholder scientists, forecasted rainfall and estuarine conditions, and continued balance of achieving LORS multiple purposes that also include water supply, flood risk management, fish and wildlife enhancement, and recreation. Consistent with the FSEIS, each event to be addressed by additional operational flexibility is unique, and releases to be implemented will be defined by a desired outcome or time period. The desired outcome is to lower lake levels and maintain a stage recession within the operational band to reduce the chances of high volume releases during the wet season. Lowering the lake will require low volume releases to the estuaries during the dry season. Releases will be adjusted based on many factors consistent with LORS such as but not limited to: precipitation forecasts, ecological conditions of the lake and the estuaries, current and forecasted lake stages, and water supply. It is not intended that releases should cause high or unnatural recession rates and if this occurs releases will be adjusted. The public will be notified of these releases by the USACE's normal water management notification process (press release, internet webpage).

This AOF will be limited to low-volume releases up to 2,000 cfs measured at S-79 and up to 730 cfs measured at S-80 while lake levels are above the Water Shortage Management Band. The initial AOF releases starting on 22 February 2019 will have a weekly average pulse of 1,800 cfs measured at S-79 and 500 cfs measured at S-80. If or when AOF flows change from these levels, while remaining within the AOF limits, additional public notification will be made in order to continue the Lake Okeechobee stage recession. Occasionally local basin runoff may cause flows at these structures to exceed these targets. Flows to the south through S-354, S-351, and S352 will continue to be maximized to the extent practicable, while recognizing STA water quality treatment capacity.

AOF may not be applied if lake levels rise and move into the Low sub-band resulting in releases other than base flow releases (*i.e.* more than 450 cfs and 200 cfs via S-79 and S-80, respectively). If this occurs, regulatory releases may be made according to the water control plan Part D. AOF will not be applied if lake levels recede to the Water Shortage Management band (as defined in Part B of the 2008 LORS). At such a time releases to tide and to the WCAs will be determined by USACE based on input from the South Florida Water Management District (SFWMD).

5.0 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

The 2008 LORS Final SEIS states that release decisions will take into account the estuary's biologically-derived maximum flow, future water supply demands, C&SF Project system-wide conditions, and lake ecological conditions, as appropriate. Once AOF is implemented, AOF releases will be discontinued when the conditions that prompted them have ceased or the desired outcome is achieved. The desired outcome is to lower the lake within the operational band before the onset of the 2019 wet season so as to reduce the risk of high lake stages and associated releases to the estuaries later. This section analyzes the environmental and human health effects contemplated and discussed in the original 2008 LORS Final SEIS. The AOF will be considered to obtain additional benefits, and to provide the opportunity to minimize impacts in the longer term.

- *Lake Okeechobee Ecology:* Lake stages have been above 15.5 ft. four times over the past four years and once above 16 ft. for more than 60 days causing harm to littoral zone EAV and SAV that is important for lake ecology. Lake ecology will benefit from an approximately 0.08 ft. per 7 days (~2730 cfs) recession under additional operational flexibility compared to 0.02 ft. per 7 days reduction (650 cfs) under Base Flow releases. The total difference between normal operations and AOF in lake stage could be as much as 1.1 ft compared to 0.14 ft. Utilizing AOF will reduce risk of high stages and associated harm on lake littoral zone in the dry and wet season, and allow for SAV and EAV to recover, improving resiliency for wet season lake stage. SAV had decreased from 33,000 acres in 2015 to 5,200 acres after hurricane Irma in 2018, and remains well below the high of 45,000 acres in 2013. The RECOVER Lake Okeechobee Stage performance measure indicates that periodic lower lake stages down to 11 ft will help improve lake aquatic vegetation recovery that can help provide some water quality improvement benefits. Because the forecast for a wetter dry season and above average wet season, there is a low risk of lake stages below 11 ft for longer than 80 days which can impact lake ecological resources (endangered species, fishery resources) and potentially impact water supply (LORS SEIS Section 4.4).
- *Endangered Species:* The Lake Okeechobee littoral zone is designated critical habitat for the endangered Everglade snail kite. Aquatic vegetation promotes foraging opportunities for the endangered Everglade snail kite and will improve with this regulatory release decision. Endangered Species Act consultations with U.S. Fish and Wildlife Service in 2007 and 2018 focus on avoiding low lake stages below 11 ft. (see Lake Ecology threshold above) and high recession rates to avoid impacts to wood storks and the Everglade snail kite. When Everglade snail kite nesting initiates (February to June), lake recession rate will be considered in managing lake releases to avoid high recession rates (>0.5 ft per month) that can affect nesting success. These thresholds will be used to inform water management releases to avoid and minimize any potential adverse effects to endangered species act.
- *Harmful Algal Blooms:* Allowing Lake Okeechobee stage to get lower this dry season will allow for the lake nutrients levels to improve and reduce the risk of

high lake stages in the wet season. Research has documented that high lake stages and nutrient levels increase the risk of HABs appearing on Lake Okeechobee, which then become a concern in the estuaries due to effects of Lake Okeechobee releases.

- *Water Quality:* Greater reduction in Lake Okeechobee stage will support a reduction in lake turbidity and water quality nutrients and promote increased overall lake health. Maximum releases south will be made in coordination with SFWMD and consideration of STA conditions, so as to avoid impacting STA water quality treatment performance over the long-term. This will reduce risk of water quality impacts of sending water South to the WCAs.
- *Estuaries:* Estuarine resources have already been impacted due to freshwater and reduced water quality conditions caused by high lake releases and high basin runoff. The goal is to reduce the amount of time flows are greater than 2800 cfs to the Caloosahatchee and 2000 cfs total flows to the St. Lucie this dry season (El Niño rain events) and the following wet season. In 2018, salinities in the Caloosahatchee estuary increased above desired thresholds for oysters when flows from S-79 were at 650 cfs. Estuary stakeholders from local governments and state agencies have requested low flows at 1,000 cfs from S-79 to reduce the chance of high saline conditions in the estuary impacting recovery of ecological health this dry season. The 2000 cfs out of S-79 is below the harm threshold for the Caloosahatchee based on the 2007 RECOVER performance measure for Northern Estuaries Salinity. St Lucie stakeholders have preferred no releases from S-80, but have voiced support for the intent of this plan. The 500 cfs out of S-80 is below the harm threshold of 2000 cfs from all canals (C-23, 24, 25, 44). Salinity thresholds (too fresh <10 PSU) of harm for oysters will be evaluated as part of regulatory release decisions.
- *Socioeconomics:* Beginning the wet season at a lower lake stage will decrease the chance of high flows that impact estuarine health, fishing, and reduce the risk of water discoloration in the estuaries which can impact tourism. In addition, important fishery species may have a higher chance of spawning success in Lake Okeechobee and Caloosahatchee and St. Lucie estuaries this Spring. Fishing industries in the area are economically significant. Important fishery species will also be more available in the estuary during the winter/spring tourism season. Improved lake aquatic vegetation will improve fisheries on Lake Okeechobee as well. Low lake stages will affect navigation on the lake and across the Okeechobee Waterway due to low depths in the channels.
- *Water Supply:* Based on SFWMD dynamic position analysis (DPA) from February, there is a 15-20 percent chance that Lake Okeechobee will enter the 2008 LORS Water Shortage Management band (10.5 ft.) in 2019 prior to end of the dry season (31 May 2019) while adhering to the normal operations prescribed under the 2008 LORS Water Control Plan (the standard DPA does not consider application of AOF). This percentage considers the full period of record (1965-2005) applied for the DPA, and the chance of lake stages crossing into the Water Shortage Management Band would be further reduced if forecasted El Niño dry season rainfall patterns are completely realized. By contrast, if forecasted El Niño dry

season rainfall patterns are not realized, the chance of lake stages crossing into the Water Shortage Management Band would be moderately increased with implementation of the AOF for the remainder of the dry season. AOF will not be applied if Lake Okeechobee recedes into the Water Shortage Management Band and releases will be made or cut back to avoid falling into this band. At such a time releases to tide and to the WCAs will be determined by USACE in concurrence with the SFWMD. Water supply restrictions are not likely even in the event of moderately dry conditions through the dry season.

- *HHD*: Additional releases at this level (2,740 cfs) reduces the lake by 0.08 ft. per 7 days which will decrease the risk of higher lake stages at the start of the next rainy season. Lower lake stages increase the risk of fire on the dike if weather conditions are dry.
- *Navigation*: Navigation will be impacted at lower lake stages due to low depths along the Okeechobee Waterway. Since these operations are not intended to last past the beginning of the wet season, impacts will be limited to the dry season.

6.0 DETERMINATION AND CERTIFICATION

The decision to utilize AOF is consistent with the 2008 LORS Final SEIS. The oscillating El Niño/La Niña cycles, risk of high rainfall events in the dry and wet season, consecutive high lake stage years and multiple HAB events were outside the POR evaluated in 2008 LORS Final SEIS resulting in a greater amount of time above high lake stages than desired under 2008 LORS. Implementation of AOF will increase the chance of lower Lake Okeechobee stages by the beginning of June 2019 to promote recovery of health lake aquatic vegetation for wading birds, endangered species, fisheries, improvements to water quality, and reduced risk of HAB. In addition, flows up to 2,000 cfs out of S-79 and up to 730 cfs out of S-80 will reduce risk of high salinities in the Caloosahatchee Estuary to allow a longer period of time for estuary recovery prior to spawning season (March). In addition, lowering the lake stage in anticipation of dry season El Niño rainfall event rains will reduce the risk of high flows in the Caloosahatchee and St. Lucie Estuaries over the long-term. This management decision and justification will be made available to the public, per the 2008 LORS water control plan (refer to Attachment 2).

In light of the above mentioned unique circumstances, this action is consistent with the 2008 LORS water control plan purposes and potential environmental effects analyzed in the 2008 LORS Final SEIS. A deviation to 2008 LORS and supporting NEPA are not required. This project is in compliance with NEPA and USACE regulation ER 200-2-2 for implementing NEPA on Civil Works actions.



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