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

REPLY TO
ATTENTION OF

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

OCT 26 2018

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. The flexibility will be used to address unique circumstances that collectively were not evaluated for the period of record (1965-2005). These collective circumstances include construction on Herbert Hoover Dike [HHD], frequent climate oscillations, extreme high water, major tropical events, harmful algal blooms, and estuarine salinity issues. As of 23 October 2018, Lake Okeechobee is at 13.98 feet, in the Base Flow sub-band, and there is a strong El Niño forecasted for winter 2018/2019 (October through March, 70% likelihood of El Niño). Strong El Niño events increase the chance of undesirable high lake stages in the dry season (November through May) and can have undesirable effects in the dry and wet seasons for the human environment. Accordingly, Jacksonville District USACE recommends utilization of the AOF to assist in lowering Lake Okeechobee before 1 June and the start of the 2019 hurricane season. 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 lake level recession from November through May.

Documents related to this MFR include the following:

- *Memorandum for Record. Subject: USACE Position Statement on SFWMD Adaptive Protocols. 27 May 2010. CESAJ-EN-W. Lake Okeechobee Regulation Schedule Study and Final Supplemental Environmental Impact Statement and Record of Decision,* U.S. Army Corps of Engineers Jacksonville District, 2008
- Operational Strategy for October 2018 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.

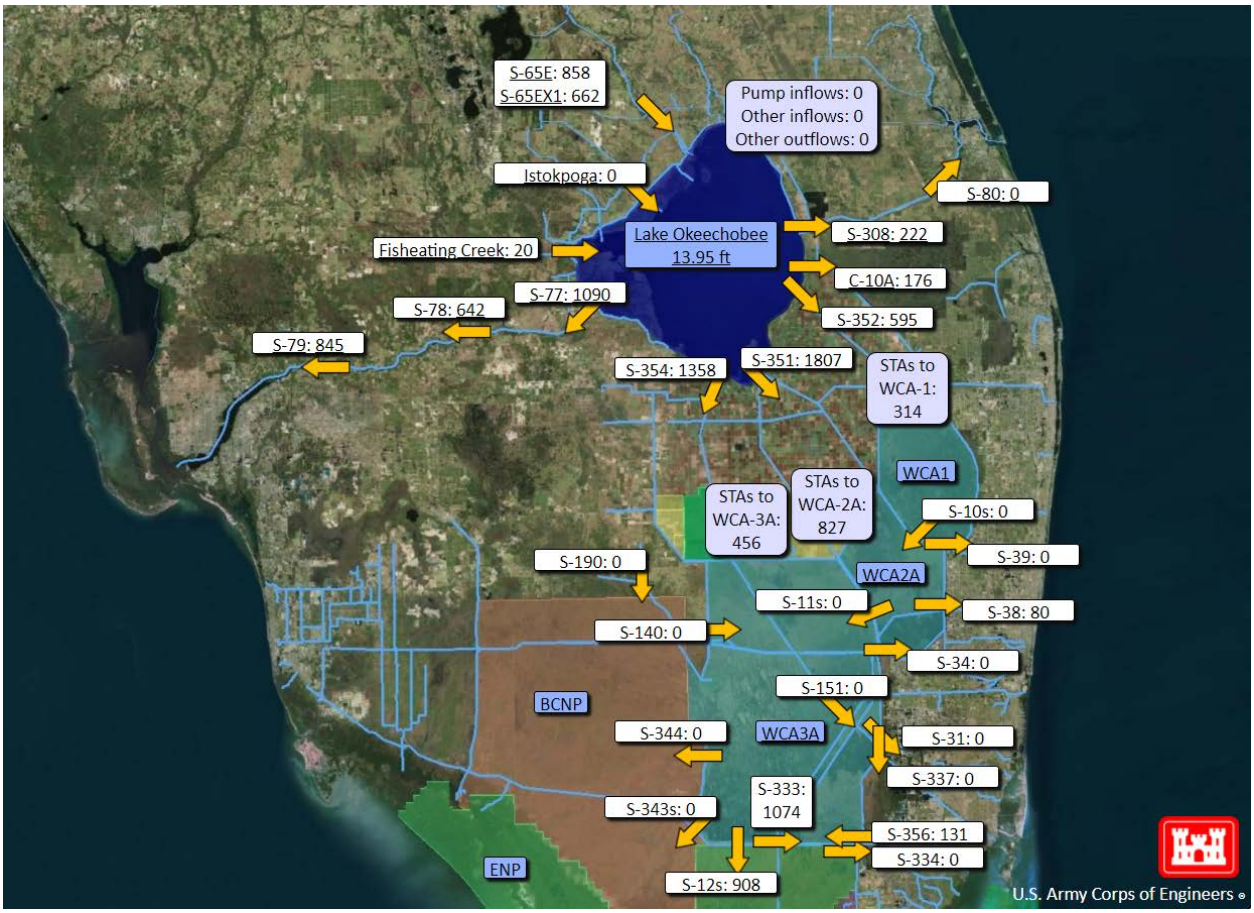


Figure 1 – Map of Lake Okeechobee Regulation Schedule Primary Effected Areas

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. Study 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 establish 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.

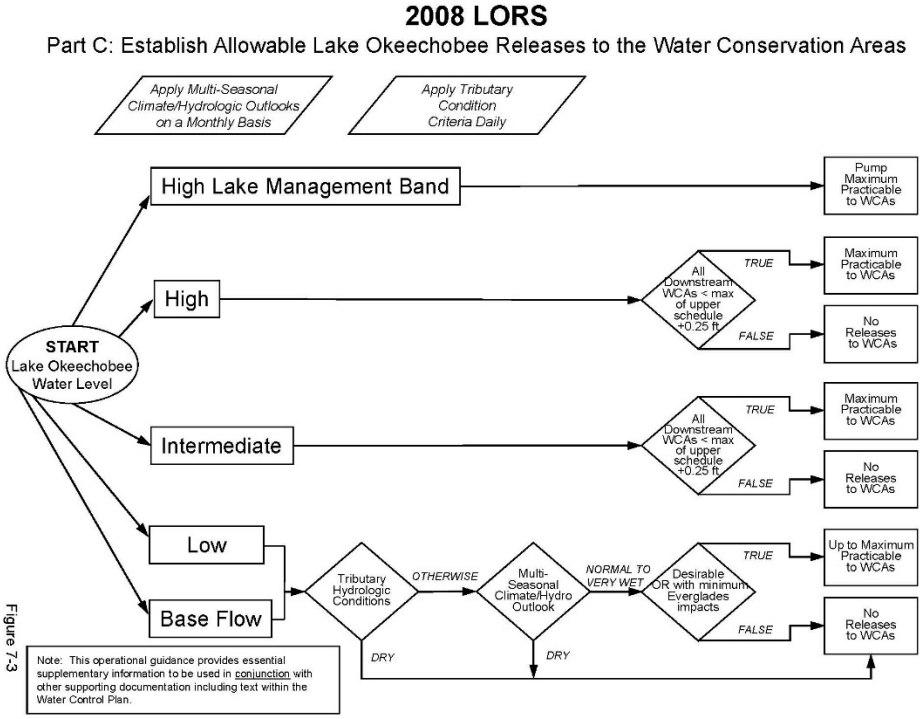
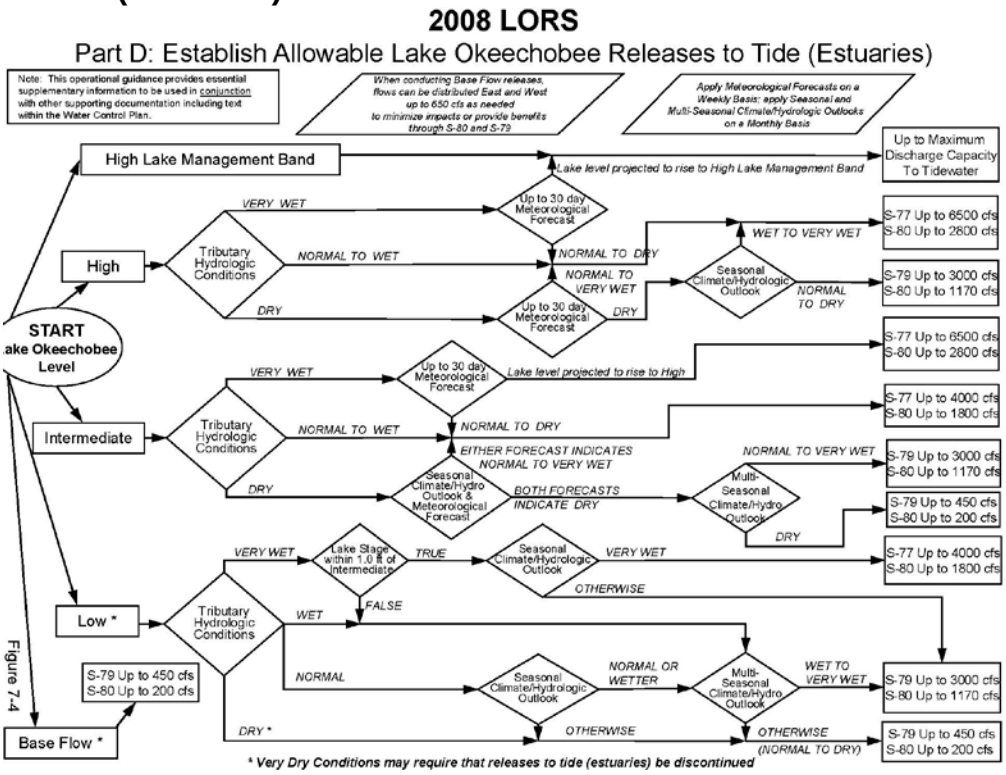


Figure 3 – Part D of 2008 LORS Establishes Allowable Lake Okeechobee Releases to Tide (Estuaries).



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 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, 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 future high discharges to estuaries (LORS Water Control Plan section 7-06b), reduce high turbidity levels in the lake (LORS Water Control Plan section 7-06c), and benefit fish and wildlife within the lake and downstream (LORS Water Control Plan section 7-07c). The following factors describe the current (*i.e.* October 2018) south Florida water management and ecosystem status that support the decision for pursuing AOF provided within 2008 LORS.

- *4.1 Construction* – HHD culvert replacement and cutoff wall construction is ongoing and is expected to be completed by 2022. Construction for the culvert replacements consists of building either earthen or sheet pile coffer dams and excavating the dike to remove and rebuild the culverts. These temporary dams are lower than the main embankment, which poses a higher risk during hurricanes and was not evaluated under LORS 2008. The culverts planned to be excavated during the 2019 hurricane season have a higher population (Belle Glade, Lakeport and the Seminole Tribe of Florida's Brighton Reservation) at risk downstream than the culvert replacement sites that were under construction during 2018. Ensuring the lake recedes by hurricane season is desirable in

order to manage risk at the HHD culvert construction sites through the 2019 hurricane season. In addition, there will be a higher number of culverts under construction in 2019 compared to previous years.

- *4.2 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 undesirable high flows to the estuaries during an environmentally sensitive time (March-April, which are peak oyster and fish spawning times), followed by wide spread harmful algal blooms on Lake Okeechobee and in the St. Lucie and Caloosahatchee Estuaries. This was followed by an above POR rainfall event in June 2017, 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 undesirable releases to the estuaries once again, as another harmful algal bloom occurred on the lake.
- *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). Harmful algal blooms 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 undesirable high flow events 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. This limited recovery of estuary resources in the Caloosahatchee before the next high flow event in the wet season of 2018.

The forecast calling for a strong El Niño this 2018/2019 winter brings a high risk of undesirable high rainfalls during the dry season that could lead to higher Lake Okeechobee stages, increased risk to HHD construction, increased risk of harmful algal blooms and undesirable high flows to the estuaries during the spring and summer of 2019. As of 23 October 2018, Lake Okeechobee is at 13.98 ft., in the Base Flow sub-band. AOF identified in LORS is needed to avoid impacts to HHD construction (human health and safety), continued impacts to Lake Okeechobee and estuarine ecology, and any 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 (up to 2,800 cfs out of S-79 and 2,000 cfs to the St. Lucie Estuary). 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. Consistent with the LORS Final SEIS, each event to be addressed by AOF is unique, and releases to be implemented will be defined by a desired outcome or time period. The public will be notified of the planned releases, desired outcome, and implementation time period by the USACE's normal water management notification process (press release, internet webpage). Starting 26 October 2018 flows out of S-79 will be pulsed to reach a 7 day average of 1,000 cfs and 0 cfs out of S-80. If or when flows increase from these levels, additional public notification will be made that flows will be increasing in order to continue the Lake Okeechobee stage recession (Refer to Attachment 1 - Operational Strategy for October 2018 Additional Operational Flexibility).

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. AOF may not be applied if lake levels recede into the Beneficial Use sub-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 in concurrence with the South Florida Water Management District (SFWMD), as outlined in the 27 May 2010 MFR (Subject: USACE Positional Statement on SFWMD Adaptive Protocols).

Additional operational flexibility will not be applied if releases out of S-77 and S-308 combine cumulatively to over 164,600 ac-ft over what Part D calls for (450 cfs and 200 cfs via S-79 and S-80, respectively). This number was derived from Table 3.1 in the FSEIS and was calculated specifically for this event, future utilization of AOF may cite different limitations based upon conditions. This volume will be calculated starting Friday 26 October 2018 by summing releases in ac-ft out of S-77 and S-308 for regulatory releases.

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. In this case the lake being able to continue recession during the dry season without high regulatory releases to avoid high lake stages during the wet season is the primary risk factor of concern. 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 vegetation and submerged aquatic vegetation that is important for lake ecology. Lake ecology will benefit from an approximately 0.03 ft. per 7 days (1000 cfs) reduction under additional operational flexibility compared to 0.02 ft. per 7 days reduction (650 cfs) under Base Flow releases.
- *Endangered Species*: The Lake Okeechobee littoral zone is designated critical habitat for the endangered Everglade snail kite. Utilizing AOF will reduce risk of high stages and harm on lake littoral zone in the wet season, and allow for submerged aquatic vegetation and emergent aquatic vegetation to recover during this dry season. Both of these habitat promote foraging opportunities for the endangered Everglade snail kite. When Everglade snail kite nesting initiates, lake recession rate will be considered in managing lake releases to avoid high recession rates that can affect nesting success.
- *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. 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 increased overall lake health.
- *Estuaries*: Estuarine resources have already been impacted due to freshwater conditions caused by high lake releases and high basin runoff. The goal is to reduce the amount of time flows that are greater than 2800 cfs to the Caloosahatchee and 2000 cfs 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 and tapegrass when flows from S-79 were at 650 cfs. Estuary stakeholders from local governments and state agencies have requested low flows at 1000 cfs from S-79 to reduce the chance of high saline conditions in the estuary impacting recovery of ecological health.
- *Socioeconomics*: Getting the lake lower at the start of the dry season 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 can have a higher chance of spawning success in Lake Okeechobee and Caloosahatchee and St. Lucie estuaries. Important fishery species will also be more available in the estuary during the winter/spring tourism season.
- *Water Supply*: Based on SFWMD dynamic position analysis (DPA) from mid-October, there is only 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); 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 realized. AOF may not be applied if Lake

releases to tide and to the WCAs will be determined by USACE in coordination with the SFWMD, as outlined in the 27 May 2010 MFR (Subject: USACE Positional Statement on SFWMD Adaptive Protocols). Water supply restrictions are not likely even in the event of moderately dry conditions through the dry season.

- *HHD*: Additional releases at this level (1,000 cfs) reduces the lake by 0.03 ft. per 7 days which will decrease the risk of higher lake stages at the start of the next rainy season. If the maximum prescribed AOF releases (164,600 ac-ft.) were released from the lake throughout the 2018-2019 dry season, the lake stage may be reduced by up to 0.37 ft. This cumulative stage reduction could be important for HHD dam rehabilitation purposes if there is another wet season in 2019 with elevated regional rainfall patterns.
- *Navigation*: Either alternative will not impact navigation.

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, high rainfall events, consecutive high lake stages 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. In addition, given the HHD construction, there is interest in reducing lake stage at the start of the next rainy season to minimize risk to dam safety. Implementation of AOF will increase the chance of lower Lake Okeechobee stages by the beginning of June 2019. In addition, flows of at least 1,000 cfs out of S-79 will reduce risk of high salinities in the Caloosahatchee Estuary to allow a longer period of time for estuary recovery prior to spawning season. In addition, getting the lake stage lower in anticipation of dry season El Niño rainfall event rains will reduce the risk of undesirable 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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