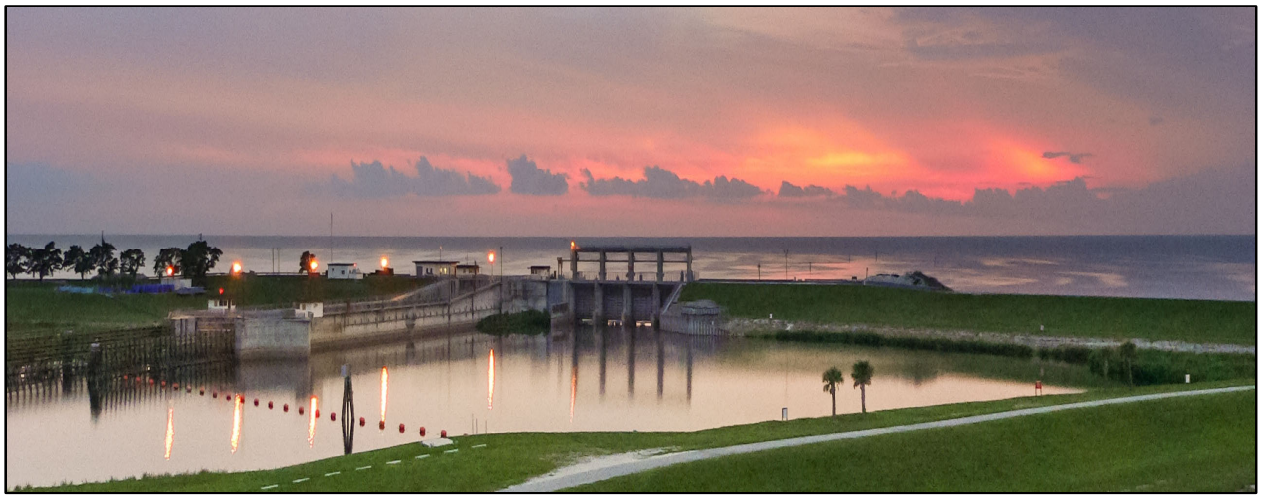
SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT

2020 PLANNED DEVIATION TO THE WATER CONTROL PLAN FOR LAKE OKEECHOBEE AND EVERGLADES AGRICULTURAL AREA (LORS 2008)



GLADES, HENDRY, MARTIN, OKEECHOBEE AND PALM BEACH COUNTIES

US Army Corps of Engineers ®
Jacksonville District

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
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FINDING OF NO SIGNIFICANT IMPACT

2020 PLANNED DEVIATION TO THE WATER CONTROL PLAN FOR LAKE OKEECHOBEE AND EVERGLADES AGRICULTURAL AREA (LORS 2008) Glades, Hendry, Martin, Okeechobee, and Palm Beach Counties, Florida

The U.S. Army Corps of Engineers, Jacksonville District (Corps) has conducted an environmental analysis in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended. Operations within the project area are currently governed by the water control plan for Lake Okeechobee and the Everglades Agricultural Area (also known as the Lake Okeechobee Regulation Schedule (LORS 2008)). The Corps is proposing to initiate a planned deviation from LORS 2008 in anticipation of and following freshwater harmful algae blooms (HABs) to reduce the risk of exacerbating potential health concerns associated with algal blooms in Lake Okeechobee, the St. Lucie, and Caloosahatchee estuaries while not impacting other project purposes. This revised supplemental Environmental Assessment (EA) has been prepared to address concerns received in response to release of the 2019 LORS Planned Deviation Draft EA and proposed Finding of No Significant Impact (FONSI) provided to the public on August 6, 2019. The 2020 Planned Deviation to LORS 2008 EA dated September 2020 occurs in Glades, Hendry, Martin, Okeechobee, and Palm Beach counties, Florida.

This final revised supplemental EA, incorporated herein by reference, evaluated various alternatives to achieve identified project objectives and constraints in the project area. A description of the preferred alternative is provided below:

- The planned deviation would allow the flexibility to make advanced releases east and west, larger than LORS 2008 Part D (recommends Lake Okeechobee releases to tide (estuaries)) calls for and make releases south when LORS Part C (recommends Lake Okeechobee releases to the Water Conservation Areas (WCAs)) does not recommend releases within the Beneficial Use Sub-band, Base Flow Sub-band, Low Sub-band, and the Intermediate Sub-band. These advanced releases, when risk of transporting harmful algal blooms (HABs) is low, would allow greater flexibility to reduce releases during times when HABs are present in the lake or estuaries. The cumulative volume of water released under the planned deviation would be tracked against the volume that would have been released under LORS 2008. The objective would be to change only the timing of releases and not the cumulative volume. The objective would be to reach a net zero balance such that the total volume released across the annual deviation time period (between 1 February and 1 December) is unchanged from the releases that would have taken place under the existing schedule.

- The proposed planned deviation intends to help mitigate risk associated with HABs by increasing operational flexibility. Because of the nature of the proposed planned deviation, the Corps may not take water management action immediately upon approval of the deviation. The operational strategy (Appendix A) in this final revised supplemental EA describes the conditions and the coordination necessary for water management action to be taken. Based on current conditions within Lake Okeechobee (as of June 9, 2020) it is unlikely that action will be taken immediately. Once action is taken, which will be communicated publicly at the beginning and throughout that year, the Corps will evaluate the performance of the strategy, identify outcomes, challenges, and conclusions in a memo to the South Atlantic Division Commander and may request changes to or an extension of the deviation based on that analysis. A subsequent extension may be applied for until LORS 2008 is replaced by a new water control plan (Lake Okeechobee System Operation Manual (LOSOM)) anticipated in 2022. The Corps may also terminate the deviation at any time. The Corps' operations under this deviation will be consistent with NEPA coverage. If conditions warrant operations outside of the NEPA analysis associated with this deviation, additional NEPA documentation will be prepared. The Corps agrees to maintain open and cooperative communication during the proposed planned deviation through the Lake Okeechobee periodic scientists calls (PSCs). A summary of findings from the memorandum would be provided at this forum.

This final revised supplemental EA has been prepared to address concerns received in response to release of the 2019 LORS Planned Deviation Draft EA and to supplement the LORS 2008 Final Supplemental Environmental Impact Statement (FSEIS). Modeling with the Lake Okeechobee Operations Screening Model (LOOPs) has since been conducted in support of this final revised supplemental EA (reference Appendix B) to further evaluate potential environmental effects of the proposed action regarding lake stages and water supply and to refine the operational strategy based on findings from the analysis. The no action alternative would continue current water management operations as defined in LORS 2008 and is fully described in the LORS 2008 FSEIS. In addition to the no action alternative, three action alternatives were evaluated to determine the preferred alternative (Alternative B). The action alternatives varied based on the allowable limit of advanced releases (cubic feet per second (cfs)) to the Caloosahatchee and St. Lucie estuaries at S-79 and S-80. Alternative C and Alternative D were eliminated from detailed evaluation. Alternative B was carried forward with the no action alternative through the environmental effects analysis in Section 4. Alternative B is expected to best meet the objectives and constraints identified in this final revised supplemental EA. Alternative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. A summary assessment of the potential effects of Alternative B are listed in Table 1.

Table 1: Summary of Potential Effects of the Preferred Alternative (Alternative B)

	Insignificant effects	Insignificant effects as a result of mitigation	Resource unaffected by action
Aesthetics	☒	☐	☐
Air quality	☐	☐	☒
Aquatic resources/wetlands	☒	☐	☐
Invasive species	☒	☐	☐
Fish and wildlife habitat	☒	☐	☐
Threatened/Endangered species/critical habitat	☒	☐	☐
Historic properties	☐	☐	☒
Other cultural resources	☐	☐	☒
Floodplains	☐	☐	☒
Hazardous, toxic & radioactive waste	☐	☐	☒
Hydrology	☒	☐	☐
Land use	☐	☐	☒
Navigation	☒	☐	☐
Noise levels	☐	☐	☒
Public infrastructure	☐	☐	☒
Socio-economics	☒	☐	☐
Environmental justice	☐	☐	☒
Soils	☒	☐	☐
Tribal trust resources	☐	☐	☒
Water quality	☒	☐	☐
Climate change	☐	☐	☒

All practicable and appropriate means to avoid or minimize adverse environmental effects were analyzed and incorporated into the preferred alternative. No compensatory mitigation is required as part of the proposed action.

The draft revised supplemental EA has been prepared and has been coordinated for public, state, and Federal agency review. All comments submitted during the public review period have been responded to in this final revised supplemental EA.

Pursuant to Section 7 of the Endangered Species Act of 1973, as amended, the Corps determined that the proposed action would have no effect on federally listed species and designated critical habitat under the purview of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). A Notice of Availability (NOA) regarding these effects determinations was e-mailed to each agency during the 30 day public review period for the draft revised supplemental EA.

No correspondence was received in response to the provided NOAs. The NMFS and the USFWS are not required to respond to the Corps' determination of no effect for federally listed species in the action area.

Pursuant to the Clean Water Act of 1972, as amended, the proposed action would not adversely affect water quality and is in compliance with the Clean Water Act.

A determination of consistency with the State of Florida Coastal Zone Management program pursuant to the Coastal Zone Management Act of 1972 is found in Appendix D of this final revised supplemental EA.The Corps has coordinated a consistency determination pursuant to the Coastal Zone Management Act of 1972 through the circulation of the draft revised supplemental EA. The Corps has determined that the proposed action is consistent to the maximum extent practicable with the enforceable policies of Florida's approved Coastal Zone Management Program. The Florida State Clearinghouse reviewed the 2019 LORS Planned Deviation Draft EA. In correspondence dated August 31, 2020, it was stated that based on the information submitted and minimal project impacts, the state had no objections to the subject project.

Pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, the Corps has determined that the proposed action has no potential to effect historic properties (36 C.F.R. Part 800.3(a)(1). The Florida State Historic Preservation Officer found the project likely to have no effect on historic property by correspondence dated August 19, 2020.

Technical and environmental criteria have been used in the formulation of alternative plans. All applicable laws, executive orders, regulations, and local government plans were considered in evaluation of alternatives. Based on this report, the reviews by other Federal, State and local agencies, Tribes, input of the public, and the review by my staff, it is my determination that the preferred plan would not cause significant adverse effects on the quality of the human environment; therefore, preparation of an Environmental Impact Statement is not required.

KELLY.ANDREW.DONALD.JR.1025510875

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8 Oct 2020
Date

Andrew D. Kelly, Jr.
Colonel, U.S. Army
District Commander

SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
2020 PLANNED DEVIATION TO THE WATER CONTROL PLAN FOR LAKE OKEECHOBEE AND EVERGLADES AGRICULTURAL AREA (LORS 2008)
GLADES, HENDRY, MARTIN, OKEECHOBEE, AND PALM BEACH COUNTIES

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1 PROJECT PURPOSE AND NEED

The following details the purpose and need of the proposed action.

1.1 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 Water Conservation Areas (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 309(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 provided authority for the Lake Okeechobee Regulation Schedule (LORS) study. The 2008 LORS and Final Supplemental Environmental Impact Statement (FSEIS) 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.

The Corps may consider water quality in its operations of the C&SF Project. Section 203 of the Flood Control Act of 1968, Public Law 90-483, approved House Document Numbered 369, 90th Congress, 2d Session, which modified the C&SF Project and explicitly states that water quality is an operational consideration. It states:

> Although the report does not make recommendations specifically for water quality control, the problems associated with water use are of particular concern and the maintenance of optimum and desirable water quality is a prime objective in the operation of the project. Engineering and operation methods to evaluate and minimize the concentration of pesticides, herbicides, and nutrients and their effects on fish and wildlife in the conservation areas, Lake Okeechobee, and in the Everglades National Park will be employed to the maximum practicable extent. Water-quality control is a vital function in proper water resource management and will be incorporated in operational procedures as may be dictated by results of continuing investigations in this area in cooperation with affected State and Federal agencies.

While the Corps does not have general authority to implement pollution control measures for the C&SF Project, it can incorporate operational methods to minimize nutrients and their effects on fish and wildlife to the maximum practicable extent.

1.2 Project Location

Lake Okeechobee is located in south central Florida, and occupies portions of Glades, Hendry, Martin, Okeechobee, and Palm Beach counties (**Figure 1-1**). 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 (EAA), in the northern WCAs, including WCA 3A north of I-75, WCA-2A, the Arthur R. Marshall Loxahatchee National Wildlife Refuge (WCA 1), and Lake Worth Lagoon.

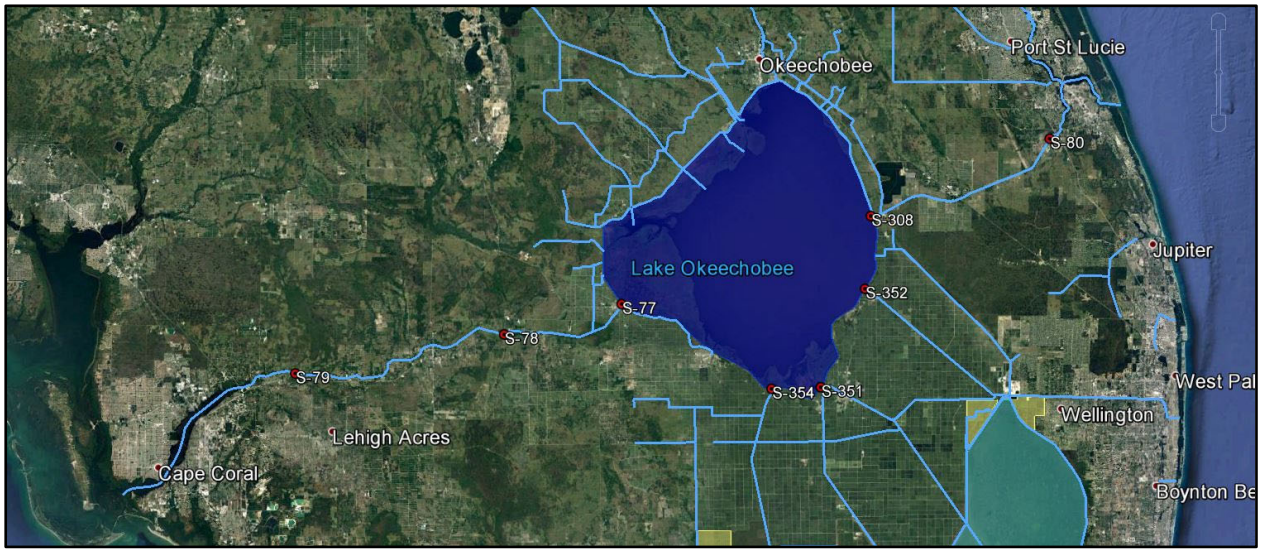

Figure 1-1. Location of Lake Okeechobee and Primary Affected Areas

1.3 Project Background

Operations within the project area are currently governed by the water control plan for Lake Okeechobee and the EAA (also known as LORS 2008). The agency goal established for LORS 2008 is to implement a regulation schedule that would ensure public health and safety while improving the health of Lake Okeechobee and the St. Lucie and Caloosahatchee estuaries, with minimal or no impact to the competing project (lake) purposes. LORS 2008 objectives consist of a) ensuring public health and safety; b) managing Lake Okeechobee at optimal levels to allow recovery of the lake's environment and natural resources; c) reducing high regulatory releases to the estuaries; and d) continuing to meet Congressionally authorized project purposes including flood control, water supply, navigation, fish and wildlife enhancement, and recreation.

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 includes 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.

The water management operational criteria described in LORS 2008 establishes the allowable quantity, timing, and duration of releases from Lake Okeechobee to the WCAs and to tide (estuaries). Water management decisions utilize LORS 2008 for guidance on releases from Lake Okeechobee. Information shown on LORS 2008 Part A and Part B is utilized to compare the Lake elevation and the corresponding band and sub-band, respectively, see **Figure 1-2** and **Figure 1-3**. Information shown on Part C and Part D helps establish the recommended releases to the WCAs and the recommended releases to tide (estuaries), respectively, see **Figure 1-4** and **Figure 1-5**. The high lake management band includes lake levels above 16 feet, National Geodetic Vertical Datum of 1929 (NGVD) in advance of the wet season, or levels above 17.25 feet, NGVD during the dry season. In this band, operations are focused on reducing the lake level and freeing up additional capacity for runoff from future heavy rain events. Maximum water releases typically take place in this band. The operational band consists of five sub-bands that help guide water managers to appropriate decisions that balance the needs of all users, while maintaining a lake level in the preferred range of 12.5 and 15.5 feet, NGVD. The operational band varies seasonally between elevations 10.5 feet, NGVD at its lowest point and 17.25 feet, NGVD at its highest point. The goal of the operational band is to manage the lake stage to balance all congressionally authorized project purposes. This involves use of flood control releases, environmental releases, base flow releases, and water supply releases.

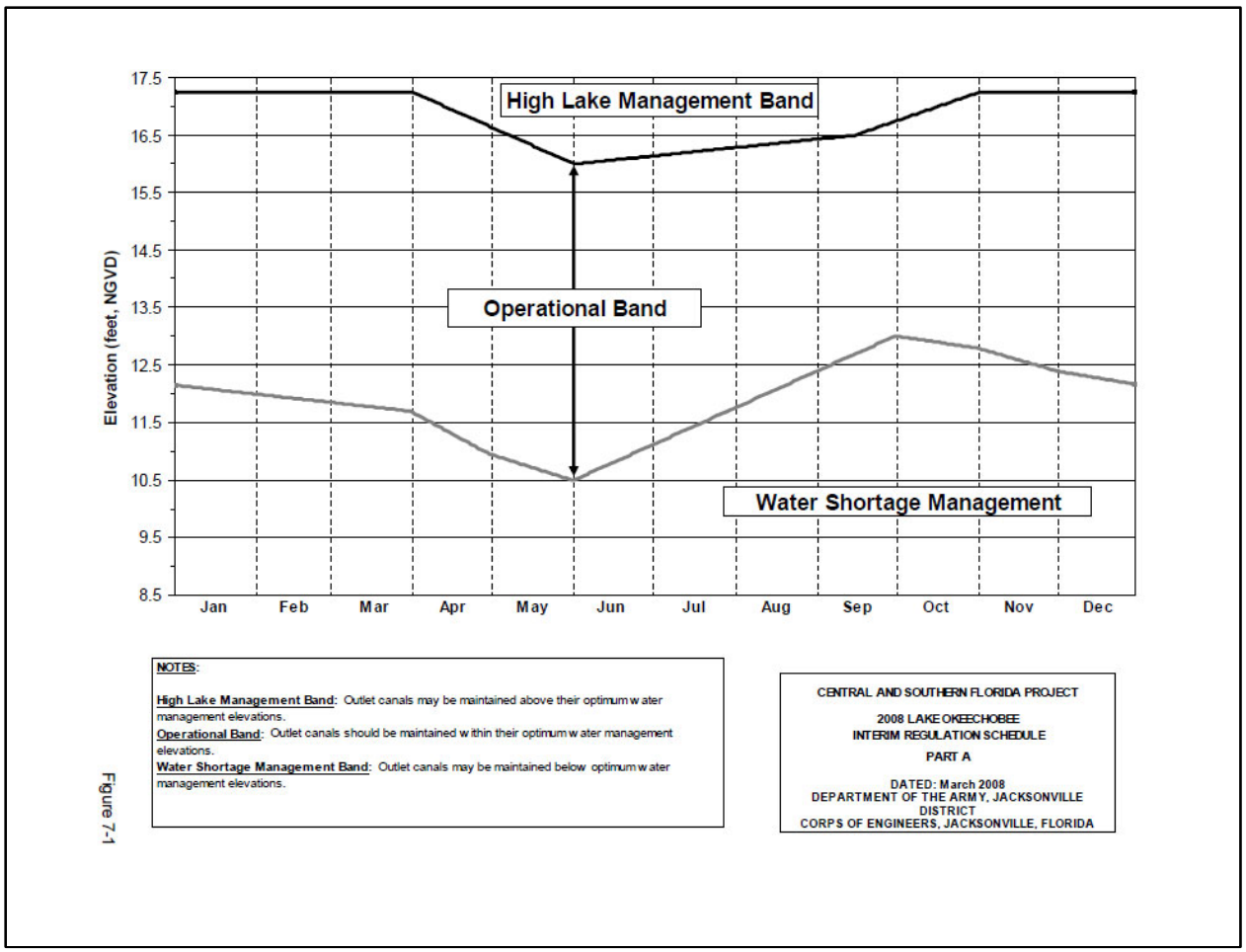

Figure 1-2. LORS 2008 Part A Defines Bands

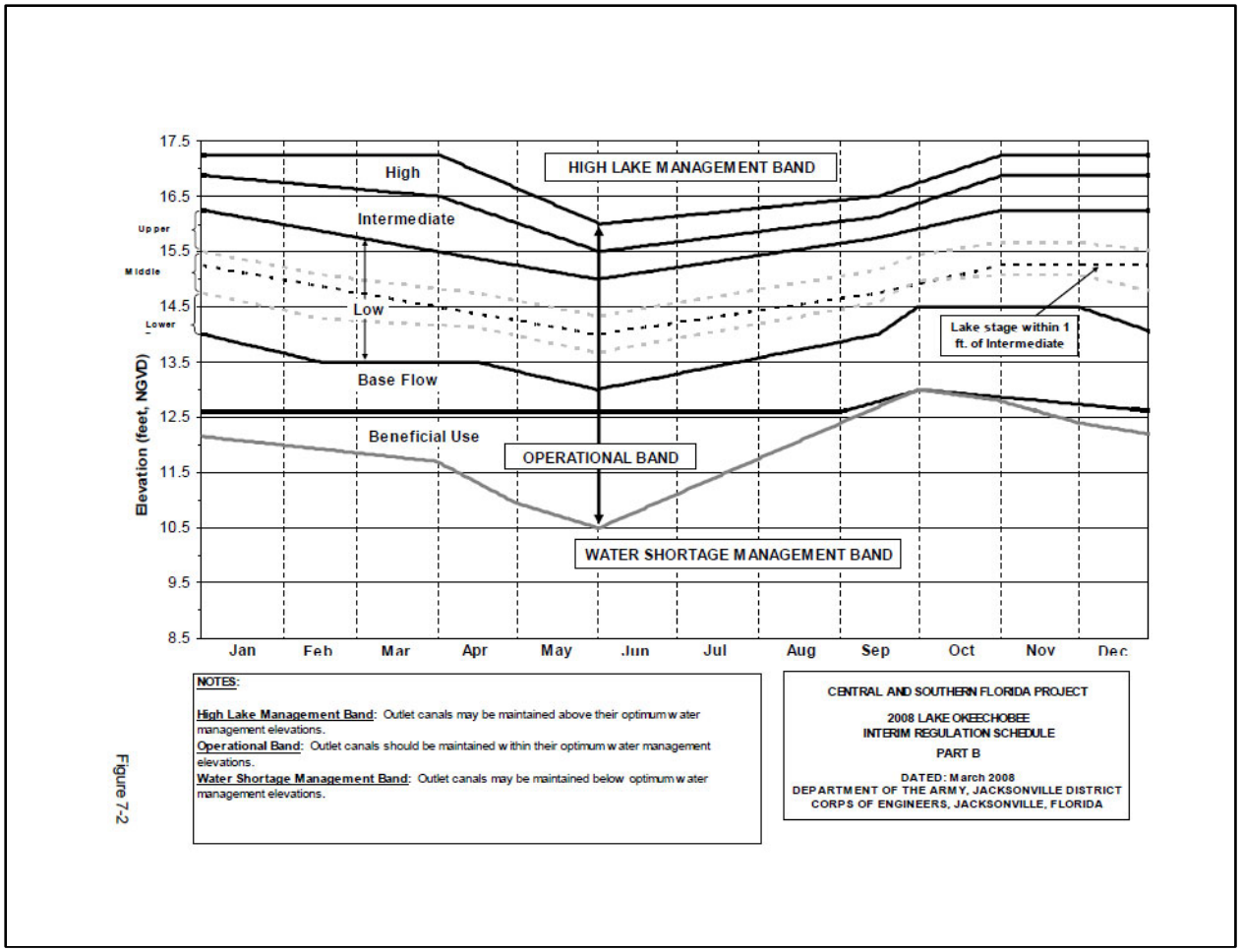

Figure 1-3. LORS 2008 Part B Defines Operational sub-bands

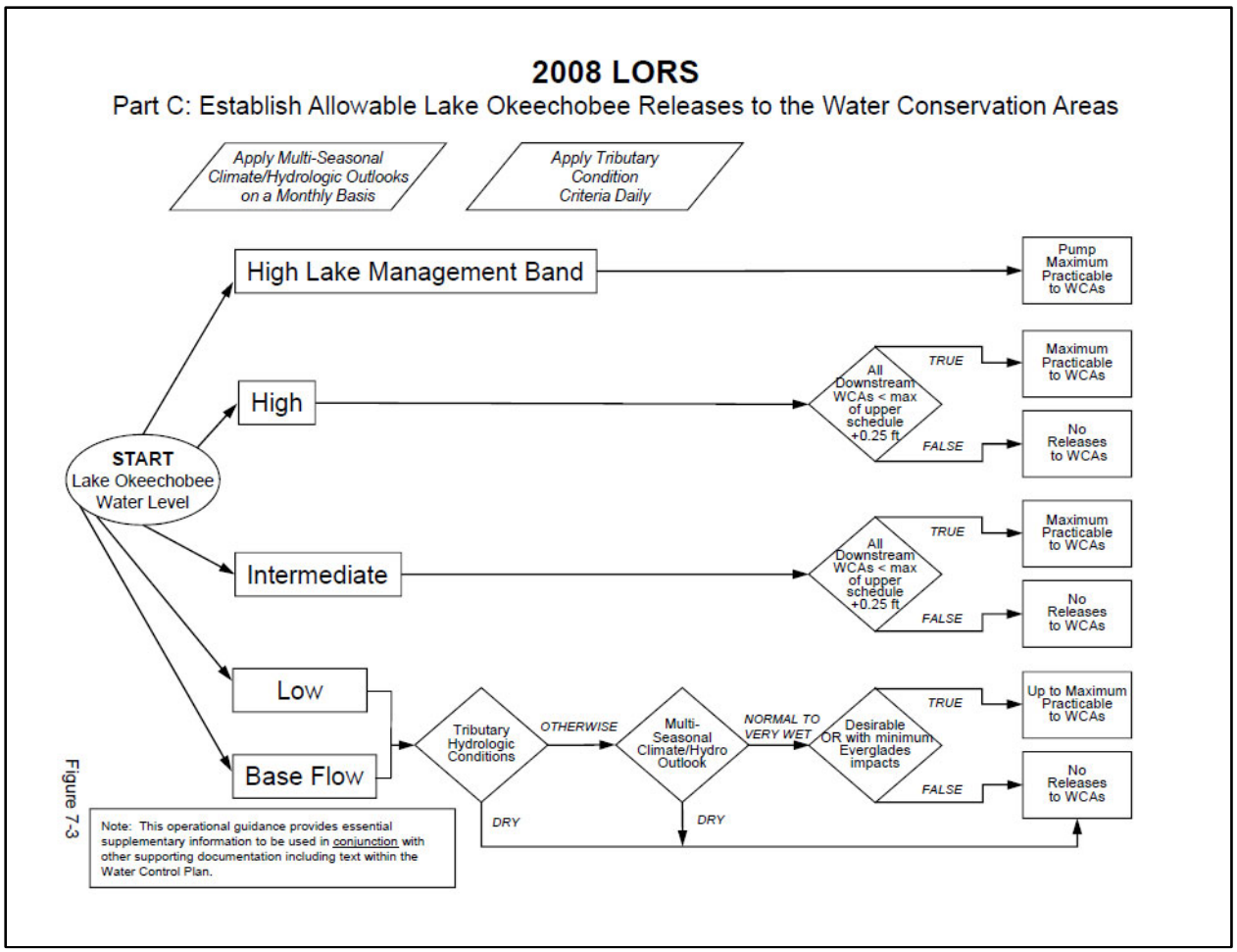

Figure 1-4. LORS 2008 Part C Release Guidance to WCAs

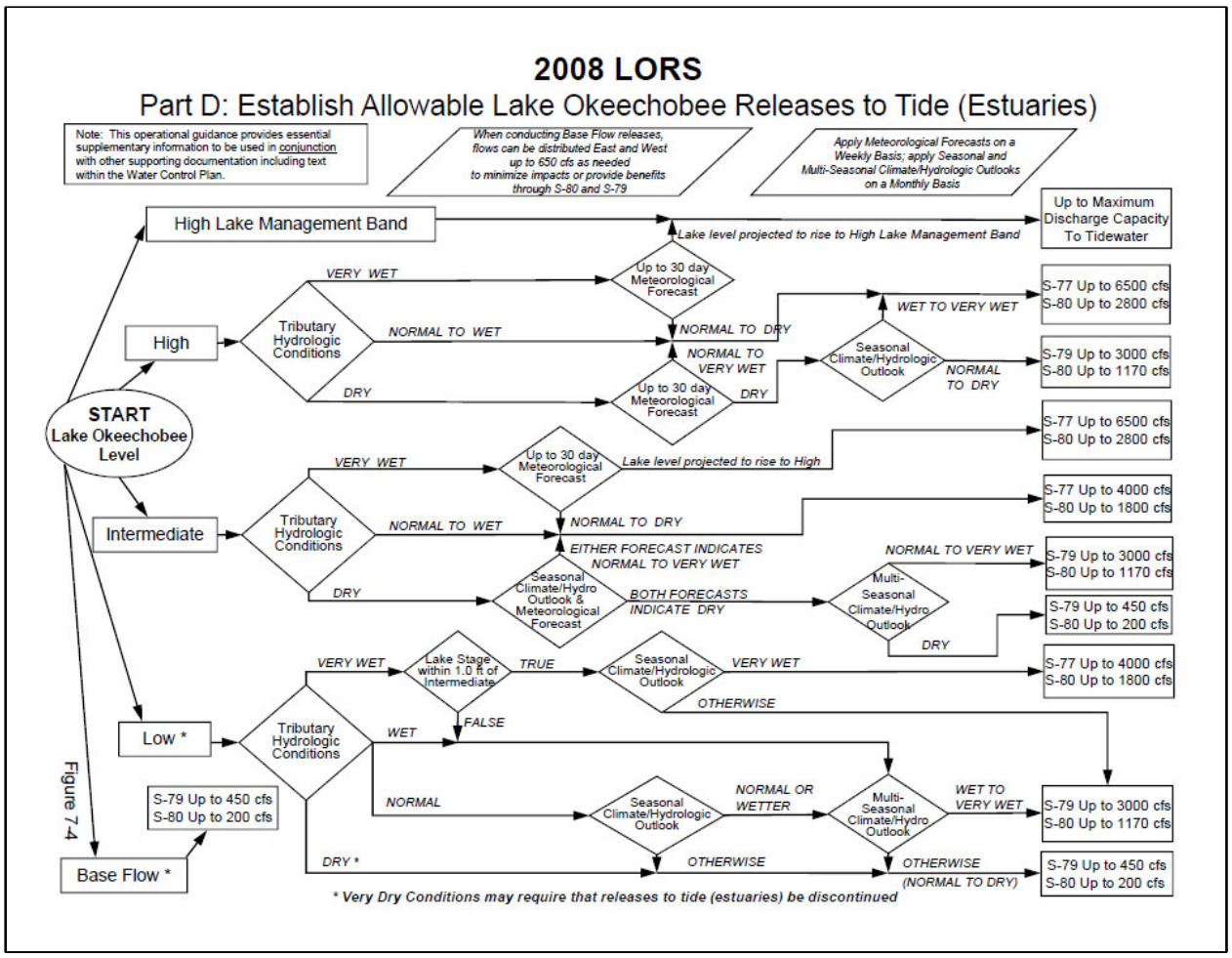

Figure 1-5. LORS 2008 Part D Release Guidance to Tide (Estuaries)

1.4 Project Need or Opportunity

The U.S. Army Corps of Engineers (Corps) is proposing to initiate a planned deviation from LORS 2008 in anticipation of and following freshwater harmful algal blooms (HABs) to reduce the risk of exacerbating potential health concerns associated with algal blooms in Lake Okeechobee, the St. Lucie, and Caloosahatchee estuaries while not impacting other project purposes. Potential health concerns associated with HABs could be increased by releasing water from Lake Okeechobee when HABs are occurring in the lake, by transferring blooms to the estuaries, or when HABs are occurring in the estuaries, by increasing nutrient loads and contributing to optimal salinity conditions for blooms to flourish. By reducing releases from Lake Okeechobee when HABs are occurring, there are also potential benefits to the ecological conditions in the estuaries and to the overall environment. As indicated in the LORS 2008 FSEIS, the Corps' highest concern for public health and safety is maintaining the integrity of the Herbert Hoover Dike (HHD); this deviation is necessary to manage risk of HABs while not increasing dam safety risk to HHD. This final revised supplemental EA has been prepared to address concerns received in response to release of the 2019 LORS Planned Deviation Draft (Environmental Assessment (EA) and proposed Finding of No Significant Impact (FONSI), and to supplement the LORS 2008 FSEIS. Modeling with the Lake Okeechobee Operations Screening Model (LOOPs) has since been conducted in support of this final revised supplemental EA and FONSI (**Appendix B**) to further evaluate potential environmental

effects of the proposed action regarding lake stages and water supply and to refine the operational strategy based on findings from the analysis. The purpose and need for this final revised supplemental EA remains consistent with the prior National Environmental Policy Act (NEPA) document. The proposed action would allow for greater flexibility with water management decisions when HABs are present or forecasted in Lake Okeechobee, the St. Lucie or Caloosahatchee estuaries or the system of canals that connect them. Estuaries are defined as any portion of the St. Lucie or Caloosahatchee Estuary which freshwater algal blooms can be observed. The St. Lucie Estuary is comprised of both North and South Forks which combine near the Roosevelt Bridge and then extends towards the Indian River Lagoon and the Atlantic Ocean. During periods of high freshwater inflows into the estuary the freshwater boundary can extend into the ocean and would be included in the definition of estuary here. The Caloosahatchee Estuary begins at the Franklin Lock and Dam and extends out to include lower Charlotte Harbor Basin at San Carlos Bay.

Generally, the proliferation of algae provides the energy source to fuel food webs, so most algae are not harmful even when they form "blooms" that are sometimes seen in coastal, estuarine, and inland waters. Some blooms are harmful to lake and estuarine ecology because they can lead to depleted dissolved oxygen in the water and cause fish kills. However, a small percentage of algae produce toxins, and when those types of algae form blooms occur, they are included in a category of algal blooms termed HABs. The algae causing HABs can either be protists, bacteria or simple plants that live in water, and under some circumstances produce toxins that can have harmful effects on people, fish, shellfish, marine mammals and birds. Cyanobacteria (*Cyanophyceae* or blue-green algae) and dinoflagellates (*Dinophyceae*) have traditionally been associated with HABs. Although they can occur at any time, HABs are most common in Florida during the summer and early fall. An algal bloom does not need to contain toxins to be considered an HAB. However, in Florida, the public generally considers an HAB to contain or potentially contain toxins. Very dense algal blooms without toxins can cause negative impacts to corals, fish, submerged aquatic vegetation and invertebrates. Still other algal blooms, with or without toxins, can discolor water, form huge smelly piles on beaches or contaminate drinking water. Algal bloom proliferation is triggered by multiple factors, including but not limited to, light, temperature, nutrients, and hydrology including stagnant low water with low wind conditions. In general, there are a number of physical, chemical, and biotic factors that influence formation of HABs, however no single factor has been identified as a root cause for freshwater HAB events. The primary concern with Lake Okeechobee, including the St. Lucie and Caloosahatchee estuaries, has been cyanobacteria (also commonly called blue green algae), which can but don't always produce a toxin called microcystin. Microcystin is the primary toxin of concern in Lake Okeechobee, but other toxins may be present. Little is known about exactly what environmental conditions trigger toxin production. Over time, these toxins are diluted and eventually break down and disappear. Breakdown of microcystin, the toxin produced by the cyanobacteria *Microcystis aeruginosa*, is fairly rapid while in the water column with significant breakdown within 14 to 21 days. Microsystin encased in sediments has a much longer half-life.

It should be noted that high stages in Lake Okeechobee maintained over an extended duration is linked to increased algal bloom activity in Lake Okeechobee. Maintaining the lake within the ecological stage envelope helps to promote submerged aquatic vegetation (SAV) which dampens water movement and competes for nutrients with the algae. Additionally maintaining the lake at lower stages or reducing the duration of high stage conditions during peak algal bloom months also reduces the potential for the algal blooms that initiate in the littoral zone which then seed blooms in the pelagic zone. This is due to the bathymetry of the lake subsurface as at higher stages the ridges within the lake separating the littoral zone from the pelagic zone are submerged. The ridge submergence provides better hydrologic connection between the littoral zone and the pelagic zone. Significant algal blooms are primarily linked

to blooms initiated in the nearshore zones which under high lake conditions are more easily transferred to the pelagic zone. Once the bloom mass initiated in the nearshore zone and is circulated to the pelagic zone, there is a higher potential for a large scale bloom within Lake Okeechobee.

Red tides are HABs that occur when microscopic algae in seawater proliferate to higher-than-normal concentrations. The dinoflagellate, *Karenia brevis*, is the most common red tide organism that is responsible for the red tide outbreaks along the southwest coast of Florida. The marine mammal mortalities in Florida have been linked to the toxins produced by the saltwater species, *Karenia brevis*. Red tide occurrences are most common off the central and southwestern coast of Florida between Clearwater and Sanibel Island, but may occur anywhere in the Gulf of Mexico and along the Atlantic coast. Red tide HAB events have been determined to be strongly linked to ocean current patterns (Weisberg et al., 2019; Tester et al., 1997). There have been no marine mammal mortalities linked to the freshwater toxins normally found in Florida.

Retaining water in Lake Okeechobee or releasing water from Lake Okeechobee has no known short term impact to HAB conditions in Lake Okeechobee. However, maintaining high stages in Lake Okeechobee over significant durations is linked with increased algal bloom risk within the lake and is to be avoided if possible. Delaying releases, making pulse releases or making releases during non-peak HAB season, may reduce HAB conditions in the estuaries. The Corps does not have influence over the main factors (sunlight, nutrient loads, wind conditions, temperature and still/stagnant/stratified water conditions) controlling bloom conditions within Lake Okeechobee. The water releases the Corps is able to make from the federally managed structures in the short term and governed by LORS 2008 are small relative to the volume/extent of Lake Okeechobee and are not able to disrupt stratification conditions in Lake Okeechobee except in close proximity to the structures. There may be some value in the pattern of releases from Lake Okeechobee to the stratification of water near the Lake Okeechobee release structures. Having additional flexibility would allow the Corps to better explore potential mitigation of localized algal bloom conditions near those structures.

Nutrient loading to the estuaries on the east coast and west coast from Lake Okeechobee is overshadowed by local runoff in most all conditions, but increased nutrient loading can be a factor in favoring freshwater bloom conditions in the estuaries. The 2020 South Florida Environment Report (SFWMD, 2020) provides analysis of water quality data from 2015-2019 indicating that Lake Okeechobee water releases represented 25% of total phosphorus and 38% of total nitrogen loads to the St. Lucie Estuary and 31% of total phosphorus and 41% of total nitrogen loads to the Caloosahatchee River estuary. Additionally it should be noted that high steady discharges from Lake Okeechobee (similar to 2016 conditions) can increase the freshwater zone in the estuaries where the Lake Okeechobee freshwater blue greens can survive, and that type of discharge can increase stratification (enhances bloom conditions for Lake Okeechobee blue greens), reduces tidal flushing (tidal flushing disrupts freshwater HAB by circulation and increased salinity levels) and tends to create stagnant water conditions (favors blooms) in some areas. Making Lake Okeechobee releases before peak algal bloom months can help reduce the need to make high steady releases during peak algal bloom months (reducing HAB risk for the reasons described above).

The proposed planned deviation incorporates operational methods to minimize nutrients and their effects on fish and wildlife to the maximum practicable extent. The proposed planned deviation intends to help mitigate risk associated with HABs by increasing operational flexibility. In general, Lake Okeechobee freshwater releases can lower salinities in the estuaries which provide a larger habitat area for the fresh water algal blooms and contribute additional nutrients that promote blue green algae blooms in the estuaries. Lake Okeechobee water releases can also transmit blue green algae from Lake Okeechobee to

the estuaries. Delaying the release of algal bloom material from Lake Okeechobee until it dissipates, is one approach to reduce HAB risk to the estuaries. The proposed planned deviation intends to take action to hold back releases (if advanced releases were made prior during the spring or early wet season) if there is a HAB within Lake Okeechobee or either estuary.

The proposed planned deviation is not focused on red tides. There is no clear evidence that Lake Okeechobee water releases contribute to red tide events (Garrett et al. 2013, Mote 2019, Weisberg et al. 2019), which is a saltwater HAB that often originates offshore in the ocean. Lake Okeechobee water releases are one of many sources of nutrients that feed coastal waters and potentially red tides (Garrett et al. 2013, Heil et al. 2014). Additional sources from ground water, other tributaries that feed the coast and offshore sources, further reduce the total percentage that Lake Okeechobee water releases could contribute to the longevity of coastal red tide events.

The Florida Department of Health (DOH) determines if a harmful algal bloom presents a risk to human health. The FDOH issues health advisories for recreational waters where there is a risk of the public coming into contact with an existing algal bloom as it deems appropriate. The Florida Department of Environmental Protection (FDEP) coordinates with the water management districts, such as the South Florida Water Management District (SFWMD), and the Florida Fish and Wildlife Conservation Commission (FWC) to routinely sample observed and reported algal blooms and test for algal identification and toxicity. The Corps coordinates with the FDOH, the FDEP, the FWC, and others on occurrence, sampling, and results within the C&SF project.

HABs have occurred in the past with blooms in the 1980s leading to the surface water improvement and management program (SFWMD 1989) and basin management action plans led by FDEP to reduce nutrients into Lake Okeechobee and the estuaries. However, the frequency and intensity of HABs may be increasing. HABs containing toxins have recently occurred on Lake Okeechobee and in the downstream estuaries twice (2016 and 2018). The 2018 HAB covered over 80% of the Lake Okeechobee surface area and occurred in the Caloosahatchee and St. Lucie estuaries. Reference **Figure 1-6**. The algae crisis has caused substantial and widespread economic impacts to Florida communities over the last several years resulting in state declared emergencies in multiple counties[1]. On July 9, 2018, Governor Rick Scott issued an Emergency Order (Executive Order 18-191) in Glades, Hendry, Lee, Martin, Okeechobee, Palm Beach and St. Lucie counties to help combat HABs. This emergency declaration allowed the FDEP and the SFWMD to waive various regulations to store water in additional areas south of Lake Okeechobee, to help alleviate releases to the Northern Estuaries. The State of Florida has also deployed two emergency task forces (Blue Green Algae Task Force and Florida Harmful Algal Bloom Task Force) to address algal blooms and has invested significant resources to develop and implement solutions to the algae crisis. The HABs that have occurred on Lake Okeechobee and in the downstream estuaries have not only impacted the surrounding communities that are dependent on tourism, but have also posed risk to health and human safety. HABs have led to the issuance of health advisories by the FDOH, closure of recreational areas, and significant economic losses in adjacent communities.

The FDEP provides updates on current algal bloom conditions and information about how the state is responding to protect human health, water quality and the environment by placing sampling results,

[1] https://www.floridadisaster.org/news-media/news/20180709-gov.-scott-issues-emergency-order-to-combat-algal-blooms-in-south-florida/

monitoring and testing information and latest actions by the FDEP, the water management districts and other local, state and federal response team partners on their website for algal blooms. As of early May 2020, the National Oceanic and Atmospheric Administration (NOAA) is reporting a moderate bloom potential over Lake Okeechobee. As conditions get warmer, inflows into the lake increase (bringing additional nutrients) as the wet season begins, and wind subsides, bloom potential and conditions can change rapidly. Reference https://floridadep.gov/AlgalBloomWeeklyUpdate. **Figure 1-7** illustrates the potential for blue green algae blooms on Lake Okeechobee from early January through current conditions. A color map is shown to illustrate the estimated bloom potential. Satellite imagery suggests cyanobacteria bloom potential continues to increase.

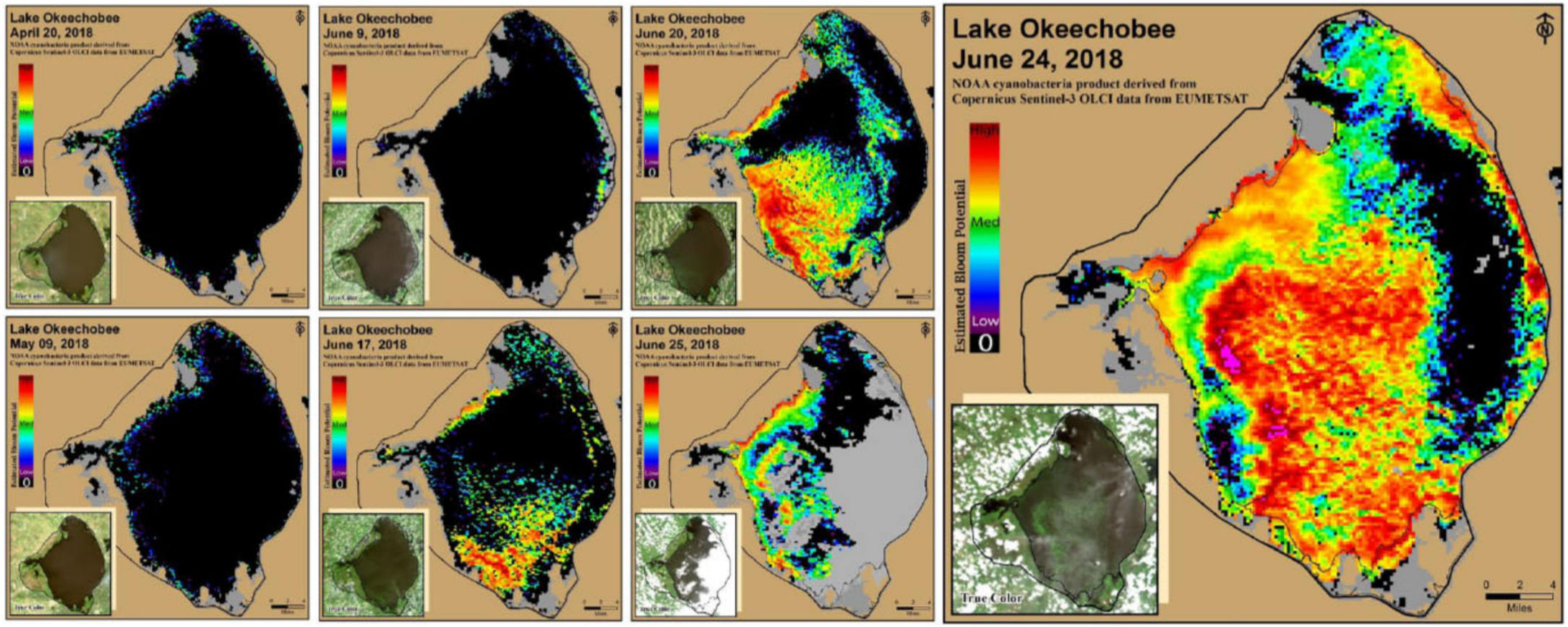

Figure 1-6. Lake Okeechobee Cyanobacteria Bloom Potential in 2018.

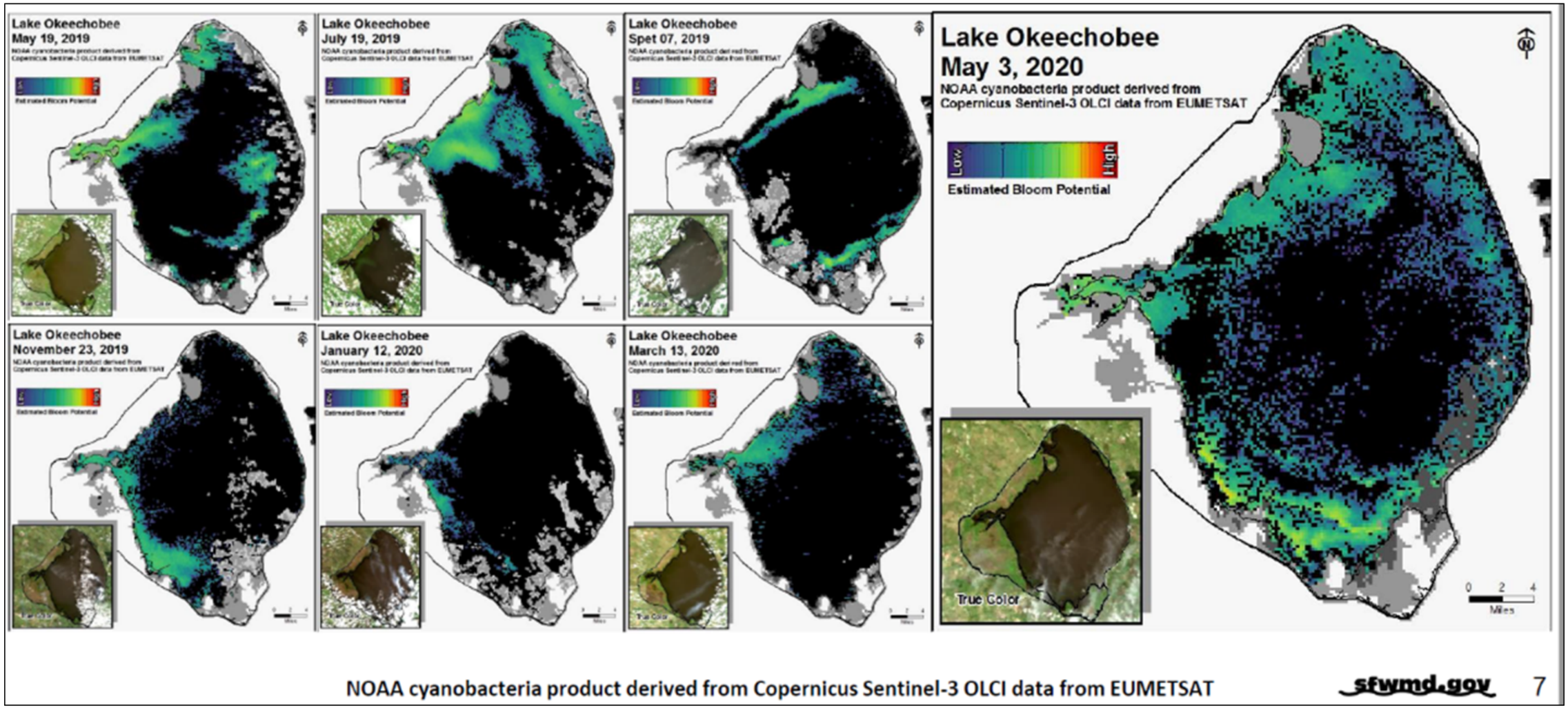

Figure 1-7. Lake Okeechobee Cyanobacteria Bloom Potential in 2020

Currently, under LORS 2008, the Corps has the flexibility to do less than the full release guidance at any time and also has a provision for making up those releases later if it is beneficial (LORS 2008 make-up releases are limited to a pulse release from Lake Okeechobee not to exceed 2,800 cfs measured at S-79, and 2,000 cfs measured at the St. Lucie Estuary). Due to unprecedented construction on Herbert Hoover Dike (HHD) to repair the vulnerable high hazard dam, the holding back of releases when LORS 2008 indicates they should be made, is a decision which the Corps has to closely evaluate based on the unique conditions at the time. Releases made in advance will give the Corps much more flexibility to consider holding back releases during a HAB event.

The proposed action will enhance the ability of the Corps to respond to HABs within its authority. The goal is to reduce the risk of exacerbating potential health concerns associated with algal blooms in Lake Okeechobee, the St. Lucie, and Caloosahatchee estuaries. Preemptive releases would create storage within Lake Okeechobee, such that the Corps can hold back releases should HABs occur and pose the associated risk of release of additional nutrients to downstream estuaries. In other words, the planned deviation will allow the Corps to alter the timing and volume of Lake Okeechobee releases to the WCAs, east, and/or west to allow for greater flexibility with water management decisions when HABs are present or forecasted in Lake Okeechobee, the St. Lucie or Caloosahatchee estuaries or the system of canals that connect them.

The planned deviation would allow the flexibility to make advanced releases east and west, larger than LORS 2008 Part D (recommends Lake Okeechobee releases to tide (estuaries)) calls for and make releases south when LORS Part C (recommends Lake Okeechobee releases to the Water Conservation Areas (WCAs)) does not recommend releases within the Beneficial Use Sub-band, Base Flow Sub-band, Low Sub-band, and the Intermediate Sub-band. These advanced releases, when risk of transporting HABs is low, would allow greater flexibility to reduce releases during times when HABs are present in the lake or estuaries. The cumulative volume of water released under the planned deviation would be tracked against the volume that would have been released under LORS 2008. The objective would be to change only the timing of releases and not the cumulative volume. The objective would be to reach a net zero balance such that the total volume released across the annual deviation time period (between 1 February and 1 December) is unchanged from the releases that would have taken place under the existing schedule.

The proposed planned deviation intends to help mitigate risk associated with HABs by increasing operational flexibility. Because of the nature of the proposed planned deviation, the Corps may not take water management action immediately upon approval of the deviation. The operational strategy (**Appendix A**) in this final revised supplemental EA describes the conditions and the coordination necessary for water management action to be taken. Based on current conditions within Lake Okeechobee (as of June 9, 2020) it is unlikely that action will be taken immediately. Once action is taken, which will be communicated publicly at the beginning and throughout that year, the Corps will evaluate the performance of the strategy, identify outcomes, challenges, and conclusions in a memo to the South Atlantic Division Commander and may request changes to or an extension of the deviation based on that analysis. A subsequent extension may be applied for until LORS 2008 is replaced by a new water control plan (Lake Okeechobee System Operation Manual (LOSOM)) anticipated in 2022. The Corps may also terminate the deviation at any time. The Corps' operations under this deviation will be consistent with NEPA coverage. If conditions warrant operations outside of the NEPA analysis associated with this deviation, additional NEPA documentation will be prepared The Corps agrees to maintain open and cooperative communication during the proposed planned deviation through the Lake Okeechobee

periodic scientists calls (PSCs). A summary of findings from the memorandum would be provided at this forum.

Implementation of the proposed action would be consistent with conditions outlined in the operational strategy (**Appendix A**).

1.5 Agency Goals and Objectives

The goal of the proposed planned deviation remains consistent with that identified in the LORS 2008 FSEIS.

Objectives in the 2008 LORS FSEIS were listed as follows:

- Objective a. Ensure public health and safety;
- Objective b. Manage Lake Okeechobee at optimal lake levels to allow recovery of the lake's environment and natural resources;
- Objective c. Reduce high regulatory releases to the estuaries;
- Objective d. Continue to meet congressionally authorized project purposes including, flood control, water supply, navigation, fish and wildlife enhancement, and recreation.

The proposed planned deviation would allow for greater flexibility with water management decisions while balancing congressionally authorized project purposes.

1.6 Related Environmental Documents

The Corps has documented a number of environmental documents relevant to the proposed action. Information contained within the documents listed below is incorporated by reference into this final revised supplemental EA. This EA supplements the NEPA analyses conducted in the 2008 LORS FSEIS and the 2019 LORS Planned Deviation Draft EA.

- Lake Okeechobee Regulation Schedule Study Final Supplemental Environmental Impact Statement and Record of Decision, U.S. Army Corps of Engineers, Jacksonville District, 2008
- Planned Deviation to the Water Control Plan for Lake Okeechobee and Everglades Agricultural Area (LORS 2008) Environmental Assessment and Proposed Finding of No Significant Impact, U.S. Army Corps of Engineers, Jacksonville District, August 2019
- Planned Deviation to the Water Control Plan for Lake Okeechobee and Everglades Agricultural Area (LORS 2008) Supplemental Environmental Assessment and Proposed Finding of No Significant Impact, U.S. Army Corps of Engineers, Jacksonville District, July 2020

1.7 Decisions to be Made

The no action alternative and other reasonable alternatives were studied in detail to determine the preferred alternative. The draft revised supplemental EA determined whether a FONSI or an EIS (EIS) was warranted based on consideration of comments received during public review of the draft revised supplemental EA. The primary decision to be made is whether or not to adopt the preferred alternative (Alternative B (ALTB)) and implement a planned deviation to LORS 2008 as described in **Appendix A** to provide more water management flexibility to address HAB risk to the estuaries. Reference **Section 2** for additional information on alternatives considered and a description of the preferred alternative

1.8 Scoping and Issues

A NEPA scoping letter was not solicited for the draft revised supplemental EA. A Notice of Availability (NOA) for the 2019 LORS Planned Deviation Draft EA was mailed to interested stakeholders to begin a 15 day review period on August 6, 2019. The review period was extended to September 20, 2019, after which the Corps pursued hydrologic modeling to further evaluate potential environmental effects of the proposed action regarding lake stages and water supply and to refine the operational strategy based on findings from the analysis. **Appendix C.1** contains pertinent correspondence related to the 2019 LORS Planned Deviation Draft EA, including a comment response matrix (**Table C.1-1**) to address public review of the EA. Comments received from public review of the 2019 LORS Planned Deviation Draft EA have been considered in developing this revised supplemental EA. **Appendix C.1** also contains pertinent correspondence related to release of the draft revised supplemental EA, including a comment response matrix (**Table C.1-2**) to address comments received from public review.

1.9 Permits, Licenses and Entitlements

The Corps has coordinated a consistency determination pursuant to the Coastal Zone Management Act (CZMA) through the circulation of the draft revised supplemental EA. The Corps has determined that the proposed action is consistent to the maximum extent practicable with the enforceable policies of the Florida Coastal Zone Management Program (CZMP). In correspondence dated August 31, 2020, the Florida State Clearinghouse stated that based on the information submitted and minimal project impacts, the state had no objections to the subject project.

2 ALTERNATIVES

The following provides a description of the no action alternative, and action alternatives to initiate a planned deviation to LORS 2008. Each of the following alternatives described below are consistent with those presented in the 2019 LORS Planned Deviation Draft EA. The action alternatives varied based on the allowable limit of advanced releases (cfs) to the Caloosahatchee and St. Lucie estuaries at S-79 and S-80. Alternative B has been amended from the 2019 LORS Planned Deviation Draft EA by establishing the concept of a credit limit for each year that the planned deviation would be implemented based on projected forecasts for that year, to address concerns related to below average dry conditions (i.e. low lake levels) following advanced releases. Modeling with the LOOPs has been conducted in support of this final revised supplemental EA as described in **Section 4** to further evaluate potential environmental effects of Alternative B. Reference **Appendix B** for a complete description of the modeling conducted for Alternative B.

2.1 Alternative Descriptions

Alternative A (No Action Alternative): The no action alternative would continue current water management operations as defined in LORS 2008. The no action alternative is fully described in the 2008 LORS and FSEIS.

Alternative B (HAB Operational Strategy): LORS 2008 applies with the following modifications. Alternative B would allow the flexibility to make slightly larger releases east and west than LORS 2008 Part D calls for and make releases south when LORS Part C does not recommend releases within the Beneficial Use Sub-band, Base Flow Sub-band, Low Sub-band, and the Intermediate Sub-band to provide increased flexibility to hold back releases during a HAB. Reference **Appendix A** for a complete description of Alternative B.

Changes to LORS 2008 to include operations for HABs can be summarized as follows:

- Under Alternative B, releases could be made in advance of HAB events, and would be limited to 2,000 cfs measured at S-79 and up to 730 cfs measured at S-80, and would only be applicable when LORS Part D (Figure 1-5) recommends up to 450 cfs measured at S-79 and up to 200 cfs as measured at S-80 (this release guidance can occur within the Intermediate, Low, or Baseflow Sub-bands) or when Part D does not specifically recommend releases (Beneficial Use Sub-band). Releases within the Beneficial Use Sub-band would be cut back if lake levels fell within 0.25 feet of the Water Shortage Management (WSM) Band (indicated by the dashed line in **Figure 2-1** in order to reduce the risk of falling into this band. When lake stages are below 12 feet, NGVD, releases would only be made if the lake was rising rapidly (greater than 0.15 feet per week on average) to attenuate the rate of rise. Releases would not be made if stages were declining and below 12 feet, NGVD or if recession rates were above 0.5 feet per month. Advanced release zones help define when, and at what lake levels advanced releases might be made (indicated by the colored zones in **Figure 2-1**). There is the "Green Zone" where advanced releases could be made up to 2,000/730 cfs at S-79/S-80; the "Orange Zone" where advanced releases could be made up to 1,000/400 cfs at S-79/S-80, and the "Purple Zone" where advanced releases would not be made and normal LORS 2008 operations would occur. These zones were informed by the modeling analysis, specifically Table 1 within **Appendix B**. Releases could be reduced or held back at any point in the schedule if HAB conditions are present. **Figure 2-1** also shows the point on 1 December where the net zero release target is, which means that by that time it is intended that the water bank account will be at zero (any advanced releases were made up by holding back

releases). These advanced release zones only apply when LORS Part D recommends releases of 650 cfs (450/200 at S-79/S-80), as shown by the red boxes in **Figure 1-5**. The tops of these zones could be raised or lowered based on the antecedent conditions by up to 0.5 feet (bottoms of zones would remain the same as shown in the figure). Conditions could include but are not limited to El Niño forecasts, above/below normal precipitation forecasts, drought or floods during previous year, water supply conditions, ecological conditions within Lake Okeechobee, etc. During the spring (beginning February 1) the decision to begin advanced releases would be made based on the considerations listed in **Appendix A** which include, but are not limited to, coordination with stakeholders and partner agencies, lake stage, timing, precipitation forecasts, tropical forecasts, seasonal outlooks, El Niño /Southern Oscillation (ENSO) forecasts, etc.. Advanced releases can be made up to 2,000/730 cfs at S-79/S-80, but releases lower than that could also be made depending on conditions.

- Alternative B would allow the flexibility to make up to maximum practicable releases south to the WCAs when LORS Part C guidance (**Figure 1-4**) does not recommend release. Maximum practicable relates to the capacity in the Miami River, North New River, and Hillsborough canals to deliver water south while still providing the authorized flood control and the capacity in the state of Florida STAs to meet downstream water quality standards. Releases made south would be done for HAB operations only when in the Beneficial Use Sub-band, Base Flow Sub-band, and Low Sub-bands and only if all WCAs were less than 0.25 feet above the max of the upper schedule (same conditions as LORS Part C guidance for High and Intermediate Sub-bands). If releases south would cause any of the WCAs to rise more rapidly than is preferable, create or exacerbate high-water conditions, then releases may not be sent south from the lake. Hydrologic, ecological, and water supply conditions within the WCAs would be taken into account before sending water south, consistent with how releases south from Lake Okeechobee are managed under LORS 2008. No impacts to the WCAs are anticipated for HAB operations.

<u>These operations would only be utilized if conditions were met for HAB operations. Any one of the conditions below could warrant the use of HAB operations:</u>

- If a HAB is currently in Lake Okeechobee, C-43, or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If the state of Florida declares a state of emergency due to HABs on Lake Okeechobee, C-43 or, C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If a HAB is anticipated to occur on Lake Okeechobee, C-43 or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If a HAB has occurred and caused h impacts to public safety or the environment during the last 12 months within Lake Okeechobee, C-43 or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.

The Corps will consult with partners on the latest science and tools predicting potential and/or indicating actual HAB presence on the Lake and Estuaries. Current tools available include NOAA's remote sensing assessment of HAB potential on the lake and estuaries as well as monitoring of HAB occurrence by the SFWMD and the FDEP.

Once the Corps determines that releases should be made south from the lake, the quantity and exact timing of those releases are determined by the SFWMD. They determine what maximum practicable

flows at any given time are for that operation which includes the conveyance capacity of the EAA canals as well as the storage and treatment capacity of the STAs. If it is determined that no releases south can be made due to treatment capacity, then flows would not be made.

Water Bank for HAB Operations:

Releases made above or under LORS guidance would be tracked for an annual deviation time period (between 1 February and 1 December). This time period was chosen to correspond with the beginning of the endangered Everglades snail kite nesting period, for which Lake Okeechobee is considered critical habitat. The intent is that action would not be taken prior to the nest initiation time period, such that conditions would be consistent with LORS 2008 conditions. Once any advanced releases are begun, recession rate constraints are applied such that any active nests would not be affected by the deviation releases. The volume of releases that are called for under LORS 2008 but are not made (releases made under the LORS Part D guidance as seen in **Figure 1-5**) would be banked as a "deposit" and have a positive volume. Releases made that exceed those called for under LORS Part D guidance would be banked as a "withdrawal" or "loan" and have a negative volume. Values would be summed for a total bank amount which can be either positive or negative at any time during the HAB tracking period. The goal will always be to get to a zero balance by 1December. When the bank has a surplus (+) sum at any time, then more releases would be planned for later in the annual tracking period. When the bank has a deficit (-) at any time, it means releases could be held back during HAB conditions. Conditions which may impact the zero sum could be, but not limited to, a large rainfall or tropical event, drought, La Niña or El Niño, or environmental concerns. Tracking and banking these releases is intended to maintain all project purposes of Lake Okeechobee to the same levels as LORS 2008. Actual releases made would be based on the targeted weekly averages at the associated structure (S-79 and S-80) so the time step would be based on the release decision (often weekly but could vary). By 1 December, if in the unlikely chance that a balance is still present in the water bank, this will be taken into consideration when evaluating when/if advanced releases are made the following year, as well as the guidelines for potential advanced releases.

Each year a "credit limit" would be established when the advanced releases are initiated based upon conditions and forecasts in order to set some guidelines for operations that year. This credit limit would limit the total volume of advanced releases made in the spring/early summer before defaulting back to LORS 2008. This limit aims to find a balance between releasing enough to hold back in summer with not releasing too much so as to impact water supply if drier than expected conditions occur later on. A specific amount is not prescribed in the operational strategy, and the limit should be based on conditions in the spring of that year.

Releases south are made for multiple reasons to include regulatory releases from Lake Okeechobee, as well as water supply (for agricultural, municipal, and industrial uses as well as to prevent saltwater intrusion along the east coast of Florida). Under LORS 2008 when Part C does not call for lake releases to be sent south, the water for water supply may still be sent as required. Only lake water sent south to the STAs/WCAs as part of HAB operations would be tracked and banked. It is not anticipated that releases south would be held back during HAB operations, as there is minimal risks associated with sending water south when blooms are occurring or forecasted. Releases made south when Part C does not call for them would be banked as negative volumes.

The water bank would be in one bank account for all HAB operations where releases are made or held back. Releases may be done east, west, or south depending on where releases could be beneficial or have minimal impacts. Needs may include, but are not limited to, environmental releases to maintain salinities

within the estuaries or to hydrate the WCAs during important nesting periods. The balance of the water bank would be reported periodically in the Lake Okeechobee Periodic Scientists Call and summarized after the initial tracking period (1 February to 1 December) of this deviation being in place. Reference **Table 1** in **Appendix A.**

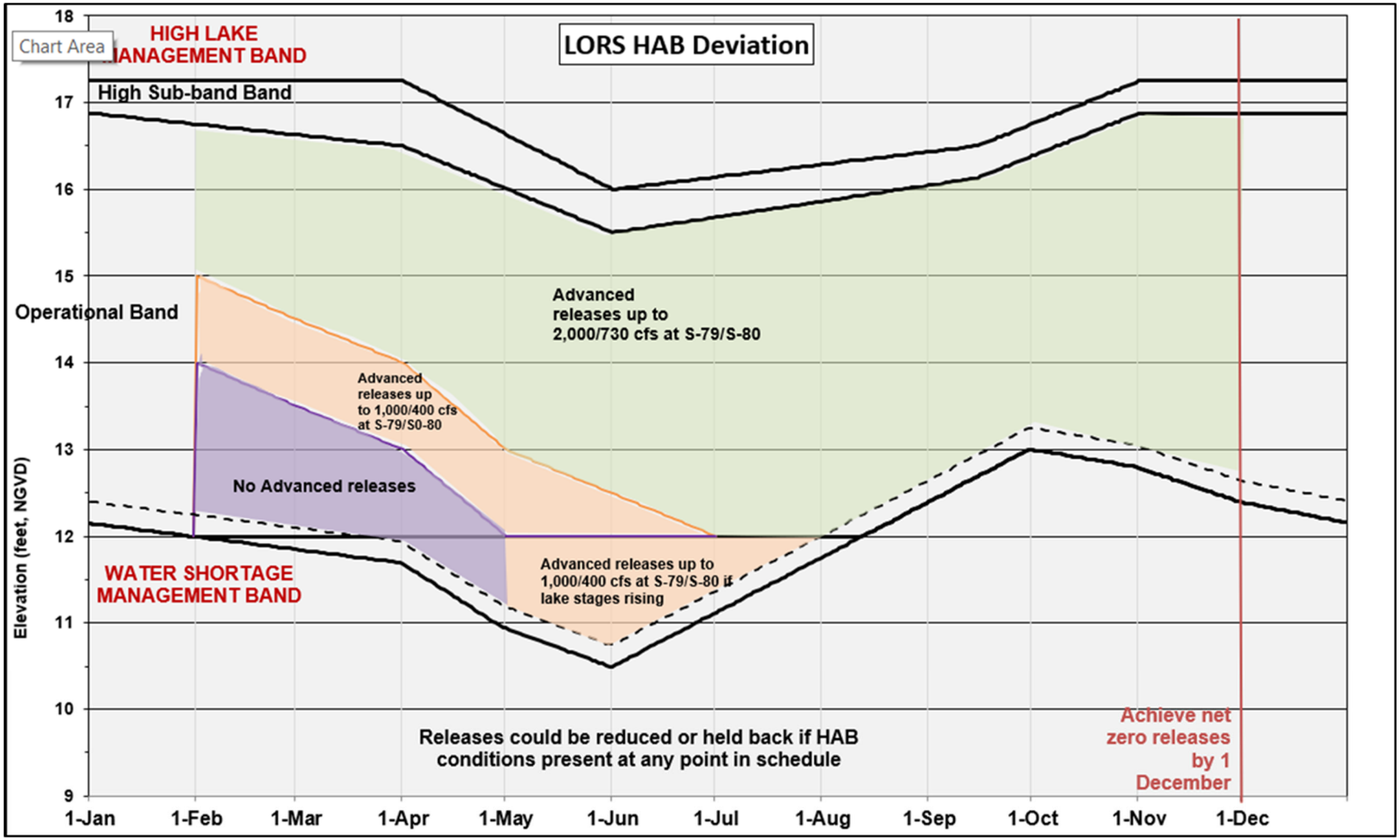

Figure 2-1. Advanced release zones are shown in green (higher release) and orange (mid-level release) and a no advanced release zone is shown in purple. Cutbacks in deviation releases implemented 0.25 feet above Water Shortage Management Band (dashed line). Below 12 feet zone is shown (orange) to show where (mid-level) deviation releases would only be made if the lake was rising. Red line indicates that new zero releases are targeted by 1 December.

Alternative C (HAB Operational Strategy Revised): Alternative C is similar to Alternative B except for the following two conditions:

- Alternative C would not limit the releases at S-79 and S-80 to the above identified thresholds. Releases at S-79 would allow to be made up to or greater than 2,800 cfs at S-79 and up to or greater than 2,000 cfs to the St. Lucie Estuary (S-80, S-48, S-49 and Gordy road structures).
- Alternative C would not include cut back of HAB releases if lake levels fell within 0.25 feet of the WSM Band. HAB releases would occur within the WSM Band.

Alternative D: Alternative D is similar to Alternative A (no action alternative), except Lake Okeechobee water releases would be held back when the following HAB criteria listed below were met, regardless of whether preemptive releases were made, except for when in the High Lake Management Band.

- If a HAB is currently in Lake Okeechobee, C-43, or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If the state of Florida declares a state of emergency due to HABs on Lake Okeechobee, C-43 or, C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If a HAB is anticipated to occur on Lake Okeechobee, C-43 or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.
- If a HAB has occurred and caused impacts to public safety or the environment during the last 12 months within Lake Okeechobee, C-43 or C-44 canals, the Caloosahatchee Estuary, or the St. Lucie Estuary.

2.2 Issues and Basis for Choice

The alternatives described in **Section 2** were considered and evaluated against the project purpose and need. The planned deviation is envisioned to enhance the ability of the Corps to respond to HABs within its authority. Modeling with the LOOPs has been conducted in support of this final revised supplemental EA as described in **Section 4** to further evaluate potential environmental effects. Restoration, Coordination, and Verification (RECOVER) is a multi-agency team of scientists, modelers, planners and resource specialists who organize and apply scientific and technical information in ways that are essential in supporting the objectives of the Comprehensive Everglades Restoration Plan (CERP). RECOVER has developed performance measures for the Northern Estuaries and Lake Okeechobee that were used (RECOVER 2007a, RECOVER 2007b, RECOVER 2020a, RECOVER 2020b) to inform potential environmental effects within the project area. In addition, other performance metrics were used to inform potential effects on regional water management operations to include water supply. Reference **Appendix B** for a complete description of the modeling conducted.

RECOVER developed a performance measure for the Northern Estuaries in 2007 to provide biologically and ecologically driven guidance for establishing and maintaining salinity regimes that sustain healthy estuarine ecosystems in the St. Lucie Estuary, Southern Indian River Lagoon, Loxahatchee River Estuary, and the Caloosahatchee River in the northern Everglades region of south Florida (RECOVER 2007a). Flow targets were developed in 2007 to achieve desired salinity ranges in the estuaries to meet the needs of key indicator species such as the Eastern oyster *(Crassostrea virginica*) and species of freshwater and marine submerged aquatic vegetation (SAV) such as tape grass (*Vallisneria americana*) and shoal grass (*Halodule wrightii*) (RECOVER 2007a). Within the Caloosahatchee Estuary, the 2007 performance

measure targets were based on freshwater from the C-43 canal at the S-79 structure where the mean monthly inflow was recommended to be maintained between 450 and 2,800 cfs (C-43 Basin runoff and Lake Okeechobee Regulatory Releases). Flows less than 450 cfs were considered undesirable since these flow levels allow salt water to intrude, raising salinity above the tolerance limits for communities of SAV in the upper estuary. Flows greater than 2800 cfs were considered to cause mortality of marine seagrasses and oysters in the lower estuary and at flows greater than 4500 cfs, seagrasses were expected to decline in San Carlos Bay. Within the St. Lucie Estuary, the 2007 performance measure targets were based on freshwater releases at the S-80, S-48, S-49 and Gordy road structures where the target frequency of mean biweekly flows were recommended to be maintained between 350 and 2,000 cfs. Based on the salinity tolerances of oysters, flows less than 350 cfs were expected to result in higher salinities at which oysters are susceptible to increased predation and disease. Flows in the 350-2000 cfs range were expected to produce tolerable salinities. Flows greater than 2000 cfs were expected to result in low, intolerable salinity within the estuary. Flows greater than 3000 cfs were expected to damage seagrasses in the Indian River Lagoon.

RECOVER released a revised Northern Estuaries performance measure on April 28, 2020 for a 30 day public and agency review period which was approved on July 7, 2020 (RECOVER 2020a). The revised performance measure incorporates monitoring data since 2007 and hydrodynamic modeling tools (CH3D Hydrodynamic Salinity Model) to set salinity ranges around conditions of optimum, stressful, and damaging effects for oysters and SAV (tape grass and shoal grass). **Table 2-1** shows the flow envelopes (cfs) determined as optimum, stressful, and damaging for the corresponding salinity envelopes shown in **Table 2-2**. Optimum flow envelopes for the St. Lucie and the Caloosahatchee River Estuary represent the range of flows (cfs) expected to produce optimum salinity (within the optimum salinity envelope) for a given ecological indicator within their known or desired range within the estuary. Whereas, stress flow envelopes and damaging flow envelopes represent the range of flows (cfs) expected to produce salinities deemed stressful and damaging to one or more indicator species.

The previous 2007 RECOVER Northern Estuaries performance measure provided flow envelopes with a lower and upper boundary, outside of which the salinities in the estuary could negatively impact certain species of interest based on flows which result in salinities at a single location within the St. Lucie Estuary and Caloosahatchee Estuary. The revised performance measure aims to add a spatially-explicit component by setting salinity envelopes relevant to the whole system along the gradient of the estuary, rather than at a single location; and to the extent possible considers other factors such as duration and return frequency of flows outside the chosen envelope for each estuary.

The 2007 RECOVER Northern Estuaries performance measure flow targets were predicated on target salinities as well, but were not separated by individual species; the St. Lucie Estuary 350-2,000 cfs flow envelope was based on establishing salinities 12-20 at the US1 Roosevelt Bridge (middle estuary) for both shoal grass and oysters; and the Caloosahatchee Estuary flow envelope was informed by the previous Caloosahatchee Minimum Flows and Levels (MFL) for the low bound, and at the high flow end by flows required to prevent flow salinities in the lower estuary near Shell Point and San Carlos Bay.

The 2007 RECOVER Northern Estuaries performance measure for the St. Lucie Estuary was adjusted from 350-2000 cfs to an optimum flow envelop of 150-1400 cfs. Both the low and high flow bounds were reduced compared to the 2007 performance measure in order to increase salinities in the estuary proper, which, especially in the Forks, were insufficiently low. This could provide significant benefit to extant Eastern oyster reefs upstream by creating optimum salinities throughout middle estuary and both Forks.

The 2007 RECOVER Northern Estuaries performance measure for the Caloosahatchee River Estuary was adjusted from 450-2800 cfs to an optimum flow envelop of 750-2100 cfs. The low flow bound was raised from 450 cfs to 750 cfs. For setting flow targets conducive to supporting healthy estuarine systems, 450 cfs was assumed too low for the purposes of the performance measure. The new low flow bound target of 750 cfs should improve salinities in the upstream Caloosahatchee Estuary for tape grass habitat. The high flow bound was reduced from 2800 cfs to 2100 cfs to reduce the impact of lower salinity downstream for shoal grass and oysters.

Table 2-1. 2020 Draft RECOVER Northern Estuaries Performance Measure: Flow envelopes (cfs) determined as optimum, stressful, and damaging for the corresponding Salinity Envelopes of all indicator species in the Northern Estuaries.

Estuary	2007 RECOVER Performance Measure Target	2020 RECOVER Performance Measure: Target Optimum*	2020 RECOVER Performance Measure: Target Stress**	2020 RECOVER Performance Measure Target: Damaging***
St. Lucie	350-2000	150-1400	1400-1700	>1700
Caloosahatchee	450-2800	750-2100	2100-2600	>2600

*Optimum Salinity Envelopes – salinities yielding the greatest performance of measured response variables (e.g., good measures of growth, density, recruitment, photosynthetic capacity, osmoregulation, respiration; low disease prevalence and intensity, oxidative stress, predation) indicative of healthy organisms or wild populations/habitats.

**Stress Salinity Envelopes – salinities yielding a decline in performance of one or more response variables, but tolerable for short-term exposures. Prolonged durations of exposure to stressful salinities may result in loss of the indicator.

***Damaging Salinity Envelopes – salinities yielding significant declines in performance of one more response variables even with short-term exposure and can result in loss of the indicator with prolonged or repeated exposure.

Table 2-2. 2020 Draft RECOVER Northern Estuaries Performance Measure: Optimum, stress, and damaging salinity envelopes for Northern Estuaries indicator species.

Estuary	2007 RECOVER Performance Measure Target	2020 RECOVER Performance Measure: Target Optimum	2020 RECOVER Performance Measure: Target Stress	2020 RECOVER Performance Measure Target: Damaging
Eastern oyster (adult)	12-20 (St. Lucie Estuary)	10-25	5-9; > 25	< 5
Tape Grass	< 10 (Caloosahatchee Estuary MFL)	< 10	10 – 15	> 15
Shoal Grass	12-20 (St. Lucie Estuary)	15-45	5 – 14; > 45	< 5

The benefits of seasonally variable water levels on the littoral marshes of Lake Okeechobee has been documented in the 2007 and 2020 RECOVER Lake Okeechobee Lake Stage performance measures (RECOVER 2007b, RECOVER 2007b). The 2007 RECOVER Lake Okeechobee Lake Stage performance measure established a lake stage envelope of 12.5 feet, NGVD (June-July) to 15.5 feet, NGVD (November-January)) for the purpose of supporting a healthy ecosystem within Lake Okeechobee. RECOVER revised the 2007 Lake Okeechobee Lake Stage performance Measure on March 4, 2020. The revised performance

measure: (1) lowered the lake stage envelope by approximately 0.5 feet to align with originally cited research (Havens 2002) that specified 12 feet and 15 feet as low and high targets, rather than 12.5 feet and 15.5 feet; (2) adjusted the width of the lake stage envelope to allow greater flexibility in the spring and the fall due to the importance of inter-annual variability; (3) and reduced flexibility for the low stage target to reflect the critical nature of low stage for SAV and other communities. The lake stage envelope was developed to mimic historic conditions by receding from wet season highs (approximately November to January) to dry season lows (approximately May to June) with recession rates generally increasing along with evapotranspiration rates through the dry season. Stages then will ascend at moderate rates back to seasonal highs. The ecological envelope generally encompasses stages from 11.5 feet, NGVD to 15.5 feet, NGVD and allows for seasonal fluctuation around 12 feet, NGVD to 15 feet, NGVD. The 2020 RECOVER Lake Okeechobee Lake Stage performance measure can be accessed at the following link: https://www.saj.usace.army.mil/Missions/Environmental/Ecosystem-Restoration/RECOVER/.

Wetter periods can reduce the presence of flood intolerant species (woody plants) at higher elevations and can reduce the density of emergent plants at lower elevations. Drier periods can expose marsh soils and reduce accumulated muck, promote fires to reduce dead biomass, and increase plant diversity by providing the necessary regrowth periods for habitat that is stressed during wetter periods (lower elevation marshes and submerged plants). Extreme low stages (< 10 feet, NGVD) in Lake Okeechobee can have multi-year impacts on the littoral and nearshore areas of Lake Okeechobee. Most of the littoral marsh within Lake Okeechobee is dried when stages are < 12 feet, NGVD, and at > 10 feet, NGVD, nearly the entire shoreline fringing bulrush zone and much of the lake area that would otherwise support SAV dries out (RECOVER 2007b, RECOVER 2020b). The spread of exotic or nuisance species can also occur at extreme low lake stages (RECOVER 2007b, RECOVER 2020b). Prolonged extreme low stages can shift areas of former open water or SAV to dense stands of emergent plants. Extreme high stages (< 17 feet, NGVD) in Lake Okeechobee allow wind-driven waves to directly impact the nearshore emergent and submerged plant communities, causing physical uprooting and creation of organic berms. High stages promote the transport of suspended solids and associated nutrients from the mid-lake region into the shoreline regions; reducing water clarity and light penetration, increasing nutrients, and reducing SAV and emergent plant densities. Extreme low stages and extreme high stages can also have an effect on fish and wildlife resources through direct loss or shifting of habitat structure. Potential effects on snail kites and wading birds can occur through reductions in prey density and foraging and nesting habitat.

Releases east and west under Alternative C would be greater than 2,800 cfs at S-79 and greater than 2,000 cfs to the St. Lucie Estuary (S-80, S-48, S-49 and Gordy Road structures). Alternative C would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas, however the defined discharge rates at S-79 and S-80 are above the thresholds that have the potential to adversely affect estuarine and marine resources. Reference **Table 2-1**. Alternative C may also increase the probability of extreme low lake stages if conditions turn unexpectedly drier than normal. Furthermore, under Alternative C releases would not be cut back if lake levels were within 0.25 feet of the WSM Band. Alternative C may increase the probability of falling into the WSM Band, presenting a potential risk to water supply.

Alternative D satisfies the goal to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas; however, Alternative D would increase lake stages versus the no action alternative and thus results in increased flood risk to surrounding Lake Okeechobee. The HHD has the highest possible Dam Safety Action Classification (DSAC) rating of 1, which is the reason for the unprecedented rehabilitation of the HHD. It is not permissible to

implement operational changes that increase risk to a DSAC 1 Dam. The LOSOM would go into effect when HHD rehabilitation is complete, which would allow the LOSOM schedule to consider the post-rehabilitation dam risk.

Alternative A, the no action alternative, would maintain operations as defined in LORS 2008 and does not meet the purpose and need as described in **Section 1.3.** Alternative A does not enhance the ability of the Corps to respond to HABs within its authority.

Based upon the environmental effects analysis conducted within this final revised supplemental EA, Alternative B is the preferred alternative. Alternative B is expected to best meet the project purpose and need as described in **Section 1.3** while minimizing any potential adverse effects within the project area. There will be conditions under Alternative B which would lead to higher or lower releases than those which would have been experienced under LORS 2008 alone; however results show in **Appendix B** that the frequency of extreme low or extreme high lake stages are similar between Alternative B and the No Action Alternative. Results also show that the frequency of deviations above and below the lake stage envelope are not expected to increase. Additionally results show that there is minimal impact to water supply overall, showing that frequency, duration, and volume of water shortages are similar between Alternative B and the No Action Alternative. Results shown in **Appendix B** and summarized in **Table 4-1** support these conclusions. HAB operations, specifically lake releases, under Alternative B would be below the harm thresholds for the Caloosahatchee and St. Lucie estuaries for SAV as identified by the RECOVER 2007 Northern Estuaries performance measure and the revised performance measure approved on July 7, 2020. Reference **Table 2-1**.

For purposes of evaluation of Alternative B the 2007 RECOVER Northern Estuaries performance measure was used for modeling purposes, consistent with LORS 2008 FSEIS which looked at 2000 cfs from S-80, S-48, S-49, and the Gordy Road structures for the St. Lucie Estuary and 2,800 cfs from S-79 for the Caloosahatchee River Estuary. The 2020 RECOVER performance measure was drafted after the modeling began and was not finalized by the time modeling was conducted to support the proposed action. The 2007 RECOVER thresholds are 300 cfs greater for the St. Lucie estuary and 200 cfs greater for the Caloosahatchee Estuary than the identified flow estimates within the damaging salinity envelope in the 2020 RECOVER performance measure and are still useful for relative comparisons. Reference **Table 2-1**. Ultimately, water management flows under the proposed planned deviation will be targeted for levels that happen to be within the optimum salinity envelope under the 2020 RECOVER performance measure; S-80 flows ≤ 730 cfs (≤ 1400 cfs total structures) and S-79 flows ≤ 2000 cfs.

Action is needed to deviate from current water management practices for the purpose of allowing greater flexibility with water management decisions when HABs are forecasted or present in Lake Okeechobee, the St. Lucie or Caloosahatchee estuaries or the system of canals that connect them. Alternative B would enhance the ability of the Corps to respond to HABs within its authority of balancing multiple project purposes.

2.3 Alternatives Eliminated from Detailed Evaluation

Alternatives C and D were eliminated from detailed evaluation for the reasons outlined in **Section 2.2**. Alternative B was carried forward with the no action alternative through the environmental effects analysis in **Section 4**.

2.4 Preferred Alternative

Based upon the environmental effects analysis conducted within this final revised supplemental EA, Alternative B is the preferred alternative. Alternative B is expected to best meet the purpose and need as described in **Section 1.3**. A complete description of Alternative B can be found in **Appendix A**.

3 AFFECTED ENVIRONMENT

The following provides a brief description of the affected environment within the project area. A full description of the affected environment can be found in the LORS 2008 FSEIS and is incorporated by reference into this document (USACE 2008). This information is available for review at http://www.saj.usace.army.mil/Portals/44/docs/h2omgmt/LORSdocs/ACOE_STATEMENT_APPENDICES_A-G.pdf.

Lake Okeechobee is a subtropical lake in south central Florida with a surface area of 730 square miles and an average depth of nine feet. Lake Okeechobee is a major feature of the Kissimmee-Okeechobee-Everglades system, which is a continuous hydrologic system extending from central Florida south to Florida Bay. Lake Okeechobee provides a number of values to society and nature including water supply for agriculture, urban areas and the environment, flood protection, a multi-million dollar sport fishery, and habitat for many birds and animals, including endangered and threatened species. These values of Lake Okeechobee have been threatened in recent decades by excessive phosphorus loading transported by sediment, harmful high water levels, and rapid expansion of exotic plants.

As a result of the lake's shallow depth, wind is a major influence on Lake Okeechobee. Prior to construction of a perimeter dike system, Lake Okeechobee was much larger than it is now, with an extensive wetland littoral zone along the shoreline. Today, Lake Okeechobee is constrained within the Herbert Hoover Dike, and the littoral zone is much smaller. As a result, when water levels are above 15.5 ft., NGVD, the entire littoral zone is flooded; leaving minimal habitat for wildlife that requires exposed ground. When water levels are below 11 feet, NGVD, the entire emergent marsh is dry, and not available as habitat for fish or other aquatic life. Lake Okeechobee's littoral zone is characterized by emergent and submerged vegetation covering an area of approximately 150 square miles (33 percent of Lake Okeechobee's surface area), and is primarily located along the western shore of Lake Okeechobee. The littoral zone is sensitive to nutrient loading and light availability. The vegetation and cover types within the Lake Okeechobee region have been greatly altered during the last century. At present, the littoral zone vegetation consists of many native plant species but also consists of many less desirable and invasive and/or exotic species. The invasion of exotic vegetation has impacted the health and productivity of the littoral zone plant community. Anthropogenic disturbances such as altered hydrology and pollution, along with nutrients, can directly and indirectly affect the health of Lake Okeechobee.

The Caloosahatchee River is the major source of freshwater for the Caloosahatchee Estuary. Alterations to the Caloosahatchee River and watershed over the past century have resulted in a major change in freshwater inflow to the estuary. The Caloosahatchee River was originally a shallow, meandering river with headwaters in the proximity of Lake Hicpochee, near Lake Okeechobee. In the early 1880s, a man-made canal was constructed connecting Lake Okeechobee to the Caloosahatchee River. Today, the river extends from Lake Okeechobee to San Carlos Bay. The river now functions as a primary canal (C-43) that conveys both runoff from the Caloosahatchee watershed and releases from Lake Okeechobee. The canal has undergone numerous alterations including channel enlargement, bank stabilization, and a series of three lock and dam structures. The final downstream structure, W.P. Franklin Lock and Dam (S-79), demarcates the beginning of the estuary, and acts as a barrier to salinity and tidal action, which historically extended east near the LaBelle area. As a result of hydrological changes to this ecosystem, the timing, distribution, quality, and volume of freshwater entering the estuary from the watershed and Lake Okeechobee has resulted in negative ecological impacts. Despite these impacts, the Caloosahatchee Estuary continues to be an important environmental and economic resource.

The St. Lucie Estuary, which is part of the Indian River Lagoon ecosystem, is located on the east coast of Florida. The St. Lucie River is approximately 35 miles long and has two major forks, the North and the South, that flow together and then eastward to the Indian River Lagoon and Atlantic Ocean at the St. Lucie Inlet. Historically, the St. Lucie River system was a freshwater stream flowing into the Indian River Lagoon. An inlet (today referred to as the St. Lucie Inlet) was dug in the late 1800s by local residents to provide direct access to the Atlantic Ocean, thus changing the St. Lucie from a river to an estuary. Then in the early 1900s, the St. Lucie Canal (C-44) was constructed providing an outlet from Lake Okeechobee to the St. Lucie River. The C-44 Canal is used for navigation and releases from Lake Okeechobee. As a result, freshwater flow from C-44 into the estuary tends to be excessive at times, in particular during the wet season, leaving the estuary with too much freshwater. Other major canals constructed in the watershed contributing to freshwater inflow into the estuary include C-23 and C-24 canals. A combination of excessive freshwater inflows, runoff, nutrient loading, and shoreline alterations all contribute to the declining ecological health of the St. Lucie Estuary.

All of the Northern Estuaries are host to plant and animal communities such as seagrass beds, macroalgae, mangroves, oyster bars, birds, fishes, corals, sponges and endangered and threatened species. Additionally, the estuaries attract a variety of commercial, recreational and educational activities such as fishing, boating, ecotourism, and sightseeing.

The EAA is located on the southern tip of Lake Okeechobee and is one of the most productive agriculture regions in the State. Lake Okeechobee provides water south to the EAA through three structures, S-351, S-354, and S-352. The EAA, covering 1,122 square miles south of Lake Okeechobee is the largest contiguous area of historic Everglades cover that has been converted by land use practices. The EAA historically consisted of several different plant communities. A dense swamp of pond apple, willow and elderberry formed broad bands along the southern rim of Lake Okeechobee. The remainder of what is now the EAA was dominated by sawgrass marshes. The present EAA contains primarily agricultural cropland. It should be noted that the EAA is one of the most productive agricultural regions, not only in Florida but in the United States supplying the largest percentage of winter vegetables in the eastern United States.

The WCAs comprise about one-third of the original Everglades. The area is currently divided into five shallow water impoundments surrounded by levees and canals. These impounded marshes are managed to provide flood protection to the cities and farms to the east and to provide water for agricultural and municipal use during the dry season and for remaining ecosystem values. The WCAs are vegetated with a mosaic of habitat types dominated by sawgrass. Nearly all of the WCAs are a patterned peatland, consisting of long, linear sawgrass ridges interspersed with teardrop-shaped tree islands (hammocks) and willow strands. Tree islands are a unique feature of the Everglades ecosystem. Tropical hardwoods are found on some of the relatively unaltered tree islands in the southern portion of the area. The landscape pattern of ridge and slough has been altered significantly but appears largely intact in portions of the WCAs and into ENP. The ridge and slough patterns were developed in broad, shallow to intermediate depth basins with peat substrate in response to the original hydrologic flow regimes of the Everglades.

Information pertaining to the influence of climate change on the occurrence, severity, and impact of HABs in fresh, marine, and brackish waters has been summarized below to supplement prior NEPA for LORS 2008. References have been incorporated in **Section 8**.

According to the Intergovernmental Panel on Climate Change (IPCC) 2014 synthesis report, global surface temperatures will likely rise between 0.3 to 0.7 degrees Celsius between the years 2016-2035 and will

likely exceed a rise of 1.5 degrees Celsius between 2081-2100. Also according to the IPCC 2014 report, the change in rainfall will not be uniform and there will be an increase in intensity and frequency of extreme precipitation events due to a warming environment. These future predictions of rising temperatures, enhanced vertical stratification of aquatic ecosystems, and alteration in seasonal and interannual weather patterns could favor HABs in eutrophic waters (Paerl and Huisman 2009).

Generally, cyanobacteria tends to exhibit optimal growth rates at higher temperatures (Paerl and Huisman 2009). These higher temperatures give HABs a competitive advantage over other forms of non-harmful algae (EPA 2013). Some of these HABs favor temperatures above 77 degrees Fahrenheit (25 degrees Celsius) (EPA 2013). Increasing surface water temperatures also increases the stratification in frequency, strength and duration (EPA 2013, Paerl and Huisman 2009). Increased stratification can favor the growth of HABs (EPA 2013). Climate change can lengthen the period of stratification (Paerl and Huisman 2009). Cyanobacteria have the ability to use the stratification to their advantage by being able to control their depth within the water (EPA 2013, Paerl and Huisman 2009). This ability gives cyanobacteria a competitive advantage over eukaryotic phytoplankton species (Paerl and Huisman 2009).

Future climate change predictions suggest an increase in extreme weather events. Climate change can and is predicted to affect patterns of precipitation and drought. More intense or extreme rainfall events could increase the nutrient discharge into water bodies (Paerl and Huisman 2008). An extreme rainfall event followed by a period of drought conditions (which is predicted with climate change) can cause the water body to hold nutrients for a longer period of time which in return can increase the risk of HABs (EPA 2013). Events like this in the past have “triggered massive algal blooms in aquatic ecosystems serving critical drinking water, fishery and recreational need” (Paerl and Huisman 2008).

Karl Havens and Alan Steinman discuss the ecological response of Lake Okeechobee to climate change. The future scenarios that were discussed included a 10% increase/decrease in rainfall and an increase in evapotranspiration which was based on a 1.5 degree Celsius rise in temperature (Havens and Steinman 2013). The results shows increasing rainfall and increasing evapotranspiration had counterbalancing effects, decreasing rainfall and increasing ET decreased the Lake elevation as much as 2m, and after intense rainfall events there were occasions where the Lake stage increased as much as 3m (Havens and Steinman 2013). Changes in hydrologic conditions such as these could have a major impact on the Lake’s ecosystem (Havens and Steinman 2013). Such fluctuations in water level could influence the biodiversity within the littoral zone of the Lake (Havens and Steinman 2013). Water depth and fluctuations could give cyanobacteria a competitive advantage due to nutrients, stratification, and turbidity (Havens and Steinman 2013).

Temperature increase, stratification and an increase in extreme weather events due to climate change could increase the intensity, frequency and duration of HABs (EPA 2019, EPA 2013, Paerl and Huisman, Paerl and Huisman 2009). The evidence suggests that HABs may increase under future climate events, however, further research is needed regarding the link between climate change and HABs (EPA 2013).

The Corps has coordinated with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) in accordance with Section 7 of the Endangered Species Act (ESA) to determine federally listed threatened and endangered species that are either known to occur or are likely to occur in the action area. The Corps recently updated our ESA consultation record with the NMFS and the USFWS with respect to LORS 2008, as a result of information that was analyzed with respect to Lake Okeechobee water releases and effects on blue green algae and red tide downstream. In part, the Corps considered materials submitted by Center for Biological Diversity, the Calusa Waterkeeper, and Waterkeeper Alliance as part

of a 60-day notice of intent to sue dated December 19, 2018 under the ESA. The Corps considered whether this information would change the previous effects determinations on federally listed species. The Corps is including our updated ESA consultation record for LORS 2008 as part of this final revised supplemental 2020 LORS Planned Deviation EA to notify interested stakeholders. Reference **Section 7.1.2** and **Appendix C.2**. **Table 3-1** includes federally listed species that are either known to occur or are likely to occur in the action area as a result of our updated ESA consultation.

Table 3-1. Status of federally listed threatened and endangered species under jurisdiction of the USFWS and NMFS with the potential to occur in the action area (E: Endangered; T: Threatened; CH: Critical Habitat).

Species (Common Name)	Species (Scientific Name)	ESA Listing Status
Mammals	-	-
Florida panther	*Puma concolor coryi*	E
West Indian manatee	*Trichechus manatus*	E, CH
Florida bonneted bat	*Eumops floridanus*	E
Birds	-	-
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	E, CH
Wood stork	*Mycteria americana*	T
Cape Sable seaside sparrow	*Ammodramus maritimus mirabilis*	E, CH
Audubon's crested caracara	*Polyborus plancus audubonii*	T
Piping plover	*Charadrius melodus*	T
Red knot	*Calidris canutus rufa*	T
Reptiles	-	-
Eastern indigo snake	*Drymarchon corais couperi*	T
Plants	-	-
Okeechobee gourd	*Cucurbita okeechobeensis ssp. okeechobeensis*	E
Sea Turtles	-	-
Green (North Atlantic NA distinct population segment [DPS])	*Chelonia mydas*	T
Green (South Atlantic [SA] DPS)	*Chelonia mydas*	T
Kemp's Ridley	*Lepidochelys kempii*	E
Leatherback	*Dermochelys coriacea*	E
Loggerhead (Northwest Atlantic [NWA] DPS)	*Caretta*	T
Hawksbill	*Eretmochelys imbricata*	E
Fish	-	-
Smalltooth sawfish (U.S. DPS)	*Pristis pectinata*	E
Nassau grouper	*Epinephelus striatus*	T
Giant manta ray	*Manta birostris*	T
Oceanic whitetip shark	*Carcharhinus longimanus*	T
Invertebrates and Marine Plants	-	-

Species (Common Name)	Species (Scientific Name)	ESA Listing Status
Elkhorn coral	*Acropora palmata*	T
Staghorn coral	*Acropora cervicornis*	T
Boulder star coral	*Orbicella franksi*	T
Mountainous star coral	*Orbicella faveolata*	T
Lobed star coral	*Orbicella annularis*	T
Rough cactus coral	*Mycetophyllia ferox*	T
Pillar coral	*Dendrogura cylindrus*	T
Johnson's seagrass	*Halophila johnsonii*	T

4 ENVIRONMENTAL EFFECTS

Section 4 describes anticipated changes to the existing environment including direct, indirect, and cumulative effects. This assessment evaluates the anticipated environmental effects of Alternative B relative to the no action alternative.

For this analysis, intensity was rated as follows:

- Negligible effect to the resource or discipline is barely perceptible and not measurable and confined to a small area.
- Minor effect to the resource or discipline is perceptible and measurable and is localized.
- Moderate effect is clearly detectable and could have appreciable effect on the resource or discipline; or the effect is perceptible and measurable throughout the project area.
- Major effect would have a substantial, highly noticeable influence on the resource or discipline on a regional scale.

The duration of the effects in this analysis is defined as follows:

- No duration — no effect
- Temporary
    - Short term — effects last less than one year
    - Long term — effects that last longer than one year

Modeling with the LOOPs has been conducted in support of this final revised supplemental EA (**Appendix B**) to further evaluate potential environmental effects of Alternative B regarding lake stages and water supply and to refine the operational strategy based on findings from the analysis. The preferred alternative (Alternative B) was simulated in the LOOPs model with several different operational scenarios evaluated. The scenarios evaluated the sensitivity of several model assumptions such as a credit limit on advanced releases and stage-month criteria for beginning advanced releases in the spring. The scenarios were all evaluated against a suite of performance metrics and illustrated through standard outputs typically used in Corps planning studies. These performance metrics included: (1) Lake Okeechobee stage-duration curves; (2) the percent of time simulated Lake Okeechobee stages were below, inside, and above the lake stage envelope identified in the 2007 RECOVER performance measure; (3) standard scores for departures above and below the lake stage envelope identified in the 2007 RECOVER performance measure; (4) Lake Okeechobee low stage events (MFL exceedance); (5) frequency and duration of LOSA (Lake Okeechobee Service Area) water shortages; (6) LOSA water shortage cutbacks for 10 worst drought years; (7) LOSA demand, supply, and cutback summary tables; (8) distribution of monthly mean flows to both the St. Lucie and Caloosahatchee Estuaries consistent with the 2007 RECOVER performance measure; and (9) high discharge months triggered by runoff and Lake Okeechobee discharges for both the St. Lucie and Caloosahatchee Estuaries consistent with the 2007 RECOVER performance measure. Additionally metrics and illustrations of performance were analyzed specific to the preferred alternative (Alternative B) including an analysis of the water banking, stage/release/water account time series, and stage differentials between proposed operations and LORS 2008 to determine potential effects of the preferred alternative (Alternative B). Since the modeling effort was conducted, in March of 2020 RECOVER revised the Lake Okeechobee Lake Stage performance measure and the Northern Estuaries

performance measure. Reference **Section 2**. The 2007 RECOVER performance measures were used to inform modeling with the LOOPs, as the revised performance measures were not yet approved.

Potential environmental effects of current water management operations (no action alternative) are thoroughly evaluated within the LORS 2008 FSEIS and are hereby incorporated by reference (USACE 2008). **Table 4-1** provides a summary of potential environmental effects associated with implementation of the preferred alternative, Alternative B.

Table 4-1. Summary of potential environmental consequences associated with implementation of the no action alternative and Alternative B.

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
Climate	No significant effect.	No significant effect. Same as Alternative A. Implementation of Alternative B would not result in significant impacts to the climate of south Florida. The impact of current or projected effects of climate change on C&SF project operations is difficult to estimate given the uncertainty in predictions of future weather patterns and water management strategies. Higher average ambient temperatures may result in increased evapotranspiration. Rainfall events may become less frequent and larger in magnitude. Regional surface water storage systems would most likely experience more rapid water loss when compared to current water levels, ultimately impacting availability of water supplies. Sea level change is one of the more certain consequences of climate change, and because it affects the land/ocean interface, it has the potential for environmental impacts on coastal areas. Future rates of sea level change are expected to result in significant impacts on coastal canals and communities, with loss of flood protection and increased saltwater intrusion being the primary effects. Additionally, coastal ecosystems and estuaries are expected to be adversely affected and require additional deliveries of freshwater to maintain desirable salinity patterns and healthy ecosystems. The impacts of climate change that may affect HABs include warming water temperatures, changes in salinity, higher carbon dioxide levels, changes in rainfall, sea level rise, and coastal upwelling (EPA 2020, EPA 2013). Evidence suggests that HABs may increase under future climate events, however, further research is needed regarding the link between climate change and HABs (EPA 2013). Alternative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. The influence of climate change is not anticipated to alter the severity or nature of impacts resulting from implementation of Alternative B as compared to Alternative A.
Study Area Land Use	No significant effect. Land use within the project area would not be expected to change from current conditions. The existing use of land within the project area varies widely from agriculture to high-density residential and industrial uses to natural areas for conservation.	No significant effect. Same as Alternative A.
Hydrology	No significant effect. Hydrology within the project area would not be expected to change from current conditions.	Negligible to minor effects on stages within Lake Okeechobee relative to Alternative A. The cumulative volume of water released under the planned deviation will be tracked against the volume held back that would have been released under LORS 2008. The objective will be to reach a net zero balance such that the total volume released between 1 February and 1 December each year is unchanged from the releases that would have taken place under the current schedule. The overall volume of water released from Lake Okeechobee will not change for this implementation outcome, resulting in no net effect on lake stage at the end of the deviation period. The potential range of effects on lake stage can be seen in detail within **Appendix B** where the modeling analysis is documented. Specifically Section 3C shows effects on lake stage including the number of MFL exceedances (**Figure 11**), the number of high and low lake stages (Figure 10), and the stage duration curves (**Figure 7** and **Figure 8**) across the period of record. Groundwater conditions were not specifically modeled as a part of the revised analysis, but because there are negligible to minor effects on surface water hydrology it can be deduced that there will be similar effects to groundwater resources. In general the results from this analysis show that the deviation performs similarly to Alternative A (LORS 2008) with negligible to minor effects overall. Furthermore how lake stage is varied throughout implementation of HAB operations over the course of a year is shown (**Figure 9**) and shows negligible to minor effects at any one time and negligible to minor net effects over a year. Operations under the planned deviation will affect the timing of releases. There will be conditions under Alternative B which would lead to higher or lower releases than those which would have been experienced under LORS 2008 absent the deviation, but the overall volume of water released will not change and there will be no net effect on lake stage at the end of the period. Risk of adverse environmental effects will be minimized through consideration of current and forecasted hydrologic and environmental conditions, and continued adherence to

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		the HAB operational plan developed and implemented in close coordination with federal and state agencies. The frequency of extreme low or extreme high lake stages is not anticipated to significantly increase as a direct result of HAB operations. Nor is the frequency of deviations above and below the lake stage envelope expected to significantly increase. Results shown in Appendix B support this conclusion. Some scenarios where conditions may not be conducive to reaching net zero releases have been developed below in an effort to illustrate an envelope of effects, with potential minor to moderate effects relative to Alternative A. These scenarios are not meant to be all-inclusive or limiting in any way, but meant to identify any potential effects that this deviation could have. All effort will be made to anticipate factors and avoid the below scenarios. Scenario 1: Advanced releases are made towards the beginning of the wet season in anticipation of a HAB within the Baseflow Sub-band, and then conditions turn unexpectedly drier than normal bringing stages down into the Beneficial Use Sub-band. There would be no lake releases to make up, due to lake stages in the Beneficial Use Sub-band – as LORS does not outline releases in this sub-band. In this case an assumption of a 30 day duration of advanced releases at 2,730 cfs is made (2,000 + 730 cfs – assuming all releases out of S-79 and S-80 came from Lake Okeechobee) which is 2,080 cfs over a Baseflow release of 650 cfs. Releasing 2,080 cfs for 30 days would affect lake stages by approximately 0.28 feet (123,740 ac-ft.). This volume would have a nominal effect on water supply and starting stage for Everglade snail kite nesting the following dry season. This is considered the worst case scenario, but there is a low probability of this occurrence. Scenario 2: Advanced releases are made towards the beginning of the wet season in anticipation of a HAB, and then a large rain event comes across the lake, bringing the lake up multiple feet into the High Lake Management Band. The most recent example of this was 2017 Hurricane Irma, which brought the lake up very quickly and took many months to release water back down to safe levels. In a scenario like this, releases may not be held back, to zero out the water bank account, due to dam safety risks. In this scenario, it is likely that most project purposes would benefit from releasing water out of Lake Okeechobee, most especially flood risk management/dam safety. In this case if the same flow and duration assumptions were made as in Scenario 1 (2,080 cfs for 30 days), the lake would crest 0.28 feet lower than without HAB operations, reducing the dam safety risk than if no HAB operations were implemented. There would be no risk to project purposes (water supply, fish and wildlife enhancement, navigation, and recreation). In this instance dam safety and flood control would take precedence over holding back releases to zero the water account, a concept which was developed to maintain conditions consistent with LORS. In conditions such as this, large rainstorm events such as Hurricane Irma usually result in an immediate reduction in HAB risk due to wind and rain. As witnessed in the 2017/2018 years it is typically the summer following a large event such as Irma where the HAB risk is highest. Potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Flows to the WCAs would continue to be constrained by canal and STA capacity under the proposed planned deviation. The proposed planned deviation is not expected to cause the STAs to exceed design capacity. Releases made south would be done for HAB operations with Alternative B only when in the Low, Baseflow, and Beneficial Use Sub-bands and only if conditions allow. Allowable conditions would include when receiving downstream WCA is less than a quarter of a foot above the maximum of the upper regulation schedule zone. Under LORS 2008, once the Corps determines that releases should be made south from the lake, both normally and under this proposed action, the quantity and exact timing of those releases are determined by the SFWMD. The SFWMD determines what maximum practicable flows are for that operation which includes the conveyance capacity of the EAA canals as well as the storage and treatment capacity of the STAs. If it is determined that no releases south can be made due to canal and STA capacity, then flows would not be made (**Appendix A**). The proposed action has the potential to change the timing of water releases to the WCAs to manage HABs; however, the proposed action would not change stages in the WCAs outside the established regulation schedules.

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
Regional Water Management Operations (Water Supply and Flood Control)	No significant effect. Regional water management operations to include water supply and flood control would not be expected to change from current conditions.	No significant effect. Same as Alternative A. Slightly larger releases will allow greater operational flexibility to reduce releases during times when HABs are present or forecasted in the lake or estuary systems relative to Alternative A. Water supply conditions would also be evaluated throughout HAB operations. HAB operations would not be implemented in the WSM band or if significant impacts to water supply (such as risk of falling into the WSM) were high. A buffer of 0.25 feet above the WSM band would also trigger releases to be reduced or possibly ceased to reduce the risk of falling into this band (see red dashed line in **Figure 2-1**). Advanced releases would not be utilized if conditions such as drought or La Niña are forecasted, due to the risk to water supply. **Appendix A** (shown in **Figure 2-1**) defines several zones where advanced releases could occur throughout the year. There is the "Green Zone" where advanced releases could be made up to 2,000/730 cfs at S-79/S-80. The "Orange Zone" where advanced releases could be made up to 1,000/400 cfs at S-79/S-80 and the "Purple Zone" where advanced releases would not be made and normal LORS 2008 operations would occur. These zones were informed by the modeling analysis, specifically **Table 1** within **Appendix B**. Releases could be reduced or held back at any point in the schedule if HAB conditions are present. The figure also shows the point on 1 December where the net zero release target is, which means that by that time it is intended that the water bank account will be at zero (any advanced releases were made up by holding back releases). These advanced release zones only apply when LORS Part D recommends releases of 650 cfs (450/200 at S-79/S-80). These zones help inform when advanced releases could be made, with higher stages required earlier in the dry season required to begin to help protect water supply within the lake. The Corps must weigh the risks of holding back releases against risks associated with HABs. Dam safety risk, which is determined by the Corps' Dam Safety Officer (DSO), can be informed by tropical activity/forecasts, precipitation forecasts, lake level, projected lake level and many other factors. Alternative B would include consideration of all project purposes to minimize potential effects. Effects on water supply are evaluated in **Appendix B** specifically Section 3D which includes an analysis of the frequency and duration of water shortages (**Figure 13**) in the LOSA, the LOSA water supply cutbacks for the ten worse drought years in the POR (**Figure 14**) and the table of demand, supply, and cutbacks for each of the ten worse drought years in the POR (**Table 2**). These results show that the deviation performs similarly to Alternative A (LORS2008) with minor effects. Effects that can be seen in the figures are further discussed in the analysis, as there are some components of the operational strategy that cannot be included in the modeling assumptions (such as forecasting a La Niña) and when accounted for in real implementation of the deviation would prevent most of the minor effects shown in the modeling results.
Vegetative Communities	Negligible to minor adverse effects. HABs that have occurred on Lake Okeechobee and in the downstream estuaries have impacted the quality of the estuarine environment and in lake ecology.	No significant effect on vegetative communities within Lake Okeechobee. Same as Alternative A. Negligible to minor temporary beneficial effects on SAV within the Caloosahatchee and St. Lucie estuaries. Alternative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. The benefits of seasonally variable water levels on the littoral marshes of Lake Okeechobee has been documented (RECOVER 2007, RECOVER 2020). Wetter periods can reduce the presence of flood intolerant species (woody plants) at higher elevations and can reduce the density of emergent plants at lower elevations. Drier periods can expose marsh soils and reduce accumulated muck, promote fires to reduce dead biomass, and increase plant diversity by providing the necessary regrowth periods for habitat that is stressed during wetter periods (lower elevation marshes and submerged plants). Extreme low stages (< 10 feet, NGVD) in Lake Okeechobee can have multi-year impacts on the littoral and nearshore areas of Lake Okeechobee. Most of the littoral marsh within Lake Okeechobee is dried when stages are < 12 feet, NGVD, and at > 10 feet, NGVD, nearly the entire shoreline fringing bulrush zone and much of the lake area that would otherwise support SAV dries out (RECOVER 2007, RECOVER 2020). The spread of exotic or nuisance species can also occur at extreme low lake stages (RECOVER 2007, RECOVER 2020). Prolonged extreme low stages can shift areas of former open water or SAV to dense stands of emergent plants. Extreme high stages (< 17 feet, NGVD) in Lake Okeechobee allow wind-driven waves to directly impact the nearshore emergent and submerged plant communities, causing physical uprooting and creation of

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		organic berms. High stages promote the transport of suspended solids and associated nutrients from the mid-lake region into the shoreline regions; reducing water clarity and light penetration, increasing nutrients, and reducing SAV and emergent plant densities. Consistent with LORS 2008, releases from Lake Okeechobee are not expected to result in significant deviations from lake stage thresholds (lake stage envelope of 12.5 feet, NGVD (June-July) and 15.5 feet, NGVD (November-January)) that have been identified for supporting short to long hydroperiod vegetation communities within Lake Okeechobee. The percent of time simulated Lake Okeechobee stages were below, inside, and above the lake stage envelope identified in the 2007 RECOVER performance measure for Alternative B compared to LORS 2008 for the modeled simulations can be seen in **Figure 10** in **Appendix B**. Modeled differences were observed to be less than 1-2% for each simulation relative to LORS 2008 for any one metric. Standard scores for departures above and below the lake stage envelope for the modeled simulations can be seen in **Figure 12** in **Appendix B**. Modeled differences were observed to be less than 1-3 points for each simulation relative to LORS 2008 for any one metric. Significant adverse effects to vegetation within Lake Okeechobee are not anticipated to occur under Alternative B. Over the modeled period of record, the average stage for the modeled TD simulation (reference **Appendix B**) was observed to be lower than LORS 2008 by 0.02 feet (or ¼ inch). The largest difference when stages for the modeled TD simulation were higher than LORS 2008 on any one day was 0.26 feet (September 1992). The largest difference when stages for the modeled TD simulation were lower than LORS 2008 on any one day was 0.40 feet (June 1988). A plot of the stage differences (LORS stage minus TD stage) were plotted over time and can be seen in **Figure 5** in **Appendix B**. No discernable differences in stage were observed between LORS 2008 and Alternative B for the remaining modeled simulations. Reference **Figures 7** and **8** in **Appendix B**. Releases of freshwater flow from Lake Okeechobee along with other tributary inflows and stormwater runoff can cause large fluctuations in salinity. These fluctuations often expose SAV to salinities outside of their tolerance ranges. HAB operations with Alternative B would be below the harm thresholds for the Caloosahatchee and St. Lucie estuaries for SAV as identified by the RECOVER 2007 Northern Estuaries performance measure and the revised performance measure approved on July 7, 2020. Reference **Section 2.2**. Under Alternative B, HAB operations would be limited to 2,000 cfs measured at S-79 and up to 730 cfs measured at S-80, and would only be applicable when LORS Part D recommends up to 450 cfs measured at S-79 and up to 200 cfs as measured at S-80 or when Part D does not specifically recommend releases (Beneficial Use Sub-band). Alternative B would not result in significant adverse effects to SAV. **Figure 15** and **Figure 17** in **Appendix B**, show the distribution of mean monthly flows to the St. Lucie and Caloosahatchee estuaries, respectively for the modeled simulations. Releases to the estuaries are organized into desirable ranges (minimum monthly mean flow to maintain salinity envelopes (less is better), favorable range for suitable salinity conditions (more is better), and damaging low salinity range (less is better)). Improvements were observed with Alternative B compared to LORS 2008. A higher proportion of flows were observed in the favorable range for suitable salinity conditions (350 cfs ≤ 2000 cfs St. Lucie; 450 ≤ 2800 cfs Caloosahatchee) and a lower proportion of flows were observed in the damaging low salinity range (>2000 cfs St. Lucie and > 2800 cfs Caloosahatchee). **Figure 16** and **Figure 18** in **Appendix B**, show the number of high discharge months triggered by runoff and Lake Okeechobee regulatory releases for each estuary for the modeled simulations. Improvements were observed with Alternative B compared to LORS 2008 for the St. Lucie estuary as the total number of high discharge months for each metric was observed to decrease. Decreases in the number of high discharge months triggered by Lake Okeechobee were also observed for the Caloosahatchee estuary, however the number of high discharge months triggered by runoff remained the same compared to LORS 2008. Potential temporary beneficial effects to estuarine and marine resources may occur as Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. The likelihood of Lake Okeechobee releases to the estuaries during peak summer months may be reduced under Alternative B.

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		As reference above, under ***Hydrology***, potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Flows to the WCAs would continue to be regulated by canal and STA capacity under the proposed planned deviation. Alternative B would not change stages in the WCAs outside the established regulation schedules. Vegetative communities in the WCAs would not be significantly affected by Alternative B.
Geology and Soils	No significant effect. Geology and soils would not be expected to significantly change from current conditions.	No significant effect. Same as Alternative A. Alternative B consists of an operational change to LORS 2008. No construction is proposed. Physical disturbance to existing soils would not occur. There will be conditions under Alternative B which would lead to higher or lower releases than those which would have been experienced under LORS 2008 alone; however the frequency of extreme low or extreme high lake stages is not anticipated to significantly increase as a direct result of HAB operations. Nor is the frequency of deviations above and below the lake stage envelope expected to significantly increase. Results shown in **Appendix B** support this conclusion. Reference ***Vegetative Communities*** above for a discussion on potential effects of extreme low lake stages on the littoral marshes of Lake Okeechobee. Drier periods can expose marsh soils, reduce accumulated muck, and promote fires causing disturbances to existing geology and soils, including oxidation of peat soils and the potential for permanent loss of marsh elevation. Peat soils in the WCAs would not be significantly affected by Alternative B. As reference above, under ***Hydrology,*** potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Flows to the WCAs would continue to be regulated by canal and STA capacity under the proposed planned deviation. Alternative B would not change stages in the WCAs outside the established regulation schedules, and therefore would not increase the frequency of drought risk that can cause soils to oxidize and/or be lost to fire.
Fish and Wildlife Resources	Negligible to minor adverse effects. HABs that have occurred on Lake Okeechobee and in the downstream estuaries have impacted the quality of the estuarine environment and in lake ecology.	No significant effect on fish and wildlife communities within Lake Okeechobee. Same as Alternative A. Negligible to minor temporary beneficial effects within the Caloosahatchee and St. Lucie estuaries. Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. The benefits of seasonally variable water levels on the littoral marshes of Lake Okeechobee has been documented (RECOVER 2007, RECOVER 2020). Wetter periods can improve foraging access for aquatic predators, protect nesting areas for species like wading birds, snail kites, alligators, and sport fish. Seasonal (winter) high water levels (near 15 feet, NGVD) inundate nesting and foraging habitat for wading birds, while water levels near 14 feet, NGVD in mid-March support peak snail kite nest initiations. Falling water levels from near 15 feet, NGVD in late winter to 12 to 13 feet, NGVD in the spring concentrates prey resources in the littoral zone for improved wading bird foraging and nesting. Interannual variability of high and low lake stages allows drier and wetter years, driving productivity and balancing tradeoffs between good nesting years (e.g. wading birds and snail kites, littoral marsh prey production) and habitat recovery and maintenance years (e.g. submerged plants, bulrush, woody nesting substrates). As discussed above under *Vegetative Communities*, extreme low stages (< 10 feet, NGVD) can have multi-year impacts on the littoral and nearshore areas of Lake Okeechobee, which in turn has an effect on fish and wildlife resources through the direct loss of habitat as former open water or SAV shifts to dense stands of emergent plants. Changes in habitat structure like loss of SAV may reduce fish populations. Breeding seasons of snail kites and wading birds may also be affected by extreme low lake stages. For the snail kite, their primary prey, the Florida apple snail, requires water to reproduce and cannot survive extended dry conditions. Extreme high stages (> 17 feet, NGVD) in Lake Okeechobee can also reduce foraging habitat and prey density for wading birds and snail kites resulting in reduced nesting effort. Wading bird foraging is limited by water depth. The littoral marsh of Lake Okeechobee becomes too deep for several long-legged wading birds at stages greater than 16 feet, NGVD. As referenced above, under ***Vegetative Communities,*** consistent with LORS 2008, releases from Lake Okeechobee are not expected to result in significant deviations from lake stage thresholds (lake stage envelope of 12.5 feet, NGVD (June-July) and 15.5 feet, NGVD (November-January)) that have been identified for supporting a healthy ecosystem within Lake Okeechobee. Differences were observed to be less than 1-2% for each modeled simulation for Alternative B relative to LORS 2008 for the percent of time simulated Lake Okeechobee stages were below, inside, and above the lake stage envelope (**Figure 10** in **Appendix B**). Standard scores for departures above and

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		below the lake stage envelope for the modeled simulations were observed to be less than 1-3 points for each simulation relative to LORS 2008 for any one metric (**Figure 12** in **Appendix B**). Over the modeled period of record, the average stage for the modeled TD simulation was observed to be lower than LORS 2008 by 0.02 feet (or ¼ inch). The largest difference when stages for the modeled TD simulation were higher than LORS 2008 on any one day was 0.26 feet (September 1992). No discernable differences in stage were observed between LORS 2008 and Alternative B for the modeled simulations in **Appendix B**. Reference **Figures 7** and **8**. Under Alternative B, HAB operations would be limited to 2,000 cfs measured at S-79 and up to 730 cfs measured at S-80, and would only be applicable when LORS Part D recommends up to 450 cfs measured at S-79 and up to 200 cfs as measured at S-80 or when Part D does not specifically recommend releases (Beneficial Use Sub-band). Under this maximum release scenario, the recession rate per week would be 0.09 feet per week, which is below the 0.16 feet per week recession rate identified to be protective of the Everglade snail kite (Fletcher et al. 2017). It is acknowledged that releases out of S-79 and S-80 are not the only contributing factors to Lake Okeechobee recession rates, of which can include water supply releases and evaporation. Rapid recession may result in stranded adult apple snails that may be unavailable to snail kites, consequently reducing snail kite foraging and breeding suitability, and juvenile snail kite survival. Rapid recessions may also reduce suitability of nesting substrates (nest collapse in cattails), or dewatering the area around the nest thereby facilitating nest predation. Under Alternative B, recession rates would be monitored weekly to avoid 30 day recession rates that are greater than 0.5 feet per month (reference **Appendix A** for further clarification on calculation). The proposed planned deviation specifically accounts for recession rates such that if recession rates exceeded 0.5 feet per month, releases would be cut back or discontinued. Furthermore, when lake stages are below 12 feet, NGVD, releases would only be made if the lake was rising rapidly (greater than 0.15 feet per week on average). Attenuating the rate of rise on the lake can be beneficial to lake ecology. It is not intended that HAB operations would result in releases that would cause high or unnatural recession rates. If this occurs releases would be considered for adjustment. As referenced above, under ***Vegetative Communities,*** HAB operations with Alternative B would be below the harm thresholds for the Caloosahatchee and St. Lucie estuaries for oysters as identified by the RECOVER 2007 Northern Estuaries performance measure and the revised performance measure approved on July 7, 2020. Reference **Section 2.1**. Alternative B would not result in significant adverse effects to estuarine and marine resources. **Figure 15** and **Figure 17** in **Appendix B**, show the distribution of mean monthly flows to the St. Lucie and Caloosahatchee estuaries, respectively for the modeled simulations. Improvements were observed with Alternative B compared to LORS 2008. A higher proportion of flows were observed in the favorable range for suitable salinity conditions (350 cfs ≤ 2000 cfs St. Lucie; 450 ≤ 2800 cfs Caloosahatchee) and a lower proportion of flows were observed in the damaging low salinity range (>2000 cfs St. Lucie and > 2800 cfs Caloosahatchee). Reference **Figure 16** and **Figure 18** in **Appendix B**, for the number of high discharge months triggered by runoff and Lake Okeechobee regulatory releases for each estuary for the modeled simulations. Improvements were observed with Alternative B compared to LORS 2008 in the number of high discharge months triggered by Lake Okeechobee for both the Caloosahatchee and St. Lucie estuary as the total number of high discharge months for each metric was observed to decrease. Potential temporary beneficial effects to estuarine and marine resources may occur as Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. The likelihood of Lake Okeechobee releases to the estuaries during peak summer months may be reduced under Alternative B. As reference above, under ***Hydrology***, potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Flows to the WCAs would continue to be regulated by canal and STA capacity under the proposed planned deviation. Alternative B would not change stages in the WCAs outside the established regulation schedules. Fish and wildlife resources in the WCAs would not be significantly affected by Alternative B.

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		The Corps agrees to maintain open and cooperative communication during the planned deviation through the periodic scientists calls (PSCs). When initializing HAB operations, the Corps would engage with federal and state agencies to develop a plan on timing and quantity of advance releases to be made under these operations. Ecological conditions within the project area would be evaluated at the PSCs. If recommendations by other agencies were made against releases for risk of causing ecological harm, the provided recommendations would be taken into consideration and the proposed releases under Alternative B may not be made. Reference **Section 4.5**.
Threatened and Endangered Species	The Corps recently updated our ESA consultation record with the NMFS and the USFWS with respect to LORS 2008, as a result of information that was analyzed with respect to Lake Okeechobee water releases and effects on blue green algae and red tide downstream. Reference **Section 7.1.2**. Effects determinations for federally listed species and designated critical habitat under the purview of the NMFS and the USFWS as a result of implementation of LORS 2008 are provided below. Re-initiation of consultation with the NMFS concluded on March 27, 2020. In correspondence dated June 6, 2019, the USFWS indicated that they have found no causal links that effects to the West Indian manatee result either directly or indirectly from Lake Okeechobee water releases, however, the Corps continues to work with the USFWS on issues related to LORS operations and listed species. NMFS: No Effect for the Nassau grouper, Oceanic whitetip shark, Elkhorn coral, Staghorn coral, Boulder star coral, Mountainous star coral, Lobed start coral, Rough cactus coral, and Pillar coral; Not Likely to Adversely Affect (NLAA) for the Green, Kemp's Ridley, Leatherback, Loggerhead, and Hawksbill sea turtles, Smalltooth sawfish, Giant manta ray, and Johnson's seagrass. Reference **Table C.2-1** in **Appendix C.2**. USFWS: "No Effect" for the Florida panther, Eastern indigo snake, Cape Sable seaside sparrow, Audubon's crested caracara, Piping plover, and Red knot; May Affect Not Likely to Adversely Affect (MANLAA) for the West Indian manatee and its designated critical habitat, Florida bonneted bat, Wood stork, and Okeechobee Gourd; and May Affect, for the Everglade snail kite and its designated critical habitat. Reference **Table C.2-2** in **Appendix C.2**.	Pursuant to Section 7 of the ESA of 1973, as amended, the Corps has determined that the proposed action would have no effect on federally listed species and designated critical habitat under the purview of the NMFS and the USFWS listed in **Table 3-1**. Water management operations under Alternative B have not been modified in a manner that causes an effect to listed species or critical habitat that is not considered in prior ESA consultation for LORS 2008. LORS 2008 serves as the environmental baseline for purposes of ESA consultation. Consistent with LORS 2008, releases from Lake Okeechobee are not expected to result in significant deviations from lake stage thresholds (lake stage envelope of 12.5 feet, NGVD (June-July) and 15.5 feet, NGVD (November-January)) that have been identified for supporting short to long hydroperiod vegetation communities and fish and wildlife resources within Lake Okeechobee. Consistent with LORS 2008, releases from Lake Okeechobee are not expected to exceed the harm thresholds for the Caloosahatchee (> 2800 cfs) and St. Lucie (>2000 cfs) estuaries that have been identified for establishing and maintaining salinity regimes that sustain healthy estuarine ecosystems as identified by the RECOVER 2007 Northern Estuaries performance measure and the revised performance measure currently available for review. The proposed planned deviation would have no effect on federally listed species above the environmental baseline. Correspondence regarding these effects determinations was provided to each agency with release of the NOA for this supplemental EA. The NMFS and the USFWS are not required to respond to the Corps' determination of no effect for federally listed species in the action area. The Corps is recommending measures to avoid and minimize any additional effect above the environmental baseline to the Everglade snail kite and its designated critical habitat. These measures include achieving a net zero stage difference from LORS 2008 releases prior to the start of peak nesting season in February to avoid low stage effects on nest initiation (Fletcher, 2017). In addition, recession rates would be monitored weekly to avoid 30 day recession rates that are greater than 0.5 feet per month (reference **Appendix A** for further clarification on calculation). If recession rates are higher than the 0.5 feet per month threshold based on a given weekly assessment, then flows would be reduced to what is recommended under LORS 2008 based on the current lake stage. The Corps agrees to maintain open and cooperative communication with the NMFS and the USFWS during the planned deviation, in addition to coordination with all agencies through the PSCs. When initializing HAB operations. Ecological conditions within the project area would be evaluated at the PSCs. If recommendations by other agencies were made against releases for risk of causing ecological harm, the provided recommendations would be taken into consideration and the proposed releases under Alternative B may not be made. Reference **Section 4.5**.
Essential Fish Habitat	Negligible to minor adverse effects. The NMFS Southeast Region's Habitat Conservation Division (HCD) implements the Essential Fish Habitat (EFH) program in the coastal states from North Carolina south through Texas, as well as the territories of Puerto Rico and the U.S. Virgin Islands. One of the principal authorities for protecting and conserving marine fishery habitats is the EFH provisions of the Magnuson–Stevens Fishery Conservation and Management Act. The Magnuson-Stevens Act, defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1802 (10). Tidally influenced portions of the Caloosahatchee and St. Lucie Rivers and downstream coastal areas support oyster, hard bottom, mangrove wetlands, estuarine emergent marsh, SAV and coastal inlet habitats which have been designated as EFH by the Gulf of Mexico and South Atlantic Fishery Management Councils (SAFMC). The SAFMC identifies oyster/shell habitat as a Habitat Area of Particular Concern for estuarine dependent species of the snapper-grouper complex.	Negligible to minor temporary beneficial effects. As referenced above, under ***Vegetative Communities***, HAB operations with Alternative B would be below the harm thresholds for the Caloosahatchee and St. Lucie estuaries that are designated EFH and Habitat Areas of particular Concern for Federally managed fishery species. Reference **Section 2.2** for further information on flow targets developed to achieve desired salinity ranges in the estuaries. Under Alternative B, HAB operations would be limited to 2,000 cfs measured at S-79 and up to 730 cfs measured at S-80, and would only be applicable when LORS Part D recommends up to 450 cfs measured at S-79 and up to 200 cfs as measured at S-80 or when Part D does not specifically recommend releases (Beneficial Use Sub-band). Alternative B would not result in significant adverse effects to estuarine and marine resources including EFH. **Figure 15** and **Figure 17** in **Appendix B**, show the distribution of mean monthly flows to the St. Lucie and Caloosahatchee estuaries, respectively for the modeled simulations. Improvements were observed with

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
	Large freshwater releases from Lake Okeechobee reduce salinity within the Caloosahatchee and St. Lucie estuaries and can adversely affect EFH. HABs that have occurred on Lake Okeechobee and in the downstream estuaries have impacted the quality of the estuarine environment.	Alternative B compared to LORS 2008. A higher proportion of flows were observed in the favorable range for suitable salinity conditions (350 cfs ≤ 2000 cfs St. Lucie; 450 ≤ 2800 cfs Caloosahatchee) and a lower proportion of flows were observed in the damaging low salinity range (>2000 cfs St. Lucie and > 2800 cfs Caloosahatchee). Reference **Figure 16** and **Figure 18** in **Appendix B**, for the number of high discharge months triggered by runoff and Lake Okeechobee regulatory releases for each estuary for the modeled simulations. Improvements were observed with Alternative B compared to LORS 2008 in the number of high discharge months triggered by Lake Okeechobee for both the Caloosahatchee and St. Lucie estuary as the total number of high discharge months for each metric was observed to decrease. The likelihood of Lake Okeechobee releases to the estuaries during peak summer months may be reduced under Alternative B. The Corps coordinated with the NMFS on potential effects to EFH during development of the 2019 LORS Planned Deviation Draft EA. The NMFS HCD responded on August 23, 2019 stating that they concurred with the Corp's determination of anticipated minimal EFH effects. No EFH conservation recommendations were provided. To assist the Corps in monitoring HABs the NMFS provided a list of HAB websites to inform science based implementation of the proposed deviation. Reference **Appendix C.2**. Correspondence was not received in response to the NOA sent on July 1, 2020.
Water Quality	No change from current conditions. HABs will continue to occur periodically dependent on rainfall patterns, climate patterns (primarily wind regime), nutrient loading to Lake Okeechobee and estuaries and other factors that may influence HAB/turbidity/nutrients in the water column and SAV (helps reduce sediment resuspension as well as sequester nutrients, resulting in less available for HAB events). The STA's have been significantly overloaded over the past few years (designed to handle average of 60 thousand acre feet per year (k-ac ft./yr.) with loading of 200 to 300 k-ac ft./yr. over the past 4 years. High steady (non pulse) flows to the estuaries reduces tidal flushing and increases stratification of the water column. Reduced tidal flushing of the canals etc. and increased stratification of the water column is believed to enhance freshwater bloom formation conditions of Microcystis A.	Reduced deliveries of freshwater during prime HAB season to the estuaries would help minimize increases in habitat area for freshwater blooms. Blue green algae from Lake Okeechobee are a freshwater species that die in saline conditions. This is expected to help dampen the intensity of estuarine fresh water HAB events. By making releases to the estuaries during the fresh water HAB offseason, the potential for having to make high steady releases to the estuaries during the fresh water HAB season is reduced. Deliveries of the STA's above design treatment capacity is not expected to change under Alternative B. In general the capacity of the STA's (varies temporarily based on many factors such as previous loading, vegetation conditions, nutrient concentrations of inflows, etc.) is considered as a constraint for the flows routed south from Lake Okeechobee. Alternative B is not expected to cause the STAs to exceed design capacity, because releases south will only be made to the maximum practicable (consistent with LORS Part C). Once the Corps determines that releases should be made south from the lake, the quantity and exact timing of those releases are determined by the SFWMD. They determine what maximum practicable flows are for that operation which includes the conveyance capacity of the EAA canals as well as the storage and treatment capacity of the STAs. If it is determined that no releases south can be made due to treatment capacity, then flows will not be made. The intent of this deviation is to deliver the same volume of water during a 10 month period (between 1 February and 1 December) but to change the timing of deliveries (prior to and after peak freshwater algal bloom conditions). Releases made above or under LORS guidance will be tracked such that the goal is a net zero sum at the end of the 10 month period (between 1 February and 1 December). Conditions which may impact the zero sum could be, but not limited to, a large rainfall or tropical event, drought, La Niña or El Niño, or environmental concerns. Due to this tracking and banking, assuming the normal range of wet and dry season hydrologic variability, there is no expected net increase in nutrient deliveries projected to be delivered to the south, east and west of Lake Okeechobee. By 1 December, if in the unlikely chance that a balance is still present in the water bank, the balance would be carried over to the following year in order to minimize impacts. For additional details please refer to **Appendix A**.
Hazardous, Toxic, and Radioactive Wastes	No significant effect.	No significant effect. Same as Alternative A. Alternative B consists of an operational change to LORS 2008 and would not result in the discovery or mobilization of HTRW. No construction is proposed.
Air Quality	No significant effect. Air quality within the project area would not be expected to change from current conditions.	No significant effect. Same as Alternative A. Alternative B consists of an operational to LORS 2008. No construction is proposed.
Noise	No significant effect. Noise levels within the project area would not be expected to change from current conditions.	No significant effect. Same as Alternative A. Alternative B consists of an operational change to LORS 2008. No construction is proposed.

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
Aesthetics	No significant effect. HABs that have occurred on Lake Okeechobee and in the downstream estuaries, have detracted from current appearances (i.e. clarity of water column, fish kills).	Negligible to minor temporary beneficial effects. Alternative B consists of an operational change to LORS 2008 and does not include construction of permanent structures or structural modifications to existing C&SF project features. As such, the existing landscape profile would not be altered. Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas.
Socioeconomics	Minor to moderate adverse effects. HABs that have occurred on Lake Okeechobee and in the downstream estuaries, have impacted surrounding communities that are dependent on tourism, recreation, and real estate and have led to economic losses. HABs pose an immediate threat and impact to valuable natural resources that underpin local economies.	Negligible to minor temporary beneficial effects. Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. Economic losses to the Caloosahatchee and St. Lucie estuaries associated with HABs in recent years is assumed to be significant. Alternative B is expected to reduce economic losses that could result from HABs. The presence of HABs within Lake Okeechobee may impact existing recreational use as HABs are aesthetically unpleasing and present a human health and safety risk. However, the number and duration of HABs in Lake Okeechobee is not expected to change as a direct result of Alternative B. The main factors influencing bloom occurrence and intensity include sunlight, nutrient loads, wind conditions, temperature and still/stagnant/stratified water conditions, of which Alternative B cannot control. The lake releases the Corps is able to make are small relative to the volume/extent of Lake Okeechobee and cannot disrupt stratification of the water column within the lake.
Recreation	Minor to moderate adverse effects. Many areas throughout the project area are used for recreational activities including hunting, camping, bicycling, hiking, horseback riding, canoeing, boating, swimming, and freshwater and saltwater fishing. The Okeechobee Waterway (OWW) is an important marine highway which provides the only cross-Florida access for both commercial and recreational vessels. HABs that have occurred on Lake Okeechobee and in the downstream estuaries, have impacted surrounding communities that are dependent on tourism and recreational boating and fishing that have led to the closure of recreational areas.	Negligible to minor temporary beneficial effects. Alterative B would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas. Alternative B may benefit recreation within the Caloosahatchee and St. Lucie estuaries by reducing the potential closure of recreational areas due to HABs. Recreation is an authorized project purpose for both the OWW and the C&SF project. There are abundant recreational facilities within the project area, both private and public; however, no specific water management operations are required for this purpose. Lake and canal levels under LORS 2008 are not specifically managed for recreation, although lake levels do affect recreation facilities. For example, boat launching ramps, pleasure crafts, sightseeing vessels, bank, and small boat fishing are all influenced by lake levels. The lake level has a significant impact upon commercial and recreational navigation and the marine industry of Florida. A minimum Lake level of 12 feet provides a maximum recommended draft of 6 feet along Route 1 and 4 feet along Route 2 (based on a 2007 channel condition survey), provided the OWW channel is properly maintained. When lake levels are allowed to drop below 12 feet, navigation on the federal waterway becomes dramatically constricted, commercial and recreational vessel traffic is significantly reduced, and the use of the OWW as a hurricane evacuation route is severely compromised. Significant increases in the occurrence of low water events that may impact recreational boat users navigating Lake Okeechobee and accessing the lake from local boat ramps are not anticipated under Alternative B. As referenced above, under ***Vegetative Communities,*** consistent with LORS 2008, releases from Lake Okeechobee are not expected to result in significant deviations from lake stage thresholds (lake stage envelope of 12.5 feet, NGVD (June-July) and 15.5 feet, NGVD (November-January)) that have been identified for supporting a healthy ecosystem within Lake Okeechobee. Differences were observed to be less than 1-2% for each modeled simulation for Alternative B relative to LORS 2008 for the percent of time simulated Lake Okeechobee stages were below, inside, and above the lake stage envelope (**Figure 10** in **Appendix B**). Standard scores for departures above and below the lake stage envelope for the modeled simulations were observed to be less than 1-3 points for each simulation relative to LORS 2008 for any one metric (**Figure 12** in **Appendix B**). Over the modeled period of record, the average stage for the modeled TD simulation was observed to be lower than LORS 2008 by 0.02 feet (or ¼ inch). The largest difference when stages for the modeled TD simulation were higher than LORS 2008 on any one day was 0.26 feet (September 1992). No discernable differences in stage were observed between LORS 2008 and Alternative B for the modeled simulations in **Appendix B**. Reference **Figures 7** and **8**. Significant adverse effects

Resource	Alternative A (No Action Alternative: LORS 2008)	Alternative B (HAB Operational Strategy)
		to recreation as a result of an increase in low water levels on Lake Okeechobee are not anticipated to occur under Alternative B. The presence of HABs within Lake Okeechobee may impact existing recreational use, as HABs are aesthetically unpleasing and present a human health and safety risk. However, the number and duration of HABs in Lake Okeechobee is not expected to change as a direct result of Alternative B. The main factors influencing bloom occurrence and intensity include sunlight, nutrient loads, wind conditions, temperature and still/stagnant/stratified water conditions, of which the proposed operational criteria cannot control. The lake releases the Corps is able to make are small relative to the volume/extent of Lake Okeechobee and cannot disrupt stratification of the water column within the lake.
Cultural Resources	No effect.	No effect. Same as Alternative A. As reference above, under ***Hydrology***, potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Flows to the WCAs would continue to be regulated by canal and STA capacity under the proposed planned deviation. Alternative B has the potential to change the timing of water releases to the WCAs, where cultural resources and tree islands with historic properties or potential historic properties are present, however, Alternative B would not change stages in the WCAs outside the established regulation schedules. There would be no change from the existing condition for purposes of considering effects to cultural resources or historic properties. Furthermore, the release of water to tide has no potential to effect cultural resources or historic properties. Therefore, the Corps has determined the proposed deviation has no potential to effect historic properties pursuant to 36 CFR § 800.3(a) (1) and consideration given under the NEPA.
Native Americans	No effect.	No effect. Same as Alternative A. Reference *Regional Water Management* in the above table for effects on water supply. The Corps recognizes that the Seminole Tribe of Florida has federally protected water entitlement rights, and that LORS 2008, or other water control structures and pumps, may provide water to the Big Cypress and Brighton Seminole Indian Reservations. Alternative B is anticipated to have no effect on the Water Rights Compact (25 USC Section 1722e) as HAB operations would have a net zero effect on lake stage. Triggers are in place within the operational strategy to anticipate water supply risks. If dryer than normal conditions, drought, or La Nina conditions are forecasted, advanced releases would not be implemented to minimize potential risks to water supply. Advanced releases would also be cut back if water levels fell within 0.25 feet, NGVD of the WSM Band. Reference **Section 6** for coordination with the Seminole Tribe of Florida and Miccosukee Indian Tribe of Florida during development of the 2019 LORS Planned Deviation Draft EA. An NOA for this supplemental EA was e-mailed to the Tribes to begin the 30 day review period. Correspondence was not received in response to an NOA sent on July 1, 2020.

4.1 Cumulative Effects

Cumulative effects include the effects of future Federal, State, Tribal, local, or private actions reasonably certain to occur in the action area considered in this EA. Cumulative effects are defined in 40 CFR 1508.7 as those effects that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. **Table 4-2** summarizes past, present and projected Corps efforts that cumulatively affect the regional environment of South Florida with respect to water management operations. In addition, there are efforts underway by other Federal, State, and local agencies, as well as non-governmental organizations that are all working toward similar restoration goals. The proposed action is expected to contribute to a net beneficial effect on the region. The Corps is proposing to initiate a planned deviation from LORS 2008 in anticipation of and following freshwater HABs to reduce the risk of exacerbating potential health concerns associated with algal blooms in Lake Okeechobee, the St. Lucie, and Caloosahatchee estuaries while not impacting other project purposes. The proposed action would provide operational flexibility to manage water to reduce the risk of transporting a HAB from Lake Okeechobee to the Caloosahatchee and St. Lucie estuaries and/or exacerbating a HAB in these areas.

Modeling conducted in support of this final revised supplemental EA (**Appendix B**) shows that potential effects of the proposed action on stages within Lake Okeechobee are expected to be similar to LORS 2008. Significant adverse effects to the human environment are not expected relative to the No Action Alternative (LORS 2008). Reference **Table 4-1.** Because of the nature of the proposed planned deviation, the Corps may not take water management action immediately upon approval of the deviation. The operational strategy (**Appendix A**) in this final revised supplemental EA describes the conditions and the coordination necessary for water management action to be taken. Based on current conditions within Lake Okeechobee (as of June 9, 2020) it is unlikely that action will be taken immediately. Once action is taken, which will be communicated publicly at the beginning and throughout that year, the Corps will evaluate the performance of the strategy, identify outcomes, challenges, and conclusions in a memo to the South Atlantic Division Commander and may request changes to or an extension of the deviation based on that analysis. A subsequent extension may be applied for until LORS 2008 is replaced by a revised water control plan (LOSOM) that includes the Lake Okeechobee regulation schedule and is anticipated in 2022. The Corps may also terminate the deviation at any time. The Corps' operations under this deviation will be consistent with NEPA coverage. If conditions warrant operations outside of the NEPA analysis associated with this deviation, additional NEPA documentation will be prepared. Given the short duration of the proposed planned deviation being in place (until LOSOM), potential cumulative effects with other CERP and non-CERP projects are negligible.

The proposed planned deviation was analyzed in the context of sending water south using a similar long-term-average annual volume of water used in restoration strategies. Therefore, the proposed planned deviation is not expected to cause the STAs to exceed design capacity. Flows to the WCAs would continue to be constrained by canal and STA capacity under the proposed planned deviation. Potential effects of Alternative B on stages in the WCAs are expected to be similar to LORS 2008. Releases made south would be done for HAB operations with Alternative B only when in the Low, Baseflow, and Beneficial Use Sub-bands and only if conditions allow. Allowable conditions would include when receiving downstream WCA is less than a quarter of a foot above the maximum of the upper regulation schedule zone. Under LORS 2008, once the Corps determines that releases should be made south from the lake, both normally and under this proposed action, the quantity and exact timing of those releases are determined by the SFWMD. The SFWMD determines what maximum practicable flows are for that operation which includes

the conveyance capacity of the EAA canals as well as the storage and treatment capacity of the STAs. If it is determined that no releases south can be made due to canal and STA capacity, then flows would not be made (**Appendix A**). The proposed action has the potential to change the timing of water releases to the WCAs to manage HABs; however, the proposed action would not change stages in the WCAs outside the established regulation schedules.

Table 4-2. Past, present and reasonably foreseeable actions and plans affecting the action area.

Projects and Operational Plans	Past Actions and Authorized Plans	Current Actions and Operating Plans	Reasonably Foreseeable Future Actions and Plans
Status of Non-Comprehensive Everglades Restoration Plan (CERP) Projects	- C&SF project (1948) - Everglades National Park (ENP) Protection and Expansion Act (1989) - Modified Water Deliveries (MWD) General Design Memorandum and Final EIS (1992) - C-111 South Dade General Reevaluation Report (GRR) (1994)	- SFWMD Restoration Strategies Project - MWD 8.5 Square Mile Area GRR (2000) - MWD Tamiami Trail Modifications Limited Reevaluation Report (2008) - C&SF C-51 West End Flood Control Project - Kissimmee River Restoration - Seepage Barrier near the L-31 N Levee (Miami-Dade Limestone Products Association) - Tamiami Trail Modifications Next Steps (TTMNS) Project, Phase 1 - SFWMD Florida Bay Initiatives - C-111 South Dade Project (Contracts 8, 8A, and 9)	- SFWMD Complete Restoration Strategies Project - MWD Closeout - TTMNS Project, Phase 2
Operations Plan for Lake Okeechobee, WCA 3A, ENP and the South Dade Conveyance System (SDCS)	- Water Supply and Environment (WSE) Lake Okeechobee Regulation Schedule (2000) - Interim Operational Plan (IOP) 2002 to 2012 Everglades Restoration Transition Plan (ERTP)	- LORS 2008 - SFWMD Lower East Coast Regional Water Supply Plan - ERTP October 2012 until replaced by the Combined Operational Plan (COP); temporary planned deviations included Increment 1 and Increment 1.1 and 1.2 and 2 Operational Strategies - Herbert Hoover Dike Dam Safety Modification Study (HHD DSMS) risk reduction measures (2011 through 2022)	- LORS 2008 expected to be replaced by revised LOSOM in 2022 - SFWMD periodically revises the LEC Regional Water Supply Plan - COP expected implementation August 2020

CERP Projects		Congressional Authorization Received: - Broward County Water Preserve Areas Project - Caloosahatchee River (C-43) West Basin Storage Reservoir - Central Everglades Planning Project (CEPP) - Project for ecosystem restoration, Central and Southern Florida, Everglades Agricultural Area, Florida, as described in Section 1308 of the Water Resources Development Act (WRDA) 2018 Congressional Authorization Received and Construction in Progress: - CEPP (Department of Interior (DOI) removal of portions of Old Tamiami Trail roadway and SFWMD increased capacity of S-333N) - Indian River Lagoon-South Project - Picayune Strand Restoration Project - Site 1 Impoundment Project - Biscayne Bay Coastal Wetlands Project Phase 1 - C-111 Spreader Canal Western Project (operated by SFWMD)	Future CERP Projects: - Lake Okeechobee Watershed Restoration Project - Western Everglades Restoration Project - Biscayne Bay Coastal Wetlands Phase 2 - C-111 Spreader Canal Project Phase 2

4.2 Irreversible and Irretrievable Commitment of Resources

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. The proposed action consists of a temporary operational change to existing water management operations and does not include construction of permanent structures or modifications to existing water management features. The proposed action would not cause the permanent removal or consumption of any natural resources.

4.3 Unavoidable and Adverse Environmental Effects

Environmental effects for each resource are discussed above in **Table 4-1**. The proposed action is not anticipated to result in unavoidable and significant adverse environmental effects and is temporary in nature. The Corps' assessment of hydrometeorological conditions and stakeholder or agency input may terminate the planned deviation at any time due to impacts greater than expected/discussed within this final revised supplemental EA.

4.4 Conflicts and Controversy

Over the lifetime of the C&SF project, considerable interest has been generated among local and regional stakeholders. The Corps continually strives to include all interested parties in its decision making process and will continue to consider all issues that arise. Reference **Section 6** for a description of coordination with Federal, State, and local agencies, affected Indian Tribes, and other interested private organizations and individuals regarding the proposed action. **Appendix C.1** contains pertinent correspondence related to the 2019 LORS Planned Deviation Draft EA, including a comment response matrix (**Table C.1-1**) to address public review of the EA. Comments received from public review of the 2019 LORS Planned Deviation Draft EA have been considered in developing the draft revised supplemental EA. Appendix **C.1** also contains pertinent correspondence related to release of the draft revised supplemental EA, including a comment response matrix (**Table C.1-2**) to address comments received from public review. Several stakeholders provided supporting documentation in addition to the letters summarizing their comments. Supporting documentation is not included in **Appendix C.1** and can be provided upon request.

The following provides a summary of potential concerns received from public review of the 2019 LORS Planned Deviation Draft EA and the draft revised supplemental EA:

- Authority: Authority by the Corps to implement the proposed deviation
- Operations: lack of operational guidance as to when and for what length of time the Corps would make releases from Lake Okeechobee in response to HAB; concerns related to water banking and the ability to reach a net zero balance such that the total volume released across the annual deviation time period is unchanged from the releases that would have taken place under LORS 2008.
- Environmental Effects: the influence of HAB operations on salinities in the Northern Estuaries and potential effects to the estuarine and nearshore marine habitats; the influence of HAB operations on the release of nutrients into the Northern Estuaries and association with red tide events; the influence of HAB operations and water quality including MFLs and TMDLs; the influence of HAB operations on lake stage, and the ability to minimize low lake stages and high recession rates that affect threatened and endangered species conservation efforts; the influence of HAB operations on water quality treatment performance of STAs and ability to meet state water quality standards in the Everglades Protection Area (WCAs and ENP).
- Recreation and Navigation: the influence of HAB operations on lake stage and potential effects to recreational access including ability to navigate during low water events and potential economic impact on the marinas and fishing businesses
- Public Health and Safety: the influence of HAB operations on water supply and coastal flooding
- Socioeconomics: potential effects to agriculture within the EAA due to the influence of HAB operations on water supply

- NEPA: preparation of an EA versus an EIS; compliance with environmental requirements

In response to comments received, language within **Section 1.1** (**Project Authority**) of the draft revised supplemental EA was updated to reflect the pertinent authority under which the Corps may consider water quality in its operations of the C&SF Project. The operational strategy in **Appendix A** has also been amended from the 2019 LORS Planned Deviation Draft EA by establishing the concept of a credit limit for each year that the planned deviation would be implemented based on projected forecasts for that year, to address concerns related to below average dry conditions (i.e. low lake levels) following advanced releases.

4.5 Environmental Commitments

The Corps commits to avoiding, minimizing or mitigating for adverse effects. All practicable means to avoid or minimize environmental effects were incorporated into the preferred alternative (Alternative B). 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 includes consideration of, but not limited to: C&SF project conditions, historical lake levels, estuary conditions/needs, lake ecology conditions/needs, WCA water levels, STA available capacity, current climate conditions, climate forecasts, hydrologic outlooks, projected lake level rise/recession, and water supply conditions/needs. Reference **Appendix A**.

When initializing HAB operations, the Corps would engage with federal and state agencies to develop a plan on timing and quantity of advance releases to be made under these operations. The State of Florida has the authority to regulate water quality within the C&SF Project and their monitoring information and expertise will be taken into consideration during HAB operations. This plan will be re-evaluated for each instance of these operations. The Corps is committed to continuing meeting with stakeholders to gather information on current conditions and observations. Periodically (currently select Tuesdays), a group of water managers, scientists and engineers from the Corps, the sponsor (SFWMD), and other federal, state and local agencies meet via telephone conference to discuss conditions of the C&SF system as well as concerns related to fish and wildlife, water quality, and water supply. The Corps is committed to using this forum prior to consideration of any deviation related releases. Information gathered at this forum can help inform when HAB operations may be warranted. The call also allows for members of the public to listen and then provide comment during a public comment period. Reports on the ecological and hydrological status of different physiographic areas, such as estuaries and the Everglades, are presented. Meeting input is documented and available upon request to the Corps.

Under the proposed action, the Corps would continue consulting with the agencies weekly to determine the status of the individual ecosystems in the project area. When initializing HAB operations, the Corps will engage with federal and state agencies to develop a plan on timing and quantity of advance releases to be made under these operations. Determinations will be made based on best science available on HAB occurrence or likelihood of occurrence in coordination with agency experts at the SFWMD, U.S. Geological Survey (USGS), FDEP, NOAA, DOH, and the U.S. Environmental Protection Agency (USEPA). Much attention from the group centers on the spring season (March-June), which is critical for all ecosystems in the area. For Lake Okeechobee, allowing spring recessions with limited reversals is critical to plants and animals, including nesting and foraging habitat for the endangered snail kite. Additionally, many estuarine dependent species reproduce in the spring. This is a critical period for maintaining certain flow ranges for proper salinity regimes in the estuaries. It is not intended that releases should cause high or unnatural recession rates and if this occurs releases will be considered for adjustment. The public will be notified of

these releases by the Corps normal water management notification process (press release, internet webpage).

5 LIST OF PREPARERS

Table 5-1 provides a list of the persons involved in the preparation and review of this document.

Table 5-1. List of report preparers and reviewers.

Name	Organization	Discipline/Expertise	Role in Document Preparation
Luis Alejandro	USACE	Water Manager	Reviewer
Chris Altes	USACE	Archeologist	Cultural Resource Analyses
Laureen Borochaner	USACE	Engineer	Reviewer
Dan Crawford	USACE	Hydrologist	Reviewer
Angela Dunn	USACE	Biologist	Reviewer
Jason Engle	USACE	Hydrologist	Reviewer
Savannah Lacy	USACE	Water Manager	Hydrologic Analyses/Operations
Andrew LoSchiavo	USACE	Biologist	Reviewer
Meredith Moreno	USACE	Archeologist	Reviewer
Melissa Nasuti	USACE	Biologist	Environmental Effects Analyses
Jim Riley	USACE	Environmental Engineer	Water Quality Analyses
Eric Summa	USACE	Biologist	Reviewer

6 PUBLIC INVOLVEMENT

The following details public involvement during development of the 2020 LORS Planned Deviation.

6.1 Scoping and EA

Reference **Section 1.8**. A NEPA scoping letter was not solicited for the draft revised supplemental EA. **Appendix C.1** contains pertinent correspondence related to the 2019 LORS Planned Deviation Draft EA, including a comment response matrix (**Table C.1-1**) to address public review of the EA. Comments received from public review of the 2019 LORS Planned Deviation Draft EA have been considered in developing this revised supplemental EA.

Appendix C.1 also contains pertinent correspondence related to release of the draft revised supplemental EA, including a comment response matrix (**Table C.1-2**) to address comments received from public review.

6.2 Agency Coordination

The Corps is in continuous coordination with other Federal, State, and local agencies, affected Indian Tribes, and other interested private organizations and individuals. This extensive coordination is a result of the magnitude of the Corps efforts underway to implement water management strategies in south Florida. Prior to public review of the 2019 LORS Planned Deviation Draft EA, the Corps coordinated with the following parties regarding the proposed action: (1) SFWMD; (2) FDEP; (3) FDACS; (4) FWC; (5) Department DOI; (6) ENP; (7) USFWS; (8) NMFS; (9) USEPA; (10) Seminole Tribe of Florida; and (11) Miccosukee Indian Tribe of Florida. Each of these parties were contacted on July 10, 2019. At that time, the Corps had completed the 2019 LORS Planned Deviation Draft EA in accordance with 33 C.F.R. 230.1 to 230.26, with the intent of transmitting the deviation request to the Corps' SAD for approval. If SAD were to approve the deviation the Jacksonville District had planned to sign the FONSI prior to posting the NEPA document for public notification and a comment period. After further consideration of the comments received in response to the initial coordination with the above listed parties, the Jacksonville District did not proceed with signature of the FONSI. An NOA of the 2019 LORS Planned Deviation Draft EA was mailed to interested stakeholders on August 6, 2019 to initiate public review. **Appendix C.1** includes all pertinent correspondence related to the 2019 LORS Planned Deviation Draft EA, and this final revised supplemental EA. Reference **Section 4.4** for a summary of concerns associated with implementation of the 2019 LORS Planned Deviation EA and this final revised supplemental EA.

A virtual meeting was held on July 21, 2020, to provide information on the proposed action. The meeting was open to the public and was attended by several Federal, State, and local agencies. The provided presentation was made available at the following website: https://www.saj.usace.army.mil/Deviations/.

6.3 List of Recipients

An NOA for the draft revised supplemental EA was e-mailed to interested stakeholders to begin the 30 day review period on July 1, 2020. Recipients included Federal, State, and local agencies, affected Indian Tribes, and other interested private organizations and individuals. A news release notifying the public of the availability of the document was also released through the Jacksonville District's Corporate Communications Office. Hard copies of the NOA were not mailed due to COVID19. Comments received in response to public review were considered in developing this final revised supplemental EA. Copies of this final revised supplemental EA were also posted to the internet at the following address:

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

7 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

The following documents compliance of the proposed action with environmental requirements.

7.1.1 National Environmental Policy Act of 1969

Environmental information on the project has been compiled and the draft revised supplemental EA has been prepared and coordinated for public, state, and Federal agency review. The proposed action is in compliance with the NEPA.

7.1.2 Endangered Species Act of 1973

Pursuant to Section 7 of the ESA of 1973, as amended, the Corps has determined that the proposed action would have no effect on federally listed species and designated critical habitat under the purview of the USFWS and the NMFS. An NOA regarding these effects determinations was e-mailed to each agency during the 30 day public review period for the draft revised supplemental EA. No correspondence was received in response to the provided NOAs. The NMFS and the USFWS are not required to respond to the Corps' determination of no effect for federally listed species in the action area. **Appendix C.2** contains pertinent correspondence related to the re-initiation of consultation for LORS 2008. The Corps recently updated our ESA consultation record with the NMFS and the USFWS with respect to LORS 2008, as a result of information that was analyzed with respect to Lake Okeechobee water releases and effects on blue green algae and red tide downstream. In part, the Corps considered materials submitted by Center for Biological Diversity, the Calusa Waterkeeper, and Waterkeeper Alliance as part of a 60-day notice of intent to sue dated December 19, 2018 under the ESA. The Corps considered whether this information would change the previous effects determinations on federally listed species. The Corps is including our updated ESA consultation record for LORS 2008 as part of this final revised supplemental 2020 LORS Planned Deviation EA to notify interested stakeholders. Re-initiation of consultation for LORS 2008 was concluded with the NMFS via correspondence dated March 27, 2020. In correspondence, dated June 6, 2019, the USFWS, indicated that they have found no causal links that effects to the West Indian manatee result either directly or indirectly from Lake Okeechobee water releases, however, the Corps continues to work with the USFWS on issues related to LORS operations and listed species.

7.1.3 Fish and Wildlife Coordination Act of 1958, as amended

The Fish and Wildlife Coordination Act, as amended (16 U.S.C. 661 et seq.) requires Federal agencies to consult with the USFWS regarding the impacts to fish and wildlife resources and the proposed measures to mitigate these impacts. Additional coordination authorities exist through the review process of the NEPA and the consultations required under the ESA of 1973 (ESA; 7 U.S.C. 136, 16 U.S.C. 1532 ET SEQ. December 28, 1973). A final Fish and Wildlife Coordination Act Report (FWCAR) was transmitted to the Corps by the USFWS and was included in the LORS 2008 and FSEIS. The Corps is committed to continuing meeting with stakeholders to gather information on current conditions and observations. Periodically a group of water managers, scientists and engineers from the Corps, the sponsor (SFWMD), and other federal, state and local agencies meet via telephone conference to discuss conditions of the C&SF system as well as concerns related to fish and wildlife, water quality, and water supply. The USFWS are active participants in these Lake Okeechobee PSCs. The project has been fully coordinated with the USFWS in response to the requirements of this Act. The Corps has and will continue to coordinate with the USFWS during the planned deviation. The proposed action is in full compliance with this Act.

7.1.4 National Historic Preservation Act of 1966

The proposed action is in compliance with Section 106 of the National Historic Preservation Act, as amended (PL 89-665). The Corps has determined the proposed action has no potential to effect historic properties. Correspondence was received from the State Historic Preservation Officer on August 19, 2020, in response to public review of the draft revised supplemental EA, stating that the proposed project will likely have no effect on historic properties listed, or eligible for listing, on the National Register of Historic Places, of that are otherwise significant to Florida's history or prehistory. The proposed action is in compliance with the Archaeological and Historic Preservation Act, as amended (PL 93-29), Archeological Resources Protection Act (PL96-95), American Indian Religious Freedom Act (PL 95-341), Native American Graves Protection and Repatriation Act (NAGPRA) (PL 101-601), Executive Order 11593, 13007, and 13175, the Presidential Memo of 1994 on Government to Government Relations and appropriate Florida Statutes.

7.1.5 Clean Water Act of 1972

The proposed action will not adversely affect water quality and is in compliance with the Clean Water Act. As the proposed action is strictly of an operational nature, and does not involve any new discharge or construction activity, water quality certification from the State of Florida is not required. Furthermore, as there are no structural components contained in the proposed action and no dredge and fill operations being considered, a Section 404(b) Evaluation is not appropriate. The proposed action is in compliance with this Act.

7.1.6 Clean Air Act of 1972

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

7.1.7 Coastal Zone Management Act of 1972

A determination of consistency with the State of Florida Coastal Zone Management Program (CZMP) pursuant to the Coastal Zone Management Act (CZMA) of 1972 is found in **Appendix D** of this revised supplemental EA. The Corps has determined that the proposed action is consistent to the maximum extent practicable with the enforceable policies of the Florida Coastal Zone Management Program (CZMP). In correspondence dated August 31, 2020, the Florida State Clearinghouse stated that based on the information submitted and minimal project impacts, the state had no objections to the subject project.

7.1.8 Farmland Protection Policy Act of 1981

No designated prime and unique farmland would be adversely affected by the proposed action. No conversion of important farmlands would take place. The proposed action is in compliance with this Act.

7.1.9 Wild and Scenic River Act of 1968

No designated Wild and Scenic river reaches would be adversely affected by project related activities. The Northwest Fork of the Loxahatchee River is designated a Wild and Scenic River and would not be adversely affected by the proposed action. The proposed action is in compliance with this Act.

7.1.10 Marine Mammal Protection Act of 1972

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

7.1.11 Estuary Protection Act of 1968

The National Estuary Program (NEP) is a USEPA program to protect and restore the water quality and ecological integrity of estuaries of national significance. The Indian River Lagoon and Charlotte Harbor are designated as estuaries of national significance under the NEP and are located in the project area. No designated estuary would be adversely affected by the proposed action. Therefore, the proposed action is in compliance with this Act.

7.1.12 Federal Water Project Recreation Act of 1965, as amended

Recreation and fish and wildlife enhancement have been given full consideration in the proposed action. No recreational resources would be adversely affected by the proposed action. The proposed action may benefit recreation within the Caloosahatchee and St. Lucie estuaries by reducing the potential closure of recreational areas due to HABs. The proposed action is in compliance with this Act.

7.1.13 Fishery Conservation and Management Act of 1976

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

7.1.14 Submerged Lands Act of 1953

The proposed action consists of an operational change to LORS 2008. No construction is proposed on submerged lands. The proposed action is in compliance with this Act.

7.1.15 Coastal Barrier Resources Act and Coastal Barrier Improvement Act of 1990

There are no designated coastal barrier resources in the project area that would be adversely affected by the proposed action. This Act is not applicable.

7.1.16 Resource Conservation and Recovery Act (RCRA), As Amended by the Hazardous and Solid Waste Amendments (HSWA) of 1984, Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Toxic Substances Control Act (TSCA) of 1976

The proposed action consists of an operational change to LORS 2008 and would not result in the discovery or mobilization of HTRW. No construction is proposed. The proposed action is in compliance with these Acts.

7.1.17 Rivers and Harbors Act of 1899

The proposed action would not permanently obstruct navigable waters of the United States. The proposed action is in full compliance with this Act.

7.1.18 Safe Drinking Water Act of 1974, As Amended

The proposed action would not prevent public water supply utilities from meeting drinking water quality standards as outlined in the Safe Drinking Water Act of 1973, as amended. Effects on water supply are evaluated in **Appendix B** specifically Section 3D and referenced in **Table 4-1**. Water supply would not be adversely affected by the proposed action. Results show that the proposed action performs similarly to LORS 2008. The proposed action is in full compliance with this Act.

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

Acquisition of real estate is not required for the proposed action. This Act is not applicable.

7.1.20 Anadromous Fish Conservation Act

Anadromous fish species would not be adversely affected by the proposed action. The proposed action is in compliance with this Act.

7.1.21 Migratory Bird Treaty Act and Migratory Bird Conservation Act

Migratory and resident bird species have been observed within the project area and are likely to use available habitat for foraging, nesting, and breeding. The proposed action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The proposed action will not pursue, hunt, take, capture, kill or sell migratory birds. The proposed action is in compliance with these Acts.

7.1.22 Marine Protection, Research and Sanctuaries Act

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

7.1.23 Magnuson-Stevens Fishery Conservation and Management Act

No EFH would be impacted the proposed action. Reference **Table 4-1**. The Corps coordinated with the NMFS on potential effects to EFH during development of the 2019 LORS Planned Deviation Draft EA. The NMFS HCD responded on August 23, 2019 stating that they concurred with the Corp's determination of anticipated minimal EFH effects. No EFH conservation recommendations were provided. To assist the Corps in monitoring HABs the NMFS provided a list of HAB websites to inform science based implementation of the proposed deviation. An NOA for the draft revised supplemental EA was e-mailed to the NMFS HCD at the start of the 30 day public review period on July 1, 2020. Reference **Appendix C.2**. Correspondence was not received in response to the NOA sent on July 1, 2020. The proposed action is in compliance with this Act.

7.1.24 E.O. 11990, Protection of Wetlands

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

7.1.25 E.O. 11988, Floodplain Management

This E.O. instructs Federal agencies to avoid development in floodplains to the maximum extent possible. The proposed action consists of an operational change to LORS 2008. This action is consistent with the intent of this E.O. and is in compliance.

7.1.26 E.O. 12898, Environmental Justice

E.O. 12989 provides that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low income populations. The proposed action would not result in disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The Corps is proposing to initiate a planned deviation from LORS 2008 in anticipation of and following freshwater HABs to reduce the risk of exacerbating potential health concerns associated with algal blooms in Lake Okeechobee, the St. Lucie, and Caloosahatchee estuaries while not impacting other project purposes. The proposed action is in compliance with this E.O.

7.1.27 E.O. 13089, Coral Reef Protection

No coral reefs would be adversely affected by the proposed action. This E.O. does not apply.

7.1.28 E.O. 13112, Invasive Species

The proposed action would have no significant impact on the introduction of invasive species compared to existing conditions. The proposed action is in compliance with the goals of this E.O.

7.1.29 E.O. 13045, Protection of Children

E.O. 13045, requires each Federal agency to "identify and assess environmental risk and safety risks [that] may disproportionately affect children" and ensure that its "policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This action has no environmental safety risks that may disproportionately affect children. The proposed action is in compliance with the goals of this E.O.

7.1.30 E.O. 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Migratory and resident bird species have been observed within the project area and are likely to use available habitat for foraging, nesting, and breeding. The proposed action is not expected to destroy migratory birds, their active nests, their eggs, or their hatchlings. The proposed action will not pursue, hunt, take, capture, kill or sell migratory birds. The proposed action is in compliance with the goals of this E.O.

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