

Attachment 1 - Operational Strategy for October 2018 Additional Operational Flexibility

CESAJ - EN-W

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Operational Strategy for October 2018 Additional Operational Flexibility

Summary

The Corps will utilize additional operational flexibility (AOF) to release up to 2,800 cfs out of S-79 and 2,000 cfs to the St Lucie Estuary (2,000 cfs includes all inflows into the estuary, including S-80) to assist with lowering Lake Okeechobee down before the wet season 2019. Releases will also be limited to a total volume of 164,600 ac-ft out S-77 and S-308 over release guidance from Part D of the 2008 Lake Okeechobee Regulation Schedule (2008LORS). The initial AOF releases starting on 26 October 2018 will have a weekly average pulse of 1,000 cfs out of S-79 and 0 cfs out of S-80. If or when flows increase from these levels, additional public notification will be made.

Additional operational flexibility is included in the 2008 Lake Okeechobee Regulation Schedule Water Control Plan consistent with the final supplemental environmental impact statement (FSEIS) (November 2007) for the Lake Okeechobee Regulation Schedule. Occasionally, additional operational flexibility will be used to address circumstances (i.e., construction on Herbert Hoover Dike [HHD], hydrologic conditions, lake levels, spawning in the estuaries and downstream runoff) that were not evaluated for the period of record (1965-2005). This provision gives water managers the ability to consider releases from Lake Okeechobee to the water conservation areas (WCAs) and to tide (estuaries) to minimize damages or to meet project purposes when the 2008 LORS Parts A through D are not effective at managing lake levels consistent with the intent of the 2008 LORS. Consistent with the FSEIS, each event to be addressed by additional operational flexibility is unique, and releases to be implemented will be defined by a desired outcome or time period. The public will be notified of the planned releases, desired outcome, and implementation time period by the USACE's normal water management notification process (press release, internet webpage).

Desired Outcome

As of 17 October, 2018 Lake Okeechobee is at 14.19 feet, in the Base Flow sub-band, and there is a strong El Niño forecasted for the winter months, which increases the chance of undesirable high lake stages in the dry season which can have undesirable effects in the dry and wet seasons for the human environment. The Corps will utilize AOF to assist lowering Lake Okeechobee before the 2019 wet season begins (1 June). Currently LORS Part D guidance recommends 450 cfs out of S-79 and 200 cfs out of S-80 (with the ability to distribute flows east or west as needed). As of 17 October, 2018 LORS Part C guidance recommends Up to maximum practical releases to WCAs. The Corps will utilize additional operational flexibility to release more water from the lake than is called for in Part C and D to help the lake levels recede during the winter months.

Conditions (2016-2018)

Conditions over the past several years (2016-2018) with in the Central and Southern Florida (C&SF) Project have included many challenges ranging from construction on HHD, climate oscillations, extreme high water, major tropical events, harmful algae blooms, and estuarine salinity issues. These circumstances have led water managers to utilize the additional operational flexibility in order to make releases out of Lake Okeechobee which may be higher than releases called for in Parts C and D of LORS 2008. These challenges are further elaborated below:

- Construction

Herbert Hoover Dike (HHD) culvert replacement and cutoff wall construction is ongoing and is expected to be completed by 2022. Construction for the culvert replacements consists of building either earthen or sheet pile coffer dams and excavating the dike to remove and rebuild the culverts. These temporary dams are lower than the main embankment, which poses a higher risk during hurricanes and was not evaluated under LORS 2008. The culverts planned to be excavated during the 2019 hurricane season have a higher population at risk downstream than the sites that were under construction during 2018. Ensuring the lake recedes by hurricane season is desirable in order to manage risk at the HHD culvert construction sites through the 2019 hurricane season.

- Climate Oscillations

A very strong El Niño condition was present during the winter of 2015/2016 causing approximately 12 inches of rainfall above normal for south Florida (168% of normal) for the dry season. This resulted in high damaging flows to the estuaries during environmentally sensitive times (March-April). The summer following this event there was wide spread harmful algae blooms on Lake Okeechobee and in the St Lucie and Caloosahatchee Estuaries.

La Niña conditions set in during the winter of 2017/2018 and which aided in Lake Okeechobee receding by approximately 4.5 feet between October 2017 and May 2018. The dry season ended in May with 5.5 inches below normal rainfall (60% of normal) for south Florida.

As of October 2018, the probability of a strong El Niño condition for December 2018 through February 2019 is approximately 73% (International Research Institute for Climate and Society). Depending on rainfall distribution and quantity over south Florida this could lead to higher lake releases during the dry season in accordance with the 2008 LORS.

This oscillation between El Niño and La Niña has only occurred a few other times since 1965 (2008 LORS Period of record for analysis was 1965 through 2005). Since 1965 there has only ever been one other very strong El Niño condition, which was in 1997 and was followed by three consecutive years of La Niña conditions. The very strong El Niño condition in 1997 was defined by the Oceanic Niño Index of +2.4 at the highest,

compared to 2015 index of +2.6. During the period of record there has not been a case similar to 2018.

- Extreme High Water/Tropical Events

During the 2017 wet season there were two major events that occurred which brought record rainfall to the C&SF system. June rainfall brought the WCAs up to period of record highs (POR 1962-2016), which initiated the Corps to enact three deviations from the water control plan and the South Florida Water Management District (SFWMD) to take actions to reduce high water levels during the wet season. The state of Florida also made an emergency declaration due to these high water levels. Then in September 2017 Florida was hit by Hurricane Irma which brought the lake level up from around 13.5 to 17.2 feet NGVD (3.7 feet stage increase) in 30 days and brought the district rainfall to around 200% of normal for the month. Maximum releases were being made out of Lake Okeechobee for weeks (approximately Sep 19 2017 through Dec 8 2017). The lake was above 15.5 feet for approximately 3 months. This high water condition combined with runoff and wind agitation caused the lake water to become very turbid and water clarity has remained poor throughout the 2018 wet season.

- Harmful Algal Blooms (HABs)

The summer following the 2015/2016 El Niño, the lake and the estuaries experienced significant algae blooms which caused damage not only to the ecosystem of these areas but also to the economy. The blooms produced toxins and oxygen shortages that caused harm to marine life. The toxins and the aesthetics of HABs caused people to avoid waterways and beaches affected by the blooms, leading to decreased economic revenue for areas that rely on water related tourism and recreation.

Following Hurricane Irma in the fall of 2017, the summer of 2018 saw algae blooms on par with the 2016 summer which caused similar environmental damage. Economic damage was higher for 2017 due to the additional presence of Red Tide (not related to fresh water algae or Lake Okeechobee releases) blooms along the Gulf coast of Florida, which caused widespread fish kills and human respiratory irritation.

- Salinity Issues

Over the last several years the St. Lucie and Caloosahatchee Estuaries have received high flows from Lake Okeechobee due, in part, to the events outlined above (El Niño, Hurricanes, etc.). Between 1 January 2016 and 15 October 2018 the Caloosahatchee received flows higher than 2,800 cfs for 493 days and the St. Lucie received flows higher than 2,000 cfs for 147 days. High flows cause salinities in the estuaries to become very fresh much further out into the ocean than would be normal. During the La Niña event in winter of 2018 the estuaries received base flow releases (650 cfs was sent to the Caloosahatchee at S-79 and no releases to the east). During the winter of 2018 the

Caloosahatchee estuary stakeholders indicated that it had become more saline than is normal, causing harm to marine life. The switch between fresh and saline conditions due to high followed by low flows has caused stakeholders and scientists to become concerned that the estuary has not had ideal salinity conditions for an extended period of time.

Factors Affecting Implementation

Water Managers will evaluate conditions continuously to determine the recommended lake releases per normal operation. The recommended flows, while utilizing this additional operational flexibility will be within the bounds of the water control plan (up to 2,800 cfs out of S-79 and 2,000 cfs to the St Lucie Estuary). Factors that will be evaluated include but are NOT limited to: LORS Part D guidance, current and projected lake levels, coordination with agency and stakeholder scientists, forecasted rainfall and estuarine conditions. Consistent with the FSEIS, each event to be addressed by additional operational flexibility is unique, and releases to be implemented will be defined by a desired outcome or time period. The public will be notified of the planned releases, desired outcome, and implementation time period by the USACE's normal water management notification process (press release, internet webpage). Starting 26 October 2018 flows out of S-79 will be pulsed to reach a 7 day average of 1,000 cfs and 0 cfs out of S-80. If or when flows increase from these levels, additional public notification will be made that flows will be increasing.

Additional operational flexibility may not be applied if lake levels rise and move into the low sub-band resulting in a release guidance other than base flow releases (i.e. more than 450 cfs and 200 cfs via S-79 and S-80, respectively). If this occurs, release guidance may be made according to the water control plan. Additional operational flexibility may not be applied if lake levels recede into the beneficial use sub-band (as defined in Part B of the 2008 LORS). At such a time releases to tide and to the WCAs will be determined by the Corps in concurrence with the SFWMD, as outlined in the 27 May 2010 Memorandum For Record (Subject: USACE Positional Statement on SFWMD Adaptive Protocols).

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

References

Water Control Plan for Lake Okeechobee and Everglades Agricultural Area March 2008
http://www.saj.usace.army.mil/Portals/44/docs/h2omgmt/LORSdocs/2008_LORS_WCP_mar2008.pdf

Final Supplemental Environmental Impact Statement. Lake Okeechobee Regulation Schedule. November 2007.

http://www.saj.usace.army.mil/Portals/44/docs/h2omgmt/LORSdocs/ACOE_STATEMENT_APPENDICES_A-G.pdf

Memorandum for Record. Subject: USACE Position Statement on SFWMD Adaptive Protocols. 27 May 2010. CESAJ-EN-W.

International Research Institute for Climate and Society El Niño Southern Oscillation (ENSO) forecast for October 2018.

<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/2018-October-quick-look/>

Attachment 2 – 2008 Lake Okeechobee Regulation Schedule Water Control Plan