

**DRAFT**  
**Proposed Revisions to**  
**Lake Okeechobee Operational Guidance**  
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## **General Overview**

The U.S. Army Corps of Engineers (USACE) is responsible for management of the water resources contained within Herbert Hoover Dike and for the development of regulations for operation of Lake Okeechobee's outlet structures. Water management operations at Lake Okeechobee are performed to ensure that Congressionally-authorized project purposes are met. The Congressionally-authorized project purposes for Lake Okeechobee include: flood control; navigation; water supply for Everglades National Park, salinity control, regional groundwater control, agricultural irrigation, municipalities, and industry; enhancement of fish and wildlife; and recreation.

The purpose of this operational guidance document is to describe and explain the implementation of the proposed water management operational changes to Lake Okeechobee and the Everglades Agricultural Area. These changes will be included in the revised Lake Okeechobee and Everglades Agricultural Area Water Control Plan. This proposed water management operational guidance pertains to the Lake Okeechobee regulation schedule which defines allowable releases to the Water Conservation Areas (WCAs) and to tide (estuaries). The water management operational guidance pertaining to operations that are not prescribed by the regulation schedule and which are utilized in accordance with the current water control plan (Lake Okeechobee and Everglades Agricultural Area, July 2000) will remain in effect and be incorporated into the revised water control plan. The revised Lake Okeechobee and Everglades Agricultural Area Water Control Plan (Lake Okeechobee/EAA WCP) is currently scheduled to be approved for implementation after the Lake Okeechobee Regulation Schedule Study Supplemental Environmental Impact Statement (LORSS SEIS) process has been completed.

## **Lake Okeechobee Regulation Schedule**

The regulation schedule is a tool used by water managers to meet Congressionally-authorized project purposes. The regulation schedule has been, and will continue to be, designed to balance multiple, and often competing, project purposes and objectives. Managing for better performance of one objective often worsens performance of competing objectives. For example, higher regulation schedules tend to benefit water supply, but may increase the risk to public health and safety, and can harm the ecology of the lake. Lower lake schedules may produce lake levels more desirable for the lake ecology and improved flood protection, but reduce water supply potential and may also harm the ecology of the lake and downstream estuaries. Therefore, the Lake Okeechobee regulation schedule is not developed to optimize performance of any single project purpose, but rather balances the performance of the multiple project purposes. The regulation schedule contains bands which vary with the time of year. Releases are outlined by flowcharts that define the allowable releases by structure within each band.

It is important to recognize that although water supply benefits may be affected by a regulation schedule, water supply release volumes are not prescribed by this regulation schedule. A regulation schedule attempts to meet all functional objectives of the particular project, acting separately or in combination with other projects in a system. Water supply releases are made to meet downstream demands that can include agricultural irrigation, municipal and industrial needs, estuary and other environmental water supply needs.

## **Lake Okeechobee Regulation Schedule Study**

The current Lake Okeechobee and Everglades Agricultural Area Water Control Plan includes the existing Lake Okeechobee interim regulation schedule, commonly referred as “Water Supply and Environment (WSE) regulation schedule”, which has been in use since July 2000 (found at: <http://www.saj.usace.army.mil/h2o/lib/documents/WSE/index.html>). The Lake Okeechobee Regulation Schedule Study (LORSS) was initiated to address high lake levels, high estuarine discharges, estuary ecosystem conditions, and lake ecology conditions that occurred during the 2003 to 2005 time period. The LORSS considered the back-to-back historically significant 2004 and 2005 hurricane seasons’ effects on the recognized structural integrity issues of Herbert Hoover Dike (HHD) along with effects to other project purposes.

The LORSS resulted in the development of several alternative regulation schedules, including the Tentatively Selected Plan (TSP). The TSP is a completely new regulation schedule with new breakpoints for all bands, new release magnitudes in many bands, and new forecasting indices. Both WSE and the TSP are based on WSE’s Operational Guidance that includes: “Part 1: Define Lake Okeechobee Discharges to the Water Conservation Areas” and “Part 2: Define Lake Okeechobee Discharges to Tidewater (Estuaries)”. Parts 1 and 2 of the WSE Decision Tree are shown on Figure 2 and Figure 3, respectively. The South Florida Water Management District (SFWMD) and USACE 1999 report; “The Lake Okeechobee WSE Operational Guidelines” located in the July 2000 Lake Okeechobee Regulation Schedule Environmental Impact Statement defines and describes the implementation of WSE.

The LORSS TSP was identified to be effective at decreasing the risk to public health and safety, providing a reduction of damaging events and salinity violations to the estuaries, and providing critical flexibility to perform water management operations, compared to WSE. Selection of the TSP included analysis of South Florida Water Management Model (SFWMM also known as the 2x2) output. The SFWMM was used to simulate the performance of the alternative regulation schedules over a 36-year period of record, based on climate and hydrometeorologic data from 1965 to 2000.

It is important to realize that daily water management operational decisions will consider all conditions/data available and that climatologic conditions during the 1965 to 2000 period are representative of a wide range of historic conditions, but are not a predictor of future climatologic conditions. The new Lake Okeechobee/EAA WCP will need to contain flexibility to manage for high lake levels, including scenarios not experienced during the period of record. Water managers make decisions based on the best available information, given the uncertain nature of future events.

The TSP simulation resulted in a one-day average-daily peak lake elevation of 17.33 feet, National Geodetic Vertical Datum of 1929 (ft., NGVD). High lake levels are of importance due to the known integrity issues with Herbert Hoover Dike and the Corps responsibility to provide for public health and safety. The Corps recognized in 1998 that the combined probability for a breach at Herbert Hoover Dike, shown on Table 1 below, is of concern. These probabilities

assumed an unidentified and unaddressed integrity issue. The Corps currently has both short-term as well as long-term solutions addressing this concern. For additional information on HHD, please visit the USACE Jacksonville District webpage at: <http://www.saj.usace.army.mil/>

Table 1

Probability of HHD Breach at Selected Lake Elevations  
From Table H-10.2, 1998 HHD Major Rehabilitation Report

Lake Elevation (ft.,NGVD)	Combined Probability Of HHD Breach (%)
15	1
16	3
17	11
18	45
21	100

**Summary of the Tentatively Selected Plan**

The LORSS TSP resulted in proposed water management operational guidance to be used on a daily basis in the management of Lake Okeechobee. The proposed operational guidance includes: 2007 Lake Okeechobee Interim Regulation Schedule Part A through D (Figures 4 through 7, respectively), tributary hydrologic conditions, weather forecasts, and climate-based hydrologic outlooks, and historical as well as projected lake level information.

Through the LORSS TSP, management of Lake Okeechobee water levels and determination of Lake Okeechobee releases to the WCAs and to tide (estuaries) is based upon seasonally varying lake elevations divided into three bands as shown on the proposed 2007 Lake Okeechobee Interim Regulation Schedule Part A (Figure 4). These bands include “High Lake Management” (top band on Figure 4), “Operational” (middle band on Figure 4), and “Water Shortage Management” (bottom band on Figure 4). The High Lake Management Band is meant to address public health and safety, especially related with the structural integrity of Herbert Hoover Dike by providing the ability to make releases up to the maximum capacity that lake outlets will allow. The Operational Band is meant to facilitate authorized project purposes by providing the ability to make releases of various volumes, including no release; Lake Okeechobee outlet canals should be maintained within their optimum water management elevations. The Water Shortage Management Band pertains to low lake levels which necessitate rationing water supplies; Lake Okeechobee outlet canals may be maintained below their optimum water management elevations. The water supply releases made within this band are made according to the SFWMD’s draft Lake Okeechobee Water Shortage Management Plan (LOWSM).

The 2007 Lake Okeechobee Interim Regulation Schedule Part B (Figure 5) further defines the bands of the regulation schedule. On Part B, the Operational Band is subdivided into additional bands and sub-bands that are directly related to defining allowable Lake Okeechobee releases to the WCAs and to tide (estuaries). In general as lake levels rise through the higher sub-bands, the allowable release rates increase.

Evaluation of the LORSS TSP over the period of record (1965 to 2000) shows that the proposed regulation schedule releases to the WCAs and to the estuaries will reduce the likelihood of lake levels that both increase the probability of a breach of the HHD and also contribute to poor ecological conditions within the lake. For Lake Okeechobee, a high lake level can lead to the decline of emergent and submerged vegetation which is essential habitat for the lake's sport fishing population.

The LORSS TSP provides the ability to make long-term, low-volume releases to the Caloosahatchee Estuary, St. Lucie Estuary, and WCAs. These releases include low-volume pulse releases and base flow releases to the Caloosahatchee and St. Lucie Estuaries that allow the lake to be maintained at more-desirable levels throughout the year. A pulse release attempts to simulate a natural rainstorm event within the basins. The receiving body would respond to the pulse in a similar fashion as if a rainstorm had occurred in the upstream watershed. Through implementation of pulse releases, daily releases may vary, however, an average flow rate is targeted for the duration of the pulse release. The pulse releases and base flow releases are intended to regulate lake levels and reduce the potential for future prolonged high-volume releases that may be damaging to the estuaries. The base flow releases also provide a benefit of maintaining desirable salinity levels in the estuaries. By regulating lake levels, these low-volume releases improve public health and safety performance by reducing risk to the HHD and provide improved benefits for the health of the lake and the estuaries.

### **General Comparison of the TSP to WSE**

The TSP includes the Lake Okeechobee Management Bands and Sub-Bands shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part B (Figure 5), and the release guidance, Part C (Figure 6) and Part D (Figure 7). The differences between the decision trees for WSE and the TSP's 2007 Lake Okeechobee Interim Regulation Schedule Parts C and D are shown in blue on Figures 6 and 7. As with WSE, the LORSS TSP utilizes climate-based hydrologic outlooks that may result in a release less than the maximum allowable within a given band when the lake is within the High, Intermediate, or Low Sub-Bands. The use of hydrologic outlooks allows releases to be made that are commensurate with expected inflow conditions. For example, if the hydrologic outlook is relatively dry, then releases can be less than the maximum allowable within a given band.

The TSP's Tributary Hydrologic Conditions (THC) shown in blue on Figures 6 and 7 have been improved to provide a more inclusive representation of hydrologic conditions in the Lake watershed. Tributary Hydrologic Conditions used with WSE only utilized average historical evapotranspiration and excluded rainfall over Lake Okeechobee. As proposed, the THC within Figures 6 and 7 now utilizes the Palmer Index from the National Weather Service and the calculated Lake Okeechobee Net Inflow (Table 2). The Palmer Index depends on temperature, rainfall and soil moisture data, and represents hydrologic conditions such as a drought, or an abnormal dry, or an abnormal wet state. The second THC is the Lake Okeechobee Net Inflow. Net Inflow is defined as rainfall minus evapotranspiration plus lake inflows. WSE used the S-65E inflow as a THC. The TSP's use of the Net Inflow THC accounts for all inflows

to, and direct rainfall over Lake Okeechobee. The wettest of the two indicators describes the current tributary condition.

Similar to WSE, the TSP's release guidance (Part D, Figure 7) includes the use of weather forecasts and climate-based hydrologic outlooks as represented by the terms "Seasonal Climate Outlook", "Meteorological Forecast", and "Multi-Seasonal Climate Outlook". Meteorological forecasts are short-term (typically days to weeks) whereas climate outlooks are longer term (months to a year). The climate-based hydrologic outlook is known as the Lake Okeechobee Net Inflow Outlook (LONINO). The seasonal LONINO (6-month outlook) and multi-seasonal LONINO (up to 12-month outlook) are based on historical net inflow data and climate outlooks provided by NOAA's Climate Prediction Center (CPC), et al. The use of these forecasts and outlooks improved management of the Lake and their use will continue with the implementation of the TSP.

The WSE decision tree did not consider actual lake level rise or an anticipated or projected lake level. As proposed, Figure 7 now includes "Lake level projected to rise to" in the High and Intermediate Sub-Bands to allow quicker implementation of lake releases to slow rapid rates-of-rise.

As was the practice for WSE, the TSP includes continuous releases at various volumes, including pulse releases. In a similar manner as WSE, actual releases to be implemented may be performed in a pulse release to simulate natural hydrologic conditions, such as a rainfall event.

The TSP references pulse releases to the Caloosahatchee Estuary at S-79; WSE referenced pulse releases at Lake Okeechobee through S-77. By referencing pulse releases at S-79, local basin runoff is considered when determining the necessary supplemental release at S-77. This achieves pulse releases that are more sensitive to the estuary. This new operation is also consistent with the current way pulse releases are made to the St. Lucie Estuary at S-80.

The TSP also provides a base flow release to the estuaries; base flow releases to the estuaries were not included in the WSE regulation schedule, up to 450 cubic feet per second (cfs) can be made at S-79 and up to 200 cfs can be made at S-80. These base flow releases also consider basin runoff and Lake Okeechobee releases are made when basin runoff is less than the base flow target. It is important to recognize that base flow releases are releases intended to regulate lake levels and reduce the potential for future prolonged high-volume releases that may be damaging to the estuaries. The base flow releases also provide a benefit of maintaining desirable salinity levels in the estuaries.

### **Proposed Operational Guidance**

The Operational Guidance establishes the allowable quantity, timing, and duration of releases from Lake Okeechobee to the WCAs and to tide (estuaries). Water management decisions will utilize the 2007 Lake Okeechobee Interim Regulation Schedule Parts A through D (Figures 4 through 7) to provide guidance on releases from Lake Okeechobee. Various information shown on Part C and Part D (Figures 6 and 7) are utilized to establish the allowable releases to the WCAs and the allowable releases to tide (estuaries), respectively.

When the Operational Guidance and/or basin conditions between the lake and the estuaries result in flows deemed undesirable by SFWMD to the estuaries, the SFWMD may seek to store Lake Okeechobee water on available SFWMD designated lands. As CERP reservoirs designed to receive Lake releases become available, they will be operated according to the operations established for those projects. These efforts are intended to reduce undesirable lake releases to the estuaries by first making lake releases to alternative storage areas to minimize flows that are above the estuary's biologically-derived maximum flow criteria.

The "Lake level projected to rise to" phrase in the Lake Okeechobee Operational Guidance to Tide (Figure 7) can be determined on a daily basis, as necessary. Information to be considered includes, but is not necessarily limited to, the following: climate forecasts, release constraints due to downstream conditions, actual lake level rate of rise, historical lake levels, and the state of the Central and Southern Florida (C&SF) Project (including the availability of new facilities proposed by the Comprehensive Everglades Restoration Plan [CERP] Project).

### **Lake Okeechobee Management Bands**

The proposed operational guidance for management of the Lake Okeechobee water levels and outlet canals, as a result of the LORSS TSP, has three distinct bands defined by seasonal fluctuations of the lake level (Figure 4). Each management band is designed to achieve specific objectives consistent with Congressionally-authorized purposes for Lake Okeechobee. The bottom band, at the lower lake levels, is the Water Shortage Management Band. In this band, water in Lake Okeechobee will be managed in accordance with the Water Shortage Plan established by the South Florida Water Management District; outlet canals may be maintained below their optimum water management elevations. The top band, at the higher lake levels, is the High Lake Management Band. The goal for lake management within this band is to quickly lower high lake levels. This will make lake storage available for use during the next rainfall event, to reduce impacts on the lake's submerged aquatic vegetation and to reduce the risk to public health and safety, including but not limited to HHD integrity issues; outlet canals may be maintained above their optimum water management elevations. The middle and largest band is the Operational Band, which includes several sub-bands. It is anticipated that the majority of time, lake levels will reside within the Operational Band, and the lake would be managed according to the operational criteria established for the sub-bands of the Operational Band, including provisions to meet water supply demands (for Everglades National Park, salinity control, regional groundwater control, agricultural irrigation, municipalities, and industry; outlet canals should be maintained within their optimum water management elevations

Within the Operational Band (High, Intermediate, Low, and Base Flow Sub-Bands), the allowable release from Lake Okeechobee to the WCAs is defined by; lake level, hydrologic conditions, effect of desired release on the Everglades, treatment capacity of Storm Water Treatment Areas (STAs), downstream WCA level(s), as well as long-term climate-based hydrologic outlooks (Figure 6). Also within the Operational Band and its sub-bands, the allowable release from Lake Okeechobee to the estuaries is defined by: lake level, the trend of the lake level, hydrologic conditions, short-term weather forecasts, and long-term climate-based hydrologic outlooks (Figure 7). A detailed description of the management bands follows.

Water Shortage Management Band – varies seasonally between 9.7 to 12.2 ft., NGVD and below. Operations in this band are governed by the South Florida Water Management District’s Lake Okeechobee Water Shortage Management Plan (**NOTE: draft Water Shortage Management Band elevations may change upon completion of SFWMD’s rule making process in 2007**). The goal of this band is to manage existing water supply contained within the lake in accordance with SFWMD rules and guidance.

High Lake Management Band – varies seasonally between elevations 16.0 and 17.25 ft., NGVD and above. The goal of this band is to reduce the risk to public health and safety and releases will be made to lower the lake below the High Lake Management Band as soon as possible. In this High Lake Management Band, it is of the utmost importance that the lake level be reduced as rapidly as possible to make storage available for the next possible rainfall event, to relieve stress on the Herbert Hoover Dike, and to reduce impacts on the lake’s littoral zone. Releases up to the maximum discharge capacity will be made to tide and up to maximum practicable discharges will be pumped to the WCAs and made available to CERP impoundments (as they become available). In an effort to reduce undesirable lake releases to the estuaries, Lake Okeechobee water will also be made available to the SFWMD for their use to store on lands designated by SFWMD (as they become available). Within the High Lake Management Band, the allowable release from Lake Okeechobee to the WCAs and to the estuaries is defined by the lake level as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part C and Part D (Figures 6 and 7), respectively. Actual rates of release from the lake will vary depending on but not limited to; downstream channel conditions, estuary conditions, conditions in the water conservation areas, and conditions in the STAs. Although unlikely to be required due to wet conditions that are likely to exist when Lake levels are within this band, Lake Okeechobee releases to meet water supply demands (for Everglades National Park, salinity control, regional groundwater control, agricultural irrigation, municipalities, and industry) may be made at any time within the High Lake Management Band.

Operational Band - the largest management band varies seasonally between 9.7 ft. at its lowest point and 17.25 ft., NGVD at its highest point. The goal of the Operational Band is to manage the lake stage to balance all authorized project purposes. This involves use of flood control releases, environmental releases, base flow releases, and water supply releases. In an effort to reduce undesirable lake releases to the estuaries, Lake Okeechobee water may be stored in CERP reservoirs (as they become available) or SFWMD may seek to store Lake Okeechobee water on available SFWMD designated lands. The USACE will coordinate operations with the SFWMD as necessary. For Lake Okeechobee, an environmental release can be considered as a release from Lake Okeechobee to benefit the lake ecosystem, downstream ecosystems, and/or upstream ecosystems. For Lake Okeechobee, a base flow release to the Caloosahatchee Estuary is a release from Lake Okeechobee at S-77 to achieve a 450 cfs flow at S-79. A base flow release to the St. Lucie Estuary is a release at S-308 to achieve a 200 cfs flow at S-80. When conducting base flow releases, flows up to 650 cfs can be distributed East and West as needed to minimize impacts or provide additional benefits. Very dry tributary hydrologic conditions may require that releases to tide (estuaries) be discontinued. For Lake Okeechobee, a water supply release can be considered a release from Lake Okeechobee to meet water supply demands (for Everglades National Park, salinity control, regional groundwater control, agricultural irrigation,

municipalities, industry and the environment). Lake Okeechobee releases to meet water supply demands may be made at any time within the Operational Band. Within the Operational Band, several sub-bands have been established to further define lake releases: Beneficial Use Sub-Band, Base Flow Sub-Band, Low Sub-Band, Intermediate Sub-Band, and High Sub-Band; these sub-bands are described below.

**Beneficial Use Sub-Band:** This sub-band varies seasonally between elevation 9.7 ft. and 13.0 ft., NGVD at its highest point. Except for navigation, SFWMD allocates water to various users in this sub-band. Navigation can typically be supported by releases from Lake Okeechobee that are conducted for other authorized project purposes. Fish and wildlife enhancement and/or water supply deliveries for environmental needs may involve conducting an environmental release from Lake Okeechobee through the SFWMD's "Adaptive Protocols" or other SFWMD authorities.

**Base Flow Sub-Band:** This sub-band varies seasonally between elevation 12.6 ft. and 14.5 ft., NGVD. In this band, the allowable release from Lake Okeechobee to the WCAs is defined by: lake level, hydrologic conditions, effect of desired release on the Everglades, treatment capacity of STAs, downstream WCA level(s), tributary hydrologic conditions, and climate-based hydrologic outlooks as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part D (Figure 7). Also in this sub-band, continuous, low-volume releases are to be made to the Caloosahatchee Estuary and the St. Lucie Estuary. Base flow limits are defined as up to 450 cfs measured at S-79, and up to 200 cfs measured at S-80. If the basin runoff between the lake and the estuary is less than this "base flow", then Lake Okeechobee releases are made to supplement the difference. These base flow releases of excess Lake water may have environmental benefits to the estuaries and help to reduce the chances of subsequent high discharges that may be damaging. In addition, the SFWMD may allocate water to the environment through its "Adaptive Protocols" or other SFWMD authorities.

**Low Sub-Band:** This sub-band varies seasonally between elevation 13.0 ft. and 16.25 ft., NGVD. In this sub-band, operations for releases to the WCAs and base flow to the estuaries will be conducted consistent with the Base Flow Sub-Band. Lake releases to the estuaries that are greater than base flow are allowed within this sub-band and are defined by: lake level, hydrologic conditions, lake level's distance from the Intermediate Sub-Band, tributary hydrologic conditions, and climate-based hydrologic outlooks as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part D (Figure 7). As shown on Part B, this sub-band was divided into thirds (Upper Range, Middle Range, Lower Range). Within the Upper Range, the pulse release to the Caloosahatchee Estuary is up to 3000 cfs while to the St. Lucie Estuary it is up to 1170 cfs (3000/1170). The pulse release in the Middle Range and the Lower Range is 2500/950 and 2000/730, respectively. Within the Low Sub-Band, the release from Lake Okeechobee to the WCAs is defined by: lake level, tributary hydrologic conditions, effect of desired release on the Everglades, downstream WCA level(s), and the multi-seasonal climate-based hydrologic outlook as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part C (Figure 6). The maximum allowable lake releases to the WCAs and estuaries is provided as follows:

- (1) To WCAs - When tributary hydrologic conditions and the multi-seasonal climate/hydrologic outlook are not in their dry classifications, then up to maximum practicable release to the WCAs are allowable if the release is beneficial to, or will result in minimum Everglades impacts. Both the quantity and quality of Lake Okeechobee water will be considered.
- (2) To Estuaries - When tributary conditions are very wet, the lake level is within 1.0 foot of the Intermediate Sub-Band, and the seasonal climate forecast is very wet, then lake releases up to 4000 cfs at S-77 and up to 1800 cfs at S-80 (4000/1800) are allowable.
- (3) To Estuaries – When the lake level is not within 1.0 foot of the Intermediate Sub-Band, or tributary conditions are not very wet, and the multi-seasonal climate/hydrologic outlook is wet, then lake releases up to 3000 cfs at S-79 and up to 1170 cfs at S-80 (3000/1170) are allowable. These releases are intended to be made in a pulse release that is sensitive to the estuary environment.

**Intermediate Sub-Band:** This sub-band varies seasonally between elevation 15.0 ft. to elevation 16.88 ft., NGVD. In this sub-band, operations for base flow to the estuaries will be conducted consistent with the Base Flow Sub-Band. Lake releases to the estuaries that are greater than base flow are allowed within this sub-band and are defined by; lake level, tributary hydrologic conditions, the projected rise of the lake, short term meteorological forecasts, seasonal hydrologic outlooks, and climate-based hydrologic outlooks as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part D (Figure 7). The allowable release from Lake Okeechobee to the WCAs is defined by; lake level and downstream WCA level(s), as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part C (Figure 6). The maximum allowable lake releases to the WCAs and estuaries is provided as follows:

- (1) To WCAs - When all downstream WCAs are less than a quarter of a foot above the maximum elevation of their regulation schedules, then up to maximum practicable release to the WCAs are allowable. Downstream WCAs are all WCAs downstream of the WCA receiving Lake discharges. For example, if it is desired to make a release to WCA-3A (via STA-3/4), then WCA-1 and WCA-2A water levels do not constrain the release to WCA-3A since they are upstream of WCA-3A. However, if it is desired to make a release to WCA-2A (via STA-3/4), and if the WCA-3A water level was higher than 0.25 ft above the maximum of its regulation schedule, then no release to WCA-2A would be made.
- (2) To Estuaries - When tributary conditions are very wet and the lake level is projected to rise into the High Sub-Band, lake releases up to 6500 cfs at S-77 and up to 2800 cfs at S-80 (6500/2800) are allowable.

**High Sub-Band:** This sub-band varies seasonally between elevation 15.5 ft. at its lowest point and elevation 17.25 ft., NGVD. In this sub-band, there is always the ability to release to the Caloosahatchee Estuary up to 3000 cfs measured at S-79, and to release up to 1170 cfs to the St. Lucie Estuary measured at S-80, for management of the lake level. The allowable lake releases to the estuaries are defined by; lake level, tributary hydrologic conditions, the projected rise of

the lake, short term weather forecasts, and the seasonal climate/hydrologic outlook as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part D (Figure 7). The allowable release from Lake Okeechobee to the WCAs is defined by; lake level and downstream WCA level(s), as shown on the 2007 Lake Okeechobee Interim Regulation Schedule Part C (Figure 6). The maximum allowable lake releases to the WCAs and estuaries is provided as follows:

- (1) To WCAs - When all downstream WCAs are less than a quarter of a foot above the maximum elevation of their regulation schedules, then up to maximum practicable release to the WCAs are allowable.
- (2) To Estuaries - When tributary hydrologic conditions are very wet and the lake level is projected to rise into the High Lake Management Band, then lake releases up to maximum discharge capacity are allowable.

### **Make-up Release Description**

Historically, the planned Lake Okeechobee releases to tide (estuaries) have been subject to reduction or prevention by downstream conditions such as downstream local basin runoff, the tidal cycle, and tidal storm surge. Similarly, planned Lake Okeechobee releases to the WCAs have also been subject to reduction or prevention by conditions such as high water levels in the WCAs, STA treatment capacity limits, and limited or no conveyance capacity in the primary canals within the Everglades Agricultural Area. When this has occurred, the reduction of the lake level has been delayed or discontinued. To address this issue, proposed operational guidance includes conducting releases from Lake Okeechobee to tide and or the WCAs (via STAs) to make-up releases that were previously reduced or prevented. These make-up releases from Lake Okeechobee to tide (estuaries) and WCAs will occur as soon as possible and may occur when Parts C and D (Figures 6 and 7) do not allow releases or prescribes a lower volume release. The lake make-up releases to tide (estuaries) would be limited to a pulse release from Lake Okeechobee not to exceed 2800 cfs measured at S-79 and 2000 cfs at the St. Lucie Estuary (this includes releases from all C&SF structures that discharge into the St Lucie Estuary) when the lake level is below the Intermediate Sub-Band.

### **Decision-Making Process**

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 various information related to water management. This information includes but is not necessarily limited to: C&SF Project conditions, historical lake levels, estuary conditions/needs, lake ecology conditions/needs, WCA water levels, stormwater treatment area available capacity, current climate conditions, climate forecasts, hydrologic outlooks, projected lake level rise/recession, and water supply conditions/needs.

Part A of the 2007 Lake Okeechobee Interim Regulation Schedule (Figure 4) can be considered a starting point in the decision-making process for Lake Okeechobee water

management operations. Part A allows a quick visual determination of which of the general management bands applies to the current lake stage.

Use of the 2007 Lake Okeechobee Interim Regulation Schedule Parts B through D (Figures 5 through 7) will result in the determination of releases from Lake Okeechobee. The elevation guidelines include appropriate variations by season to conform with functional needs and rainfall runoff. As with WSE, recreation and navigation is provided for when water is available and/or through releases conducted for other project purposes.

The release to be implemented will be limited to the allowable release determined from Part C and Part D (Figures 6 and 7). Releases can vary up to the allowable release based upon consideration of current and anticipated conditions/needs stated above. This process allows for the quantity, timing, and duration of the releases to be performed to address the competing needs associated with water resources and the Congressionally-authorized project purposes while not exceeding the release ability provided by the TSP.

When operating near band and sub-band limits, up to 30-day forecasts will be made and releases will be scheduled to lower or maintain the lake at the desired level during the 30-day period. Scheduling of releases may include the adjustment of band/sub-band limits when determining the release to implement. Factors considered in adjusting the band/sub-band limits would include but not be limited to: availability of STA treatment, SFWMD designated lands, CERP reservoirs, and the condition of tributary basins. The band/sub-band adjustment is meant to transition into and out of sub-bands by allowing flows to gradually increase or decrease between sub-bands. An example of this adjustment would be: a condition above is occurring, lake level is 0.2 feet below the Intermediate Sub-Band and projected to rise into the Intermediate Sub-Band, then the allowable Lake Okeechobee release would be determined by following Part D with the lake level considered to be in the Intermediate Sub-Band (not 0.2 ft. below the Intermediate Sub-Band).

### **Additional Operational Flexibility**

It is anticipated that future events similar to those experienced over the period of record (1965-2000) will be effectively managed by the TSP. The TSP was also simulated for the 2001 through 2005 period, and deemed effective for managing high lake elevations under this set of conditions. Occasionally, additional operational flexibility will be used to address circumstances (hydrologic conditions, lake levels, estuary spawning, downstream runoff, etc.) that were not evaluated in the TSP for the period of record. Additional operational flexibility provides water managers the ability to consider releases from Lake Okeechobee to the WCAs and to tide (estuaries) to minimize damages or to meet project purposes when the 2007 Lake Okeechobee Interim Regulation Schedule Parts A through D (Figures 4 through 7) is not effective at managing lake levels consistent with the intent of the TSP.

Release decisions will take into account the estuary's biologically-derived maximum flow, future water supply demands, C&SF system-wide conditions, and lake ecological conditions, as appropriate. Consideration of the concern for public health and safety is the USACE's highest priority. Once implemented, releases will be discontinued when the conditions

that prompted them have ceased or the desired outcome is achieved. Based upon the evaluation of historical conditions and the expected performance of the TSP, it is anticipated that use of additional operational flexibility will be infrequent.

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). The following sections identify the scenarios that would trigger the use of additional operational flexibility and provide details on releases to be considered under each scenario.

**a. Undesirable/Prolonged High Lake Levels**

Releases may be considered for implementation to prevent anticipated high lake levels or to lower high lake levels, in order to reduce risk to the HHD and to prevent additional adverse environmental impacts to Lake Okeechobee. In 2003, continuous high lake levels (above 15 ft., NGVD in excess of 13 months) resulted in a Temporary Deviation. The purpose of this Temporary Deviation was to minimize the risk of high lake levels, to lower Lake Okeechobee for prevention of additional adverse impacts in the lake and to reduce the potential of make high constant releases to the estuaries. These intended purposes were accomplished while balancing other management objectives of water supply and flood control.

In the event that there are ongoing or planned activities at C&SF Project features (including CERP Projects) upstream or downstream of Lake Okeechobee and high lake levels are projected to occur or anticipated to occur as a result of these activities and based on any combination of planned water management operations, climate forecasts, and historical information/data, then additional releases to the WCAs and to tide (estuaries) could be considered. The consideration of all project purposes will be considered. When possible, the lake releases to tide (estuaries) would be limited to a pulse release from Lake Okeechobee not to exceed 2800 cfs measured at S-79 and 2000 cfs measured at the St. Lucie Estuary (this includes releases from all C&SF structures that discharge into the St Lucie Estuary). Releases to the WCAs would consider available treatment capacity in the STAs.

Additional releases might be implemented to lower the lake level in advance of planned activities and/or prevent high lake levels. An example is a planned muck removal operation involving a lake drawdown in the Kissimmee River Basin that could result in the need to create storage in Lake Okeechobee prior to the planned Kissimmee River Basin drawdown.

**b. Climate Conditions**

In the event that climate conditions including but not limited to, El Nino, La Nina, and/or active hurricane season forecasts are projected to create or continue high lake levels, additional operational flexibility would allow releases to WCAs and to tide (estuaries) to be implemented. The lake releases to tide (estuaries) should be limited to a pulse release from Lake Okeechobee not to exceed 2800 cfs measured at S-79 and 2000 cfs measured at the St. Lucie Estuary (this includes releases from all C&SF structures that discharge into the St Lucie Estuary). The 2004

wet spring (normally the dry season) and an overly active hurricane season is an example of conditions that could be addressed by implementation of additional operational flexibility.

**c. Low Volume Releases**

In the event that the lake level is above the Water Shortage Management Band and there are conditions that would require low-volume releases, additional operational flexibility would allow low-volume releases to be implemented. The low-volume releases would be implemented to address conditions including, but not limited to the following: to prevent and/or to lower high lake levels, to address algal blooms, to disperse saltwater in the river and/or estuary, or improve other conditions related to the Congressionally-authorized project purposes, especially future water supply demands. The proposed low-volume releases would be limited to a pulse release from Lake Okeechobee up to a 2000 cfs measured at S-79 and up to a 730 cfs measured at S-80. In 2004, a Temporary Deviation that enabled the ability to implement an Up to Level 1 Pulse Release (a pulse release that averaged up to 1600 cfs to the Caloosahatchee Estuary and up to 730 cfs measured at S-80). The purpose of this Temporary Deviation was to minimize the risk of high lake levels, to lower Lake Okeechobee for prevention of additional adverse impacts in the lake and to reduce the potential of make high constant releases to the estuaries. These intended purposes were accomplished while balancing other management objectives of water supply and flood control.