

APPENDIX A

Proposed Revisions to Lake Okeechobee Operational Guidance

U.S. Army Corps of Engineers
Jacksonville District

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PROPOSED REVISIONS TO LAKE OKEECHOBEE OPERATIONAL GUIDANCE

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 document is to describe and explain the implementation of the proposed water management operational guidance to be included in a Revised Lake Okeechobee and Everglades Agricultural Area Water Control Plan. This proposed water management operational guidance will include the Regulation Schedule and Lake Okeechobee releases to the Water Conservation Areas (WCAs) and to tide (estuaries). Portions of the water management operational guidance from the current water control plan (Water Control Plan for Lake Okeechobee and Everglades Agricultural Area, July 2000) will be utilized and incorporated into the Revised Water Control Plan. The Revised Lake Okeechobee and Everglades Agricultural Area Water Control Plan 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 Study

The Lake Okeechobee Regulation Schedule Study (LORSS) was initiated to address continued high lake levels, estuary ecosystem conditions, and lake ecology conditions that occurred during the 2003 to 2005 time period. At the forefront of the LORSS was the back-to-back historically significant hurricane seasons of 2004 and 2005, the recognized structural integrity issues of Herbert Hoover Dike (HHD), and the potential danger that any hurricane season poses for the people relying upon the protection provided by HHD. Other important considerations were the environmental needs of Lake Okeechobee, the Caloosahatchee Estuary, the St. Lucie Estuary, and the Everglades, including Everglades National Park.

The LORSS resulted in the development of several alternatives, including the Tentatively Selected Plan (TSP), that are considered to be modifications of the July 2000 Lake Okeechobee Regulation Schedule (Figure 1), better known as Water Supply/Environment (WSE). Both WSE and the TSP are based on an 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" defines and describes the implementation of WSE.

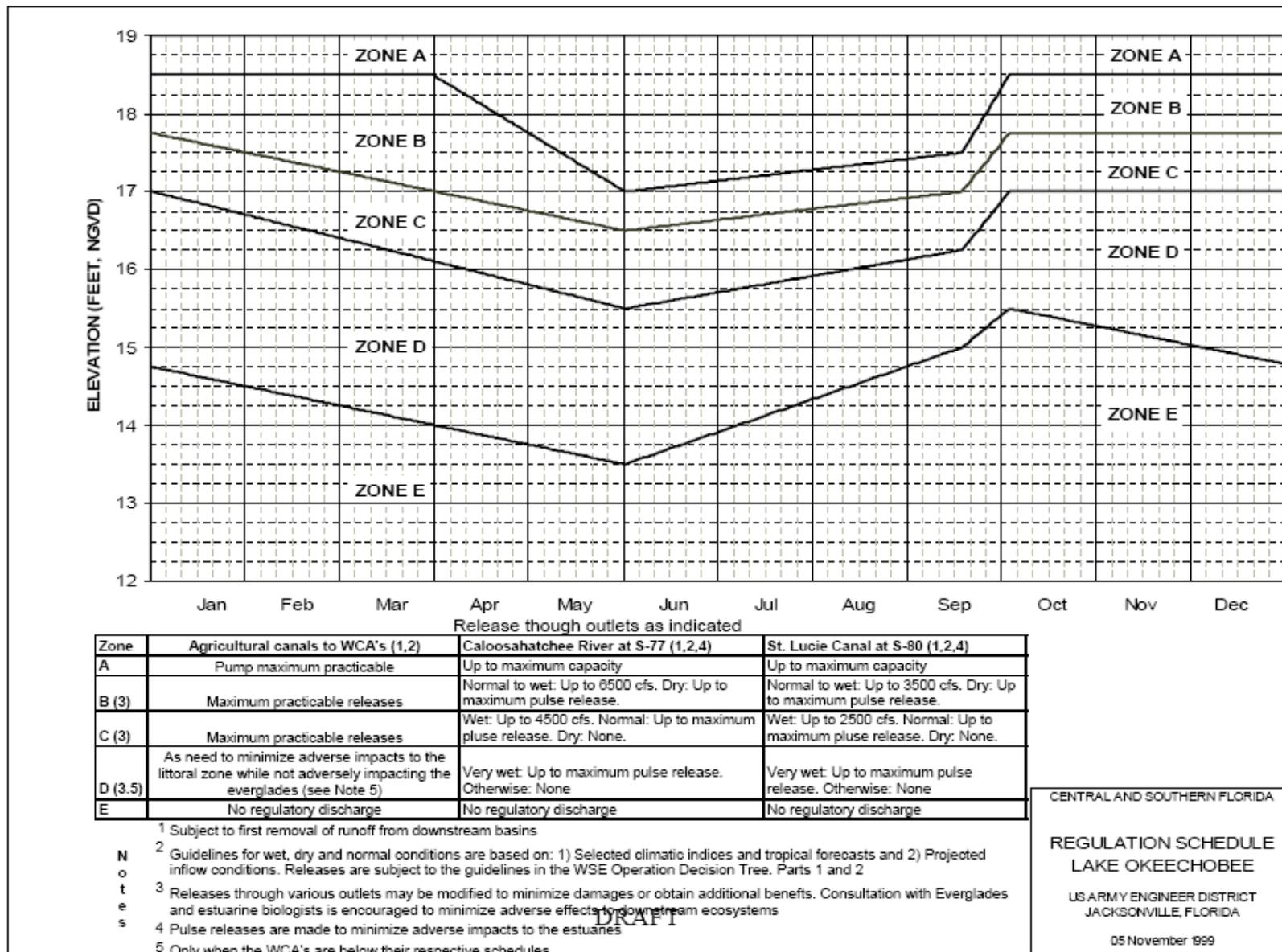


FIGURE 1: LAKE OKEECHOBEE REGULATION SCHEDULE

Part 1: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas

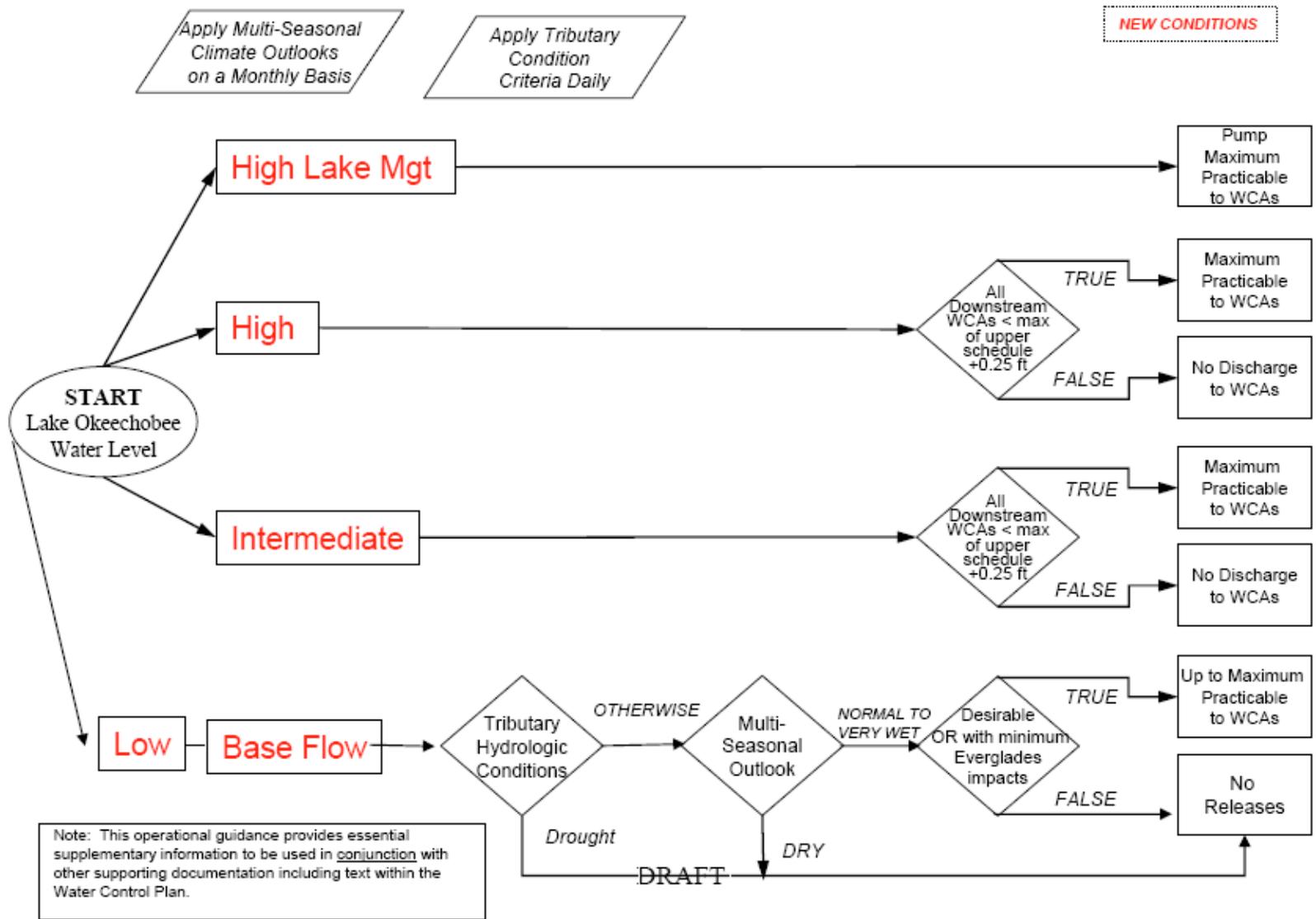


FIGURE 2: WSE OPERATIONAL GUIDELINES DECISION TREE – PART 1

The LORSS SEIS TSP was identified to be effective and proficient at providing for public health and safety, containing flexibility to perform water management operations, and when unavoidable, having a more equal distribution of shared adversity than WSE. Selection of the TSP included analysis of South Florida Water Management Model (2x2) output. As was the practice with the 2x2 modeling done for WSE, the releases modeled in LORSS alternatives using the 2x2 consisted of continuous releases at various volumes. In a similar manner as WSE, actual releases to be implemented may be performed in a pulse style of release to simulate natural hydrologic conditions, such as a rainfall event.

The 2x2 modeling output was generated using input representing each LORSS alternative, such as the TSP's Lake Okeechobee Management Bands (Figure 4), Lake Okeechobee Operational Guidance to WCAs (Figure 5), and the Lake Okeechobee Operational Guidance to Tide (Figure 6). The Operational Guidance and the Lake Management Bands establish the quantity, timing, and duration of releases from Lake Okeechobee allowable within the TSP. The differences between the decision tree for WSE and the Operational Guidance for the TSP are shown in red on Figures 5 and 6.

The Tributary Hydrologic Conditions (THC) shown in red on Figure 6 have been changed to incorporate a better representation of hydrologic conditions than WSE included. Tributary Hydrologic Conditions within WSE only utilized average historical evapotranspiration and excluded rainfall over Lake Okeechobee. As proposed, the THC within Figure 6 now includes a Drought Severity Index which encompasses these WSE shortcomings.

Summary of the Tentatively Selected Plan

The proposed water management operational guidance, resulting from LORSS TSP, to be used on a daily basis in the management of Lake Okeechobee, includes the proposed Lake Okeechobee Management Bands (Figure 4), Operational Guidance (Figures 5 and 6), the Lake Okeechobee Regulation Schedule (Figure 7), various weather related forecasts, and historical as well as projected lake level information. In the future, more experience will likely be gained through conducting water management operations, weather related forecasting improvements may occur, and additional C&SF Project infrastructure will be constructed. This will likely result in the water management operational guidance being updated or expanded to include additional items, as necessary.

Management of Lake Okeechobee water levels and determination of Lake Okeechobee releases to the WCAs and to tide (estuaries) is based upon three guidelines as shown on the proposed Lake Management Bands (Figure 4). These guidelines include "High Lake Management" (top band on Figure 4), "Operational Band" (middle band on Figure 4), and "Supply Side Management" (bottom band on Figure 4). The High Lake Management Band is meant to address public health and safety especially related to known issues with the structural integrity of Herbert Hoover Dike. The Operational Guideline is meant to facilitate authorized project purposes by providing the ability to make, or not to make, various releases from Lake Okeechobee, depending on, but not necessarily limited to, recent rainfall, the time of year, ecosystem conditions, and future climate projections. The Supply Side Management Band is meant to provide the water supply needs for service areas defined by the SFWMD.

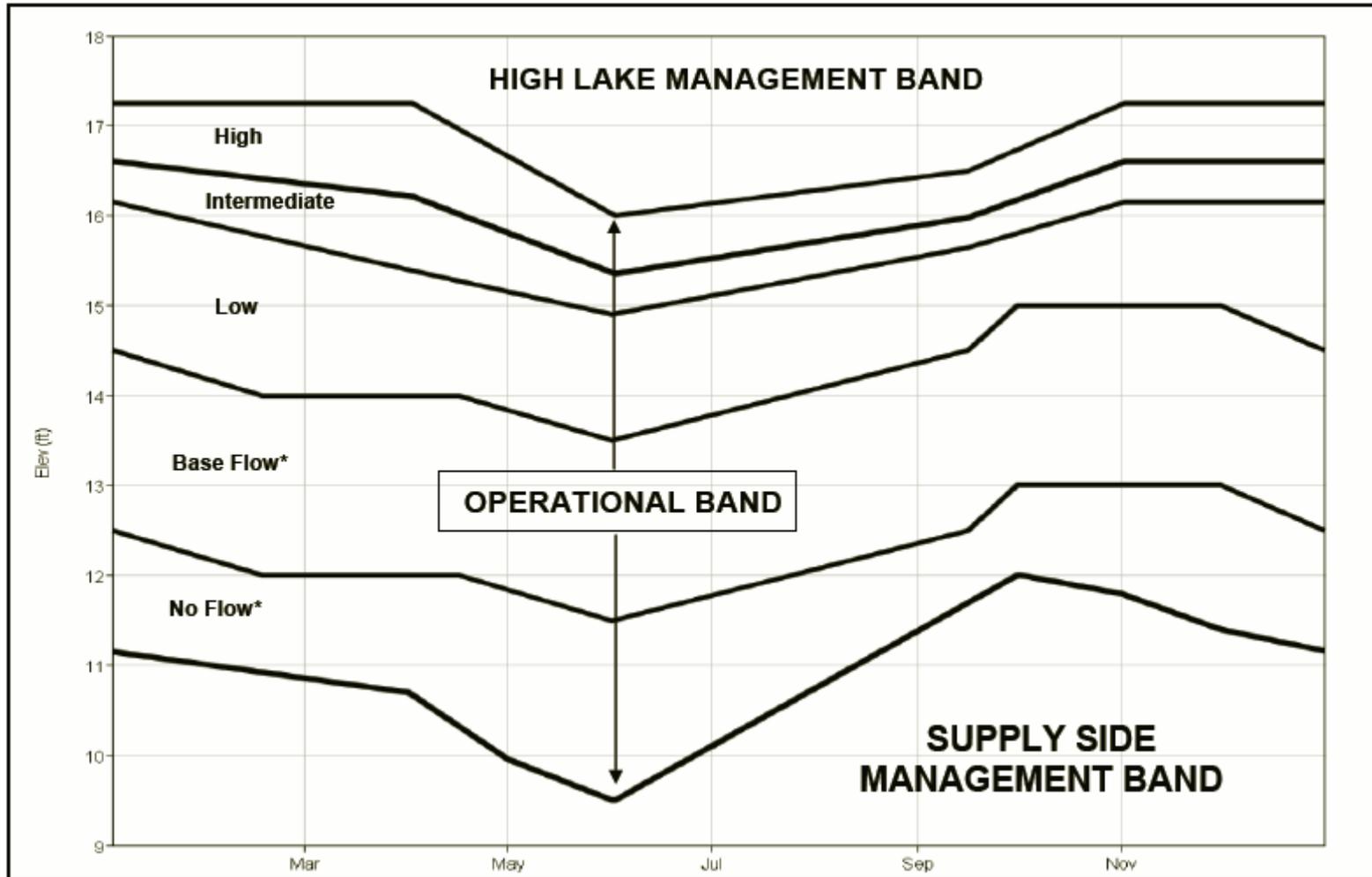


FIGURE 4: LAKE OKEECHOBEE MANAGEMENT BANDS

Part 1: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas

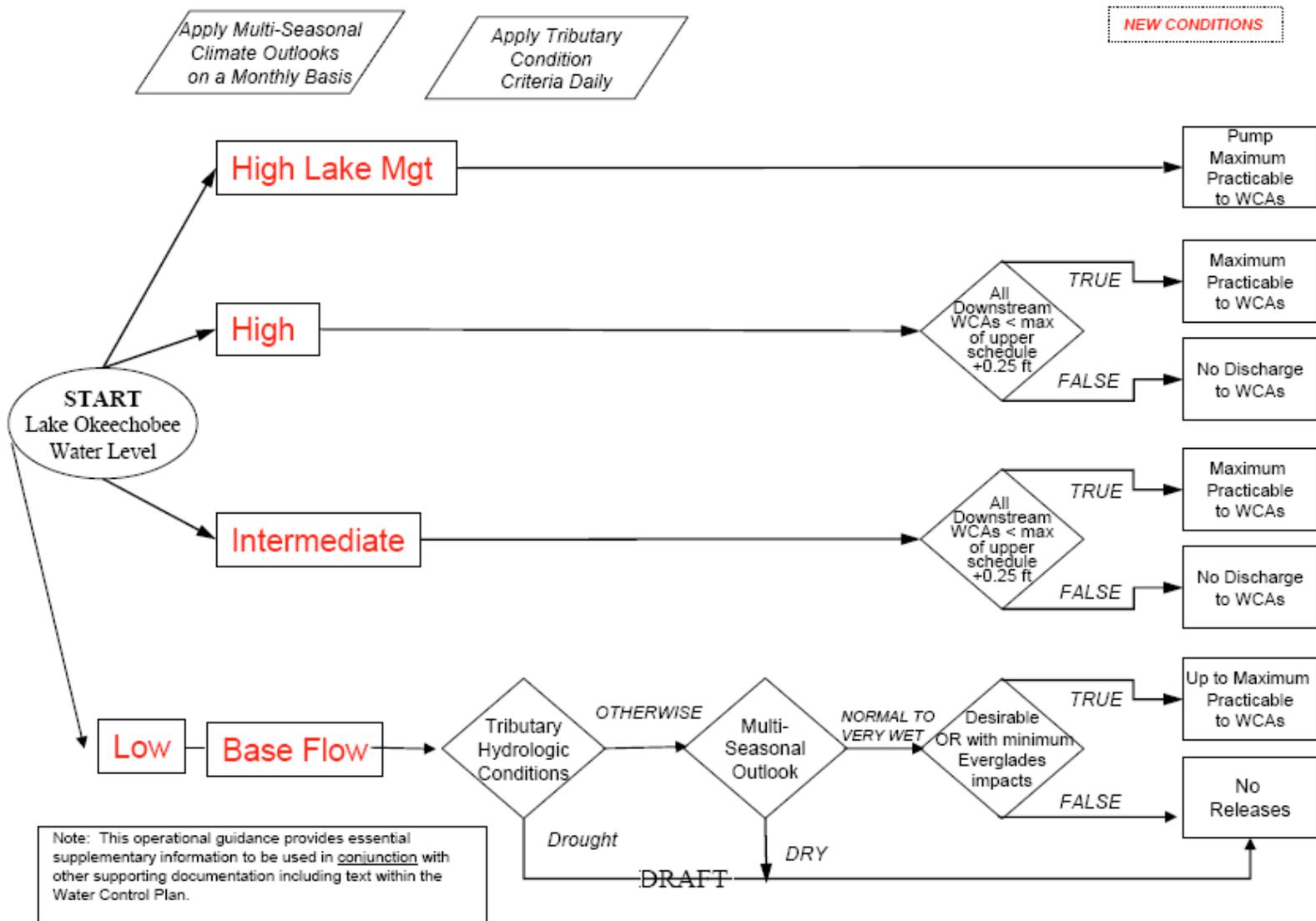


FIGURE 5: LAKE OKEECHOBEE OPERATIONAL GUIDANCE – PART 1

Part 2: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)

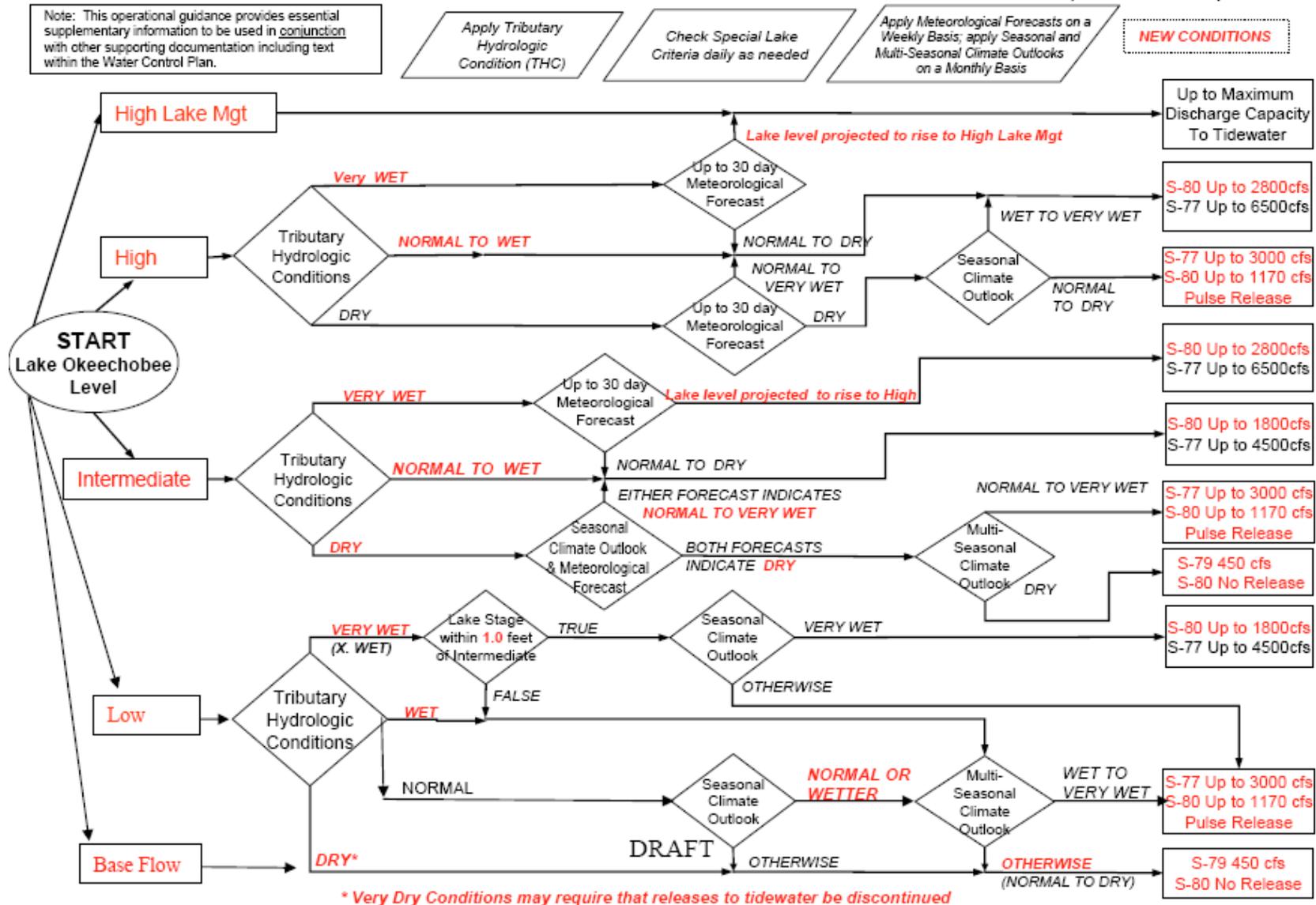


FIGURE 6: LAKE OKEECHOBEE OPERATIONAL GUIDANCE – PART 2

To assist water management decision making, a “Lake Stage Envelope” as well as an “Operational Guideline” have been established and are shown on the Regulation Schedule (Figure 7). The Lake Stage Envelope varies seasonally between 15.75 feet, National Geodetic Vertical Datum of 1929 (ft., NGVD) at its high point, to elevation 11.75 ft., NGVD at its low point. This envelope represents seasonal lake levels that are desirable for the lake ecosystem only. The Operational Guideline varies on a seasonal basis from 12.5 ft., NGVD to 15.5 ft., NGVD and represents a daily guide to be used for management of the lake level. The seasonal fluctuations were developed using the lake average elevation over the period of record from 1965 to 2005 (POR). The historical lake level data is a direct relationship to the historical management of the lake over the POR. Therefore, since the Operational Guideline is based on this historical lake level data, the Operational Guideline reflects a fundamental water management goal to facilitate all Lake Okeechobee authorized project purposes (fish/wildlife enhancement, flood control, water supply, etc.) While the Lake Stage Envelope provides seasonal guidance for lake levels, the Operational Guideline allows consideration of other factors including project conditions, historical lake levels, estuary conditions/needs, lake ecology conditions/needs, storm water treatment area available capacity/needs, current weather conditions, weather forecasts, projected lake level rise/recession, and water supply conditions/needs.

The lake is normally managed seasonally between 12.5 ft., NGVD and 15.5 ft., NGVD to prevent ecologically damaging high and low lake levels. Releases to the WCAs and to the estuaries will reduce the likelihood of undesirable high lake levels that contribute to poor ecological conditions within the lake. High lake levels can also lead to the decline of emergent and submerged vegetation which is essential habitat for the lake’s sport fishing population. Species of special concern and other issues will be considered in determination of the lake release to be performed at lower lake levels to avoid extreme low lake levels, when possible. Forecasted dry weather conditions, projected lake recessions, and/or anticipated lower lake levels will all be considered in determining if adjustments to releases are necessary to prevent lower lake levels below 12.5 ft., NGVD.

Public health and safety is ensured by maintaining the lake at desirable levels through the use of long term low volume releases to the Caloosahatchee Estuary, St. Lucie Estuary, and WCAs. Determination of a desirable lake level can be influenced by many issues including, but not limited to; season, watershed conditions, and weather, and will be determined on a daily basis, as needed. A determination based on forecasted weather conditions and projected lake levels can also potentially result in undesirable high volume releases, but will allow the lake to be lowered to an acceptable level sooner than just basing the decision on the actual lake level. The seasonal fluctuation that lowers the lake prior to hurricane season is meant to provide storage for future anticipated extreme weather events. This has the potential to affect future water supply needs. The seasonal fluctuation that results in a higher lake level at the end of the hurricane season is meant to provide water for the upcoming dry season.

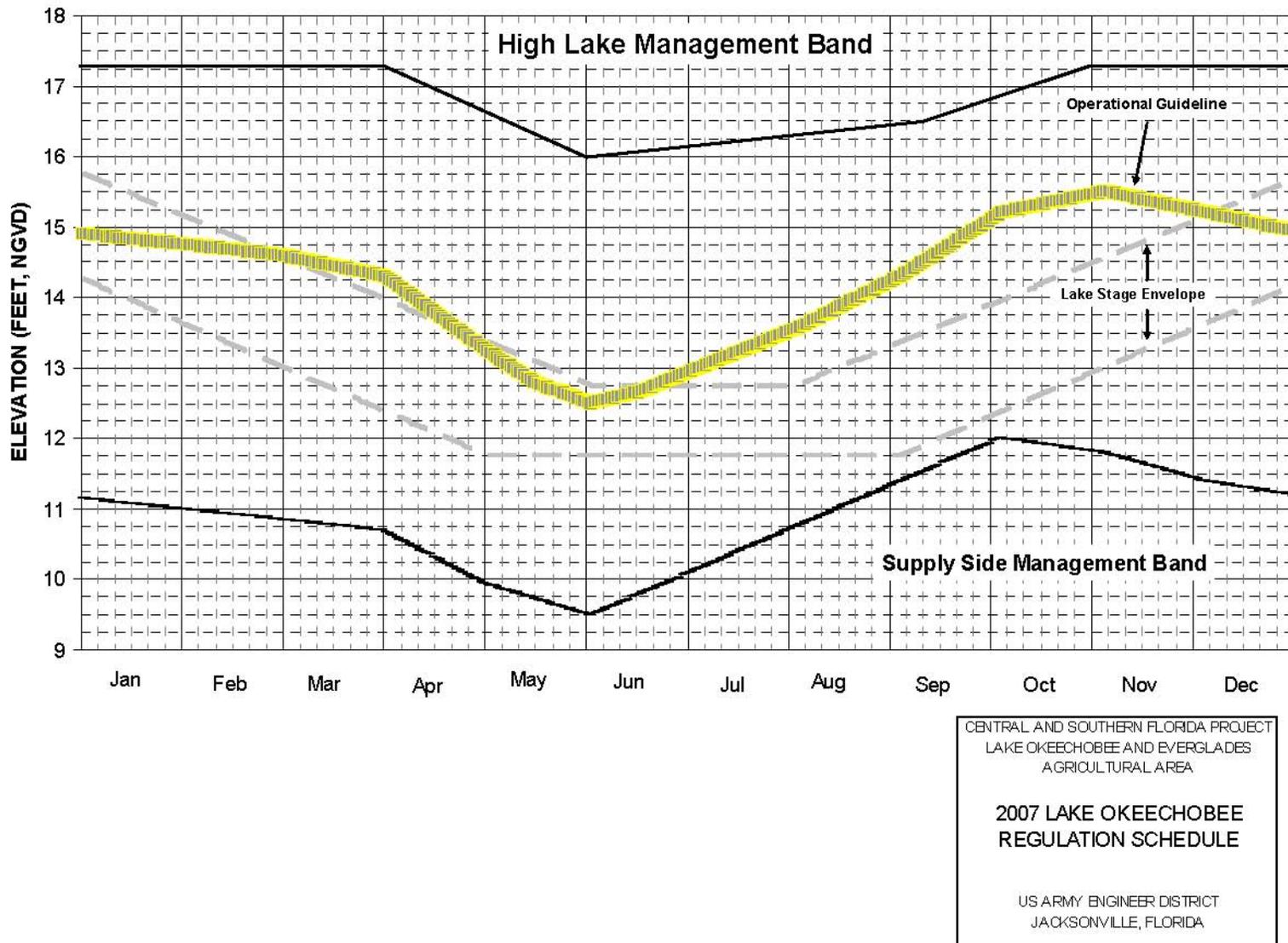


FIGURE 7: 2007 LAKE OKEECHOBEE REGULATION SCHEDULE

Management decisions for the lake will consider estuary conditions/needs, potential impacts from lake releases, local runoff, and dry weather conditions. This includes releasing an environmentally friendly volume of water over an acceptable period of time to the St. Lucie Estuary, the Caloosahatchee Estuary, and the WCAs. Low volume regulatory releases, low volume environmental releases, and a base flow to the Caloosahatchee Estuary are used over long periods of time in an effort to reduce the potential for future prolonged high volume releases while providing appropriate amounts of freshwater to maintain desirable estuary salinity.

Lake Okeechobee Management Bands

The proposed operational guidance has three distinct bands of lake level management (Figure 4). Each management band is designed to achieve specific lake objectives. The lowest band is known as Supply Side Management. In this band, water in Lake Okeechobee will be managed in accordance with the Supply-Side Management Plan established by the South Florida Water Management District. The highest band is known as High Lake Management. The goal is to quickly lower high lake stages to make room for the next possible flood event, to reduce impacts on the lake's littoral zone, and to ensure public health and safety by relieving stress on the Herbert Hoover Dike. The middle and largest band is known as the Operational Band. It is anticipated that the majority of time, water levels will be managed according to the operational criteria established for this band. This includes releases to meet water supply demands. A detailed description of this operational band criteria follows.

Supply Side Management Band – varies seasonally between 9.5 to 12.0 ft., NGVD. Operations in this zone are governed by the South Florida Water Management District Supply Side Management (SSM) Plan (**NOTE: SSM name and numbers will likely change upon completion of SFWMD's rule making process in 2006**). Releases will be governed by this plan which is pending. The goal of this band is to manage existing water supply 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 ensure public health and safety; therefore operations will be done to lower the lake to the bottom of the High Lake Management Band as quickly as possible using regulatory releases. For Lake Okeechobee, a regulatory release can be considered as a release from Lake Okeechobee to achieve a lower lake level or prevent an anticipated higher lake level. It is of the utmost importance that the lake level be reduced as rapidly as possible to make room for the next possible flood 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 south to the WCAs and CERP impoundments. Rates of release will vary depending on downstream channel conditions, estuary conditions, conditions in the water conservation areas and stormwater treatment areas, and other constraints.

Operational Band - the largest management band varies seasonally between 9.5 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 best meet all authorized project purposes. This involves use of regulatory releases, environmental releases, base flow releases, and water supply releases. Within this

Operational Band, several sub-bands have been established to define lake management practices. 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. For Lake Okeechobee, a water supply release can be considered a release from Lake Okeechobee to meet water supply demands. Lake Okeechobee releases to meet water supply demands may be made in all sub-bands of the Operational Band. Criteria and the decision making process for the sub-bands are described below.

Sub-Band 1/No Flow: This sub-band varies seasonally between elevation 9.5 ft and 13.0 ft., NGVD at its highest point. Except for navigation and fish and wildlife enhancement, SFWMD allocates water to various users in this sub-band period. Navigation can typically be supported by releases from Lake Okeechobee that are conducted for other authorized project purposes. Fish and Wildlife enhancement may involve conducting an environmental release from Lake Okeechobee. No regulatory releases are made in this sub-band. In addition, SFWMD may allocate water to the environment through its “Adaptive Protocols”.

Sub-Band 2/Base Flow: This sub-band varies seasonally between elevation 11.5 ft NGVD and 15.0 ft., NGVD. In this sub-band a base flow will be provided to the Caloosahatchee Estuary. No base flow is provided to the St. Lucie Estuary, unless requested by the SFWMD under “Adaptive Protocols” or other authority. Releases through various outlets may be modified to minimize damages or obtain additional benefits.

Sub-Band 3/Low Lake Stage: This sub-band varies seasonally between elevation 13.5 ft. and 16.15 ft., NGVD. The Operational Guidance (Figures 5 and 6) provides essential supplementary information to be used in conjunction with the 2007 Lake Okeechobee Regulation Schedule (Figure 7). Releases through various outlets may be modified to minimize damages or obtain additional benefits. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs.
- (2) Under wet tributary conditions, up to 3000 cfs pulse release to the Caloosahatchee Estuary, and up to 1170 cfs pulse release to the St. Lucie Estuary (3000/1170 pulse release), including a base flow to the Caloosahatchee Estuary. Pulse releases are described below.
- (3) Under very wet tributary conditions, releases up to 4500 cfs may be made at S-77, and up to 1800 cfs may be made at S-80 (4500/1800).

Sub-Band 4/Intermediate Lake Stage: This sub-band varies seasonally between elevation 14.90 ft. at its lowest point to elevation 16.60 ft., NGVD. The Operational Guidance provides essential supplementary information to be used in conjunction with the Regulation Schedule (Figure 7). Releases through various outlets may be modified to minimize damages or obtain additional benefits. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above the maximum of their upper regulation schedules, then no releases are made. These flows are secondary to the use of these canals for providing drainage and flood control for the local drainage area.
- (2) Under dry tributary conditions, provide a base flow to the Caloosahatchee Estuary or if the seasonal outlook is normal to very wet, releases up to 4500/1800 may be made, otherwise if multi-seasonal is not dry 3000/1170 pulse release, to the estuaries. For normal to wet tributary hydrologic conditions, releases up to 4500/1800 may be made. Under very wet tributary hydrologic conditions, and water levels are projected to rise into sub-band 5/High Lake Stage, then releases up to 6500 cfs at S-77 may be made and up to 2800 cfs at S-80 (6500/2800) may be made. Otherwise, releases up to 4500/1800 may be made.

Sub-Band 5/High Lake Stage. This sub-band varies seasonally between elevation 15.35 ft. at its lowest point and elevation 17.25 ft., NGVD. The Operational Guidance provides essential supplementary information to be used in conjunction with the Regulation Schedule (Figure 7). Releases through various outlets may be modified to minimize damages or obtain additional benefits. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above the maximum of their upper regulation schedules, then no releases are made. These flows are secondary to the use of these canals for providing drainage and flood control for the local drainage area.
- (2) Under dry tributary, and forecasted dry conditions, up to the maximum pulse releases to the estuaries can be utilized. For normal to wet tributary hydrologic conditions, and the seasonal outlook is wet to very wet, the releases up to 6500/2800 may be made. Under very wet tributary hydrologic conditions, and water levels are projected to rise into the High Lake Management Band, then up to the maximum discharges to tide can be made.

Proposed Operational Guidance

On a daily basis, water management decisions will utilize Lake Okeechobee Management Bands (Figure 4), Operational Guidance Decision Trees, and the 2007 Lake Okeechobee Regulation Schedule (Figure 7) to provide guidance on releases from Lake Okeechobee. Two parts of the Operational Guidance have been established; Part 1 (Figure 5) is utilized to establish the allowable releases to the WCAs and Part 2 (Figure 6) is utilized to establish the allowable releases to tide (estuaries).

The Operational Guidance establishes the allowable quantity, timing, and duration of releases from Lake Okeechobee to the WCAs and to tide (estuaries). Base flow releases from Lake Okeechobee to tide (Caloosahatchee Estuary) are permitted when the lake level is as low as 11.5 ft., NGVD. There are no provisions for a base flow from Lake Okeechobee to the St. Lucie Estuary to be conducted. Regulatory releases from Lake Okeechobee to tide (both estuaries) are

permitted when the lake level is as low as 11.5 ft., NGVD. Releases from Lake Okeechobee to the WCAs are permitted when the lake level is as low as 11.5 ft., NGVD.

The Tributary Hydrologic Conditions (“THC”) in the Lake Okeechobee Operational Guidance to WCAs (Figure 5) and the Lake Okeechobee Operational Guidance to Tide (Figure 6) utilize the Drought Severity Index (Index) from the National Weather Service and the calculated Lake Okeechobee Net Inflow which are shown on Table 1. The Index uses temperature and rainfall as an indicator and climatological tool that responds to weather conditions such as a drought, or an abnormal dry, or an abnormal wet period.

Similar to WSE, the “Seasonal Climate Outlook”, “Meteorological Forecast”, and “Multi-Seasonal Climate Outlook” in the Lake Okeechobee Operational Guidance to Tide (Figure 6) incorporate weather forecasting. Figure 6 is used to establish the allowable Lake Okeechobee release to tide (estuaries). These release limits (allowable) represent the TSP’s allowable quantity, timing, and duration of release from Lake Okeechobee to the WCAs and to tide (estuaries).

As part of the TSP, the Lake Okeechobee Net Inflow includes actual rainfall over Lake Okeechobee, actual evaporation at Lake Okeechobee, and all available tributary inflows to Lake Okeechobee. Conversely, WSE utilized evaporation at Lake Alfred in the Kissimmee Basin, “regional rainfall”, and inflow to Lake Okeechobee only from Structure 65E (S-65E) in the Lake Okeechobee Net Inflow.

The “Lake level projected to rise to” phrase in the Lake Okeechobee Operational Guidance to Tide (Figure 6) can be determined on a daily basis, as necessary. Information to be considered includes, but is not necessarily limited to, the following: weather forecasts, release constraints due to downstream conditions, actual lake level rate of rise, historical lake levels, and C&SF Project conditions (including the Comprehensive Everglades Restoration Plan [CERP] Project). The WSE decision tree did not consider actual lake level rise or an anticipated or projected lake level.

Decision Making Process

The decision making process to determine quantity, timing, and duration of the potential release from Lake Okeechobee includes consideration of important information related to, but 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/needs, current weather conditions, weather forecasts, projected lake level rise/recession, and water supply conditions/needs. Either the possible release, something less than the possible release, or no release will be performed based upon this comparison and consideration of current and anticipated conditions/needs stated above. The release to be implemented will be limited by the allowable release determined from the Operational Guidance. 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 authorized project purposes while not exceeding the release ability provided by the TSP.

TABLE 1: TRIBUTARY CONDITIONS BASED ON PALMER INDEX AND LAKE OKEECHOBEE NET INFLOWS

Definition of Tributary conditions based on the Palmer Index and Net Inflow

Tributary Hydrologic Classification	Palmer Index Class Limits	2-wk mean L.O. Net Inflow Class Limits
Very Wet	3.0 or greater	Greater \geq 6000 cfs
Wet	1.5 to 2.99	2500-5999 cfs
Near Normal	-1.49 to 1.49	500-2499 cfs
moderate drought Dry	-1.5 to -2.99	-5000 – 500 cfs
severe drought Very Dry*	-3.0 or less	Less than -5000 cfs

The wettest of the two indicators describes the current tributary condition

*For modeling purposes, the dry and very dry classes can be combined into one class

The Net Inflow is represented by $NI = RF - ET + \text{Inflows}$,

where RF = rainfall over the lake, ET = lake evapotranspiration, and Inflows = all inflows to the Lake.

Using the basic mass balance equation, the Net Inflow can be calculated by $NI = DS + \text{Outflows}$,

where DS = storage change, and Outflows = measured outflows

The Palmer Index is a meteorological index that responds to weather conditions that have been abnormally dry or abnormally wet. The index is calculated based on precipitation and temperature data, as well as the local available water content of the soil.

Discussion on Palmer Index: <http://www.drought.unl.edu/whatis/indices.htm#pdsi>

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/wpdanote.shtml

Current Conditions:

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

Use of the Lake Okeechobee Management Bands (Figure 4), the Operational Guidance (Figures 5 and 6), and the Regulation Schedule (Figure 7) will result in the determination of releases from Lake Okeechobee. The Regulation Schedule includes consideration of authorized project purposes (specifically; flood control, water supply, as well as fish and wildlife enhancement) represented by elevation guidelines (High Lake Management, Supply Side Management, Operational) to regulate the accumulation and drawdown of storage for various uses, with 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 “Operational Guideline” (shown on Figure 7) can be considered a starting point in the decision making process for Lake Okeechobee water management operations. If a lake release is needed, the possible quantity of the lake release, as determined through Part 1 and Part 2 of the Operational Guidance (Figures 5 and 6), will be compared to the calculated release value needed to achieve the Regulation Schedule’s Operational Guideline (Figure 7). The calculated release value will be based upon the difference between the actual daily lake level and the Operational Guideline with consideration of the appropriate anticipated conditions (“Wet Atlantic Multi-decadal Oscillation [AMO]”, “Dry AMO”, “El Nino”, “La Nina”, “Average”, etc.). Either the possible release, something less than the possible release, or no release will be performed based upon this comparison and consideration of current and anticipated conditions/needs stated above. The release to be implemented will be limited by the allowable release determined from Part 1 and Part 2 (Figures 5 and 6). 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 authorized project purposes while not exceeding the release ability provided by the TSP.

Pulse Release Description

Low volume releases from Lake Okeechobee to tide (estuaries) will be implemented in a pulse style release to produce a natural flow pattern in the estuaries. High volume releases from Lake Okeechobee to tide (estuaries) may also be implemented in a pulse style release to produce a natural flow pattern in the estuaries. These pulse releases will be named based on the total flow value and time period associated with each pulse release. For instance, what was previously known as a Level 1 pulse release to the Caloosahatchee Estuary will be known as a 31,740 acre feet, 10-day, pulse release. Pulse release volume will also no longer be restricted to Level 1, 2, or 3 as with WSE but will be determined by the Operational Guidance. This allows greater consideration of estuary conditions and needs than WSE did. This naming convention will ease explanation and understanding of the various pulse releases that may be implemented in the future.

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. When this has occurred, 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 to make up releases that were previously reduced or prevented. These make-up releases from Lake Okeechobee to tide (estuaries) will occur as soon as possible and may even occur when Figure 6 does not allow releases or prescribes a lower volume release.

Non-typical Temporary Operations

Non-typical Temporary Operations (NTO) will only be considered for use when the Lake Management Bands (Figure 4) and Parts 1 and 2 of the Operational Guidance are not effective at managing lake levels as defined under the conditions below. The Lake Management Bands (Figure 4) as well as Part 1 (Figure 5) and Part 2 (Figure 6) of the Operational Guidance are

designed to achieve desirable lake levels over a variety of hydrologic conditions such as those conditions that occurred between 1965 and 2005. Occasionally there may be combinations of factors that may require NTO to achieve the results predicted by the Lake Okeechobee Operational Guidance or compensate for other constraints or changes which affect lake level management.

Only if the Management Bands (Figure 4) and Parts 1 and 2 of the Operational Guidance are not effective at managing lake levels as defined under the conditions below and it has been determined that it would be advantageous, NTO would be utilized. NTO and the determination of releases from Lake Okeechobee include the use of the NTO Bands (Figure 8), temporarily replacing Figure 4, and the use of Part 3 (Figure 9) of the Operational Guidance, temporarily replacing Part 2. The release to be implemented will be limited by the allowable release determined from Part 1 (Figure 5) and Part 3 (Figure 9) of the Operational Guidance.

Temporary utilization of Part 1 (Figure 5) and Part 3 (Figure 9) during NTO allows for the quantity, timing, and duration of the releases to be performed to address the competing needs associated with water resources and the authorized project purposes while not exceeding the release ability provided by the LORSS SEIS. Either the possible release, something less than the possible release, or no release will be performed based upon this comparison and consideration of current and anticipated conditions/needs.

Factors leading to the temporary utilization of NTO could include the prediction of very active hurricane seasons during a wet winter and spring, the occurrence(s) of hurricanes, unplanned changes in the CS&F Project (loss of structure capacities, temporary stormwater treatment area constraints, etc.), unusual Tributary Hydrologic Conditions, unusual predictions of lake level rise, or consensus among State and Federal agencies that hydro-meteorological information indicates an action is needed that was not anticipated by the Lake Okeechobee Operational Guidance.

Each NTO is unique and will be defined by a desired outcome or time-period. In most cases, it is expected that achievement of the lake level represented by the Operational Guideline will be the desired outcome of the NTO. Once implemented, the NTO will be discontinued once the conditions that prompted the NTO have ceased or will no longer cause a significant rise in lake level, the desired outcome is achieved, or the specified time-period has elapsed. Based upon historical conditions that have been experienced and expected performance of the TSP, it is anticipated that use of NTO will be infrequent.

Examples of when an NTO may be implemented are: (1) an event where the Lake Okeechobee Operational Guidance is not effective at lowering undesirable high lake levels and/or preventing undesirable high or prolonged lake levels projected to occur or anticipated to occur based upon weather forecasts and/or historical information/data; (2) an unusual ongoing or planned temporary deviation activity at C&SF Project features upstream or downstream of Lake Okeechobee (e.g. planned muck removal operations which necessitate lake drawdowns in the Kissimmee River basin would require lower Lake Okeechobee levels in order to receive the excess flow) and undesirable high lake levels are projected to occur or anticipated to occur based upon any combination of planned water management operations, weather forecasts, and

historical information/data; (3) weather conditions or forecasted weather conditions including but not limited to, El Nino, La Nina, and/or Active Hurricane Season forecasts are projected to create or continue undesirable high lake levels; (4) there is a need to facilitate periodic managed recessions of Lake Okeechobee to benefit the lake's ecosystem (e.g. the managed recession on Lake Okeechobee in 2000); or (5) consensus among State and Federal agencies that hydro-meteorological information indicates an action is needed that was not anticipated or indicated by the Lake Okeechobee Operational Guidance.

Non-typical Temporary Operations Bands

The proposed NTO have three distinct bands of lake level management very similar to the Lake Management Bands previously described above. A detailed description of these bands is below.

Supply Side Management Band – is below 9.5 ft., NGVD and varies seasonally from 9.5 ft., up to 12.0 ft., NGVD. Operations in this band are governed by the South Florida Water Management District Supply Side Management Plan. Releases in this band will be governed by this plan. **(NOTE: SSM name and numbers will likely change upon completion of SFWMD's rule making process in 2006).** The goal of this band is to manage existing water supply within the lake in accordance with SFWMD rules and guidance.

High Lake Management Band – is above 17.25 ft., NGVD and varies seasonally from 17.25 ft., down to 15.75 ft., NGVD. The goal of this band is to ensure public health and safety, therefore operations will be done to lower the lake to the bottom of the High Lake Management Band as soon as possible. It is of the utmost importance that the lake level be reduced as rapidly as possible to make room for the next possible flood event, to relieve stress on the Herbert Hoover Dike, and reduce impacts on the lake's littoral zone. Releases up to the maximum practicable will be made to tide and south to the water conservation areas and CERP impoundments. Rates of release will vary dependent on: downstream channel conditions; estuary conditions; conditions in the water conservation areas; and stormwater treatment areas and other constraints.

Operational Band - the largest management band varies seasonally between 9.5 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 provide for all authorized project purposes. Within this Operational Band, several sub-bands have been established to define lake level management. Criteria and the decision making process for the sub-bands are described below.

Sub-Band 1/No Flow: This sub-band varies seasonally between 9.5 ft. at its lowest point, to 13.0 ft., NGVD at its highest point. Except for navigation and fish and wildlife enhancement, SFWMD allocates water to various users in this sub-band. No regulatory releases are made in this sub-band. In addition, SFWMD may allocate water to the environment through its "Adaptive Protocols".

Non-typical Temporary Operations Bands *(To include water supply demand releases)

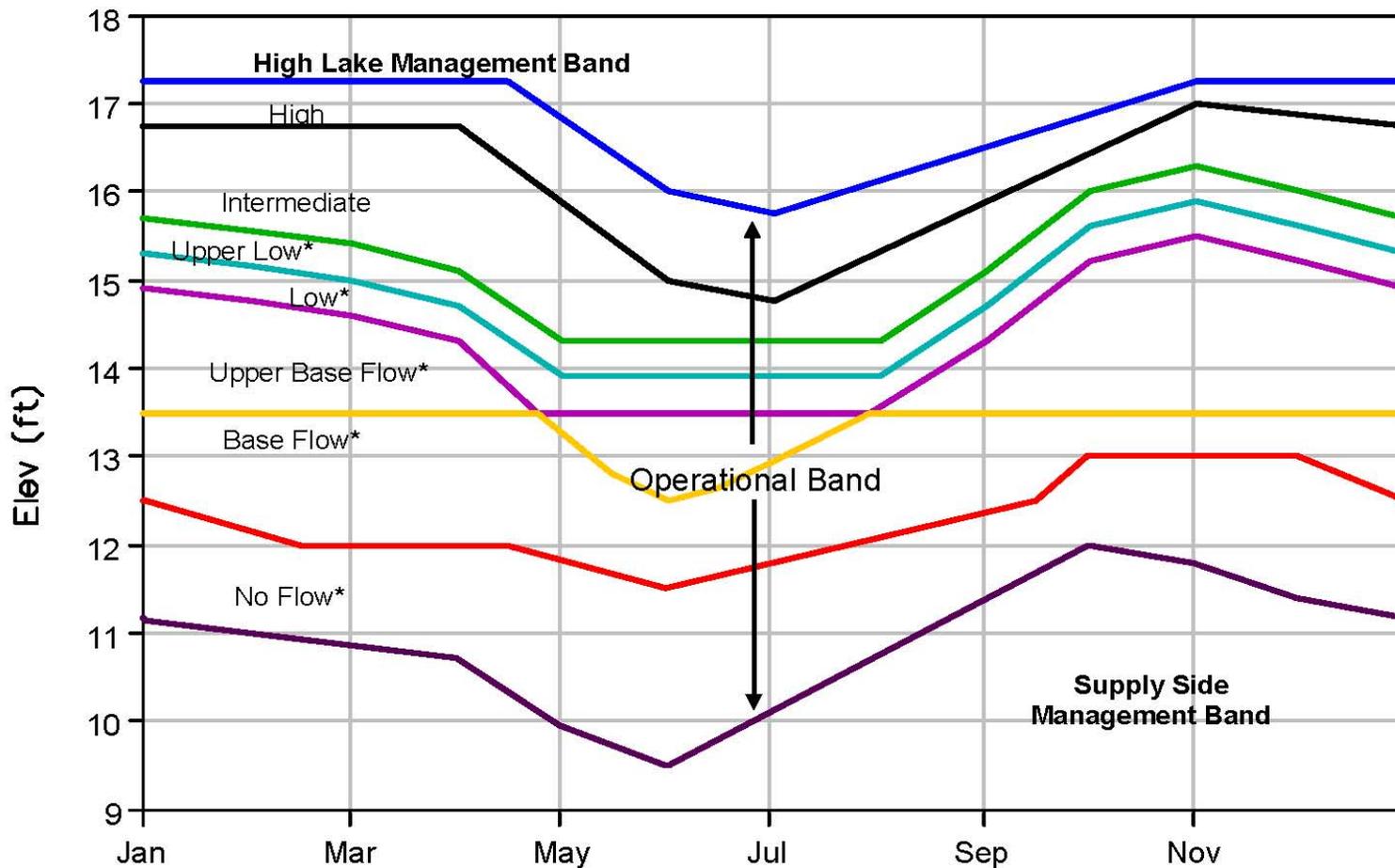


FIGURE 8: NON-TYPICAL TEMPORARY OPERATIONS BANDS

Sub-Band 2/Base Flow: This sub-band varies seasonally between 11.5 ft. and 13.5 ft., NGVD. In this sub-band a base flow of up to 450 cfs measured at S-79 can be provided to the Caloosahatchee Estuary.

- (1) Discharge up to maximum practicable flows to the WCAs.
- (2) Under “projected to rise” condition, releases may reflect the release of the band the lake is projected to rise into. For lake that is projected to rise into “Upper Base Flow”, up to 800 cfs pulse release to the Caloosahatchee Estuary and up to 400 cfs pulse release to the St. Lucie Estuary (800/400 pulse) may be made.

Sub-Band 3/Upper Base Flow: This sub-band varies seasonally between 12.5 ft. and 15.5 ft., NGVD. In this sub-band, release up to 800/400 pulse may be made.

- (1) Discharge up to maximum practicable flows to the WCAs.
- (2) Under “projected to rise” condition releases may reflect the release of the band the lake is projected to rise into. For lake that is projected to rise into “Low”, up to 1600 cfs pulse release to the Caloosahatchee Estuary and up to 800 cfs pulse release to the St. Lucie Estuary (1600/800 pulse) may be made.

Sub-Band 4/Low Lake Stage. This sub-band varies seasonally between 13.5 ft. and 15.9 ft., NGVD. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above the maximum of their upper regulation schedules, then no releases are made. These flows are secondary to the use of these canals providing drainage and flood control for the local drainage area.
- (2) When tributary hydrologic conditions is “otherwise” (not “very wet”) and the lake is not “projected to rise” into “Upper Low”, up to 1600/800 pulse may be conducted.
- (3) Under very wet tributary hydrologic conditions and lake is within .5 ft of Intermediate Band, up to 2300 cfs pulse release to the Caloosahatchee Estuary and up to 1400 cfs pulse release to the St. Lucie Estuary (2300/1400 pulse) may be made. Otherwise, release up to 1600/800 pulse may be made.
- (4) Under “projected to rise” condition releases may reflect the release of the band the lake is projected to rise into. For lake that is “projected to rise” into “Upper Low”, up to 2300/1400 pulse may be made.

Sub-Band 5/Upper Low Lake Stage. This sub-band varies seasonally between 13.9 ft. and 16.3 ft., NGVD. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above the maximum of their upper regulation schedules, then no releases

are made. These flows are secondary to the use of these canals for providing drainage and flood control for the local drainage area.

- (2) Under very dry tributary hydrologic conditions, release up to 1600/800 pulse may be made.
- (3) Under wet or normal tributary hydrologic conditions, release up to 2300/1400 pulse may be made.
- (4) Under very wet tributary hydrologic conditions, releases up to 3500 cfs to the Caloosahatchee Estuary and releases up to 2000 cfs to the St. Lucie Estuary (3500/2000) may be made.
- (5) Under “projected to rise” condition releases may reflect the release of the band the lake is projected to rise into. For lake that is “projected to rise” into “Intermediate”, releases up to 3500/2000 may be made.

Sub-Band 6/Intermediate Lake Stage. This sub-band varies seasonally between 14.3 ft., NGVD to 17.0 ft., NGVD. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above their maximum of their upper regulation schedules, then no releases are made. These flows are secondary to the use of these canals for providing drainage and flood control for the local drainage area
- (2) Under very wet tributary hydrologic conditions, releases up to 7500 cfs to the Caloosahatchee Estuary and releases up to 5000 cfs to the St. Lucie Estuary (7500/5000) may be made. When tributary hydrologic conditions are “otherwise” (not “very wet”), releases up to 3500/2000 may be made.
- (3) Under “projected to rise” condition releases may reflect the release of the band the lake is projected to rise into. For lake that is “projected to rise” into “High”, releases up to 7500/5000 may be made.

Sub-Band 7/High Lake Stage. This sub-band varies seasonally between elevation 14.75 ft., NGVD and 17.25 ft., NGVD. The conditions displayed in the Operational Guidance are described as follows:

- (1) Discharge up to maximum practicable flows to the WCAs. If stages in the WCAs are more than 0.25 ft. above their maximum of their upper regulation schedules, then no releases are made. These flows are secondary to the use of these canals for providing drainage and flood control for local drainage area

- (2) Under very wet tributary hydrologic conditions, releases up to maximum practicable to the estuaries may be made. When tributary hydrologic conditions are “otherwise” (not “very wet”), releases up to 7500/5000 may be made.
- (3) Under “projected to rise” condition releases may reflect the release of the band the lake is projected to rise into. For lake that is “projected to rise” into “High Lake Management”, releases up to maximum practicable to the estuaries may be made.

Non-typical Temporary Operations and Water Management Decisions

To assist water management decision making during NTO a “Lake Stage Envelope” and an “Operational Guideline” have been established within the Operational Band, as shown on the Regulation Schedule (Figure 7). The Lake Stage Envelope varies seasonally between 15.75 ft., NGVD at its high point, to elevation 11.75 ft., NGVD at its lowest point and is shown on Figure 7. This envelope was developed to best meet the ecological goals for the lake ecosystem. The Operational Guideline varies on a seasonal basis from 12.5 ft., NGVD to 15.5 ft., NGVD. The Lake Stage Envelope and the Operational Guideline may be used as a guide in developing NTO. While the Lake Stage Envelope provides seasonal guidance for lake levels, the Operational Guideline allows consideration of other factors including project conditions, historical lake levels, estuary conditions/needs, lake ecology conditions/needs, stormwater treatment area available capacity/needs, current weather conditions, weather forecasts, projected lake level rise/recession, and water supply conditions/needs.

The proposed NTO will utilize Part 1 and Part 3 of the Operational Guidance and consider historical lake levels, projected lake level information, as well as calculated releases to achieve the desired lake level. The calculated release value will be based on the difference between the actual daily lake level and the Operational Guideline. However, the quantity, timing, and duration of Lake Okeechobee releases to the WCAs and to tide (estuaries) will be limited by Part 1 and Part 3 of the Operational Guidance.

Undesirable/Prolonged High Lake Levels and Lake Level Fluctuations

In the event that the Lake Management Bands and Part 1 and Part 2 of the Operational Guidance are not effective at providing the desired lake level fluctuation, lowering undesirable high lake levels and/or preventing undesirable high lake levels projected to occur or anticipated to occur based upon weather forecasts and/or historical information/data, NTO may be considered for implementation. The NTO would be implemented to prevent and/or lower undesirable high lake levels. Determination of an undesirable lake level can be influenced by many issues including, but not limited to, season, watershed conditions, lake ecology conditions, projected lake levels, as well as weather, and can be determined on a daily basis, as needed. In 2003, high continuous lake levels (in excess of 13 months) resulted in a Temporary Planned Deviation to prevent additional impacts to Lake Okeechobee, reduce the loss of significant amounts of emergent and submerged vegetation, as well as reduce the potential for future high volume lake releases to the estuaries.

Upstream/Downstream Activities

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 undesirable high lake levels are projected to occur or anticipated to occur based on any combination of planned water management operations, weather forecasts, and historical information/data, NTO may be considered for implementation. The NTO would be implemented to lower the lake level in advance of planned activities and/or prevent undesirable high lake levels. Determination of an undesirable lake level can be influenced by many issues including, but not limited to, season, watershed conditions, lake ecology conditions, projected lake levels, as well as weather, and can be determined on a daily basis, as needed. An example that could result in a Non-typical Temporary Operation is 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.

Weather Conditions

In the event that weather conditions or forecasted weather conditions including but not limited to, El Nino, La Nina, and/or active hurricane season forecasts are projected to create or continue undesirable high lake levels, NTO may be considered for implementation. The NTO would be implemented to prevent and/or lower undesirable high lake levels. Determination of an undesirable lake level can be influenced by many issues including, but not limited to, season, watershed conditions, lake ecology conditions, projected lake levels, as well as weather, and can be determined on a daily basis, as needed. The 2004 wet spring (normally the dry season) and an overly active hurricane season provide conditions that could be addressed by this Non-typical Temporary Operation.

Managed Lake Recessions

In the event that there is a need to facilitate periodic managed recessions of Lake Okeechobee to benefit the lake's ecosystem, NTO may be considered for implementation. The NTO would be conducted to improve lake water clarity and to benefit the lake's submerged aquatic vegetation as well as other lake ecology reasons. In 2000, the SFWMD performed a managed recession on Lake Okeechobee for reasons similar to those mentioned above.

Low Volume Releases

In the event that the lake level is above 12.5 ft., NGVD and there are conditions that would require low volume releases, NTO may be considered for implementation. The NTO would be implemented to address conditions including, but not limited to the following: to prevent and/or to lower undesirable lake levels, to address algae blooms, to disperse saltwater, or improve other conditions related to the Congressionally authorized project purposes. The proposed NTO would provide the ability to implement a pulse release with an average daily release of up to a 1600 cfs/day and up to a 730 cfs/day from Lake Okeechobee to the Caloosahatchee Estuary and the St. Lucie Estuary, respectively. In 2004, a Temporary Deviation that enabled the ability to implement an Up to Level 1 Pulse Release (a ten-day pulse release that averaged up to 1600 cfs

to the Caloosahatchee Estuary and up to 730 cfs to the St. Lucie Estuary) benefited spawning in the estuaries by making low volume releases prior to spawning in the estuaries while eliminating releases when there was actual spawning in the estuaries.